

**Bias and Discrimination in
Intra-Household Food Allocation:
Case Study of a Rural Labour Population in Northeast Brazil**

**Thesis submitted in partial fulfilment of the requirements
for the Degree of Doctor of Philosophy**

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December 2010

Abstract

Bias and Discrimination in Intra-household Food Allocation: Case Study of a Rural Labour Population in Northeast Brazil.

My thesis examines food allocation and nutritional outcomes in a sample of 152 individuals in thirty-two households of sugarcane workers in the municipality of Gameleira, Northeast Brazil. Anthropometric data show that undernutrition and overnutrition coexist in the study population, and often within households – a consequence of the changes in diet and physical activity linked to the nutrition transition. Food allocation was examined using an indicator of the frequency of consumption of high status foods - non-staple foods which are considered more desirable than staples because they add variety and taste to an otherwise monotonous diet. I created an intra-household index of food allocation in order to observe each individual's consumption in relation to the average in his or her household at two seasonal points of the year. The sample was split into two groups, a group of more affluent households in which high status foods were eaten on the harvest and non-harvest dietary recalls, and a group of less affluent households in which no-one ate high status foods on the non-harvest recall.

I found gender biases in the allocation of food in favour of men relative to women, and girls relative to boys, in the higher income group, but no gender biases in the group of less affluent households. In relation to age, I found biases in favour of children relative to adults in less affluent households, but not during seasonal shortage in the higher income households. The biases were greater in households with higher incomes, but lower in households in which women controlled some household income relative to households in which men controlled all income. I considered whether discriminatory behaviour underpins these biases, based largely on periods of observation in a sub-sample of six households, and concluded that food distribution operates as a powerful medium for the expression of differential status among men and women, but not among boys and girls, who have equal status in this population.

Acknowledgements

I am first and foremost eternally grateful to my research participants for putting up with my numerous visits and so many apparently banal questions. They gave unselfishly of their time, patience and honesty. Without them this thesis could not exist. I hope I have done justice to their stories

Equal gratitude goes to my supervisor, Professor Barbara Harriss-White, for her invaluable substantive contributions to my thinking, her willingness to react so quickly to endless drafts, her constant support and encouragement, and her unwavering trust in my ability to complete the thesis when I myself was in doubt. She has been, and continues to be, a truly inspiring role model for me.

Then there are all those who helped me throughout the highs and lows of my fieldwork and made it such a fulfilling and rewarding experience. Among them are my knowledgeable and dedicated research assistants Geovane and Geraldo, staff at the Gameleira Health Secretariat and the Santa Maria Health Centre, Dorinha and Maria at my Ribeirão lodgings, and Sylvia in Recife.

For helping me get to grips with the technical details of nutrition and anthropometry I am extremely grateful to Professors Geoffrey Harrison and Stanley Ulijaszek, Louise Dennis, Inka Barnett, Edleide de Brito, and Micheli Dantas Soares.

I am also indebted to a number of people who helped me grasp the basics of statistical analysis. They include Emma Samman who did a meticulous job of data entry and grounded me in the basics of SPSS, Alan Sanchez who gave generously and patiently of his time and expertise, and Eli Grant who brought more sophisticated statistical procedures alive for me. I was also helped along the way by Xiaolan Fu, Francis Marriott, and Jason Oke.

I could not have undertaken my research without financial support from the following institutions: the Clarendon Fund, the Wingate Foundation, the Wenner-Gren Foundation, the Parkes Foundation, the Centres for Latin American Studies and Brazilian Studies at the University of Oxford, the George Peters Research Fund, and the Oxford Development Studies Bursary Fund.

And last but by no means least I am thankful to family and many friends who have been present throughout and provided crucial moral support through some of the difficult periods, and to my father and brother particularly for the painstaking proof-reading they undertook at short notice.

Table of Contents

List of Tables	iv
List of Figures	vi
Acronyms	vii
Abbreviations	ix
Glossary	x
Introduction	1
Chapter 1. Intra-Household Food Allocation: Evidence and Theory	
1.1 Introduction.....	6
1.2 Empirical Evidence of Bias in Intra-Household Food Allocation.....	7
1.3 Theories of Intra-Household Resource Allocation.....	13
1.4 Intra-Household Food Allocation: Research Questions and Theoretical Framework.....	16
1.5 Hypothesised Biases in the Intra-Household Allocation of High Status Foods.....	25
1.6 Definitions.....	28
1.7 Conclusion.....	32
Chapter 2. Methodological Approaches and Data Collected	
2.1 Introduction.....	33
2.2 Research Paradigm: A Pragmatist Approach.....	34
2.3 Mixed Methods Research Design.....	37
2.4 Data Collection Timeframe and Phases.....	41
2.5 Quantitative Data.....	42
2.6 Qualitative Data.....	46
2.7 The Fieldwork Process.....	52
2.8 Conclusion.....	58
Chapter 3. Sugarcane Labourers in Pernambuco: The Research Site and the Household Sample	
3.1 Introduction.....	60
3.2 The Sugarcane Sector in Brazil.....	61
3.3 The Research Site.....	65
3.4 The Gameleira Sugar Labour Market.....	67
3.5 The Household Sample.....	71
3.6 Sample Household Characteristics.....	79
3.7 The Household Sub-Sample.....	92
3.8 Conclusion.....	94

Chapter 4. The Nutrition Transition I: Diet and Health

4.1 Introduction.....	96
4.2 Diet in the Sample Population.....	97
4.3 Physical Activity in the Sample Population.....	105
4.4 Food and Nutritional Security in the Sample Population.....	107
4.5 The Epidemiological Transition in the Sample Population.....	113
4.6 Conclusion.....	116

Chapter 5. Gender Roles and Relations in the Research Site

5.1 Introduction.....	118
5.2 The Gender Division of Household Labour.....	119
5.3 The Balance of Power Within Households.....	124
5.4 Gender Control over Household Resources: Income and Spending.....	128
5.5 Gender Control over Household Resources: Food and Food-Related Activities.....	133
5.6 Gender, Food Beliefs and Intra-Household Food Allocation.....	136
5.7 Conclusion.....	142

Chapter 6. The Nutrition Transition II: Nutritional Status

6.1 Introduction.....	144
6.2 Anthropometry as an Indicator of Nutritional Status.....	145
6.3 Data Collection Methods and Procedures.....	146
6.4 Precision and Accuracy of Anthropometric Data.....	147
6.5 Anthropometric Indicators, Cut-Off Points and Reference Populations.....	150
6.6 Gender Bias in Anthropometric Assessment.....	157
6.7 Data Analysis and Logistic Regressions.....	158
6.8 Nutritional Status in the Sample Population.....	161
6.9 Nutritional Status in Northeast Brazil.....	168
6.10 The Availability of Dietary Energy in Sample Households.....	171
6.11 ‘Mixed Households’: Undernutrition and Overnutrition within Households.....	173
6.12 Conclusion.....	173

Chapter 7. Intra-Household Food Allocation: Is There Bias?

7.1 Introduction.....	176
7.2 Data Collection Methods and Procedures.....	177
7.3 Precision and Accuracy of Recall Data.....	180
7.4 Dietary Indicators.....	181
7.5 Data Analysis and Logistic Regressions.....	185
7.6 Differences in Food Allocation among Age-Gender Groups.....	187
7.7 Is There Bias in the Intra-Household Allocation of High Status Foods?.....	196
7.8 Conclusion.....	199

Chapter 8. Intra-Household Food Allocation Behaviour: Is It Discriminatory?	
8.1 Introduction.....	201
8.2 Breakdown of the Individual Status Foods Scores (ISFS) Indicator.....	202
8.3 Gender Bias and Discrimination in Group 1.....	205
8.4 Gender Bias and Discrimination in Group 2.....	224
8.5 Age Bias and Discrimination.....	230
8.6 Theoretical Framework Revisited: Using Quantitative and Qualitative Data to Model Intra-Household Food Allocation Behaviour.....	236
8.7 Intra-Household Food Allocation and Nutritional Outcomes in the Nutrition Transition.....	241
8.8 Conclusion.....	242
Chapter 9. Conclusion: Key Findings, Policy Implications and Further Research	
9.1 Key Findings.....	245
9.2 Policy Implications.....	248
9.3 Further Research.....	253
Appendices	
Appendix 1. Household Survey Topics.....	257
Appendix 2. Key Informants.....	260
Appendix 3. Mealtime Observation Schedule.....	261
Appendix 4. Adjusted Values on Household Characteristics.....	262
Appendix 5. Construction of BMI/Age Cut-off Points for Infants Under Two Years...	263
References.....	264

List of Tables

Chapter 3

Table 3.1. Hierarchy of occupations in the local sugar industry

Table 3.2. Demographic composition of the sample

Table 3.3. Distribution of households in Groups 1 and 2 by location, labour group and location-labour group

Table 3.4. Demographic characteristics of sample households

Table 3.5. Gender, labour relations, occupations and level of skill of workers in sample households

Table 3.6. Unemployment among workers in sample households during harvest and non-harvest periods, 2006-2007

Table 3.7. Mean value of assets in sample households (US\$) (August 2006)

Table 3.8. Percentage of sample households owning furniture and white and electronic goods (August 2006)

Table 3.9. Mean regular monthly per capita income (US\$) in sample households, non-harvest (August 2006) and harvest (January 2007) seasons, and seasonal differences

Table 3.10. Percentage of sample households with regular monthly per capita income below the poverty and extreme poverty lines, non-harvest (August 2006) and harvest (January 2007)

Table 3.11. Mean monthly per capita spending (US\$) in sample households, non-harvest (August 2006) and harvest (January 2007) seasons, and seasonal differences

Table 3.12. Mean monthly per capita food spending (US\$) in sample households, non-harvest (August 2006) and harvest (January 2007) seasons, and seasonal differences

Table 3.13. Distribution of sub-sample households by location, labour group, location-labour group and dietary group

Chapter 4

Table 4.1. Percentage of sample households experiencing food insecurity, season and reason, September 2005 to August 2006

Chapter 5

Table 5.1. Percentage of sample households with male, female and mixed control over household income

Chapter 6

Table 6.1. Inter-observer precision and accuracy in height and weight measures, whole sample and by location

Table 6.2. Indicators, cut-off points, and reference populations used to classify undernutrition and overweight in the sample population

Table 6.3. Prevalence of undernutrition, overweight and obesity by age-gender group in the sample population

Table 6.4. Significance of regression predictors on adult and child overweight

Table 6.5. Significance of regression predictors on adult overweight and obesity

Table 6.6. Prevalence of undernutrition, overweight and obesity by age-gender group in Groups 1 and 2

Table 6.7. Prevalence of undernutrition, overweight and obesity by age-gender group in rural Northeast Brazil, 2002/03

Table 6.8. Secular changes in undernutrition and overweight by age-gender group in Northeast Brazil, 1974/75 to 2002/03

Chapter 7

Table 7.1. Categories and individual foods included in the Individual Status Foods Score (ISFS) indicator

Table 7.2. Mean daily Individual Status Foods Scores (ISFS), pooled, harvest, and non-harvest seasons, and seasonal differences by age-gender group in Group 1

Table 7.3. Percentage of individuals with Relative Individual Status Foods Score (RISFS) below one, pooled, harvest, and non-harvest seasons, and seasonal differences by age-gender group in Group 1

Table 7.4. Significance of regression predictors on pooled Relative Individual Status Foods Score (RISFS), Group 1

Table 7.5. Significance of regression predictors on non-harvest Relative Individual Status Foods Score (RISFS), Group 1

Table 7.6. Mean Individual Status Foods Scores (ISFS) at harvest by age-gender group in Groups 1 and 2

Table 7.7. Percentage of individuals with Relative Individual Status Foods Score (RISFS) below one, harvest, by age-gender group in Groups 1 and 2, and age group and gender in Group 2.

Chapter 8

Table 8.1. Mean daily frequency of consumption of high status food groups by age-gender group, Group 1 pooled, harvest and non-harvest seasons

Table 8.2. Mean daily frequency of consumption of high status food groups and rank by age-gender group, Group 2 harvest seasons

Table 8.3. Percentage of individuals with pooled Relative Individual Status Foods score (RISFS) below one in households with male and female income control by age-gender group in Group 1

Table 8.4. Percentage of individuals with Relative Individual Status Foods score (RISFS) equal to one by age-gender group in Groups 1 and 2

Table 8.5. Percentage of individuals with harvest Relative Individual Status Foods score (RISFS) below one in households with male and female income control by age-gender group in Group 2

Appendix

Table A.1. Values on household demographics and economics after adjusting for outliers in Groups 1 and 2

Table A.2. Cole et al reference population BMI/age at two years, and equivalent WHO (2006) Z-scores for BMIs of 16, 17, 18.5, 25 and 30 at eighteen years, boys and girls

List of Figures

Chapter 1

Figure 1.1. Theoretical framework for intra-household food allocation

Chapter 2

Figure 2.1. The pragmatist approach used for research design

Figure 2.2. Mixed methods research design: ‘triangulation convergence approach’

Figure 2.3. Data collection timeframe and phases

Acronyms

ACC/SCN	Administrative Committee on Coordination/Subcommittee on Nutrition (United Nations)
BFIS	Brazilian Food Insecurity Scale
CDC	Centre for Disease Control and Prevention
CNPQ	Conselho Nacional de Desenvolvimento Científico e Tecnológico (National Council for Scientific and Technological Development)
CONAB	Companhia Nacional de Abastecimento (National Supply Company)
ENDEF	Estudo Nacional de Despesa Familiar (National Survey of Household Expenditure)
EU	European Union
FAO	Food and Agriculture Organisation
FETAPE	Federação dos Trabalhadores na Agricultura do Estado de Pernambuco (Pernambuco Federation of Agricultural Workers)
FGV	Fundação Getúlio Vargas (Getúlio Vargas Foundation)
HDI	Human Development Index
HES	Health Examination Survey
IFPRI	International Food Policy Research Institute
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
IMIP	Instituto Materno Infantil de Pernambuco (Pernambuco Mother Child Institute)
IOTF	International Obesity Task Force
LSHTM	London School of Hygiene and Tropical Medicine
MDS	Ministério do Desenvolvimento Social (Ministry of Social Development)
MS	Ministério da Saúde (Ministry of Health)
NCHS	National Centre for Health Statistics
NHANES	National Health and Nutrition Examination Survey
OPSAN	Observatório de Políticas de Segurança Alimentar e Nutrição (Observatory of Food and Nutrition Security Policies)
PAHO	Pan-American Health Organisation
PETI	Programa de Erradicação do Trabalho Infantil (Child Labour Erradication Programme)
PNAD	Pesquisa Nacional por Amostra de Domicílios (National Household Sample Survey)
PNAN	Política Nacional de Alimentação e Nutrição (National Food and Nutrition Policy)
PNDS	Pesquisa Nacional sobre Demografia e Saúde (National Demographic and Health Survey)
PNSN	Pesquisa Nacional sobre Saúde e Nutrição (National Health and Nutrition Survey)
POF	Pesquisa de Orçamentos Familiares (Household Budgets Survey)
PPV	Pesquisa de Padrão de Vida (Living Standards Survey)

PSF	Programa de Saúde Familiar (Family Health Programme)
SPSS	Statistical Package for the Social Sciences
UFPE	Universidade Federal de Pernambuco (Federal University of Pernambuco)
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNICAMP	Universidade Estadual de Campinas (Campinas State University)
US	United States
USDA	United States Department of Agriculture
USP	Universidade de São Paulo (University of São Paulo)
WHO	World Health Organization

Abbreviations

BMI	body mass index
CC	Caneto contract workers group
CI	confidence interval
cm	centimetres
CP	Caneto permanent workers group
DRI	Daily Recommended Intake
GDP	Gross Domestic Product
g	gram
HR	human resources
HSFS	Household Status Foods Score
IQR	inter-quartile range
ISFS	Individual Status Foods Score
kg/ha	kilograms/hectare
mm	millimetres
OR	odds ratio
Pc	per capita
RISFS	Relative Individual Status Foods Score
SD	standard deviation
SE	standard error
Sign.(p)	significance (p-value)
SN	Santana group
VIF	variance inflation factor

Glossary

<i>Acerola</i>	A tropical fruit high in Vitamin C
<i>Azeitona</i>	Olive; a small black fruit with a stone, local to the region, which highly resembles a black olive and is therefore referred to by the Portuguese word for an olive
<i>Besteira</i>	Junk food
<i>Bico</i>	An ‘odd job’; informal employment
<i>Biscoitos recheados</i>	Cream-filled biscuits such as ‘Orio’
<i>Bóia</i>	The ‘food-for-work’ system operated on some sugar plantations, with payment in credit instead of cash, to be redeemed on food in the landowner’s store
<i>Bolsa Família</i>	Child benefit paid to households with a monthly per capita income less than or equal to US\$55
<i>Cajá</i>	A fruit native to Northeast Brazil
<i>Cajú</i>	Cashew fruit
<i>Calabreza</i>	Sausage widely available throughout Brazil
<i>Carambola</i>	Star-fruit
<i>Clandestino</i>	Off-plantation labourer hired informally on a daily or weekly basis
<i>Cuscuz</i>	Cornmeal steamed to make a light ‘cake’
<i>Diária</i>	A pre-determined area of cane to be cut per day for the worker to receive the minimum wage
<i>Engenho</i>	A large sugarcane plantation shaped during the former slave economy
<i>Enxoval</i>	‘Bottom drawer’; a collection of household goods which some girls collect before marriage
<i>Fastio</i>	Loss of appetite, anorexia
<i>Fiado</i>	An informal credit arrangement with local shopkeepers
<i>Fichado velho</i>	The term given to a cane worker with a permanent job
<i>Fubá</i>	Coarse cornmeal
<i>Guaraná</i>	A small berry native to the Amazon; a popular guaraná-flavoured carbonated drink
<i>Jaca</i>	Durian fruit
<i>Mortadela</i>	A large pork sausage of Italian origin
<i>Pitomba</i>	Rose apple
<i>Pousada</i>	A small hotel or hostel
<i>Pudim</i>	A milk-based dessert
<i>Quarenta</i>	Cornmeal cooked with water to make a thick porridge
<i>Real/reais</i>	The Brazilian currency
<i>Safrista</i>	A worker contracted for the harvest season
<i>Salgadinho</i>	Small, savoury snack foods sold on street stalls
<i>Salsicha</i>	Hot dog sausage
<i>Vitaminado</i>	Contains vitamins
<i>Zona da Mata</i>	‘Forest Zone’, the name of the sugarcane growing region along the Northeast coast of Brazil previously covered in Atlantic Rainforest

Introduction

“[My] objective is to analyse the phenomenon of collective hunger.....not the starvation found in areas of extreme poverty, but the more common and more serious phenomenon of partial hunger, so-called hidden hunger, in which, due to the permanent lack of certain nutritional elements, whole population groups slowly die of hunger even though they eat every day” (Castro, 1946:18).

So wrote Josué de Castro, one of the most famous Brazilian medical doctors, of the hunger he encountered in extensive travels through impoverished areas of Brazil, in his preface to the first edition of ‘The Geography of Hunger’ in 1946. His description is as valid now as it was then among rural labouring populations of Northeast Brazil.

I chose to study the intra-household allocation of food for two reasons. First, there is a body of research which clearly demonstrates the need to take household processes and dynamics into account for development policies and programmes to reach all social groups and improve individual welfare (Haddad et al, 1997). Second, I was intrigued by a phenomenon that was just being explicitly and widely recognised at the beginning of the twenty-first century: that there are as many overfed as underfed individuals in the world, most of them located in developing countries (Gardner and Halweil, 2000). I wanted to understand how undernutrition and overnutrition could co-exist within communities and even households (Doak et al, 2005), and to explore whether the intra-household allocation of food contributed to the divergence of nutritional outcomes.

I explore the living and working conditions in households of landless rural labourers located in a sugar-producing region of the southern *Zona da Mata*, in the state of Pernambuco. Most rural labouring households in the region are dependent on the sugar labour market for employment, and subject to seasonal downturns in employment and incomes in the growing season. Incomes are low throughout the year, and most individuals consume a monotonous diet of inferior quality, deficient in essential nutrients. Some face chronic, if intermittent, hunger, particularly during seasonal shortages. Recent changes in dietary habits and patterns of physical activity for some have created

conditions characteristic of the so-called ‘nutrition transition’, with sharp rises in overweight, and undernourished and overnourished individuals living in the same households.

I approached the topic from a practitioner’s perspective, having worked in a development organisation in Brazil. This shaped the nature of the study in two ways. First, I developed an inter-disciplinary framework with the potential to reflect the complex realities of any given context, including the interaction of social and biological factors underlying nutritional outcomes. In so doing, I recognised food as a material resource, primordial to human survival and health, well-being and functionality, and as a symbolic entity constitutive and expressive of identity and social relations, status and power. Second, I used a mixed methods approach to bring different kinds of quantitative and qualitative evidence to bear on the same problem, forms of evidence which work together to tell a more complete story than could either one in isolation. The result is an account which is intended to be both accessible and credible to researchers from different disciplinary perspectives and practices.

My aim was to produce a rich empirical account of the processes and outcomes of the allocation of food, in this case high status foods, within households in a nutrition transition setting. My literature search indicated that this is the first quantified study of food allocation to be undertaken in Brazil, and the first in any nutrition transition setting. It is not my intention to generalise quantitative findings beyond households with characteristics similar to those in the sample households in the research site, but the detail with which contextual conditions are described allows others to consider the implications of this study in other settings.

I also aimed to indicate some theoretical propositions which hold in this context, and may contribute more broadly to the existing body of theory in intra-household food allocation, by examining allocation behaviour and outcomes, and asking whether behaviour can be characterised as discriminatory. I did so by separating the concepts of bias and

discrimination, thereby recognising that biases in food allocation can occur due to factors other than discriminatory behaviour.

I lived and worked in Brazil for eight years before embarking on this doctoral project. My understanding of Brazilian culture and my fluency in the Portuguese language positioned me particularly well to undertake this research and perceive insights which may not have been apparent to other non-native (or native) researchers.

The thesis is organised as follows. Chapter 1 reviews the existing literature on intra-household food allocation, including empirical evidence of gender and age biases in different contexts, and theoretical constructs that have been used to examine intra-household resource and food allocation. I present my research questions and theoretical framework and explain my reasons for examining the allocation of high status foods (which I define) in a nutrition transition context. I then lay out my hypotheses with regard to the existence and nature of age and gender biases in the allocation of high status foods in the research context. In the final section I present my definitions of core concepts, including difference, bias and discrimination.

Chapter 2 focuses on research methodology and data collection. It outlines my adoption of a pragmatist approach to research design, and my reasons for using mixed methods to collect and integrate quantitative survey data with qualitative ethnographic data. It presents the timeframe and phases of my fieldwork, and some of the challenges I faced during fieldwork, including ethical issues, and my approaches to building trust and rapport with women in the households I visited.

In Chapter 3 I present an overview of living and working conditions in the research site, and then describe my sampling design and strategy, the size and composition of the household sample and sub-sample, and the scope for generalisation from sample statistics to the underlying population. I discuss the split in the sample into two groups for dietary analyses, and present survey data on sample household demographic and economic characteristics, including seasonal variations in employment, incomes and spending.

Chapter 4 introduces the concept of the nutrition transition, and discusses information on diet and physical activity in the sample population in the context of the changes of the nutrition transition in Brazil. It explores the interaction of a poor quality, energy-dense diet with intermittent food shortages for some which, in combination with poor environmental health, create the conditions for the co-existence of micro-nutrient deficiencies and infectious and chronic diseases.

In Chapter 5 I examine gender roles and relations and the manifestations of patriarchy and gender discrimination within and beyond households, and the ways in which these shape intra-household relations and processes, resource control and allocation, and individual outcomes. Specifically, I use qualitative data to explore the gender division of household labour, the balance of power within households, and gendered control over household income, food and food-related activities. The last section examines the food beliefs which shape the intra-household allocation of food among adults and children by gender.

Chapter 6 picks up the story of the nutrition transition in the sample population, using anthropometric data collected in the early stages of the survey to expose the impact of changes in diet and physical activity on nutritional outcomes: sharp rises in overweight among adults, while a high proportion of children remain stunted, and the emergence of ‘mixed households’, with under- and overnourished individuals living side-by-side. The data leave no doubt that the nutrition transition has ‘arrived’ in this population.

In Chapter 7 I look at the intra-household allocation of high status foods and consider my first research question: are there gender and/or age biases in intra-household food allocation in the research context? The focus is on allocation outcomes in four age-gender groups – men, women, boys and girls - based on quantitative data collected in three 24-hour recalls of dietary intake. I use two indicators to examine the frequency of consumption of high status foods. One expresses consumption by age-gender group across the sample. The other represents each individual’s consumption in relation to the

average in his or her household. In the last section I define two criteria for the operationalisation of bias and ask whether the differences observed among age-gender groups across and within households can be characterised as bias.

Finally, Chapter 8 looks at the nature of the household behaviour underlying food allocation outcomes, and the macro-level factors which underpin household behaviour, and addresses my second research question: can intra-household food allocation behaviour in the research context be characterised as discriminatory? I revisit my theoretical framework, considering, in particular, whether the facets of collective household modelling incorporated in the framework help to understand household behaviour in this context. Finally, I consider the implications of food allocation processes and outcomes in the nutrition transition.

In my Conclusion I review my key findings, discuss the implications of my findings for policy, and suggest avenues of further research.

Chapter 1. Intra-Household Food Allocation: Evidence and Theory

1.1 Introduction

“Family life is a shifting and somewhat unpredictable mixture of selfishness and altruism.” (Folbre, 1994:23).

“....the family-based household....is...accurately described as an arena of joint and competing interests.” (Whitehead and Kabeer, 2001:23).

“Households are the locus of expression of cultural values relating to food.” (Gittelsohn and Vastine, 2003:4038S).

Broadly speaking, researchers working on intra-household food allocation have approached the subject in three ways: first, location-specific studies with empirical evidence from primary case studies or secondary analysis of surveys; second, reviews of empirical evidence over time and space; and third, contributions to theory-building. In this brief introduction to the literature I survey the empirical findings presented in the most significant reviews of intra-household food allocation studies and explore theoretical constructs of intra-household resource allocation, and their application to the intra-household allocation of food, with attention to the dynamics within households characterised by the quotes above.

My review focuses on empirical evidence of gender and age biases, since these are the focus of my thesis. It discusses bias and discrimination in resource and food allocation as they are manifest in developing country patriarchal settings, where patriarchy is understood as a system in which adult males have authority over women and children (Oxford English Dictionary, 2002:1046). Few studies explicitly define the use of the terms ‘bias’ and ‘discrimination’. Bias is generally used to indicate unequal or inequitable access to food in the household, usually, but not always, in relation to biological need; discrimination is usually assumed to operate where biases exist. I review the evidence without questioning these definitions, and present my own definitions at the end of the chapter.

The following section contains an overview of evidence of gender and age biases in the literature. In Section 1.3 I review the principal theories of intra-household resource allocation relevant to intra-household food allocation, in Section 1.4 I present my research questions and the theoretical framework which I developed to understand intra-household food allocation in my research site, and in Section 1.5 I present my hypotheses about gender and age biases in the research context. In Section 1.6 I specify my own use of terms, including ‘bias’ and ‘discrimination’.

1.2 Empirical Evidence of Bias in Intra-Household Food Allocation

Of the large body of empirical work on intra-household resource allocation, only a small part focuses specifically on the allocation of food (Rahman and Bouis, 2009:3). Of the studies which address intra-household food allocation, only a relatively small number can be characterised as truly intra-household, meaning they examine the dietary intake of *all* household members, disaggregate data *by gender and age group*, and undertake *intra-household* analyses – examining within-household, rather than cross-sample, differences among age and gender groups (Wheeler, 1988:3; Harriss, 1990:248; Ulijaszek and Strickland, 1993:108).

Early studies of intra-household food allocation date back to the 1950s (see studies cited in Hartog, 1973; Schofield, 1975; Van Esterik, 1985), but extensive data collection began in the 1970s, and continued throughout the 1990s; less data has been published since 2000. There is distinct geographical patterning to the empirical literature, with the largest number of studies focused on Asia (especially the South – the region which gave rise to the study of intra-household food allocation as a possible explanation for gender differences in mortality (Basu, 1989)), fewer from Africa (usually sub-Saharan Africa), and fewer still from Latin America. My literature search found no quantitative studies of intra-household food allocation in Brazil; this was confirmed by prominent Brazilian researchers¹ (see also Shrimpton, 1986 in Tonial, 2001:99). The bulk of the empirical

¹ Among them, nutritionists (Batista Filho, Osorio, Assis), and an economist (Campino) (all 2003); also a British nutritionist with long-term research interests in Brazil (Ashworth-Hill, 2003). A study of intra-household food allocation among rural labourers in the Northeast by nutritionists, using the food weighing method, was underway at the time of writing (CNPQ, 2009).

work examines intra-household food allocation in developing country conditions of under-nutrition. My search suggests that no intra-household food allocation studies have, to-date, been undertaken among populations characterised by over- rather than under-nutrition, or among populations characterised by the co-existence of under- *and* over-nutrition found in so-called ‘nutrition transition’ contexts. This may be because one of the original imperatives – the search for an explanation for the higher incidence of undernutrition among women and children (Senaur et al, 1988) - has largely disappeared in these contexts.

1.2.1 Evidence of Gender and Age Biases in Intra-Household Food Allocation

Much of the empirical work explores two commonly-held beliefs about access to food within households derived principally from early studies in South Asia, the geographical area held to be most uniformly patriarchal (Kandiyoti, 1988; Ueyama, 2007): (1) that males are privileged over females (see Wheeler, 1988; Sommerfelt and Arnold, 1998; DeRose et al, 2000), and (2) that adults are privileged over children (Hartog, 1973; Sen 1984b; Wheeler, 1988; Senaur, 1990). The principal beneficiaries of these patterns are posited to be men, who receive ‘the lion’s share’ of household food supply (Wheeler, 1988), and then boys, who have preferential food access over girls and possibly women. Both biases are believed by many to be sufficient in quantitative terms to contribute to nutritional and health inequalities as well as to subjectively-experienced discrimination (see Sen, 1984a for South Asia).

But empirical findings about the existence, nature and magnitude of gender and age biases are far from conclusive, and reveal a bewildering level of complexity, even within specific continents, regions, countries, and social classes (Haddad et al, 1996). Several decades of data-mining and theoretical debate have failed to produce meaningful generalisations or conclusions².

² As Haddad et al (1996:37) point out, there may be much more evidence against the existence of bias than we are aware of, because it is less likely to be published than evidence which indicates biases.

Most reviews have indicated little or no systematic gender bias in caloric adequacy (i.e. after adjusting intake for body weight and energy expenditure) (Haaga and Mason, 1987; Wheeler, 1988:6; Nieves and Engle, 1989:747; Wheeler, 1991:77; Messer, 1997; DeRose et al, 2000; Webb, 2002:14; Ueyama, 2007); even in South Asia, the evidence is uneven (Harriss, 1990; Haddad et al, 1996; Miller, 1997). Pregnant and lactating women may be the exception, with caloric shortfalls common (DeRose et al, 2000:518). On the other hand, many reviews strongly suggest anti-female bias in micro-nutrient adequacy due to higher female requirements for some nutrients, in combination with reportedly widespread pro-male bias in access to more-costly ‘choice’ or ‘high status’ foods like meat, milk and fruits (Hartog, 1973; Wheeler, 1988:10; Messer, 1997; Webb, 2002:13³; Rahman and Bouis, 2009). It seems that these patterns apply to children as much as to adults, although gender-disaggregated data among children are scarce (Wheeler, 1991; DeRose, et al, 2000).

Exploration of age bias is more scant and the evidence even less conclusive. It is more difficult to assess than gender bias due to the very different needs of adults and children and the difficulties of measuring what Van Esterik (1985) terms the frequently ‘unstructured feeding’ of children, via non-meal intake. Some reviews indicate anti-child bias in energy and protein intake as an explanation for child malnutrition, morbidity and mortality amidst relatively well-nourished adults, for instance in circumstances in which productive adults or elders are given priority in terms of caloric adequacy and some ‘choice’ foods (den Hartog, 1973:9; Wheeler, 1988:6; Harrison, 1988; Wheeler, 1991:78; Ulijaszek and Strickland, 1993:108; Messer, 1997:1676); some indicate preferential treatment of children, especially pre-schoolers, particularly when non-meal food intake is taken into account (Haaga and Mason, 1987:152; Nieves and Engle, 1989:747; Messer, 1997:1679).

Evidence that intra-household food allocation changes in response to food shortage, including seasonal stress, with particular age-gender groups bearing the brunt of shortage,

³ Webb’s (2002) review also indicates some conditions under which micro-nutrient deficiencies are higher among males than females.

is also inconclusive. Some studies indicate that children's diets are most negatively affected when food is short (see, for example, the studies cited in Leonard (1991)); some suggest that this is because food resources are channeled towards the most productive individuals (Wheeler, 1988). Leonard (1991) found that children's intakes were protected during seasonal food security, but again suggested that the rationale was economic; children were often the ones undertaking essential productive tasks during seasonal shortages. Other studies have shown that children are protected during seasonal shortage even if they are not productive (Graham, 1997 (Peru); Panter-Brick, 1993 (Nepal)); Abdullah and Wheeler (1985) found that men, not unproductive individuals, absorbed seasonal shortages, and that girls who were usually at a disadvantage got a larger share of household food during seasonal reductions in intake in Bangladesh. Harriss (1990) concluded, on the other hand, that seasonality and scarcity were not major determinants of allocation behaviour in her review of data from six Indian villages. Similarly, there is some debate, and little hard evidence to clarify, whether or not children fare better than adults in especially low-income populations and households. It is likely that adaptive responses vary by context and even by household, depending on subsistence patterns, level of household per capita income, the age and gender division of labour, and household structure (Leonard and Thomas, 1989; Panter-Brick, 1993).

Studies that infer intra-household food allocation patterns by indirect methods – by modeling household economies, expenditures and elasticities (Deaton, 1997; Haddad et al, 1996; Rahman, 2002), or by examining the distribution of nutritional status or micro-nutrient adequacy across age-gender groups or within households (Sommerfelt and Arnold, 1998; Marcoux, 2002; Webb, 2002) – have been no more successful at generating consistent evidence in relation to the findings of intra-household food allocation studies, even when undertaken in the same population (see Norgan et al, 1974; Cunha et al, 2010). This should come as no surprise, since each method measures a different phenomenon: economic models reveal the impact of exogenous and endogenous factors on economic behaviour in the household; intra-household food allocation indicates individuals' access to food; nutritional and micro-nutrient status reflect access to health and other forms of care, as well as to food (UNICEF, 1998:24).

1.2.2 Why is the Evidence so Inconclusive?

A number of factors may explain the inconclusive nature of global inquiry. Patterns of intra-household food allocation have proved to be highly context-specific, determined by complex configurations and interactions of social, economic, demographic, cultural and ecological characteristics, at the societal, household and individual levels, in any given geographic and temporal context. There is a “dizzying amount of local diversity” as one researcher has put it (Miller, 1997:1693); she and Harriss-White (1997) have both highlighted the diversity of findings *within* South Asia. Additionally, intra-household food allocation may be temporally-specific; the dynamics and incentives underlying household behaviour may alter in response to external changes like shifts in the labour market (Sridhar, 2005) and the increase in pre-natal gender detection (Miller, 1997), and to internal changes in household size, composition and income (Ueyama, 2007), or shifts from the production of food to cash crops (Haaga and Mason, 1987).

A number of issues related to methods of data collection and analysis may also have a lot to do with the lack of conclusive evidence. The first is the paucity of intra-household studies, and the small sample sizes of those which exist, largely due to the methodological complexities and the high resource costs of involving all household members, over a long enough period of time, and in a sufficient number of households, to generate reliable and representative data (Wheeler, 1988; Ulijaszek and Strickland, 1993). The shortage of empirical data makes it difficult to identify area- or population-specific patterns.

The second is a pervasive lack of uniformity in the use of language and concepts like bias, discrimination, equality, equity, fairness and justice as they pertain to intra-household resource allocation (Van Esterik, 1985; Farmer and Tiefenthaler, 1995). The way in which these terms are used naturally defines how evidence is interpreted and reported. The effect of such inconsistencies is to hamper collective understanding of both the outcomes and the processes of intra-household food allocation.

The third is the high sensitivity of findings to research design, particularly to the kinds of data used, and the methods used to collect and analyse the data. Analysis of large-scale, quantitative survey data on dietary intakes and anthropometric outcomes has more often than not indicated no bias, or sometimes anti-male bias (see for example, Sommerfelt and Arnold, 1998; Marcoux, 2002), while case studies which use ethnographic observation (sometimes in combination with small-scale quantitative data collection) have more frequently uncovered anti-female, and sometimes anti-child, biases (for example, Messer, 1997; Miller, 1997), generating a kind of ‘numbers/narrative’ dichotomy (Rahman and Bouis, 2009:3). Perhaps all the more disconcerting is the observation that different approaches to data analysis *using the same data-set* can generate different conclusions as to the existence and magnitude of biases (Harriss-White, 1997).

The considerable perplexity surrounding the issue largely (but not wholly) reflects disciplinary perspectives; demographers, nutritionists and economists are more likely to undertake or review large-scale quantitative surveys; anthropologists are wont to conduct qualitative case studies. Underpinning these different approaches are questions of theoretical perspective regarding the assessment of well-being, whether by the assessment of physical factors like individual food intake, nutritional status and functional capacity, or the observation of individual rights and the satisfaction of individual tastes and preferences; and epistemology – what constitutes valid knowledge, so-called ‘scientific’ survey data which is subject to errors of definition, measurement and analysis, or ethnographic work which reflects the personal lens and biases of the researcher. To a large extent, discipline also dictates the use of language and concepts, some of which are poorly-understood outside disciplinary boundaries. Little progress has been made in the development of inter-disciplinary approaches which could bridge the worldviews and underlying assumptions of different academic disciplines in a field which, at the interface of the social and physical sciences, requires multi-faceted knowledge and inquiry.

The fourth stems from problems of data analysis in nutritional science which confound evidence of age and gender bias. Nutritional requirements and anthropometric references,

both delineated by age and gender, are not the objective and universal yardsticks which they are frequently represented to be; rather, they are defined by subjective judgements and politicised processes, and fraught with technical difficulties of measurement and interpretation (Sen, 1984a:351; Harriss-White, 1997:195). As such, they may carry a degree of bias by gender (expectations of female passivity, or downward-estimation of female requirements due to adaptation to prolonged underfeeding (Harriss, 1990; Messer, 1997; DeRose et al, 2000), and/or by age (anthropometric standards generated from overfed Western children, suggesting higher child deficiencies, relative to adults, than is the case (Wheeler, 1988:7)). Such biases interact with data from specific populations in different ways. The issue is further complicated by the use of different sets of requirements and standards in different studies; Moestue (2008) has shown how different conclusions about gender bias in child growth are reached in the same population using different international standards and different methods of analysis.

Perhaps the biggest frustration at the lack of consistent findings is the thwarted desire of researchers to impose order, to uncover uniform rules or patterns – to generate theory - at least within certain grouping principles (region, social class, etc.), and at certain points in time. The failure to identify consistent patterns may in turn bolster unexamined early beliefs, largely inferred from non-dietary data, that under virtually all conditions women and children's nutritional needs are sacrificed to the greater demands of men.

1.3 Theories of Intra-Household Resource Allocation

With few exceptions (notably Chayanov, 1926, and Samuelson, 1956, both in Haddad et al, 1997:3, 5), there was very little academic interest in what happens inside households until the 1970s. Anthropologists were more interested in the study of kinship and lineage within households, and economists were satisfied with the assumptions of neoclassical economic theory (with households purported to act like individuals), or, at best, those of Beckerian-style New Home Economics (households with joint utility functions pursued by benevolent decision-makers acting in the interest of collective efficiency and well-being) (Becker, 1981)) (Messer, 1983; Bentley and Pelto, 1991; Vermeulen, 2002; Jackson, 2005). It was evidence of inequalities which appeared to have their origin in

households – the presence of undernourished individuals, especially women and children, in households with adequate food supply (Haddad, 1994; DeRose and Millman, 1998), and gendered differentials in undernutrition, morbidity and mortality in Southeast Asia (Sen and Sengupta, 1983; Sen, 1990; Miller, 1997) - that pushed researchers to peer inside the ‘black box’ of the household and understand the intra-household processes behind allocative outcomes (Messer, 1983; Sen, 1984b; Piwoz and Viteri, 1985).

Considerable theoretical work since the 1970s has advanced our understanding of intra-household processes as they affect resource allocation and individual consumption of ‘goods’ like cash, healthcare, educational opportunities, adult goods (alcohol, tobacco and leisure activities), food and nutrients⁴. Various iterations of so-called ‘collective household models’ have embodied recognition of the existence of different interests and preferences within households, non-pooling of income and resources, and the importance of the identity of those in control of income and resources (Carter and Katz, 1997; Chiappori, 1997; Lundberg and Pollack, 1997; McElroy, 1997; see Iversen (2003) and Xu (2007) for recent reviews); some of these point to evidence of different outcomes when men or women control household income. Many studies have explored the dynamic nature of intra-household processes, including formal and informal decision-making, and cooperative, uncooperative, and conflictive bargaining processes, as well as the threat or use of violence; some have highlighted the inequalities in intra-household power underlying these processes (Sen, 1990; Agarwal, 1997; Kabeer, 1998; Quisumbing and Maluccio, 2000; Whitehead and Kabeer, 2001; Bloch and Rao, 2002; Brown, 2009).

Researchers have also discussed the underlying determinants of intra-household power differentials, recognising the pervasive role of socially-constructed, context-specific economic, social, cultural and legal norms and institutions in shaping intra-household relations, bargaining and decision-making power, and control over household resources. Among these are public policies, market structures, religion, gender ideology, the media,

⁴ Important landmarks in this evolution are: Young et al, 1981; Food and Nutrition Bulletin 1983 (Khare and Pinstrup-Andersen, 1983); Rogers and Schlossman, 1990; an IFPRI-World Bank Conference in 1992 and resulting publications (IFPRI, 1992; Haddad et al, 1997); and the IFPRI ‘intra-household’ research programme 1995-2000 and publications (Quisumbing, 2003; Quisumbing and McClafferty, 2006).

and the norms regulating marriage⁵ and divorce, all of which are frequently co-opted to support and preserve structural inequalities and maintain low aspirations among the subordinate⁶. Much attention has been paid to the role of each party's 'fallback position' in determining their bargaining power, the position that each would be in if the marriage were to collapse, shaped by such factors as assets brought to the marriage, access to labour markets and/or productive resources, income, and divorce laws and norms (Sen, 1990; Folbre, 1994; Haddad et al, 1996; McElroy, 1997; Quisumbing and Maluccio, 2000).

In patriarchal societies, these forces are deemed to work to the disadvantage of women and children, for example by facilitating male dominance in wage labour outside the household and placing higher value on wage labour than on female domestic and 'reproductive' work; by limiting female ownership of property and other productive resources; by rendering women materially dependent on male family members; by diminishing the financial and other responsibilities of absent fathers to their children; and by sanctioning domestic violence as a strategy of male dominance (Harris, 1981; Kabeer, 1988; Sen, 1990; Moore, 1992; Folbre, 1994; Wheeler, 1991; Folbre, 1997; Smith et al, 2003). For this reason, together with the fact that most households are constructed on unions between men and women, the nature and determinants of gender relations are of supreme importance in the study of intra-household resource allocation.

Some researchers recognise the effects of parallel processes of resistance and contestation of structural forces - overt or covert manifestations of female agency - on intra-household relations and processes. Some highlight the potential for altruism in intra-household resource allocation, where acts of love, care and reciprocity are as commonplace as those of self-interest, conflict and oppression (Folbre, 1986; Kabeer, 1998). They warn against the over-simplification of extremely complex relationships inherent in the essentialisation of women as necessarily weaker than men, regardless of location, class, ethnicity,

⁵ I use the term 'marriage' to indicate unions, in this case between men and women, whether or not they are formalized as legal marriages, and regardless of their stability or duration.

⁶ These have been variously conceptualized as "socially-generated asymmetries" (Sen, 1990); "structures of constraint" (Folbre, 1994); "extra-household environmental parameters" (McElroy, 1997); "background effects of the cultural frame" (Ridgeway, 2009).

religion, marital status, household role, age and so on (Harriss, 1990:233; Kandiyoti, 1998).

1.4 Intra-Household Food Allocation: Research Questions and Theoretical Framework

My thesis explores two research questions: (1) are there gender and/or age biases in intra-household food allocation in the research context?; (2) can intra-household food allocation behaviour in the research context be characterised as discriminatory?

I focus on the intra-household allocation of high status foods, non-staple foods considered more desirable than staples because they provide a greater variety of pleasing aspects like taste, texture, appearance, and aroma not contained in monotonous diets and lower status foods (Bouis, 1996:248; Rahman, 2002:10). High status foods are variously referred to in the literature as high status, prestige, preferred, choice, desirable, socially-valued, and luxury foods (see for example, Gittelsohn, 1991; Bouis and Peña, 1997; Peña, 1998; Rahman, 2002; Sudo et al, 2006; Newkirk et al, 2009).

Recent research suggests that differentiation is more likely to occur in the intra-household distribution of high status foods than of all foods, once all household members' hunger has been satiated with relatively cheaper staple foods, in all but the most severely energy-constrained households (Bouis and Peña, 1997:181; Luo et al, 2001; Rahman and Bouis, 2009). I classified foods as high status at the end of my fieldwork on the basis of my observations during data collection. The foods classified as high status in the research site were: fresh meat and fish (usually consumed at mealtimes); and fresh dairy products, non-local fruits grown in temperate climates, and sweet foods bought in shops rather than made at home (mainly cream biscuits) (usually consumed as between-meal snacks). Full details of the individual foods in each group, and how foods were classified, are presented in Chapter 7.

I address the research questions through the lens of an inter-disciplinary theoretical framework (Figure 1.1). The framework integrates elements from existing knowledge in

each of several disciplines: from micro-economics it draws on economic household models to understand the control and distribution of household resources; from anthropology it draws on the critical assessment of social hierarchies and relations of power as they play out in a specific context and are reflected in, among other things, the selection and distribution of food; from nutrition science it draws on current knowledge of social and biological factors, including differences by age and gender, which affect nutrition and health within households.

Laid out as is, the framework appears static, reductionist and deterministic, suggesting that the processes underlying intra-household food allocation can be summarised by the depiction of causal pathways working in a single direction. Reality is wont to be much more complex. The value of the framework lies in the clarity that comes of the visualisation of the possible relationships among biological and social factors which interact to shape the outcomes of intra-household food allocation in any given context, and any given household within a single context. It acknowledges the systemic interaction of individual and collective factors, and explores the complex interplay of cultural, material and functional determinants of intra-household food distribution at multiple levels – extra-household, intra-household and individual. And it allows for the exploration of two related questions: who has the power to control and allocate household resources, including food?, and who benefits from the intra-household distribution of high status foods?.

The framework was initially developed during the pilot phase of fieldwork, on the basis of my literature review and initial observations in the research context. It was modified and refined over time as my ideas about the intra-household allocation of food developed, culminating in a model which captures the complexity of the intra-household processes which shape food allocation in this setting, and can be applied and tested in other settings in which households are almost completely dependent on wage labour and produce very little food for home consumption. I use it to examine the intra-household allocation of high status foods, but it can be just as useful to explore the allocation of all foods, or of energy or particular nutrients. It was used to guide the research process, to derive

hypotheses relative to age and gender biases in the intra-household allocation of high status foods, to define independent variables for testing in regression analyses, to develop themes for the collection of qualitative data, and then to understand and explain my findings.

1.4.1 Who Has the Power to Control and Allocate Household Resources?

At the heart of the framework are the intra-household relations and processes which underlie resource control and allocation in the so-called ‘black box’ of the household—behaviour which happens behind closed doors, underpinned, in the case of food allocation, by implicit, largely unspoken, and possibly unrecognised, norms, rules and rationales rather than any formal decision-making process (Gittelsohn and Mookherji, 1997:175). The processes underlying resource control are sometimes cooperative but may just as often be conflictive (Folbre, 1986; Sen, 1990). When this is so, the preferences of the individuals with most power in the household are more likely to be met.

Below this central box are a number of factors which determine the distribution of power within the household according to the inequalities inherent in socially-constructed identities, roles and statuses attributed to different individuals, and the perceived economic contribution which individuals make to household welfare (Sen, 1990).

Underlying these are the broad, extra-household ecological and material conditions, institutional arrangements, and social and cultural norms shown at the base of the framework - specific to particular countries and cultures, and played out at neighbourhood, local and regional levels. These factors shape individual social and economic roles and statuses, and the power to exercise control over household resources and enforce personal preferences, and may carry discrimination in the opportunities open to some social groups and not others (Folbre, 1994; Carter and Katz, 1997).

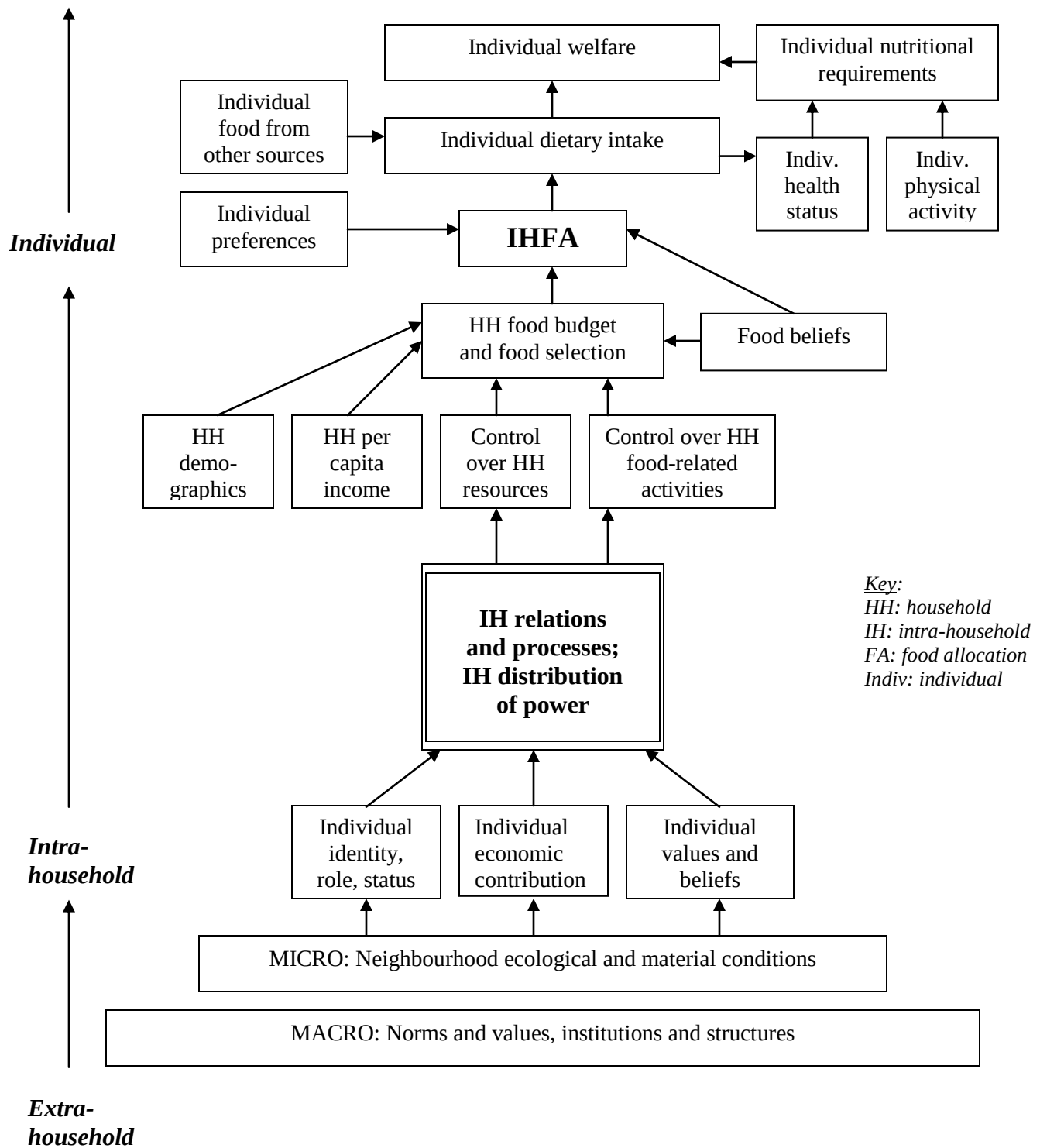


Figure 1.1. Theoretical framework for intra-household food allocation

In patriarchal settings, men are granted higher status than women and children based on their gender identity, their role as household head, and the economic contributions they make when they work for wages outside the home. Their power in the household is bolstered by their fallback positions, stronger than those of women if their independent economic viability is greater than that of women, and their remarriage prospects are as good, or better, should the marriage break down (McElroy, 1997). It is further strengthened by their greater physical strength than women and children in contexts in which domestic violence goes unpunished (Whitehead, 1994). This balance of power may be modified when women are economically active, producing food or working for wages, have another source of income, or have control over a financially-valuable asset.

Above the 'black box' are the outputs from intra-household processes: the control of some individuals over household monetary income and food resources which, in tandem with household demographics, per capita household income, and beliefs about food and nutrition, shapes the allocation of household resources to the food budget, the selection of foods, and the distribution of foods within the household. Much research into the dynamics of collective models of household economies has demonstrated that income in the hands of men is more likely to be used for their private consumption, including food consumed outside the household and adult goods, rather than for family welfare (Whitehead, 1981; Engle, 1990). Other studies suggest that when women have control over at least some household resources for food procurement, the proportion of financial resources channelled to food acquisition increases, different food distribution rules may be followed, and nutritional outcomes of women and children, sometimes girls specifically, may improve (Haddad et al, 1996:47; Thomas, 1997; IFPRI, 2002; IBASE, 2008:15).

Women are responsible for food procurement and preparation almost all the time in almost every culture (Van Esterik, 1985; Engle and Nieves, 1993). Female control in the kitchen and in serving food can provide the space for women to contest and redress constraints imposed by powerful anti-female structural forces in other spheres (Messer, 1984; Weismantel, 1988; Counihan, 1998:7). Female responsibility for food procurement

and preparation does not, however, necessarily mean that women exercise autonomy in food-related activities (Counihan and Kaplan, 1998). It is often men who determine the amount of income allocated to the food budget, the foods selected for purchase, how and when foods are prepared, and who gets how much of what. For many women, the acts of preparing and serving food are experienced as servile, a sensation sometimes reinforced by men's judgements on the food they prepare (Counihan, 1998:4).

These questions raise the issue of the impact of the value systems of the individuals in control of monetary and food resources upon distribution patterns (Engle and Nieves, 1993). They may draw on positive, non-economic, motivations of love and care, and choose to meet the interests and preferences of others in the household (Folbre, 1986; Gittelsohn and Vastine, 2003:4038S), whether or not in combination with the pursuit of self-interest. Their actions may be driven by altruistic concepts (conscious or unconscious) of distributional justice, and the desire to achieve equality in dietary intake or equity in health outcomes among household members (Behrman, 1988; Engle and Nieves, 1993; Farmer and Tiefenthaler, 1995), even if to do so flouts convention. Some researchers propose that self-interest and altruism operate along gender lines, with women more prone than men to be altruistic (Engle and Nieves, 1993:321). Others oppose the gender-stereotyping of welfare preferences frequently implied in collective household models (Whitehead and Kabeer, 2001:19); some men may willingly channel their earned income to the welfare of all in the household, and many women are fully capable of recognising and protecting, rather than abdicating, their own interests.

This discussion brings issues of structure and agency in food allocation, and their interaction in any given household, into sharp relief. The dominant individuals – usually men – may enforce their own preferences, or relinquish the power to control household resources and allow others to determine resource allocation, including food distribution. Women, largely relegated to a subordinate position, may submit to and collude with dominant norms which dictate the preferential treatment of certain individuals, and maintain inequalities via the socialisation of their children (Delphy, 1979; Sen, 1990; Messer, 1997:1677; Agarwal, 1997), their perceptions of their own rights and interests

stifled by the pervasive influence of dominant norms (Sen, 1990; Engle, 1990). Or they may find a way to exercise agency and contest prevailing norms which dictate their deprivation, or that of others in the household. I explore these questions in Chapter 8 in relation to my second research question: can allocation behaviour be characterised as discriminatory?

1.4.2 Who Benefits from the Intra-Household Allocation of High Status Foods?

As we have seen, who benefits from the intra-household allocation of high status foods may depend upon the identities and preferences of the individuals in control of income and food-related activities. Allocations are also shaped by the unspoken, and possibly unrecognised, norms and rules which govern food allocation, frequently related to perceptions of power and status, and concepts of need and reward, justice and equity. These translate into ideas about who in the household should get how much of what, by age, gender, role and health status, based on the understanding of the connections between food, health, growth and work embedded in local food belief systems (Van Esterik, 1985; Behrman, 1988; Engle and Nieves, 1993).

Those perceived to make a tangible economic contribution to household welfare - wage workers and pensioners for example – may have greater access to high status foods as recognition and reward for their contribution, while the time and efforts of those responsible for essential household reproductive work – an essential, but less tangible, contribution to the social ‘reproduction’ of workers for the labour market - go unrecognised (Senaar, 1990; Agarwal, 1997). The privileged access of wage workers to high status foods may also rest on the belief that they have greater nutritional needs than others. In households with an energy constraint, due to low per capita incomes or during periods of food shortage, it may be essential to channel more dietary energy towards wage workers, proportionate to their needs, than to others as the means to maximise their productivity and income and thereby the welfare of all in the household (Cassidy 1980; Sen and Sengupta, 1983; Behrman, 1988; Engle and Nieves, 1993; Wheeler, 1988; Messer, 1997). Beliefs about the greater energy needs of workers may extend to the allocation of better foods – higher status and more expensive foods – to those individuals.

By the same token, children more likely to contribute to household welfare may be privileged as an investment in the current or future well-being of the household (Rosenzweig and Schultz, 1982; Farmer and Tiefenthaler, 1995). The value of different individuals in the household may be determined by institutional arrangements such as those shaping individuals' income-earning opportunities, and by social customs such as marriage rules regarding asset redistribution (dowries paid by girls' families, bride price paid by boys' families in many cultures (Gittelsohn, 1991:1152; Miller, 1997:1692)), and normative living arrangements (patrilocal or matriloc) which shape the future availability of household labour (Messer, 1997; Kabeer, 1998).

Those with higher social status in the household may have greater access to high status foods as symbolic expression of their position (Messer, 1984; Wheeler, 1991). In patriarchal settings men are likely to have privileged access to high status foods due to their gender identity, as well as their role as household head when they form a household of their own (Messer, 1997; Aguirre, 2000)). That differentiated consumption operates under conditions of food scarcity, sufficiency and abundance in many locations suggests that differentiated access is frequently more social and symbolic than it is economic (Delphy, 1979). Those with greater power to control household resources and enforce their own preferences and who chose to act in self-interest – usually the same individuals as those with higher status - are also likely to have greater access to high status foods.

Lastly, those perceived as nutritionally vulnerable may receive better foods, including high status foods, than others. They may include infants and young children, since they are generally understood to have specific needs for growth and development, and frequently cannot look after their own interests (Wheeler, 1991; Graham, 1997), especially weak and sickly children; pregnant and lactating women, if it is understood that their diets affect the health of their babies; and the sick, if they are understood to need certain foods for recovery.

These issues, related to my first research question, are explored in Chapters 7 and 8. I focus principally on the impact of these issues by gender, exploring whether allocations

are biased among men and women, and among boys and girls. I examine biases by age, among adults and children, only in relation to modifications in allocations during seasonal food shortage and in less affluent households.

1.4.3 Impacts on the Individual

The top portion of the theoretical framework in Figure 1.1 shows that at the individual level, dietary intake is determined by the distribution of foods in the household, along with personal tastes and preferences, and the opportunities available to the individual to obtain foods from sources outside the household.

Food distribution within the household can impact on individuals in two ways. The first is physical well-being. Individual welfare - nutritional status, health, the capacity to function, learn and work, and quality of life - is shaped by dietary intake in combination with health status (which influences the biological utilisation of food) and nutritional requirements (determined mainly by age and gender, body weight, physical activity, growth and physiological status) (WHO, 1995).

The second impact is symbolic. An individual's social status is signalled and reinforced by differentiated access to foods, particularly high status foods (Delphy, 1979; Messer, 1984; Wheeler, 1991), and the power of more privileged individuals is further reinforced by better nutrition, health, and the capacity to work and earn an income. Food taboos, whether or not they are of nutritional significance (many believe they are not: Harriss, 1990:231; Ulijaszek and Strickland, 1993:115), may act as another powerful medium for the communication and reproduction of differential social status, by insinuating that some groups – frequently women, children and the sick – are too weak to tolerate certain foods. Particular facets of mealtime behaviour, like the order in which household members are served, and access to seating and utensils, can also function to signify and reinforce social status (Gittelsohn, 1991).

1.5 Hypothesised Biases in the Intra-Household Allocation of High Status Foods

I formulated specific hypotheses regarding gender and age biases in the intra-household allocation of high status foods in the research context on the basis of my literature review and theoretical framework, and some early impressions of the research context after the exploratory phase of my fieldwork. Despite the lack of quantitative studies of intra-household food allocation and the general paucity of survey data on food intake in Brazil⁷ (Oliveira and Thébaud-Mony, 1997), ethnographic and sociological observations on food-sharing norms and rules in Brazil throw some light on the matter, and studies addressing gender relations, the labour market, and living and working conditions in the sugar-producing regions of the Northeast helped to flesh out my own impressions.

I hypothesised, with regard to gender, that: (1) there would be gender bias among adults, with men favoured over women, and; (2) there would be no gender bias among children. I expected to see men most privileged, with little if any difference among women and children.

These hypotheses rest on several propositions outlined in the theoretical framework. Patriarchal norms in the research site automatically grant men higher social status in the household, giving them authority over women and children via their unquestioned position as household head; higher status was likely to translate into greater access to household resources, including high status foods. In this context, the local labour market is clearly highly gendered, with almost all men but very few women working for wages outside the home. Men were likely to be rewarded by preferential access to resources like valued foods, in their capacity as wage workers, while the value of unpaid domestic and reproductive work undertaken by women in the home went unrecognised and unrewarded. They were also more likely, given their status as household heads and wage earners, to have the power to control household resources and to enforce their preferences, not least

⁷ Data on individual food intake were collected only in metropolitan areas of Brazil in the 1974/75 ENDEF survey. Nationally-representative data on individual food were collected for the first time in the 2008/09 POF (Sichieri, 2008). The latter present the potential to undertake intra-household food allocation analyses, but the data are limited by the exclusion of children under 10 years old, and the use of written self-reporting of intake which compromises the accuracy of the data, especially among illiterate respondents.

because they receive wages in cash, giving them the power to allocate income with complete autonomy if they so wish. Given this gender division of labour, most women are financially dependent on men, and their fallback positions, and hence the power to follow their preferences within their households, are weak.

Most observations on food distribution in Brazilian households indicate that men have greater access to most foods, including high status foods, than others in their households (Gross, 1971; Tanner, 1985; Scheper-Hughes, 1992:141; Vasconcellos, 1994:5117; Safiotti, 1997:6; Minayo, 2001:12; Tonial, 2001:132). Other studies in Latin America (Aguirre, 2000 in Argentina), and in other regions (Gittelsohn, 1991 in Nepal; Gomna and Rana, 2007 in Nigeria; see studies in Gittelsohn and Vastine, 2003), and a number of the reviews of gendered access to choice foods cited earlier (Section 1.2.1) arrive at the same conclusion.

I hypothesised that no bias existed in the allocation of high status foods between boys and girls despite the dominance of patriarchal norms generally and in the labour market, such that bias in favour of boys would constitute a material investment in future wage workers. This proposition was backed by observations in other low-income populations in Brazil reporting no child gender preference (Scheper-Hughes, 1984:539), and the observation of ‘egalitarian’ rules for food distribution, based variously on criteria like body size or appetite rather than gender (Zaluar, 1982:178, Scheper-Hughes, 1984, 1992:163), and from observations in similar contexts around Latin America (Leonard and Thomas, 1989 and Leonard, 1991 in Peru; Engle and Nieve, 1993 in Guatemala; Graham, 1997 in Peru; Backstrand et al, 1997 in Mexico), and even in Bangladesh (Abdullah and Wheeler, 1985), suggesting that in many patriarchal societies, gender discrimination is not apparent until adulthood

With regard to age, I hypothesised, that: (3) during periods of seasonally-low availability of high status foods, children’s access to high status foods would improve relative to adults’, although men would remain privileged, and women would be most deprived; and (4) children’s access to high status foods would improve relative to adults in less affluent

households with lower intakes of high status foods, although men would remain privileged and women would again be the most deprived. I also expected that there would be less differentiation among age-gender groups when high status foods were less available.

The protection of children's consumption during food scarcity has been demonstrated in a number of studies in Latin America (Grieb, 1989 in Honduras; Leonard and Thomas, 1989 and Leonard, 1991 in Peru; and Graham, 1997 in Peru) and other regions (Wheeler and Abdullah, 1988 in Malawi and Bangladesh; Panter-Brick, 1993 in Nepal), mainly with reference to energy intake. The majority of studies commenting on food allocation behaviour in low-income households in Brazil state that women are more deprived than others in their households in times of shortage (Tanner, 1985; Scheper-Hughes, 1992:141; Vasconcellos, 1994; Safiotti, 1997:6; Minayo, 2001:12; Tonial, 2001:132)⁸. These observations are not dissimilar to ethnographic claims in other Latin American countries (for example, Nicaragua (Fredersdorf, 1993); Argentina (Aguirre, 2000)). I hypothesised that children would be favoured in the allocation of foods even though they did not contribute to the household economy, because their caretakers – mainly women – frequently understand that young children must ingest sufficient food in order to survive, grow and develop under the adverse conditions of severe resource constraints (Leonard, 1991; Panter-Brick, 1993).

The expectation that men's intake of high status foods remained advantageous relative to others in their households during seasonal food shortages and when they were unemployed rested on the proposition that their privileged intake was based on their 'permanent' status as men, household heads and wage workers as much as their seasonally-specific needs as workers.

⁸ The exception is the study by Gross (1971), which suggested that women's needs were met before those of their children.

1.6 Definitions

1.6.1 The Household

The definition I use for the household is ‘a group of individuals sharing a common food supply’- a quantity of food purchased at regular intervals and shared among those individuals⁹ - regardless of whether or not the individuals were related, lived continuously under the same roof, or pooled all their resources. The term is differentiated from ‘family’, due to the broader set of relationships beyond physical location implied by the latter¹⁰ (Folbre, 1997:264). Households defined in this way are by no means static, especially in developing countries (Deaton, 1997:23). The application of this definition in the research context, and the changes in composition in many households in the brief interval between the first and second household surveys, are discussed in Chapter 3.

I recognise the household as a functional social and economic unit for the organisation of livelihoods (especially production and consumption to meet physiological and other needs), and for the production and reproduction of individual and group identities, including status and hierarchy, across age groups and between genders (Guyer and Peters, 1987; Moore, 1992). The ideological and socially-constructed norms associated with households – the nature of the household as ‘private’ space in stark contrast with ‘public’ domains, the gendered division of household labour, the confinement of women to the domestic sphere and their financial dependency on men (Harris, 1981; Roberts, 1991) - are discussed in relation to the research context in Chapter 4.

1.6.2 Gender and Sex

A number of feminist authors make an important distinction between the terms ‘sex’ and ‘gender’: ‘sex’ indicates a variable differentiated by innate biological characteristics, both chromosomal and reproductive; ‘gender’ indicates a variable of which the identities, roles

⁹ The difficulties associated with accounting for individual access to food from multiple sources in more affluent settings are limited in this setting to largely negligible amounts of school food for some children, occasional meals or snacks in other households, and occasional, independently-purchased food for a few adults.

¹⁰ Resource flows into and out of the household recorded in the household surveys include flows to and from family members temporarily or permanently residing elsewhere.

and behaviours are socially-constructed, relational, and contextually- and temporally-specific (Unger, 1979; Young et al, 1981; Kandiyoti, 1998; Wilkinson, 2007).

I recognise the validity and importance of this distinction. Throughout this study I refer to differences between the sexes in dietary adequacy and nutritional outcomes in relation to requirements and standards based on guidelines for biologically-differentiated groups. I also discuss bias, inequality, discrimination, and subordination as they embody the asymmetry of rights, responsibilities and access to resources between the genders within and beyond households. Because, however, the distinction between sex and gender is not always and in every case clear-cut I have chosen, for simplicity's sake, to use the term 'gender' throughout.

1.6.3 Difference, Bias and Discrimination

I define differences in intra-household food allocation as “the inter-individual variation in the consumption of high status foods to be expected on the basis of random idiosyncratic personal preferences and random daily variation in diets”. I conceive of these differences as just or fair distinctions in the way that foods are distributed among the members of a household; it would clearly be nonsense to expect that all household members ate exactly the same quantities of the same foods.

I use the term 'bias' in reference to the immediate allocative outcomes of intra-household food allocation. Bias is defined as “consistently inequitable access to high status foods among different categories of people within the household, whether or not it creates nutritional disadvantage” and assessed by the individual frequency of consumption of high status foods in relation to others in the household. Bias is conceived as the expression of unjust distinctions among household members; some are consistently privileged, and others are denied, access to foods beyond the differences to be expected, as defined above. Thus, outcomes are conceived as biased when patterns of privilege and deprivation are systematically and consistently observed in some groups, such as particular age-gender groups, and are socially-constructed rather than biological in nature. They are defined as biased whether or not they contribute to inequalities in nutritional

and health outcomes, because factors other than food intake, such as health status and care, also shape these outcomes (UNICEF, 1998:24), and may compensate for inequality in food allocations.

The term ‘discrimination’ is common in the intra-household food allocation literature. It is frequently conflated with the term ‘bias’ in two ways; firstly, where bias is found it is automatically labelled as discrimination, with no attention to processes, behaviour and motivations; or, secondly, the behaviour underlying the bias is assumed to be discriminatory, with no exploration of non-discriminatory social, economic and cultural factors underlying the bias¹¹. Rarely are the concept and its application to intra-household food allocation explicitly discussed.

Discriminatory intra-household food allocation behaviour is defined as “behaviour which has the effect of creating, expressing and maintaining intra-household inequalities in power and status, whether or not it creates nutritional inequality”. It is conceived of as but one of many potential determinants of biased allocations. When the behaviour underlying allocations is discriminatory it contributes to social processes which create and sustain structural inequalities in power and status across age and gender lines, and within and beyond households, by drawing on the loaded symbolic power of the differentiated access to food (Messer, 1984:208; Van Estrik, 1985:113; Mintz, 1994; Counihan, 1998). As such, it forms part of a set of mutually-reinforcing processes which operate at different levels – within households and in the broad normative and structural framework in which they are embedded – through deeply-ingrained norms which are socialised and reproduced over generations, and may be more unconscious than conscious or intentional. Allocation behaviour which is expressive of intra-household inequality is characterised as discriminatory whether or not it directly creates nutritional or health inequalities, because freedom from subjective experiences of subordination and powerlessness is assumed to be as important as physical well-being (ILO, 1958). In so defining discrimination, I acknowledge the influence of my own culturally-specific biases,

¹¹ See, for example, Haaga and Mason, 1987:155; Peña, 1998; DeRose et al, 2000; Marcoux, 2002, Webb, 2002:12; Ueyama, 2007:10.

as well as those of global institutions (for example of the United Nations (UN, 1979)) on gender discrimination, rooted in Western philosophical concepts of the supremacy of individual rights.

So, for example, food-related behaviour which demonstrates social superiority, such as the consistent satisfaction of the preferences of some household members who have the opportunities, denied to others, to determine the composition of the household diet, to dictate how and when household food is prepared and served, to choose to consume more of more highly-valued foods, and/or to purchase food for individual consumption, is characterised as discriminatory. The observation of food taboos which restrict some groups' access to food with no biological basis is also classified as discrimination.

On the other hand, biases in food allocations which arise under conditions of dire material poverty, when food supply is inadequate to meet all household members' needs (let alone preferences), are not characterised as discriminatory; it may make more sense to prioritise the food needs of some household members, such as those who are economically and physically active, than to leave all equally below their requirements. It is, however, crucial to distinguish between the satisfaction of physiological needs required to sustain work, and the allocation of socially-valued foods on the basis of the social status ascribed, for example, to those who work for wages outside the household. Inadvertently-detrimental practices which arise from misconstrued food beliefs (relative to current nutritional science) are also not defined as discriminatory. These include, for example, the underfeeding of small children whose high nutritional needs for growth and health may not be fully-recognised, and the restriction of the food intake of sick children (Van Esterik, 1985; Wheeler, 1988), which combine with common practical difficulties in child feeding (breast-feeding of limited duration, the lack of special weaning foods, and the difficulties of adapting to a bulky adult diet), and heightened susceptibility to disease and infection, to create high levels of childhood undernutrition, morbidity and mortality even in contexts with adequate nutrition among adults and older children.

1.7 Conclusion

While great strides have been made in improving our understanding of the inner workings of households in relation to food allocation, it is generally recognised that more empirical data and theoretical analysis are needed (Haddad et al, 1997; Gittelsohn and Mookherji, 1997:178; Messer, 1997:1683). My thesis is designed to add new empirical data to the debate – data collected in the conditions of the nutrition transition in a middle-income country – and further theorisation based on an inter-disciplinary framework which probes the dynamics of intra-household behaviour, power and status as well as examining the allocation outcomes of that behaviour.

The analytical separation of bias and discrimination and the distinction between allocation outcomes and the underlying household behaviour are crucial to our understanding of how and why inequalities arise in the household and how they may be addressed in policies and interventions to improve individual nutritional and health outcomes. I examine bias and discrimination in the research context in Chapters 7 and 8.

Chapter 2. Methodological Approaches and Data Collected

2.1 Introduction

In this chapter I present my research design and methodology, and the underlying paradigm which guided my research. My aim is to demonstrate the credibility of the research process, the quality of the data collected, and the legitimacy of the evidence underlying my claims. I discuss my reasons for using a mixed methods design and the benefits to an inter-disciplinary research project which came of adopting a pragmatist approach with assumptions of inter-subjectivity and abduction at its core. The following terms are used in my discussion:

Pragmatism: an alternative to the positivist and constructivist paradigms in social science methodology, pragmatism integrates quantitative and qualitative approaches and data to arrive at a more complete and nuanced interpretation of complex social realities than can singularly quantitative or qualitative approaches;

Inter-subjectivity: in pragmatism the research account is recognised as the product of the interaction between the subjective perceptions of the researcher and those of the research participants;

Abduction: an approach to reasoning in pragmatism which moves back and forth between deduction and induction and acknowledges that hypotheses are tested theoretically and empirically throughout the research process;

Triangulation convergence approach: a particular approach to pragmatism in which quantitative and qualitative data are collected and analysed concurrently and have equal weight in the study;

Transferability: the degree to which knowledge created in one context can be of practical use in other contexts.

The fieldwork process and data collection and analysis were iterative learning experiences crafted from my early planning of the study through to the write-up of my findings. My approaches were continually refined and informed by some of the most recent literature on research paradigms and mixed methods research in the social sciences,

some of which was published as I was analysing and interpreting my data and reflecting on my fieldwork experiences.

The chapter is organised as follows. Section 2.2 outlines the most salient characteristics of the pragmatist approach as they apply to my study, Section 2.3 describes how quantitative and qualitative approaches were integrated throughout the research process, and Section 2.4 outlines the timeframe and phases of data collection. Sections 2.5 and 2.6 describe quantitative and qualitative data collection and analysis. Finally, Section 2.7 describes the fieldwork process, my approach to building trust with my research participants, my handling of ethical issues, and my recognition of the impact of reflexivity on the research process and findings.

2.2 Research Paradigm: A Pragmatist Approach

The inter-disciplinary nature of my study, its position at the interface between the social and physical sciences, and the research questions I sought to answer, motivated my choice of a ‘mixed methods’ research design, one that integrates the methodological approaches of quantitative and qualitative research.

My understanding and application of a ‘mixed methods’ approach drew heavily on the tenets of pragmatism described by Tashakkori and Teddlie (2003) and Morgan (2007). The pragmatist approach has been of supreme utility in helping to transcend the supposed incompatibility of the assumptions and beliefs of the positivist and constructivist paradigms long ascribed to in the social sciences (Alise and Teddlie, 2010). Such has been the popularity and influence of the approach in recent years that it has been recognised by some as a “third methodological movement” co-existing with quantitative and qualitative approaches (Tashakkori and Teddlie, 2003:45).

In the pragmatist approach, the strict ontological and epistemological assumptions evoked in traditional research paradigms are relaxed, substituted by more flexible theoretical notions of ‘inter-subjectivity’. In place of the contradictory assertions of, on one hand, the existence of a single, objective reality, or on the other, multiple, socially-

constructed realities, pragmatists assert that “...there exists a single ‘real world’ and that all individuals have their own unique interpretations of that world” (Morgan, 2007:72). In place of competing epistemological theories, of the possibility or otherwise of reaching some ‘objective truth’, is a more flexible approach to knowledge production which acknowledges the research account as the product of inter-subjectivity - the interaction between the subjective perceptions of the researcher and those of the researched.

Pragmatism takes the false dualisms exhorting in traditional research paradigms and shows that the underlying approaches to research are not only compatible but complementary. Pragmatists utilise a flexible and iterative ‘abductive’ approach to reasoning, moving back and forth between deduction and induction; tentative explanations and hypotheses emerge and can be tested theoretically and empirically using quantitative and/or qualitative data throughout the research process (Wheeldon, 2010). The inferences made from data can contribute simultaneously to an understanding of context-specific and culturally-relative phenomena *and* the construction of more general theory applicable beyond the research context. The emphasis is on transferability, that is, the degree to which knowledge created in one context can be of practical use in other contexts (Morgan, 2007:72). Inferences based on mixed method designs are held to be more transferable than inferences based on only one kind of data on the basis of ‘gestalt theory’, that is that the whole is bigger than the sum of the parts (Tashakkori and Teddlie, 2003:42). There results a flexible framework that can support all kinds of research designs with a focus on the production of knowledge geared towards solving complex practical problems.

Methodology - the overall strategy for data collection and analysis - lies at the centre of this framework. In the pragmatist view, it is the research topic and questions, rather than the adherence to rigid theoretical stances, which determine the choice of methodology, and the appropriate combination of methods (Crotty, 1998:13). In practice, the choice of research topic and questions, methodology and methods in the social sciences is not a completely rational and value-free process. On the contrary, such choices are shaped by the researcher’s personal ‘worldview’, values and politics, his or her judgement as to

what topics warrant the use of research resources, and then what methodologies are most desirable (Oakley, 1999; Morgan, 2007) (see Figure 2.1).

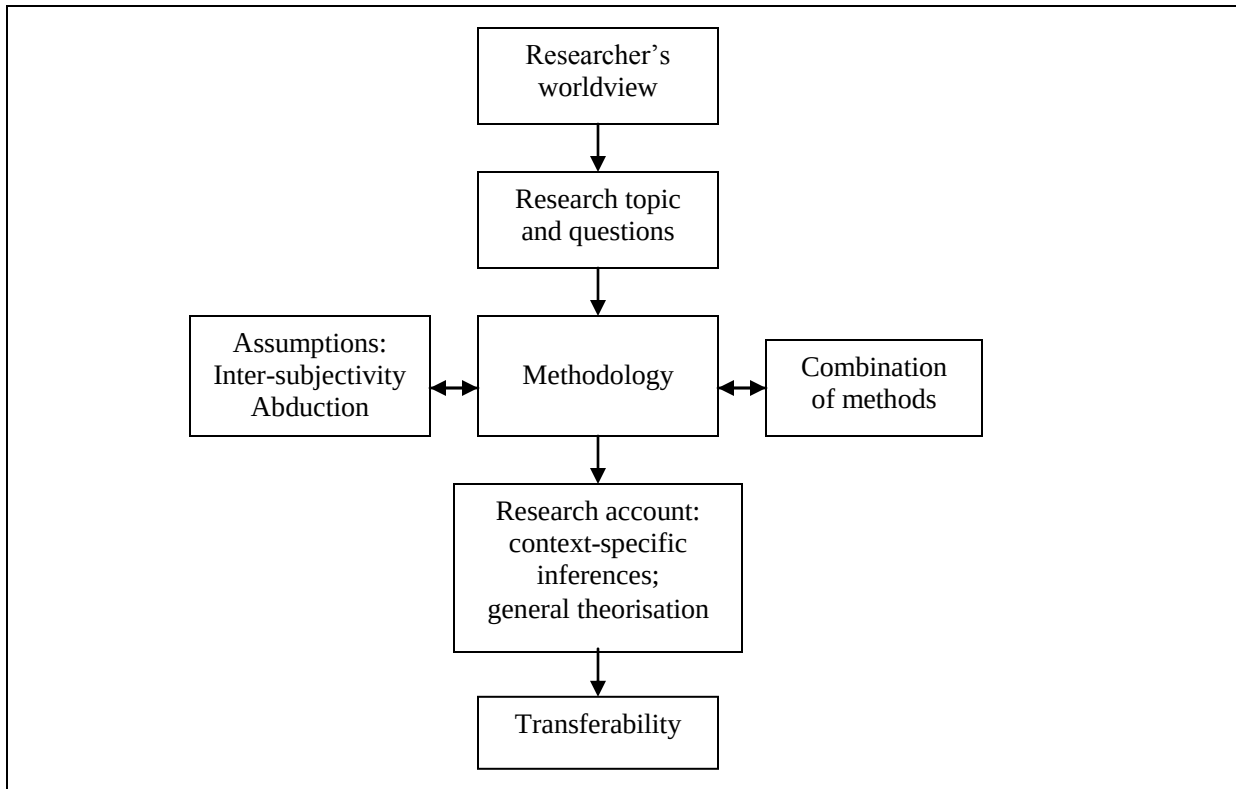


Figure 2.1. The pragmatist approach used for research design

Over the last twenty years or so, social science researchers have increasingly sought to craft methodological designs which make use of mixed methods and data – quantitative and qualitative - whether or not they adopt an explicitly pragmatist approach (Ivankova et al, 2006; Alise and Teddlie, 2010). Mixed methodological designs capitalise on the strengths of each approach (Creswell and Plano Clark, 2007:62). They benefit from the clarity of numerical counts generated by quantitative approaches, albeit with an evaluation of the validity and reliability of the data and an estimated margin of error, which can highlight issues for further exploration. They acknowledge, at the same time, the complexity of social reality which cannot be reduced to the stand-alone numbers generated in inferential statistical procedures. They value the subjective knowledge and interpretations of research participants, and recognise the contestability of meanings behind the numbers. And they utilise the expertise and intuition of the researcher, based

on first-hand knowledge of the faces behind the numbers (Olsen and Morgan, 2005; Wheeldon, 2010). In this way, measurement and meaning work together to arrive at more robust and rigorous conclusions than either approach alone can provide (Wheeldon, 2010:93).

Mixed methods research designs are particularly appropriate in inter-disciplinary studies such as Development Studies¹², indeed the use of mixed methods has largely arisen from inter-disciplinary areas of study (Alice and Teddlie, 2010:107). I have strived to demonstrate that the use of mixed methods in a research project which draws on economics, anthropology and nutritional science does not produce knowledge that appears untrustworthy to scholar of any particular discipline, precisely because the use of mixed methods does not violate the ontological and/or epistemological beliefs traditionally assumed to underpin each discipline.

2.3 Mixed Methods Research Design

I aimed to integrate quantitative and qualitative approaches as fully as possible, from conceptualisation (research purposes and questions) to interpretation and explanation. The overall research design was integrated at all the levels which Alise and Teddlie (2010:111-112) recommended in their recent review of mixed methodological approaches in the social and behavioural sciences: methodology, sampling, types of data, data collection and analysis, and underlying paradigm.

2.3.1 Methodology

A mixed methodology design was most appropriate to explore my research questions. Survey work was used to measure and understand living and working conditions, individual diets, and nutrition, and to explore intra-household biases in food allocation and nutritional outcomes. Ethnographic inquiry was used to explore context-specific meanings and valuations, and thereby understand the nature of the household behaviour underlying intra-household food allocation, and whether it could be characterised as discriminatory.

¹² Understood broadly to signify the study of poverty, inequality and well-being (Hulme and Toye, 2006).

2.3.2 Sampling and Representativeness

A sample of 32 households was selected on probabilistic criteria, thereby allowing for generalisation of survey data inferences to the kinds of households meeting the selection criteria described in Chapter 3. A sub-sample of six households was selected on non-random convenience criteria, also described in Chapter 3. In the smaller sub-sample the goal was ‘rich description’ rather than representativeness (Olsen, et al, 2003:317). The behaviour observed in the sub-sample households is used to illustrate the way that similar households in the research locations may behave in terms of the intra-household allocation of high status foods in the nutrition transition. Data from the sub-sample are drawn on throughout the thesis, and take centre-stage in the final chapter.

2.3.3 Types of Data and Methods of Data Collection and Analysis

I adopted what Creswell and Plano Clark (2007:62) have since called a ‘triangulation design’ with a ‘convergence’ approach in which complementary quantitative and qualitative data are collected and analysed concurrently and have equal importance in the inquiry. Each kind of data was collected and analysed separately using conventional techniques: quantitative data were collected via survey and recall questionnaires and anthropometric measurements, and analysed using descriptive and inferential statistics; qualitative data were collected in informal conversation, semi-structured interviews, and non-participant observation and analysed for thematic trends and emerging theory during and after fieldwork. Figure 2.2 demonstrates the concurrent process of quantitative and qualitative data collection.

Although the collection of quantitative and qualitative data was concurrent, each kind of data informed the other, to a degree, during data collection: qualitative data collected during an initial exploratory phase in households adjacent to the research locations informed the design of survey instruments, the development of taxonomies for variables (such as ‘labour group’), and the formulation of hypotheses, for quantitative data collection; interviews and conversations in sample households were crafted to contextualise and understand information collected on the household surveys and the

dietary intake of different household members collected through recalls; and the observation of behaviour in sub-sample households in the last phase of fieldwork was designed to explore issues which became apparent during earlier surveys and interviews. Quantitative household surveys were undertaken before in-depth interviews, conversations and observation in order to minimise the risk of creating bias in survey responses which might have been influenced by earlier conversations or interviews.

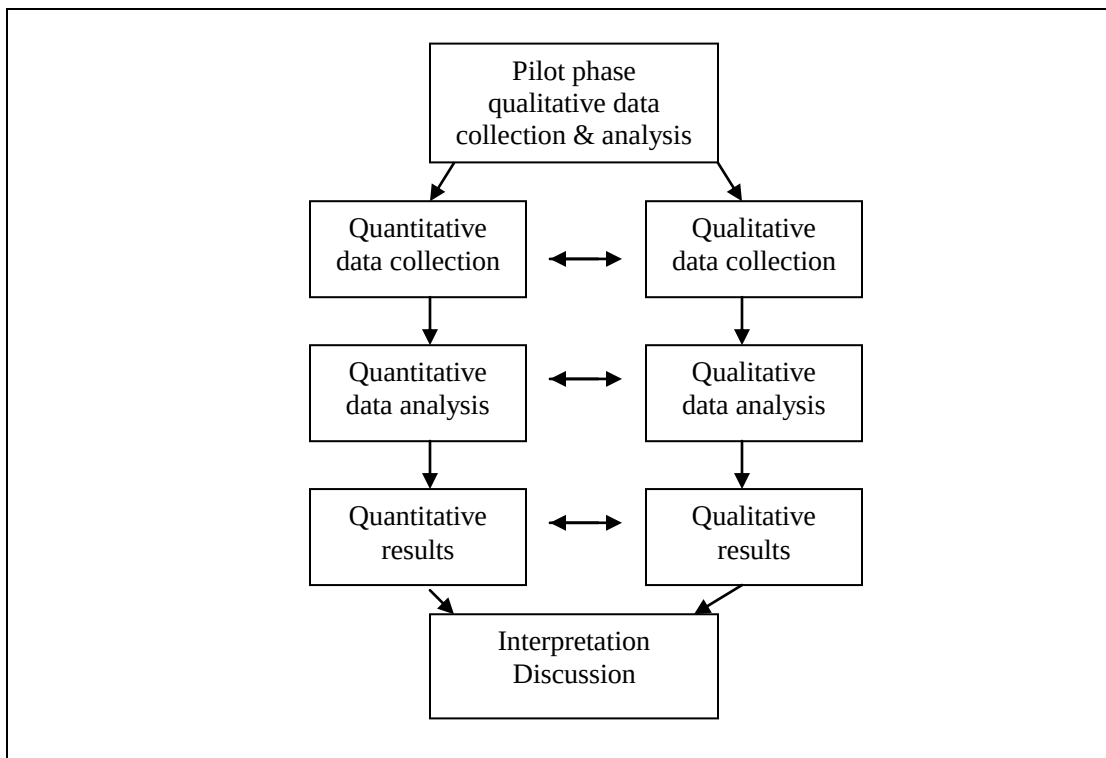


Figure 2.2. Mixed methods research design: ‘triangulation convergence approach’

Adapted from Creswell and Plano-Clark, 2007

Quantitative and qualitative results were integrated at the interpretation stage of the research process in order to develop a more complete picture than was provided by each kind of data alone. Convergence between the two kinds of data was assessed by examining both simultaneously to see if one could provide insights into the other, if each could confirm, or might refute, ideas suggested by the other (Creswell and Plano Clark, 2007:137). Both kinds of data are presented throughout the thesis and are integrated most fully in the final chapter.

The principal drawback of a mixed methods approach is that it requires more resources – time, money and expertise – than the use of a singularly quantitative or qualitative approach. For a researcher working alone, these requirements can create a critical tension between the desire to collect and analyse sufficient quantitative data from a large enough sample for the use of inferential statistical procedures which allow generalisation beyond the observations in the sample, together with the collection and analysis of in-depth qualitative data which provides insight into context-specific meanings and behaviours. The manifestation of this tension in my research project becomes apparent in the sections that follow and in Chapter 3.

2.3.4 Underlying Paradigm

By using a pragmatist approach I sought to reveal an approximation of the ‘real world’ and to explore the subjective interpretations of that world among my research participants. Survey data were thus treated as approximate portraits of some reality rather than as an objective representation of ‘the truth’; they were shaped by the kinds of questions which I chose to ask, the subjective perceptions and biases of my respondents, and the interaction between myself and my respondents. Ethnographic data on the subjective meanings attached to the topics I was studying among research participants were, in turn, informed and enriched by descriptive and inferential statistics based on the numerical survey data. The result is my account of conditions in the research locations, based on extended interaction with many research participants with their own socially-constructed interpretations, and reported through my own, personal and subjective, lens. The integration of the two – survey and ethnography – in a case study lent greater analytical power to my inquiry than would the use of either one in isolation. Survey work was oriented towards theory verification by testing specific hypotheses about intra-household food allocation. The collection of ethnographic data was directed towards theory generation about the ways individuals and households behave under certain conditions.

Perhaps the most explicit illustration of my use of mixed methods and abductive reasoning in a pragmatist paradigm is the timing and process of the formulation of tentative hypotheses about the intra-household allocation of high status foods. These

hypotheses were formulated after the pilot phase of fieldwork during which I amassed qualitative, contextual information through conversations with key informants and several women in households adjacent to the chosen research locations. This approach allowed me to assess the ways in which empirical observations and theoretical propositions in the literature might fit the research context – factors such as gender roles and relations, the gender division of labour, and the manifestations of patriarchy within households and labour markets, as well as local ecological and material conditions – in a process which has been termed ‘disciplined noticing’ (Olsen et al, 2003:315).

Thus my hypotheses were formulated on the basis not only of a review of the literature and my theoretical framework, as would occur within a deductive positivist research design, but also with the benefit of my impressions and intuitions from a pilot stage of fieldwork. This kind of data-oriented approach to hypothesis formulation is uncommon in mainstream research in disciplines favouring quantitative approaches of the so-called ‘scientific method’ (among them, economics and nutrition), but is recognised as a credible approach to knowledge production in the pragmatist approach (Morgan, 2007:70).

2.4 Data Collection Timeframe and Phases

Data collection took place over a period of 13 months in 2006-07 (see Figure 2.3). Three periods of fieldwork, each of 3 months, were interspersed with periods of 2 months spent in Oxford. The first phase was a pilot phase involving interviews and conversations with key informants and visits to various neighbourhoods in the municipality, with the Family Health Programme (PSF)¹³ teams, in order to develop my understanding of the research context and select suitable research locations. During the second phase, at the beginning of the harvest season, the household sample was selected, anthropometric data and the first rounds of seasonal-specific household and recall data were collected, and semi-structured interviews were held with women and men in sample households. The second round of surveys was completed during the third phase of fieldwork, in the non-harvest

¹³ ‘*Programa de Saúde Familiar*’: doctors and nurses traveled from the municipal town to rural communities each day.

season, as well as household observation in the sub-sample. Informal conversation and observation were ongoing in sample households during the second and third phases.

Year	2006										2007			
Season	Non-Harvest					Sugar Harvest					Non-Harvest			
Month	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Phase	First phase			Break		Second phase			Break		Third phase			
Data Collection:														
Key Informants														
Research Site Selection														
Anthropometry Survey														
Household Surveys														
Recall Surveys														
Conversation/ Observation														
Semi-structured Interviews														
Household Observation														

Figure 2.3. Data collection timeframe and phases

The breaks between data collection phases were invaluable for getting some distance and perspective on my experiences, reflecting on and discussing my data with colleagues, and planning the next fieldwork phase. They were of insufficient length to undertake in-depth analysis of my data, but I was able to formulate basic impressions in terms of household demographics and economics, local diets, and nutritional status.

2.5 Quantitative Data

2.5.1 Collection of Quantitative Data

The survey method was used to collect quantitative data. Standardised questionnaires with close-ended questions were used to collect information on household demographics, economics, food sources and food security, housing and environmental conditions, and on individual occupations, employment, health and lifestyle in September 2006; data on aspects susceptible to seasonal change were collected again in the non-harvest season,

March 2007. For a full list of the topics covered in the survey, see Appendix 1. These data map on to the bottom and middle portions of the theoretical framework presented in Chapter 1 – micro-level conditions in neighbourhoods and households, and household characteristics which condition the food budget and intra-household food allocation. One round of individual anthropometric data (weight and height) and three rounds of individual twenty-four hour dietary intake recalls (two in the harvest season, one in the non-harvest season) were also collected via surveys; these data measure the impact on individuals of intra-household food allocation in the top portion of the framework

The units of analysis were both households and individuals in order to assess the effects of household-level phenomena on individual household members. This meant having two databases, one based on households, the other on individuals which included the household-level data specific to each individual. All survey data were entered directly into SPSS 14.0, with the exception of anthropometric data which were first entered and transformed into anthropometric indicators in Epi-Info (CDC, 2007), and then exported to SPSS.

The internal validity of the survey data – the degree to which the measures used reflect the concepts they were intended to measure – was maximised by ensuring precise operational definitions of indicators and careful use of proxy variables, and by piloting and revising survey questions and procedures before use (Bernard, 1995:41; Fowler and Floyd, 1995). The use of probabilistic sampling for the selection of households maximised the external validity of the study, such that results can be generalised to households with similar characteristics in the two research locations (Tabachnick and Fidell, 2007).

Standardisation of survey instruments and procedures maximised the reliability of survey data – the degree to which the same data would be attained in repeat measures. This was relatively easy as I was the sole enumerator for the collection of all data except anthropometry; I followed the survey procedures carefully in each household, always read questions and the possible responses as they were written on the survey form, and

reviewed all forms for inconsistencies and mistakes at the end of each day. There may nevertheless be certain kinds of biases in the data, resulting from misunderstandings of the meaning of survey questions on the part of respondents, memory error among respondents for more detailed data like income, expenditure and foods consumed, and the wish among respondents to enhance the ‘social desirability’ of their responses in order to be favourably viewed (Bryman, 2008:255). There may also be errors in the data recording and entry.

The anthropometric measurements were taken by my research assistants, working under my close supervision. They were carefully trained and given clear instructions, and I acted as a check, writing down the measurements and questioning implausible values. The inter-observer consistency in the anthropometric data is reported in Chapter 6. The precision and accuracy of the anthropometric and dietary intake data, both components of data reliability, are discussed in Chapters 6 and 7.

2.5.2 Analysis of Quantitative Data

Descriptive and inferential statistical procedures were used to analyse the quantitative survey data. Descriptive statistics were used to describe household-level demographics, income and expenditure, and food security, and individual occupations and employment, nutritional status and dietary intake. Anthropometric data were converted to height- and weight-related indicators. Dietary intake was analysed by constructing an Individual Status Foods Score (ISFS) on the basis of the average daily frequency of consumption of high status foods; this indicator was then transformed into an intra-household index, the Relative Individual Status Foods Score (RISFS), which expressed each individual’s score relative to the average score in the household. At a later stage, the ISFS indicator was deconstructed to observe the consumption of individual kinds of high status foods. The anthropometric and dietary data were then disaggregated in order to observe differences by age-gender group (men, women, boys, girls).

Binary logistic regression was used to control for fixed group and household effects – demographic, economic and environmental factors specific to location, labour group and

household - before observing the effects of age-gender group on the anthropometric and dietary intake indicators. The use of a statistical procedure to control for clustering effects in this way diminished the potential of incurring a Type I error - that differences among age-gender groups would appear to be statistically significant when they were not - if the observed differences among the groups were due to differences between, rather than within, groups and households (Nelson, 1986:269) (in other words, because the observations for individuals in the same household were not independent) (Tabachnick and Fidell, 2007:443; Field, 2009:360). The use of a multivariate statistical procedure with several household-level predictors also provided more sophisticated insight into the complexity of household behaviour than could bivariate analyses with only one predictor.

Regressions were logistic rather than linear, using categorical instead of continuous data, in order to examine the effects of predictors on prevalence rates above and below normal anthropometric ranges and the proportions of the population with a relative intra-household index below one, indicating a less than fair share of household high status foods. Predictors were chosen carefully on the basis of my literature review and theoretical framework. The use of categorical data was also convenient given the non-normal distribution of data on the intra-household index.

Survey data were analysed for a sample of 152 individuals in 32 households, selected on the basis of probabilistic sampling. The sample was smaller than originally planned after four households were dropped from the sample for reasons explained in detail in Chapter 3. The reduction in sample size may have diminished the power of the regressions to detect statistically significant differences among age-gender groups (a Type II error), especially if the differences were small, and the limitation on the number of predictors, to ensure an appropriate predictor:case ratio (Tabachnick and Fidell, 2007:123), may have reduced the explanatory power of the regression models.

Regression analysis cannot provide a complete and infallible explanation of social reality, nor can it provide a neat account of deterministic causes of human behaviour. Complex social phenomena cannot be reduced to single variables, nor can the social reality behind

any research question be captured in a few variables; unobserved intervening and latent variables are inadequately represented in the analysis. In line with the pragmatist approach, I prefer to separate inferential statistics from the ontological and epistemological foundations assumed to underpin them, viewing my regression analyses as a social construction: they are built on hypotheses and variables which I perceived to be important based on my literature review, and they represent a ‘snapshot’ of time- and location-specific phenomena (Olsen et al, 2003:312)¹⁴. As such, the statistical models do not provide definitive answers to my social inquiry, but are an informative part of a more holistic and pluralistic methodological approach.

The problems inherent in the analysis of quantitative data – questions regarding validity and reliability, the impact of measurement error and Type I and II errors, the reductionist nature of variable-based analysis, and problems associated with sampling, representativeness and generalisability - reinforce the case for using a mixed methods approach and data triangulation, so that other forms of evidence work together to elucidate the story told by the numbers.

2.6 Qualitative Data

2.6.1 Collection of Qualitative Data

A period of approximately six months was spent in sample households, using informal conversation, semi-structured interviews and observation to collect ethnographic data. This was a relatively short period of immersion which was further limited by my decision not to spend nights in the research locations for practical reasons, firstly to ensure sufficient time to write up notes each evening, and secondly to avoid the health risks associated with endemic schistosomiasis; I usually remained in the research locations until 6pm, when the last bus passed through. I nevertheless define both the overall methodology and the final product as ethnography, because the nature of my inquiry was to “uncover meanings and perceptions on the part of the people participating in the research, viewing these understandings against the backdrop of the people’s overall

¹⁴ Olsen and colleagues refer to this approach to inferential statistics as ‘realist statistics’.

worldview or ‘culture’” (Crotty, 1998:7), and to this end I spent a significant amount of unstructured time in households.

This may not have been ‘participant observation’ in the strictest sense, indeed I prefer to define my activity as ‘non-participant observation’ as I did not participate in the activities going on around me (Bryman, 2008:257). That a six-month period sufficed to collect ethnographic data and develop critical insights into behaviour in households was helped by the clear focus of my inquiry into food allocation behaviour from the beginning, by the collection of important information from key informants in the pilot stage of fieldwork, and by my familiarity with Brazilian culture and fluency in the Portuguese language from living and working in Brazil for eight years.

The following ethnographic data, which map closely on to the theoretical framework presented in Chapter 1, were collected: perceptions of individual economic contributions to the household, individual roles and status, values and beliefs, and position and power within the household; intra-household relations and dynamics, resource control, and the intra-household distribution of power; food beliefs, food selection, strategies for dealing with food shortage and hunger, mealtime dynamics, and the intra-household allocation of different kinds of foods; and perspectives on work and physical activity, energy expenditure, and food needs for work. I also collected anecdotal evidence on changes in work patterns and labour relations, diet, physical activity and food security by asking adults about conditions in their families of origin.

Three methods were used to collect ethnographic data. The first was informal conversation and semi-structured interviews with key informants throughout my fieldwork to enable me to comprehend local meanings and practices and understand what I was observing. My informants included Brazilian academics, among them nutritionists at the Pernambuco state university with field experience in the municipality; staff of the Municipal Health Secretariat, including the Health Secretary, doctors, nurses, community health workers and the nutritionist; local sugar mill employees; and trade unionists (see

full list in Appendix 2)¹⁵. I also talked about issues related to my thesis with many other individuals with whom I came into contact including drivers, school teachers, staff and ‘residents’ at the hostel where I boarded¹⁶, and individuals from the research locations who were not included in the sample.

The second method was informal conversation and observation, and open-ended semi-structured interviews with at least one woman, and a few men, in each sample household. Interviews were conversational in style, using a flexible interview guide and allowing the interviewee to add his or her own viewpoints; I did not record interviews so as to avoid inhibiting responses around sensitive issues, and only jotted down key words in order to keep the tone as informal as possible. The information was supplemented by purposeful ‘hanging out’ (Bernard, 1995:151) in households during the second and third phases of fieldwork, at times which I judged to be non-intrusive, taking advantage of opportunities to observe the gathering of several individuals, the interactions between men and women, adults and children, and the presence of visitors and professionals in the home. Data collected in this way helped me to understand the richness and complexity behind the survey data, to gain insight into how participants interpret their own circumstances, to uncover possible inconsistencies between reported and actual behaviour, and to probe the ‘discourse-in-use’ (Olsen, et al 2003:321) underlying phenomena such as ‘gender relations’.

Third was non-participant observation of household behaviour in the sub-sample on two non-consecutive weekdays in the non-harvest period of 2007. Observation was undertaken on weekdays in order to observe ‘normal’ activities and routines¹⁷. Observation days in sub-sample households were agreed in advance; surprise visits at mealtimes would be socially unacceptable in this context (as Graham (2003) found in Peru). A week or more lapsed between the two visits in each household to allow me time

¹⁵ Informants’ titles are used when referred to in the text to protect their identity, with the exception of academics, who are referred to by name.

¹⁶ This was a small hostel (*pousada*) in Ribeirão, the town next to Gameleira.

¹⁷ Also for practical reasons: it would have been more difficult to observe behaviour on Saturdays because virtually all women went to town in the morning to do the weekly grocery shopping; and because I did not want to intrude on Sundays, the only rest day for cane workers.

to review my notes and plan the next visit. The following occurred during each observation day:

- Unstructured observation of household behaviour throughout the day, watching household processes and dynamics, roles and relations, and individual activity patterns, thereby providing data to contextualise food-related behaviour and characterise the nature of household behaviour;
- Semi-structured observation of food preparation and mealtime behaviour, recording data about food preparation and clearing up, food serving and control over food distribution, use of utensils and seating arrangements, eating order, and second servings (see observation schedule in Appendix 3); data were used to identify patterns of behaviour which were not adequately captured in surveys, conversations and interviews;
- ‘Purposeful’ conversations with women and some men in sub-sample households, seeking to understand the behaviour I had observed and the subjective meanings and interpretations of such behaviour by women and men;
- Twenty four-hour dietary recall on the observation day; this data was not entered and analysed in SPSS, instead it served as a means to verify that intake on the observation days resembled intake on the prior three recalls.

Some general practices were followed in the collection of qualitative data. Topics were generally explored to saturation, to the point where I felt I was hearing nothing new (Bryman, 2008:416), and they were continually developed and modified, in iterative fashion, on the basis of ongoing conversations and my reflections. I was careful to observe my subjects of interest with great attention to detail in a manner which Bernard (1995:147) terms ‘explicit awareness’. I followed guidelines from ethnographers (for example Ellen, 1984) for keeping field notes, making minimal notes during conversations, interviews and observation, at most key words and memory triggers, to avoid making participants self-conscious. I fleshed these notes out at lunchtime, and wrote up full accounts at the end of each day. I also used photos as memory aides, for example to record aspects of mealtimes (the food prepared, who ate what, who sat where) during household observation.

2.6.2 Analysis of Qualitative Data

Analysis of qualitative data was an ongoing, inductive process from the beginning. During fieldwork and in breaks away from the field I frequently reviewed and reflected on my field notes, looking for overarching themes and connections and re-interpreting earlier ideas in the light of new evidence, in what Ellen (1984:283) calls ‘a constant and cumulative dialogue with the material’. These reviews were also essential for noticing gaps and planning next steps.

On completion of fieldwork I reviewed my notes from conversations, interviews and observation, and began consolidating notes and cross-referencing data. Blocks of text were coded, and the codes grouped into broader themes, such as ‘individual identities/roles/status’, ‘intra-household relations’, ‘food beliefs’; themes were related to each other and to my theoretical framework in order to visualise broader perspectives. My notes were not typed in the interest of time, and I used hand-coding rather than a qualitative data analysis software. I began writing early drafts of chapters at this stage, using the writing process as an essential part of analysing the data, getting clarity on my thoughts, and generating theory.

The output from this process is a descriptive and analytical ethnography focused on food and eating, working and living conditions, intra-household behaviour and gender relations, informed by critical inquiry into social hierarchies and power relations, and their impact on individuals (Crotty, 1998:12). There will inevitably be biases in my account, biases which are inherent to the inter-subjective nature of any qualitative research process and the particular methods I used. These derive firstly from biases in the accounts of research respondents – what they choose to tell me, and not tell me; my account is also likely to contain some pro-female bias, given that I spoke primarily with women.

It is also inevitable that some behaviour was modified during my presence, in an effort by participants to present a favourable impression, whatever that meant to each individual.

This was most likely to occur at mealtimes, as the focal point of my observation, even though I asked women to select, prepare and serve food as if I were not there. I may however have reached a 'reactivity threshold', a point at which the participants ceased to react to my presence (Gittelsohn and Mookherji, 1997:174), at least by the time I spent full observation days in sub-sample households, as I had by then spent almost six months in the sample households. Certainly, it struck me that people's behaviour seemed natural enough, was not questioned by other household members, and did not depart radically from the behaviour I observed in other households and in the same households on other occasions. Observation data are based largely on behaviour in the sample and sub-sample households which I felt were more amenable to my visits and felt more comfortable being observed; this may also introduce bias, if there are important differences in the characteristics of households which were and were not open to my visits.

My account is also shaped by my own abilities and preferences; by my ability to retain large amounts of information without recording speech, especially during household observation (aided by the observation schedule and photos), and by how I heard information, what I considered important to include in my account, and how I have chosen to relay it (Davis, 1984).

The credibility of my account rests on several important principles. I spent a not-insignificant amount of time in sample households and developed an intuitive understanding about many of the processes I was observing; this was aided by my language skills. I used an approach based on theoretical sampling, refining ideas and topics throughout fieldwork in order to develop theory and guide subsequent data collection (Bryman, 2008:415). And my arguments are built on triangulated data and methods - different kinds of data from a variety of sources and methods of data collection and analysis - which provide consistent and coherent evidence on the same question or phenomenon (Olsen et al, 2003:323). To cite just a few examples: data about the gendered control of household income was elicited through a simple survey question ('male/female/both') and in interviews and conversations which explored the more nuanced aspects of household economies and gender relations; information on differences

in diet by age and gender was collected on recall forms and in interviews and conversations; and household observation provided the opportunity to validate, or otherwise, the discourses I heard in interviews and conversations.

As in any ethnographic account, there are questions of representativeness and generalisability. In line with the pragmatist approach, I have aimed to present an account with ‘thick description’ (Geertz, 1973) of the context and the population to facilitate assessment of the transferability of findings to other contexts (Tashakkori and Teddlie, 2003:38). But in contrast to the analysis of quantitative data, the aim was not to reach inferences that necessarily held across the population in or beyond the household sample so much as to achieve a degree of theoretical generalisation which can be supported both within and beyond the context, building upon existing theories in the study of intra-household food allocation (Bernard, 1995).

2.7 The Fieldwork Process

2.7.1 Local Support and Research Assistance

The Municipal Health Secretary of Gameleira was fully supportive of the research project and gave me permission to speak with, and observe the work of municipal PSF professionals - doctors, nurses, community health workers, and the municipal nutritionist, as well as access to transportation around the municipality.

Two community health workers, each native to the community in which he worked, acted as part-time research assistants. They assisted me by drawing detailed community maps and with initial introductions to survey households, the process of securing informed consent, and the collection of anthropometric data. They were of fundamental importance to the success of my fieldwork, first because I am convinced that I would not have been so readily accepted in survey households had I not initially been introduced by my assistants; and second, because they continually helped me to understand local concepts, categories and meanings which differed in use from the Southeast region of Brazil where I had lived.

That both were male was sheer coincidence and I have no reason to believe that their gender impacted on the data collected since they only accompanied me to households at the very beginning of the fieldwork process. One of them was himself a sugarcane worker with a wealth of knowledge about the industry. Both provided me with valuable male perspectives on my research topics.

2.7.2 Building Trust

The trust and rapport which I built with individuals in study households was key to the success of my research. Without them I would have had difficulty raising, and getting honest responses to, the more sensitive issues on my research agenda, like household finances, eating habits and body weight, hunger, and access to food at times of shortage. The agreement of all sub-sample women to my presence in their households during two days, including access to the kitchen - considered a very private part of the home - and the withdrawal of none despite the intrusion and disruption which my presence inevitably caused, was testimony to the trust that grew over time.

I adopted many strategies to create trust between myself and my research participants: complete confidentiality of information and anonymity of individuals was assured; after securing consent and taking anthropometric measurements, I visited households alone, without my local research assistants, so that participants were less anxious about the disclosure of private information; interviews were conducted in the privacy of individuals' homes with the option of postponing until a later date if others were present; conversations and interviews were not recorded to avoid inhibition, especially around more sensitive issues; I handled information with complete discretion, never relaying information gained in conversations or interviews to others; sensitive issues were not addressed until the third visit to a household, and were cut short if the respondent appeared uneasy. My approach to fieldwork activities, such as travelling by public bus and on foot rather than circulating in a private vehicle, respecting people's schedules when they were busy, and being willing to sit, chat and listen with genuine interest, also helped, as did my fluency in the Portuguese language.

My efforts to build trust with my research participants, particularly women, were not merely instrumental, an exploitative strategy to allow me to extract information from them. It was very important to me at a personal level that women felt respected and valued in the research process. I adopted a feminist approach, allowing for two-way interaction in a non-hierarchical relationship with those women who wanted to engage with me (Oakley, 1981). I was genuinely interested in these women, their life experiences and perspectives. I was also happy to answer their questions about me and my experiences and perspectives, and they had many: did I have a husband or boyfriend?; what were relationships between men and women like in my country?; did I have children?; what was it like to be a woman who can travel and visit new places alone?

At the same time, I was aware of the need to gain and maintain at least passive consent to my presence in the household on the part of male household heads. To do so, I maintained a posture of respect, sometimes deference even, towards them to ensure that my interactions with their spouses were not perceived as a threat to their position and authority in the household.

2.7.3 Ethical Considerations

My research design was approved by the Research Committee of the Department of International Development at the University of Oxford, and the Research Ethics Committee of the Health Sciences Centre of the Federal University of Pernambuco (UFPE) in Brazil. Informed consent was secured from every household included in the study, with specific consent secured for every child under 16 years of age in the household, as well as permission to use photographs taken in the household. A copy of the consent form was read aloud to an adult, most frequently the male and female spouses together, and was then left with the household, with the assurance that they were free to withdraw from the study at any time.

I faced several ethical dilemmas related to the research I was conducting. The first was whether to disclose the exact topic of my research. I was reluctant to talk explicitly about ‘intra-household food allocation’ for fear that research participants would alter their

responses during interviews and recalls, and their behaviour during observation periods, in order to suggest whatever they felt to be socially desirable, or felt that I would perceive as socially desirable. My solution was to talk in more general terms of my interest in the local diet and the kinds of foods that were eaten by different household members, and how these varied on different days and seasonally. I was uncomfortable with this lack of complete transparency, it conflicted with my feminist beliefs that research participants should be fully informed and involved in the research process (Oakley, 1981), but I felt it was a worthwhile compromise in order to maximise the validity of my data.

Second was the decision as to whether to accept food in the sub-sample households when I was present at midday and evening meals, particularly households which, in the middle of the non-harvest season, were struggling to secure enough food for all household members. My strategy changed over time. I initially turned down the offer to eat, explaining that I had brought my own food because I did not want to alter the way things normally happened at mealtimes - an attempt to minimise reactivity to my presence. But I quickly noticed that my unwillingness to eat created an awkward atmosphere. On reflection, I felt that my refusal caused offence, firstly because hospitality to visitors is extremely important in the Brazilian culture, and secondly because it could be understood to imply that their food was in some way not good enough for me. Both threatened to undermine the trust built with women in these households. I therefore agreed to eat the midday meal prepared on my second visit to their homes, but stressed that while they could prepare more food than they otherwise would, they should not prepare different foods because of my presence. I took a contribution to the household food supply – usually packets of rice and beans – on a subsequent visit as a gesture of thanks.

My impression was that my decision to partake of their midday meal did not compromise my data. By the time household observation was undertaken, after three dietary recalls in every study household, I had a good grasp of the nature of the local diet and the value of particular foods, in general and in each household; my feeling was that food served on the observation day did not differ systematically from other days in the non-harvest season. Since quantities of food served to different household members were not under

investigation, the preparation of a greater quantity of food at those meals, if it occurred, did not impact on my inquiry. Besides, since it was the non-harvest season, a number of sub-sample households simply did not have anything other than basic foodstuffs. It is however possible that the high status foods I was served in some households would otherwise have been served to other household members.

Ultimately, my decision to eat in the households produced several positive impacts which enhanced the quality of my data. Firstly, my willingness to eat food they had prepared, and the act of eating together, strengthened my relationship with these women, and in some cases our conversations took on a new, more intimate, tone. Secondly, my participation in the meal seemed to distract from my role as observer in a way which helped to overcome the self-consciousness of household members, especially women, of being observed while eating. And thirdly, the meal I was given – always served up by the woman - provided more data on the value of different foods, given my position as a guest perceived to have elevated status.

My third ethical dilemma related to my interactions with women. I was aware of the need to calibrate these interactions carefully in two respects in order to minimise the risks of women's participation in the study. One was the risk of engendering a strong sense of dissatisfaction with unequal gender roles and relations in their households and communities – which is not to suggest that many women were not already aware of the restrictions under which they lived and their limited agency to change this situation. The second was the risk that women might suffer threats of, or actual, violence at the hands of their male partners, if the latter felt that my interactions with their spouses threatened their culturally-sanctioned authority within the household. Many women managed this risk themselves, policing their comments if we were not alone; I was also careful not to place them in compromising positions when men were around.

Lastly, I confronted a very personal dilemma in the sense that I was given a lot – people's time and information, and access to their homes, as well as food – and gave very little

back¹⁸. I would like to think that my interactions with women made a small difference in their somewhat monotonous and isolated lives. Certainly, I was made to feel very welcome in most households, and was greeted with enthusiasm when I returned after each break. Indeed, some research participants told me that women in non-sample households wished that they had been included in the study. Only occasionally was I asked what was to be gained by participating in the study – and always by men; my honest response, that there was essentially nothing in it for them, was not met with hostility. I sensed that the simple act of being present and listening had a big impact on people who felt largely abandoned – by populist politicians who made pre-election promises and then disappeared, by the state for its failure to provide basic services and adequate social safety nets (unemployment benefits for example), and by busy health professionals who had little time to listen to their clients, let alone spend time in their homes. I became friends with some of the women, and was again greeted with enthusiasm when I returned on a personal visit in 2009.

2.7.4 Reflexivity

Where economists and nutritionists strive for detachment and neutrality in their relationship to the research context and process, anthropologists, especially in the post-modern school, recognise the weighty influence of their identity and the choices they make on the research process. Because, in the view of the anthropologist, meaning, and therefore knowledge, are constructed out of the personal interactions which occur in the research process, high levels of subjectivity and inter-subjectivity (between researcher and research participant), are inherent and valuable to the final research account (Lockwood, 1992).

To recognise reflexivity in my research process is to acknowledge the impact of my personal values and interests, academic training, preconceptions, and unquestioned assumptions on the questions I chose to ask, the data I collected, my interpretation of the data, and my final research account conveyed in this thesis (Richards, 2005:197). My

¹⁸ In material terms, I took small gifts to each sample household on my last visit – pencils and key rings with emblems of the UK.

concern, for example, with inequality and with the disadvantaged position of women relative to men in many societies is present in my choice of research topic and my feminist approach to my interactions with women.

To recognise reflexivity is also to acknowledge the effects of my personal identity on the research process in the field, and how these shaped my findings (Lockwood, 1992). I was able to capitalise on aspects of my identity to enhance the quality of my data in a number of ways. My gender, for example, was key in developing rapport with women as we were able to share a certain level of mutual identification. It also facilitated the process of securing the tacit and disinterested consent of men to my presence in their households, as we were seen to talk about apparently non-threatening women's issues around food and cooking.

Being a foreigner and an 'outsider' also brought its' advantages. I could adopt behaviours which would make 'insiders' uncomfortable, such as visiting and conversing with women preparing food in the kitchen, by appearing to be ignorant of local customs which underline the privacy of food-related behaviours in the home. I was, however, careful to remain attentive of the effects of my behaviour and retreat if I felt I was causing embarrassment or offence.

2.8 Conclusion

The mixed methods design I have described in this chapter was particularly well-suited to the needs of intra-household research and inter-disciplinary inquiry. The design adapted and integrated quantitative and qualitative approaches familiar to economists, social scientists and nutritionists, in order to explore and understand an area which is particularly difficult to research – the intra-household processes underlying resource allocation which are largely hidden from view and very difficult to observe (Haddad et al, 1997). The result, I believe, is an account of conditions and behaviour in the research locations which is both accessible and acceptable to researchers from different disciplines.

I have touched only briefly in this chapter on the household sample included in the research process. Fuller details of the household sample and sub-sample, sampling design and procedures, treatment of missing data, and the generalisability of findings beyond the sample households are presented in the next chapter after a general description of contextual conditions in the research site.

Chapter 3. Sugarcane Labourers in Pernambuco, Brazil: the Research Site and the Household Sample

3.1 Introduction

With the eighth largest economy in the world, and a per capita gross domestic product (GDP) of US\$8,114 (2008), Brazil is classified by the World Bank as an ‘upper middle income’ country (World Bank, 2010a; World Bank, 2010b). Brazil’s Human Development Index (HDI) improved from 0.551 in 1970 to 0.764 in 2010 (UNDP, 2010), and impressive progress has been made in a significant number of health and nutrition indicators since the 1970s: the infant mortality rate decreased from 95/1,000 in 1970 to 18/1,000 in 2008 and the under-five mortality rate decreased from 135/1,000 to 21/1,000 in the same period (UNDP, 2007; World Bank, 2010b); underweight (weight/age) among children under five fell from 16.6% in 1974/75 to 2.2% in 2007 (IBGE, 2006a; World Bank 2010b), and linear growth retardation among children under five fell from 36.4% in 1974/75 to 7.1% in 2007 (Monteiro, 2000a:378; World Bank, 2010b).

But national data mask pockets of deep poverty in some regions of the country, areas where progress has been patchy, at best. Brazil is infamous for its high level of income inequality, and recent reductions in the Gini coefficient - from 0.608 in 1990 to 0.55 in 2007 (World Bank, 2010b) - have been slow and unimpressive. The extent of regional disparity in income and poverty has given rise to the notion of “the two Brazils” (Sawaya et al, 2003), the Brazil of the Southeast, where 21.5% of the population lived under the poverty line¹⁹, and the Brazil of the Northeast where 57.4% of the population lived in poverty, in 2001²⁰ (UNDP, 2005:61). Regional inequalities are reflected in the HDI: while the highest ranking state, the ‘Distrito Federal’, boasted an HDI (0.844) equivalent

¹⁹. Monthly per capita income below US\$41 (UNDP, 2005). Monetary values used throughout the thesis have been converted from local *Real* to US dollars using the following exchange rates: (1) R\$1 = US\$0.45558 on 01/08/06 (Survey 1 data and values not specific to either survey), and (2) R\$1 = US\$0.4686 on 02/01/07 (Survey 2 data) (Financial Times, 2007). Most values are rounded up or down to the nearest dollar.

²⁰ These are the most recently published regional data.

to that of the Seychelles or the Bahamas, Pernambuco's HDI (0.692) was closer to that of Egypt, in 2000²¹ (UNDP, 2002).

Poverty is higher in rural than urban areas. The proportion of the rural population living below the poverty line²² in 2005 was 45.7%, against 22.8% of the non-metropolitan urban population (FGV, 2006). Rural areas are particularly vulnerable to inadequate coverage of public services and infrastructure: only 37% of rural households had improved sanitation facilities, compared to 87% of urban households, in 2008 (World Bank, 2010b). As a result, health and nutrition tend to be poorer in rural areas.

This chapter begins with an overview of the sugarcane sector in Brazil and then focuses on the living and working conditions of landless rural labourers working in sugarcane production in the municipality of Gameleira, state of Pernambuco. It begins by exploring the ecological and material conditions on a sugar plantation and in a neighbourhood on the periphery of town, and the nature of the local labour market, including the seasonal nature of employment. In Section 3.5 I describe my sampling design, the size and composition of the sample and sub-sample, and the generalisability of my findings, and in Sections 3.6 and 3.7 I present quantitative data collected by survey to describe the social and economic conditions in the research locations.

3.2 The Sugarcane Sector in Brazil

“Sugarcane is a particularly predatory crop, which has dominated both the natural and social landscape. [It] ultimately feeds on the human capital on which its production is based” (Scheper-Hughes (1992:32), describing sugarcane cultivation in Pernambuco, Brazil).

One of the first commodities of global capitalism in the early sixteenth century, sugar has a long and chequered history. With five centuries of continued growth in demand and production, and only occasional periods of decline, long-time scholar of sugar-producing regions, Sidney Mintz (1985:xxi), has anointed sugar as one of the greatest ‘success stories’ of all major food products. The history of large-scale, monocultural, export-

²¹ These are the most recently published HDI data by state.

²² Monthly per capita income below US\$55 (FGV, 2006).

oriented sugar production began with the colonization of the Americas in the early 1500s, providing abundant land for sugar cultivation based on European capital and African slave labour (Mintz, 1985). Northeast Brazil was one of the first regions in the world to be deforested for sugar cultivation, and to undergo the social, economic and political reorganization of rural life inherent to the sugar 'plantation system' (Wolfe and Mintz, 2003; O'Connell, 2004).

World demand for sugar continues to grow, bolstered by global population growth and ongoing increases in sugar consumption in sweetened and processed foods (USDA, 2007a). As in any global commodity market, the fortunes of any particular growing region are vagarious, depending on numerous local and global factors – including government credit and subsidies, the costs of inputs, labour and transportation, technological developments, protectionist policies in potential export markets, and the substitution of sugar by products such as artificial sweeteners and high fructose corn syrup (O'Connell, 2004). The effects of policies and actions in one location reverberate through distant economies, and periods of decline, when they occur, are inevitably painful.

Sugar is Brazil's third largest agricultural crop, in terms of area planted (USDA, 2007b), and Brazil is the world leader in sugar production (32.1 million metric tons, 19.2% of world production) and exports (20.6 million metric tons, 40.5% of world exports) (USDA, 2007a; USDA, 2007c; CONAB, 2007) (figures for 2007/08). The internal geography of production, and of sugar-related fortunes, has shifted, with production in the Northeast surpassed by that in the Centre-South since the mid-twentieth century (Lima and Silva, 1995). Sugarcane productivity is considerably higher in the Centre-South states; in the highest ranking state, São Paulo, productivity stood at 86,620 kilos/hectare (kg/ha) in 2007/08 compared to 56,920 kg/ha in the state of Pernambuco (CONAB, 2007). While the climate and soils in the Centre-South are more suited to sugarcane cultivation (Barros, 2005), the most important difference contributing to lower productivity in the Northeast is the hilly topography of the land, precluding the agricultural mechanisation and reduction in labour costs achieved in the Southeast (Andrade, 2001:270).

The global quest for ‘renewable’, non-fossil energy sources at the beginning of the 21st century, with oil prices soaring, oil supplies diminishing, and the recognition of the heavy environmental costs of fossil fuel usage, is set to alter the fortunes of sugarcane cultivation once more (Altieri and Bravo, 2007). Less polluting than fossil fuel²³, ethanol distilled from sugarcane or maize is a principal contender as an alternative source of energy, and is rapidly winning market share among biofuels (Hunt et al, 2006). Domestic demand for ethanol in Brazil has been high since the federal government started to subsidise the manufacture of ‘flex-fuel’ vehicles able to run on any combination of ethanol and petrol, as well as the price of ethanol at the pump (Biodiesel Brasil, 2008); in 2005 over 50% of new vehicle sales in Brazil were ‘flex-fuel’ vehicles (Worldwatch, 2006a). World demand is also soaring, due to a combination of government policies and programs to alter energy use and meet Kyoto Treaty requirements to cut carbon emissions, principally in the United States and the European Union (Jarrell and Rekas, 2006), together with rapidly increasing energy needs in growing economies such as China and India (Hazell and von Braun, 2006). Brazilian sugarcane producers are well-positioned to take advantage of world demand for ethanol. Brazil pioneered the production of ethanol in the 1970s under the ‘ProÁlcool’ programme (Andrade, 2001:274; Barros, 2005; Hunt et al, 2006), and to-date has almost always been the largest ethanol producer in the world.

The last decade of the twentieth century was one of significant decline in the Pernambucan sugar industry, due to prolonged drought affecting the sugar-growing ‘*Zona da Mata*’ in combination with tight restrictions on government credit and high production costs (Andrade, 2001: 274); many mills closed, and hundreds of thousands of cane labourers were laid-off (Barros, 2005:9). But some of the larger producers in the state successfully expanded their operations, taking over new areas of land, and incorporating modern technologies, positioning themselves to benefit from the latest market expansion (Andrade, 2005:266).

²³ Although, as Hazell and von Braun (2006) point out, undue attention has thus far been paid to the polluting effects of the energy used to grow plants for biofuel.

Amidst this latest boom in sugarcane production there is little evidence of improvement in working conditions for hundreds of thousands of unskilled cane workers (Barros, 2005). Sugarcane cultivation has been associated with labour and environmental exploitation throughout its history in Brazil, during and after the colonial period (Andrade, 2005:249). Emancipation from slavery in the late nineteenth century did little to improve the living and working conditions of newly-free men and women. With almost all of the land in sugar-producing areas given over to monocultural sugarcane production and no productive land available for small-holdings, most ex-slaves continued to work for their former owners, and were most commonly remunerated with meagre credits to buy food at inflated prices in the landowners' plantation stores (Scheper-Hughes, 1992:42). Descriptions of rural labourers' working and living conditions in the Northeastern sugar-producing regions in the mid-twentieth century suggest that little changed in the first fifty years of emancipation (Castro, 1946:96), and even today denouncements of 'slave labour', with workers paid mainly in-kind, are not uncommon (for example, Phillips, 2007).

Nowadays workers' wages are pegged to the legislated minimum wage, and productivity incentives during the harvest offer workers the chance to augment wages according to the weight of cane cut. The strategy is successful from employers' perspectives; the daily output expected of the strongest workers has increased dramatically from around 2,000 kilos in the 1960s to around 8,000 kilos today (Barros, 2005:7). But stories of worker deaths from dehydration and exhaustion somewhere in the country hit the national headlines every year (see for example, Mendonça, 2006:17; Phillips, 2007), and the damage wrought on workers' health can reduce the period in which they are fit enough to cut cane to as little as 12 years (Frei Betto, 2007; see the quote from Scheper-Hughes, above). Workers' unions have made inroads on the protection of workers' rights in collective agreements with employers (for example the Collective Convention of Cane Workers in Pernambuco 2006/07; FETAPE, 2006), but many clauses are flagrantly ignored in practice (Barros, 2005; FETAPE Director, 2007).

3.3 The Research Site

3.3.1 The Municipality of Gameleira

The municipality of Gameleira was selected principally for the nature of local labour relations in the sugar industry; almost all the land in the municipality is dedicated to monocultural sugarcane production, and landless labourers are largely dependent on the sugar industry for work and on local town markets for food. Gameleira is located in the southern *Zona da Mata*, approximately 100 kilometres from the state capital of Recife. The region's denomination as *Zona da Mata* - Forest Zone – is a stark reminder of the lush Atlantic Rainforest cover that existed before the deforestation wrought by sugar production began in the sixteenth century. The municipality has a population of approximately 26,700 (IBGE, 2007).

Land under sugar cultivation is divided into fifty-two rural plantations (*engenhos*), large estates shaped during the former slave economy. As a result of historical and ongoing concentration of land ownership (Andrade, 2005:266), plantation land in the municipality is now owned or rented by a small number of sugar mill-owners. The same process of concentration has occurred in the control of the industrial process of sugar and ethanol production (Andrade, 2001), particularly since the advent of tighter industry regulation and modernization through the governmental *Instituto de Açúcar e Alcool* (Sugar and Ethanol Institute) from 1934 onwards (Scheper-Hughes, 1992:44).

The small-scale mills which used to exist in Gameleira have all closed, and most of the municipal land planted with cane belongs to The Mill²⁴, located in a neighbouring municipality. The Mill is one of the oldest and largest in Pernambuco, a complex industrial plant producing sugar and ethanol controlled by one of the small number of large corporate groups which have come to control the production chain in the Northeast (Andrade, 2005). It employed almost five and a half thousand unskilled rural workers to work on the land in the 2006/07 harvest (The Mill HR Director, 2007), including the large majority of rural labourers living in Gameleira.

²⁴ The names of all places, organisations and individuals, except the municipality, are fictitious in order to protect the identity of my research informants and participants.

Since almost all land in the municipality is dedicated to monocultural sugarcane production, and the few existing smallholdings generally do not employ non-family labour, the sugar industry is virtually the only source of employment for rural labourers. The municipality has no industry other than sugar, and jobs are scarce in the town's small-scale commerce, services, and public sector.

3.3.2 The Research Locations: Plantation and Town

Two locations in the municipality were chosen for the study on the basis of a number of criteria: a population of landless rural labourers dependent on the sugar industry for work; reasonable ease of access from the town of Gameleira to facilitate logistics; the presence of community health workers willing to help with introductions to workers' households; and no prior research activity by the state university or government to avoid problems of 'research fatigue'. The locations selected for the study were Caneto, a sugar plantation approximately 15 kilometres from the town of Gameleira, and Santana, a neighbourhood with very rural characteristics on the periphery of the town.

The Caneto plantation is composed of 79 houses in a small settlement built around 100 years ago, with a population of about 500²⁵. The land and the houses are owned by the The Mill and at least one member of every household works in an unskilled or semi-skilled occupation on the plantation or in the industrial plant as a condition of occupying a house free-of-charge. Electricity generated by The Mill's dam is also provided to households at no cost, as is water, an unlimited supply hand-pumped from wells in the neighbourhood. The type and quality of housing varies widely, from tiny two-room mud huts, to solid three-bedroom brick and mortar constructions. Housing is poorly maintained and distinctly sub-standard in most cases, without any form of sanitation; most households have built their own rudimentary latrines a short distance from the house, but many residents prefer to use open land or the river that runs through the plantation.

²⁵ Population figures based on estimates from the Municipal Health Secretariat.

The Santana neighbourhood is a crowded area of 63 houses, with a population of approximately 270. The houses were built by the local government to house victims of serious floods left homeless in 2000; most of the residents are families who received a house free-of-charge after losing their homes. A few have purchased houses and moved in more recently. Almost all household heads are unskilled rural labourers dependent on seasonal contract work in the sugar fields or factories owned by one of several large mills in the area. Residents pay for their monthly electricity usage and a flat monthly fee for an unlimited water supply; the water, drawn from a well bored when the neighbourhood was built, is known to be contaminated. Conditions are over-crowded; each house consists of two rooms (a kitchen/living area and a bedroom), a toilet served by a rudimentary sewage system, and a small backyard.

3.4 The Gameleira Sugar Labour Market

3.4.1 The Sugar Labour Market and Working Conditions

Almost all sugar labourers in the municipality are men of 18 years or older. Child labour has been virtually eliminated in recent years on land owned by large mills (Barros, 2005); government legislation and active regulation by Regional Work Offices (DRTs) and unions make it a risky prospect to utilise illegal underage labour (Caneto Manager, 2007). Mills generally avoid employing individuals until the age of eighteen, thereby circumnavigating legal clauses about health and safety issues for 16-17 year old workers (OIT, 2006; The Mill HR Director, 2007).

The sugar labour market is highly gendered. Far fewer women are hired than in the past; Porter et al (2001:839) report that women constituted 40% of the sugar industry's workforce in the *Zona da Mata* in the 1970s and 1980s, but only 20% by 1995; only 7.4% of the workers employed by The Mill in 2006/07 were women (The Mill HR Director, 2007). Porter et al (2001) suggest that legislation for gender equality of labour rights and pay in the 1988 Constitution, including paid maternity leave, have encouraged discriminatory employment practices; added to this, mills are expected, under agreements drawn up by employers and workers' unions, to provide crèche facilities on plantations with more than 30 female workers (FETAPE, 2006).

Skilled labour is shipped in from the state capital, Recife, on a weekly or daily basis. A few local labourers are employed in semi-skilled positions, including plantation overseers (*apontador*), inspectors (*conferente*) and supervisors (*cabo*) in the fields, and machine operators in the fields or the factory (see description of basic functions in Table 3.1). Different occupations command differential wage rates, falling with lower levels of skill.

Table 3.1. Hierarchy of occupations in the local sugar industry

Job title (Eng.)	Job title (Port.)	Function	Skill-level	Wage-level*
Plantation Manager	<i>Fiscal</i>	In charge of all aspects of plantation work	Skilled	1
Plantation Administrator	<i>Administrador</i>	Responsible for daily administration on plantation	Skilled	2
Plantation Overseer	<i>Apontador</i>	Signs off on weekly work sheets stating hours worked/area covered by worker	Semi-skilled	3
Plantation Inspector	<i>Conferente</i>	Checks work in the fields, resolves disputes between field supervisor and labourers	Semi-skilled	4
Field/factory machine operator	<i>Operador de máquina</i>	Operates machinery in the fields or factory	Semi-skilled	5
Field supervisor	<i>Cabo/supervisor agrícola</i>	Responsible for organizing and supervising his work 'gang', measuring out area of land for each worker	Semi-skilled	6
Rural labourer	<i>Trabalhador rural</i>	General services in the fields, including replanting, weeding, cleaning channels, pesticide application, cane-cutting etc	Unskilled	7
Factory worker	<i>Trabalhador de fábrica</i>	General services in the factory	Unskilled	7

* 1 = highest wage level

Unskilled labourers work mainly in the sugar fields, though a few are employed in the factories. Rural labourers undertake a variety of tasks – replanting cane, weeding, cleaning water channels, applying manure and pesticides, and cutting sugarcane. Those who work in the non-harvest season are paid the minimum wage (approximately US\$160/month gross or US\$135 net²⁶ in August 2006). During the harvest, labourers are required to cut at least a pre-determined area of cane (a *diária*), equivalent to approximately 3,000 kilos in weight, an area that takes an average labourer five or six hours (FETAPE, 2006:10); they can then augment their basic wage by cutting more cane

²⁶ After employee national insurance (INSS) contributions and union fees have been deducted.

or working more hours in other tasks. Workers can opt out of cutting cane if they wish to, or for health reasons; in this case they are required to work an eight-hour day in order to receive the minimum wage. Female sugar labourers theoretically receive wages on a par with male workers, but are generally not strong enough to increment their earnings above the minimum wage during the harvest.

The seasonal nature of most unskilled, sugar-related occupations, with high labour demand during the 5 or 6 month harvesting season, and low demand during the remainder of the year, creates a high level of seasonal rural unemployment in the municipality²⁷. Very few unskilled workers in the municipality find non-sugar employment unaffected by the seasonal fluctuations of the sugar harvest - in construction, domestic service or doing odd jobs (*bicos*). Fewer still of the labourers on seasonal contracts find alternative work during the non-harvest season.

3.4.2 Labour Relations

Some labourers are hired as permanent mill employees (*fichado velho*) in semi-skilled or unskilled positions. They work all year round and are entitled to paid annual and sick leave, a thirteenth monthly wage, employer contributions to the national insurance programme (INSS) and the Employment Guarantee Fund (FGTS)²⁸, and severance pay; there are however numerous stories, and a lesser number of court cases, pointing to underpayment of entitlements by some mills (FETAPE Director, 2007).

Less fortunate workers are contracted on a seasonal basis (*safristas*) when there is demand for unskilled labour beyond that provided by permanent employees. They have no trouble finding five to six months employment during the harvest season, during which they receive benefits proportional to the time they work, as well as contract termination payments upon severance. Some contract workers are rehired for a few

²⁷ Figures for the Gameleira municipality were not available; FETAPE figures suggest that about 48% of workers in the state of Pernambuco are seasonal (FETAPE Director, 2007).

²⁸ The national insurance programme (INSS - *Instituto Nacional do Seguro Social*) pays sickness, disability and unemployment benefits and pensions (Ministério de Previdência Social, 2008); the Employment Guarantee Fund (FGTS - *Fundo de Garantia do Tempo de Serviço*) is paid to employees if they are fired without good reason, or when they retire (Caixa, 2008).

months when preparation for harvesting begins; others remain unemployed for the duration of the non-harvest season. During 2006/07, 72% of The Mill's workforce were harvest-time contract workers (The Mill HR Director, 2007). A few contract workers migrate during the non-harvest season to work in sugar harvests in other regions of the country with different climatic patterns, and send their wages to their households²⁹.

Mills have contracted labourers resident off plantations since the 1950s (Heath, 1981:269; Scheper-Hughes, 1992:27). The pool of contract labour has gradually increased in number, partly by way of forced expulsion of permanent workers from plantation land by mills seeking to reduce their fixed labour costs and social obligations to workers' families (Andrade, 2005)³⁰, and increase the amount of land available for sugar cultivation (sometimes by violent means: see Scheper-Hughes, 1992:45; Porter et al, 2001:838)³¹.

There also exists a sub-group of off-plantation labourers who are hired informally on a daily or weekly basis and paid at rates below the minimum wage (*clandestinos*). This form of employment is illegal and workers do not have recourse to legislated worker rights. While it seems that the practice has declined significantly in recent years due to heavy fines, labourers from Santana told me that they sometimes work under these conditions.

It has also been common practice for mills to contract seasonally with younger workers on plantations, mainly sons of permanent employees, at the beginning of their working lives; thus, plantation households in which the household head is a permanent employee may also have one or more contract workers. A more recent phenomenon is the imposition of seasonal contractual relations on labourers who have separated from their family of origin and set up their own households on plantations such as Caneto. By offering only seasonal contracts to some plantation workers, mills have a guaranteed pool

²⁹ Very few migrate seasonally in this way, perhaps because they lack information or contacts about these opportunities, or because they lack the initial capital for upfront expenses.

³⁰ In practice, only housing and sometimes access to land for subsistence food production, although the 2006/07 Collective Convention states that mills should also make provisions for a primary school, literacy classes, and land on which to teach agricultural skills, in settlements of 50 or more houses (FETAPE, 2006).

³¹ I was shown areas on plantations where housing had been razed to make way for sugar production.

of harvest labour in return for free year-round housing, while avoiding the fixed costs of permanent employees and exonerating themselves of any other obligations to those workers in the non-harvest period.

Both categories of worker – permanent and contract – are affected by seasonal variations in employment and income, but the impact on contract workers is far greater. During the harvest, all categories of worker can find employment; such is the demand for cane-cutters that migrant workers are shipped in and temporarily housed in large dormitories. During the non-harvest season, permanent employees earn the legislated minimum wage, more in a semi-skilled position. Contract workers, on the other hand, face anything from three to seven months unemployment depending on when they are rehired. Unemployed contract workers receive no unemployment benefit (workers become eligible for unemployment benefit only after a year's continuous service³²), and contract termination payments contribute little to a household's expenses over the non-harvest period. Many contract workers face an arduous struggle to 'make ends meet' until they are rehired.

3.5 The Household Sample

3.5.1 Sampling Design and Strategy

My original intention was to compare living and working conditions, and their impact on household diets, food distribution within households, and individual nutritional status on the plantation and in town. When I began fieldwork I was under the impression that location and labour group coincided, that at least one worker in each plantation household was a permanent mill employee, while all workers living in town were seasonal contract workers. The practice of contracting seasonally with young household heads in Caneto only became apparent during the sample selection process. This is a relatively new phenomenon – about five years according to informants – which was not apparent in the literature I had reviewed (for example, Porter et al, 2001; Andrade, 2001; Barros, 2005), and had not surfaced during the exploratory phase of fieldwork.

³² In 2007 the Pernambuco state government re-introduced a scheme (*Chapeu de Palha*) to pay unemployment benefits to unemployed workers who could demonstrate that they were formally employed by a mill in the preceding harvest season (Globo, 2010).

I initially modified my plan to explore conditions in all three location-labour groups – households in which the heads were permanent employees on the plantation (Caneto permanent-CP), contract workers on the plantation (Caneto contract-CC), and contract workers in town (Santana-SN) - until the exclusion of four households from the sample, explained in the next section, together with the division of the sample into three strata rather than two, made the use of inferential statistical techniques within each group unviable. The need to exclude some households only became apparent after data collection was under way, hence the households were not replaced with others in the sampling frame. Given these conditions, it made most sense to pool the data from the three groups, thereby creating a sample of sufficient size to use inferential statistical procedures and generalise findings to the underlying population.

Location-labour group was entered as a predictor in regression models in order to ‘remove’ the group effects on nutritional status and dietary intake and generalise findings beyond the sample households. The data presented in later chapters indicate that membership of a particular location-labour group was not a significant predictor of individual nutritional status or intake of high status foods, at least when the other predictors entered in the models were held constant; it is possible this would not be so with a different set of predictors. The non-significance of location-labour group may be because the populations in all three groups are relatively homogenous (all have low per capita incomes and are subject to some degree of seasonal variation in employment and wages, and many face periodic food insecurity), and/or because important characteristics which contribute to a particular phenomena cancel each other out (for example, child stunting could be partly due to poor sanitation in Caneto and poor quality drinking water in Santana, both of which create the conditions for disease among children).

3.5.2 Sample Size

I planned to select a total of 36 households, the maximum number of households in which I felt I could undertake extensive survey work with a large enough number of individuals

to use inferential statistical procedures³³, while also building trusting relationships in order to collect in-depth ethnographic data, within the limits on my timeframe and resources. However, after excluding infants under six months old³⁴, and dropping four households, the sample fell to 152 individuals in 32 households. The reasons for dropping the households were as follows. One SN household with two individuals was excluded after the first survey because the household head had been misclassified as a seasonal contract labourer when she was in fact a permanent mill employee. This was a unique occurrence in the SN neighbourhood³⁵, according to my research assistant. The household was excluded so that all households in the SN sample were headed by contract workers. A second SN household, also with 2 members, was excluded because they moved away after the first survey. Both households were female-headed; after their exclusion, there were no female-headed households in the sample.

A further two households were dropped due to the particularly stringent data needs for the analysis of seasonal variation in intra-household food allocation across several rounds of data collection. The computation of an intra-household dietary index based on individual scores relative to average household scores requires that households remain as intact as possible³⁶. Yet changes to household size and composition were frequently used as a strategy to deal with poverty: individuals with income moved from one family home to another (retired individuals with pensions, children with benefits in their names), children were moved to households with more resources, and related households joined during seasonal shortage and separated in times of greater employment and income. To maximise the reliability of the intra-household index, households were dropped from analyses if more than one-third of their members was absent on the recall day, or had moved away temporarily or permanently. This occurred in two large CP households with

³³ On the basis of estimates of average household size in the locations made on information available from the Health Secretariat, a sample of 36 households was calculated to yield a total sample of approximately 200 individuals; with possible attrition of up to 10%, the final sample would be around 180 individuals. It turned out that household size was overestimated by the Secretariat.

³⁴ Infants under six months were excluded from the dietary analyses because they were not expected to have access to the full range of foods classified as high status.

³⁵ She had moved from a plantation to town and retained her permanent employment status with the mill owning the plantation.

³⁶ See Leonard and Thomas (1989) for a description of similar problems in their research into the seasonal effects on intra-household dietary intake.

a total of 19 members between them. One household separated from one extended family to two nuclear families when the head of the younger family was employed during the harvest season, and joined again when he was unemployed; the other household separated when the majority of its members moved from the plantation to town.

3.5.3 Sampling Procedures

In order to explore intra-household and gender relations among cane workers, households with the following characteristics were excluded from my sampling frame: (1) households with an individual living alone; (2) households in which no-one was working, or seeking work, in the sugar fields or mills; and (3) households with one or more skilled worker(s) (specifically, the plantation manager and administrator, because they exercise very different functions, and receive significantly higher incomes, relative to semi-skilled and unskilled labourers). Eligible households were picked out of a hat at random by my research assistants. In SN, four households in the original selection had to be dropped and were replaced by reserve households for the following reasons: two were about to move out of the neighbourhood, one was temporarily empty, and in one, the residents were not found at home on three consecutive visits.

Two households refused to participate, one CP and one SN household. The daughter-in-law of the head of the CP household later told me that he had reason to be wary of losing his job with The Mill. The woman who answered my call at the SN home was known for remaining ‘aloof’ from activities in the neighbourhood³⁷. These households were replaced by others in the sampling frame.

3.5.4 Sample Groups for Dietary Analyses

In six of the 32 households, no individuals consumed high status foods on the non-harvest recall. These households could not be used in the evaluation of seasonal effects on the intra-household distribution of high status foods, and were therefore treated as a separate group for dietary analyses. I could have kept the sample intact and analysed only

³⁷ Her response may also have been because I called on her and explained the survey without the presence of one of my research assistants (it was the only case); my introduction by my local assistants may have been crucial to people’s willingness to participate.

the harvest data collected for all 32 households, but the analyses would have been based on only two dietary recalls rather than the three I had collected, giving less accurate estimates and describing food distribution at only one point in the year. I preferred to maximise use of the data collected and examine seasonal modifications in households in the larger Group 1 (113 individuals) in which high status foods were consumed on all recalls, while exploring harvest-time food allocation behaviour in the households in which no high status foods were consumed on the non-harvest recall in the smaller Group 2 (26 individuals). The number of individuals in each age-gender group in the whole sample and in Groups 1 and 2 is shown in Table 3.2.

Table 3.2. Demographic composition of the sample

	No. of individuals		
	All individuals	Group 1	Group 2
No. of individuals	152	113	39
Adults	77	65	12
Men	41	35	6
Women	36	30	6
Children	75	48	27
Boys	35	23	12
Girls	40	25	15

The groups were combined for the nutritional status regression analyses, because the data were not seasonal. They were treated separately for the dietary analyses, and regressions were undertaken only with the larger Group 1, as cell sizes in Group 2 were too small to give reliable parameter estimates. Background information on diet, health, and gender roles and relations in Chapters 4 and 5 is presented for the two groups combined as all households are embedded in the same micro- and macro-environments. I did not set up different hypotheses with regard to gender bias in Groups 1 and 2 for the same reason. Data on household characteristics in this chapter, and on nutritional status and intra-household food allocation in Chapters 6 and 7, are presented separately, and findings are discussed separately in Chapter 8.

Group 2 is particularly small – 39 individuals – so patterns are presented as *suggestive* of the way in which high status foods are shared among age-gender groups in less affluent households, although the estimates may be less reliable than those in Group 1 and

conclusions are drawn with caution. This is particularly so since neither group nor household effects were removed in regression. The split in the group coincided closely with location and labour group – Group 2 is composed of five Santana households with contract labourers and one Caneto household with a permanent employee (see Table 3.3); the Caneto household in Group 2 was very similar to that of the Santana households in Group 2 in terms of household size, dependency rate, and per capita income and spending. Location and labour group effects were therefore not of great concern, but household effects which remained mean that differences among age-gender groups may appear larger than they are within households in the underlying population.

Table 3.3. Distribution of households in Groups 1 and 2 by location, labour group and location-labour group

	No. of households		
	All households	Group 1	Group 2
No. of households	32	26	6
Location			
Caneto	22	21	1
Santana	10	5	5
Labour group			
Permanent	12	11	1
Contract	20	15	5
Location-labour group			
Caneto Permanent	12	11	1
Caneto Contract	10	10	0
Santana	10	5	5

3.5.5 Missing Dietary Recall Data

Values on the high status foods indicator (ISFS) were imputed for 12 individuals who were not present during one or two dietary recalls, whether they moved away permanently or were away from home temporarily, in households which did not lose more than a third of their members. Mean imputation was used, based on the scores of other household members³⁸. This is a conservative approach to the estimation of missing data which may have reduced the sensitivity of the analyses and their power to detect

³⁸ Missing harvest scores were imputed by adding/subtracting the mean difference between the two harvest scores of all other household members to the individual's existing harvest score; missing non-harvest scores were imputed by adding/subtracting the mean difference between the harvest and non-harvest scores of all other household members to the individual's average harvest score.

differences (a Type II error), but should not have increased the standard error (Tabachnik and Fidel, 2007:67). In addition, two individuals in two households, relatives of the household head or spouse, temporarily present only at the last recall were excluded from analyses, and it was assumed that their presence had not had a significant impact on the high status food consumption of others in those households. The percentage of individuals with imputed data was low (7.9% of the total), the identities of these individuals were random, and the seasons and weekdays for which recalls were imputed were also random; if the imputation procedure introduced an element of bias it is likely to be random rather than systematic.

3.5.6 Representativeness of the Sample and Generalisability of Findings

The small size of the sample may have diminished the power of the regression analyses to detect differences among age-gender groups in nutritional status and dietary intake, and it is possible that some small to medium differences among age-gender groups in the underlying population were not detected (a Type II error). This is of course preferable to a Type I error; where differences are shown to be statistically significant there is good reason to believe that they indicate real differences in the underlying population rather than a chance finding in the sample. The small sample size also made it unfeasible to run regression models for two of the child anthropometric indicators. A larger sample would have reduced these problems. But, as is the case in most small-scale and mixed methods studies, the estimation of a desirable sample size to achieve ideal levels of risk and confidence based on the population size and several unknown values – the population parameters, potential sources of error and the estimated size of the differences to be detected - would have indicated the need for a larger sample but done nothing to overcome the resource constraints which limited the sample size in the first place (Bryman, 2008:179).

The representativeness of the sample in relation to the underlying populations may also be limited by several factors which introduced sampling bias – non-response, refusals, and the imputation of missing data – but the impact of these was small. Quantitative findings can therefore be generalised to other households beyond the sample in the two

research locations which meet the criteria for household selection: households composed of more than one individual, with at least one unskilled or semi-skilled (but not skilled) individual working or seeking work in the sugar fields or factories. Findings may however not generalise to households with the same characteristics as those households later excluded from analyses, particularly large households which may split and join at different seasons, and female-headed households.

Difficulties with sample size and representativeness are not uncommon in the collection and analysis of survey data and illustrate the tension between breadth and depth of data collection in a mixed methods study, especially one conducted by a lone researcher; others have documented the problems they encountered in similar kinds of fieldwork (see various accounts in Harriss-White, 1999). It is sometimes recognised, but perhaps too infrequently, that there are almost always problems with “the scientific ideal of representative coverage” in the samples taken in small-scale studies (Olsen, 1999:53). The selection of specific neighbourhoods for study, for example, tends to be subjective, and these can rarely provide enough social and geographical variation (in terms of accessibility, or links beyond the neighbourhood, for example) to form the basis for inference to larger geographic areas. In this study, the neighbourhoods were chosen largely on the basis of their accessibility from the municipal town by public transportation; more distant rural plantations would differ considerably on key variables. Then there are virtually always problems of sampling bias in the selection process (some units have less chance of being selected) and sampling error (differences between the sample population and the underlying population due to natural variation) (Bryman, 2008:169) which compromise the degree of representativeness of the underlying population. In addition, the data collected in any sample are temporally-specific and as such, likely to represent the underlying population less accurately with the passage of time.

These limitations are compensated for by the strengths of my study. The external validity of the quantitative data is enhanced by the low non-response rate and the high level of cooperation throughout the study. The relatively homogenous nature of the study

population ensured a higher level of precision in quantitative analyses than would the same sample size in a more heterogeneous population (Bryman, 2008:182). And the quantitative findings are complemented by the qualitative work: my in-depth knowledge of the context and its people strengthened my ability to interpret the quantitative data, compensating for some loss of confidence in the statistical data (Bernard, 1995:79), and the rich description provided in the study allows for the assessment of the transferability of the findings to other contexts. The result is a research account more robust than one produced exclusively on quantitative or qualitative data. Ultimately the study seeks theoretical generalisation, adding to the existing body of theory in intra-household food allocation. All this is to say that the generalisability of the quantitative findings of any study to a broader population is not the only, or necessarily the most important, value of social science research.

3.6 Sample Household Characteristics

The demographics, labour relations, occupations, seasonal employment, assets, incomes and expenditures in Group 1 and 2 households are described in the following sections. Continuous data in each group were screened for outliers that might “unduly influence” the mean and standard deviation values (Tabachnik and Fidel, 1989:66). An outlier was defined as a value falling “more than 1.5 of the inter-quartile range (IQR) above the upper quartile or 1.5 of the IQR below the lower quartile” (Agresti and Finlay, 1997:64); the SPSS boxplot was used to identify outliers. In most cases there were only outlying values in Group 1 because the group contains more disparate cases from both locations and labour groups; Group 2 is much more homogenous. The value of each outlier was changed to one unit above or below the next most extreme value³⁹ (Tabachnik and Fidel, 2007:77), and the analyses were rerun. All but one of the adjustments made very little difference to the mean values, so the unadjusted values are presented; the adjusted values can be seen in Appendix 4 (Table A.1).

Paired samples t-tests were used to test the statistical significance of seasonal differences in income, total spending and food spending in the whole sample and Group 1. The non-

³⁹ A full US dollar in the case of monetary values.

parametric Wilcoxon Signed-Rank Test was used for Group 2 due to the small sample size. The results are for one-tailed probability given the prediction that income and food spending were higher in the harvest than the non-harvest season⁴⁰.

3.6.1 Sample Household Demographics

The definition of ‘household’ used in this study is ‘a group of individuals sharing a common food supply’. Unlike in some contexts (see Casley and Lury, 1987:161), this definition was easily managed as it coincided with living and sleeping accommodation in separate houses. All individuals resident in a household for the greater part of the reference month of each survey were deemed to be household members; labourers who worked and lived away from the household during the week but returned at the weekend were included, since their food needs were met within the household budget. The designation of household head provided by household members was accepted. In all cases, the head was the oldest man in the household.

There were many changes to the composition of households in the six-month period from the first to the second survey, affecting just over a quarter of all the households in the sample, due to the birth of a baby, the incorporation of other family relations, the departure of one or more household member(s) to form a new household, or the dissolution and re-integration of family units depending on the employment status of young household heads. The data presented here reflect demographic characteristics at the time of the first survey, unless otherwise stated.

Table 3.4. Demographic characteristics of sample households

	Mean (SD)		
	All households	Group 1	Group 2
No. of households	32	26	6
No. of individuals	152	113	39
Mean (SD) household size	4.84(2.25)	4.38(2)	6.83(2.32)
No. of households (econ dependency rate)	31*	25*	6
Mean (SD) economic dependency rate	2.9(2.25)	2.4(1.67)	5(3.23)

*one Group 1 household was excluded from the economic dependency rate because there were no wage-earners in the household at any time.

⁴⁰ Use of the two-tailed probability made no difference to the statistical significance of the results.

Household size in the sample varied from two to ten members. The mean household size was 4.38 in Group 1, and 6.83 in Group 2 (see Table 3.4). The economic dependency rate shows the ratio of the number of dependents to the number of income earners in the household; an individual receiving income in the form of wages or a pension was classified as an income earner, regardless of his or her employment status, in other words, whether or not he or she was employed at the time of the survey. This means the rates were most accurate during the harvest, when most workers were employed. In the non-harvest season, households with unemployed contract workers were worse off than these rates suggest.

The mean economic dependency rate was 2.4 in Group 1, and 5 in Group 2. The large difference in the dependency rates is largely because all Group 2 households were nuclear units formed of two adults, only one of whom had an income, mostly with a large number of dependent children. In contrast, there were a number of extended families containing more than one income-earning adult in Group 1. As Table 3.2 shows, there were more adults than children in Group 1, but more children than adults in Group 2.

3.6.2 Sample Household Labour Relations and Employment

At the time of the surveys, all men in the sample but two worked for wages; one of the exceptions was disabled, the other retired. All of the male wage labourers but one worked in the sugar industry; the exception was a construction labourer living in Caneto. Of the 44 workers, only two worked in the factory, the remainder were employed in the fields. Five women worked for wages, 13.9% of all women in the sample, all in unskilled occupations⁴¹. Three of them worked in the sugar fields, two in Group 1, as permanent mill employees, and one in Group 2, as contracted labour during the harvest season. The remaining two female wage workers worked as a school cook (Group 1) and a part-time domestic help (Group 2). A substantially higher proportion of the workers in Group 2 were women (25% vs 8.3%) (Table 3.5); of all the women in each group, 10% of Group 1 and 33.3% of Group 2 women worked outside the home. The number of women working

⁴¹ Two other women, one in each group, told me they sometimes worked in the sugar fields, but they did not work at any time during the surveys, one due to ongoing unemployment, largely due to alcoholism, the other due to pregnancy, followed by unemployment; they have been excluded from the counts in Table 3.5.

has fallen significantly over a generation in sample households, from 52% of the mothers of household heads and spouses to 13.9% in the sample.

Table 3.5. Gender, labour relations, occupations and level of skill of wage workers in sample households

	Percentage (count)		
	All workers	Group 1	Group 2
No. of workers	44	36	8
Gender of Worker			
Male workers	88.6 (39)	91.7 (33)	75 (6)
Female workers	11.4 (5)	8.3 (3)	25 (2)
Labour Relations			
Permanent	34.1 (15)	38.9 (14)	12.5 (1)
Contract	65.9 (29)	61.1 (22)	87.5 (7)
Occupations and Skill Level			
Semi-skilled			
Overseer	1	1	0
Inspector	1	1	0
Machine op. (field/factory)	4	4	0
Field supervisor	5	4	1
Total, semi-skilled	25 (11)	27.7 (10)	12.5 (1)
Unskilled			
Rural labourer	29	23	6
Factory worker	1	1	0
Other*	3	2	1
Total, unskilled	75 (33)	72.7 (26)	87.5 (7)

*construction worker, school cook, domestic worker (all unskilled, all contracted but not seasonal)

Just over 34% of workers in the sample were permanent employees with year-round employment, the remainder were seasonal workers (see Table 3.5). A higher percentage of Group 1 than Group 2 workers were permanent mill employees (38.9% vs 12.5%). Contract labourers living on the plantation – all in Group 1 - expected to become permanent employees in the future, as existing employees retired. The same was not true of Santana contract workers in Groups 1 and 2, who had almost no chance of becoming permanent employees.

Twenty-five per cent of workers in the sample occupied better-paid, semi-skilled positions (the plantation overseer and inspector, machine operators and field supervisors), all but one of them in Group 1. The remainder held unskilled positions. No women

occupied semi-skilled positions with higher pay rates; supervisory roles and machine operation were seen as male domains.

Table 3.6. Unemployment among workers in sample households during harvest and non-harvest periods, 2006-2007

	Percentage (count)		
	All workers	Group 1	Group 2
No. of workers	44	36	8
2006 late non-harvest (August)	18.2 (8)	16.7 (6)	25 (2)
2006/07 harvest (January)	2.3 (1)	0 (0)	12.5 (1)
2007 early non-harvest (March)	36.4 (16)	30.6 (11)	62.5 (5)

All workers but one were employed in the 2006/07 harvest season (see Table 3.6). The exception was the part-time female domestic worker in Group 2 whose work flow varied depending on her boss' needs. At the end of the non-harvest period of 2006, 18.2% of workers in the sample were unemployed, 16.7% in Group 1 and 25% in Group 2; at the beginning of the 2007 non-harvest period, 36.4% were unemployed, and again, employment was higher in Group 2 than Group 1 (62.5% vs 30.6%). The unemployed workers in the non-harvest periods were all unskilled workers with seasonal contracts on the plantation and in town. Some of them were the sole income earner in the household, leaving those households vulnerable to financial difficulties and food shortage. Contract workers on the plantation are usually in a stronger position than those in town in terms of employment opportunities, as contracts are awarded to household heads in Caneto, other contract workers in Caneto, and contract workers in town, in that order.

This pattern is typical: unemployment is usually higher earlier in the non-harvest season than later, when some workers are hired to prepare for the coming harvest. Unemployment was said to be lower in the non-harvest season of 2007 than is usual at this time of year. The Mill had retained over 1,000 contract workers upon termination of the 2006/07 harvest, and it and others in the region were promising to hire more contract workers. The higher demand for workers was largely due to the rising demand for ethanol as a biofuel in Brazil and globally (Biodiesel Brasil, 2008). The Mill was expanding its area of sugar cultivation by buying and renting more land in Pernambuco, and had bought mills and land in three other states (The Mill HR Director, 2007); some permanent

workers were sent to work in other states, and more were likely to follow, opening up space to hire more contract workers locally.

3.6.3 Sample Household Assets

Table 3.7. Mean value of assets in sample households (US\$) (August 2006)

	Mean (SD)		
	All households	Group 1	Group 2
No. of households	32	26	6
Mean value of assets (SD)	202.59(307.39)	195.01(337.88)	235.37(115.85)

Table 3.7 shows the mean value of assets in US dollars in Groups 1 and 2 at the time of the first survey. There was very high variation in the value of assets among sample households. Fifteen of the households in the sample – almost half - owned no assets of monetary value⁴². Among the remainder, ten owned the house they lived in - all of the Santana households, four owned one or more large animals, two owned mobile telephones, one owned a run-down car, and three had savings at home or in the bank.

The surprisingly higher value in Group 2 – the group with higher dependency rates, more contract and unskilled workers, and lower per capita incomes (shown in the next section) - is due to a house ownership issue specific to plantation organisation. Group 2 is composed mainly of households in Santana, where residents own their homes⁴³; most of them (66.7%) owned no assets other than their homes. In contrast, all houses on the plantation are owned by The Mill. This difference in house ownership is largely neutralised by the greater financial security of most households in Caneto – those with permanent employees who would receive pensions and accumulate FGTS benefits, values generally sufficient to buy a house in town upon retirement if they wish. The same was true of contract workers on the plantation if they were hired permanently. I was also told (by The Mill HR Director and some workers) that retired workers are allowed to

⁴² I use the term ‘asset’ to indicate ‘possessions....which have a positive money value’ (Bannock et al, 1997); the values provided by respondents were accepted, except for the houses in Santana (see footnote 43).

⁴³ Most residents in Santana do not own their homes in the eyes of the law because they do not have the cash to register the property titles in their names. This does not seem to present a problem; many houses have been bought and sold since they were occupied in 2000. Survey respondents provided wildly differing estimates of the value of their houses; since the houses are identical except for small variations in the size of the yard, values were homogenized, using the mode value given in the survey (US\$273.33).

remain in their homes on the plantation if they wished, although others disputed this claim.

Table 3.8. Percentage of sample households owning furniture and white and electronic goods (August 2006)

	Percentage (count)		
	All households	Group 1	Group 2
No. of households	32	26	6
Table and chair(s)	100 (32)	100 (26)	100 (6)
Sofa/easy chair	87.5 (28)	84.6 (22)	100 (6)
Gas stove	81.3 (26)	84.6 (22)	66.7 (4)
Radio/sound system	78.1 (25)	73.1 (19)	100 (6)
Television	59.4 (19)	57.7 (15)	66.7 (4)
Fridge	50 (16)	57.7 (15)	16.7 (1)
Satellite dish	43.8 (14)	46.2 (12)	33.2 (2)

The values in Table 3.7 do not include household furniture and white and electronic goods, most of which depreciate in value very quickly. Table 3.8 shows the percentage of sample households owning these goods. All households owned a table and chairs, and almost all households owned a sofa and/or easy chair, although the state of these possessions varied vastly, with relatively new furnishings in some households, and very old and worn-out furnishings in others.

The rates of ownership of furniture and household goods did not vary hugely among Group 1 and 2 households. The largest difference was in the ownership of fridges, with only one Group 2 household owning a fridge; some Group 2 households without used a neighbour's fridge. The ownership or use of a fridge can have an important effect on dietary quality, mainly in terms of the preservation of fresh forms of animal protein, especially when food is bought just once a week in a hot climate like this one. In Group 2, more households owned a satellite dish than a fridge, and in both groups, more households owned more of all kinds of furnishings and electronics than a fridge. Electronic goods - sound systems, TVs and satellite dishes – are highly valued in most households; only recently attainable, due to relative increases in incomes and falling prices, they function as an expression of household status as well as giving access to the wider world.

3.6.4 Sample Household Incomes

Two rounds of income and expenditure data were collected, in August 2006 (non-harvest) and January 2007 (harvest), in order to observe seasonal effects. All households' monetary income was generated from one or more of three sources: (1) wages and other employment-related payments⁴⁴; (2) government benefits, most importantly the child benefit (*Bolsa Família*)⁴⁵, state pensions, and a number of others⁴⁶; (3) payments from relatives (financial help from a parent, alimony from a child's father, contribution sent by a migrant worker). A few households produced small quantities of food for home consumption, but none sold produce for monetary income.

Accurate income data are notoriously difficult to collect (Casley and Lury, 1987:170). It is quite common for some respondents, particularly those with relatively higher incomes, to under-report income to create a perception of greater hardship, or because they are worried that social benefits could be cut, while others may over-report if they feel ashamed of low incomes, or if they are anxious to create a perception of higher social standing; if this is the case, income disparity among households would be greater than it appears. Recall failure can also present a problem, particularly when income changes monthly or seasonally (Deaton, 1997:29).

⁴⁴Contract termination payments, including the Guarantee Fund (FGTS); and the family 'bonus' (*abono familiar*), a payment of approximately US\$6.83 per child, paid by some of the mills some of the time; only one household received this payment in the survey periods.

⁴⁵ The *Bolsa Família* (essentially an income transfer programme) was established by the Lula government in 2004; at the time of the surveys it was paid to households with a monthly per capita income less than or equal to US\$55, at the rate of US\$22.78 per household plus US\$6.83 per child, for up to 3 children (MDS, 2006). A number of households did not receive the benefit to which they were entitled due, apparently, to the inefficiencies of a large bureaucratic machine.

⁴⁶ Other government payments received in some sample households included: (1) federal government benefits pre-dating the 'unified' *Bolsa Família* (the school grant (*Bolsa Escola*), and cooking gas voucher (*Auxílio-Gás*)); (2) the federal government Child Labour Eradication Programme ('PETI') (an allowance of US\$11 per child per month, for up to two children under the age of 16 who remained in school, paid to households with per capita monthly income less than US\$55 (MDS, 2008)); (3) the state government child labour eradication programme (*Mão Amiga*) (a programme to eradicate child labour among 7-14 year olds in the sugar-producing zones of the state (Jornal do Comércio, 1998) - only one household reported receiving a payment; and unemployment benefit (although contract workers were not eligible for unemployment benefit, one worker declared receiving unemployment benefit by an agreement between the state government and his employer, a different mill in a different municipality). There have been so many different federal and state government benefit programmes in the last decade that respondents were not always sure which benefits they received and why.

In this setting the task was somewhat simplified by the small number of sources of income and the relative homogeneity of values within each kind of income: there were few differences in occupations across the workers in the sample, the wage scales within those occupations were fairly standard, and many respondents presented workers' pay-slips, helping me to develop a good grasp on wage levels in different occupations and under different circumstances; government benefits are paid at standard rates; and state pensions are pegged to the minimum wage. Also, income not received on a regular monthly basis –non-wage payments from employers (contract termination payments, child bonus), and monetary transfers from relatives, all of which were infrequent and of little monetary value - was removed before undertaking analyses. Not only, then, do the values used best reflect 'typical' monthly household incomes, they are also devoid of the kinds of income which are most subject to inter-household variability.

Table 3.9 shows the mean regular monthly per capita⁴⁷ household income in the whole sample and Groups 1 and 2 in one month each of the non-harvest and harvest seasons. Per capita income increased from the non-harvest to the harvest season in almost all households in the sample. In Group 1 households, incomes increased by, on average, 59%, and the difference was highly significant at the .05 level. In Group 2, incomes rose by 62%; the Wilcoxon Signed-Rank test suggested that the difference was not statistically significant, but this may be due to the lower power of the non-parametric test to identify differences (Field, 2009). Many contract workers were already working at the end of the non-harvest season, August 2006, in preparation for the start of the harvest in early September; the difference between harvest and non-harvest incomes in these households would be greater still in the middle of the non-harvest season, especially in those households which had only contract workers.

⁴⁷ Household income data (and expenditure data in the next sections) are presented on a per capita basis: income/spending is divided by the number of household members. This approach understates the welfare of individuals in large households (1) if there is a large number of young children whose 'cost-of-living' is lower than that of adults; and (2) given economies of scale which reduce the costs per member of household 'public goods' consumed by all household members (Deaton, 1997:242).

Table 3.9. Mean regular monthly per capita income (US\$) in sample households, non-harvest (August 2006) and harvest (January 2007) seasons, and seasonal differences

	Mean (SD)		
	All households	Group 1	Group 2
No. of households	32	26	6
Non-harvest (August 2006)	47.15(29.37)	53.02(29.34)	21.72(9.46)
Harvest (January 2007)	75.08(41.89)	84.28(40.02)	35.19(22.76)
% increase, non-harvest to harvest	59.2	59	62
T-score/Z-score*	-6.124	-6.152	-1.363
1-tailed p-value	.000	.000	.109

*T-score for paired samples t-test (all households and Group 1); Z-score for Wilcoxon Signed-Rank test (Group 2)

The households in Group 1 had substantially higher incomes than those in Group 2 in the harvest and non-harvest seasons. Again, given that many contract workers were already working at the end of the non-harvest season of 2006, the difference between Group 1 and 2 household incomes would be greater still in the middle of the non-harvest season, especially in those households which had only contract workers.

The differences in per capita income between the two groups were mainly due to differences in wage income, by far the most significant component of income in most households: there were more permanent workers with year-round employment in Group 1 households, and the semi-skilled workers among them received higher wage rates than the unskilled workers in Group 2. The Group 1 households also had lower dependency rates and therefore higher *per capita* incomes.

Table 3.10. Percentage of sample households with regular monthly per capita income below the poverty and extreme poverty lines, non-harvest (August 2006) and harvest (January 2007)

	Percentage (count)		
	All households	Group 1	Group 2
No. of households	32	26	6
Non-harvest (August 2006)			
Below the poverty line	75 (24)	69.2 (18)	100 (6)
Below the extreme poverty line	18.8 (6)	11.5 (3)	50 (3)
Harvest (January 2007)			
Below the poverty line	31.3 (10)	19.2 (5)	83.3 (5)
Below the extreme poverty line	18.8 (6)	11.5 (3)	50 (3)

The per capita incomes in both groups in both seasons were extremely low by any standards. Assessed against poverty lines used in Brazil (poverty at less than R\$121 (US\$55.13) and extreme poverty at less than R\$61 (US\$27.79) per capita per month; FGV, 2006⁴⁸), 75% of all households fell below the poverty line and 18.8% below the extreme poverty line in the non-harvest season; in the harvest season 31.3% fell below the poverty line, and 18.8% fell below the extreme poverty line (Table 3.10). A higher percentage of Group 2 than Group 1 households fell below both poverty lines in both seasons.

While per capita household incomes were low, most respondents nevertheless told me they felt better off in terms of monetary income than twenty years ago, in their household or that of their family of origin. This is probably due to a combination of factors: tighter enforcement of legislated minimum wage and benefit payments by employers, higher incomes for some who have entered semi-skilled occupations due to mechanisation in the fields, the introduction of the *Bolsa Família* and the extension of rural pensions and other benefits, and a reduction in average family sizes (Fischer, 2003). The exceptions, households whose members felt they were worse off, were large households in an early stage of their lifecycle, with few workers and a high number of dependents, and therefore low per capita incomes.

3.6.5 Sample Household Expenditure

Monthly household expenditures in sample households included: (1) regular basic living expenses such as foodstuffs and non-durable household goods, electricity and water bills (Santana only), cooking fuel (gas/firewood, if purchased), transportation costs, and telephone bills for the few households with a mobile phone; (2) regular or sporadic medication, health and school expenses; and (3) non-regular expenses on durables like clothing, and large purchases for the home (furniture and white and electronic goods). A few households also made regular or sporadic financial contributions to relatives, including alimony payments in a few cases. Expenditure data were collected for each

⁴⁸ These were the values used by the government to select households for the '*Bolsa Família*' benefit at the time of the surveys.

component of these categories; spending within each component (for example, specific foodstuffs) was not itemized to avoid ‘overloading’ respondents. Food produced for home consumption, and food received ‘in-kind’, were not imputed to expenditure data; these foods may have reduced expenditure slightly, but the values were minimal.

A further component of spending not recorded in the expenditure data was the personal spending of some wage-earners on alcoholic drink, tobacco, food for personal consumption, gambling and other forms of adult entertainment, and/or other items for personal use. I omitted to ask the value of this spending during surveys because it tended to be an issue of tension within the household – it was invariably men who retained part of their wages for their personal use; instead, the subject was broached in conversation, if appropriate. The omission of funds spent on personal goods by some individuals exerted a small downward bias on their households’ expenditure estimates.

While reporting of expenditure data is less subject to status pressures than income data, it is more likely to be subject to recall bias, especially with recall periods of more than 2 weeks (Deaton, 1997:25). I nevertheless utilized a reference period of one month to be in line with income data. Recall error was minimized by asking respondents to think in terms of basic weekly expenditures, which tended to be fairly homogenous from week to week, and then to add specific, non-regular expenses incurred in the reference month.

Table 3.11. Mean monthly per capita spending (US\$) in sample households, non-harvest (August 2006) and harvest (January 2007) seasons, and seasonal differences

	Mean (SD)		
	All households	Group 1	Group 2
No. of households	32	26	6
Non-harvest (August 2006)	47.86(27.01)	53.72(26.09)	22.48(12.94)
Harvest (January 2007)	54.4(29.42)	59.74(28.38)	31.27(23.44)
% increase, non-harvest to harvest	13.7	11.2	39.1
T-score/Z-score*	-1.425	-1.148	-1.153
1-tailed p-value	.082	.131	.156

*T-score for paired samples t-test (all households and Group 1); Z-score for Wilcoxon Signed-Rank test (Group 2)

Spending increased from the non-harvest to the harvest reference period in both groups, reflecting the seasonal increases in income, although paired samples t-tests and the

Wilcoxon Signed-Rank test indicated that the differences within each group were not statistically significant (Table 3.11). The increase in spending from the non-harvest to the harvest month was somewhat higher in Group 2 than Group 1 households, 39.1% compared to 11.21%, to be expected given the very low levels of spending in Group 2 households in the non-harvest month. Per capita spending was substantially higher in Group 1 than Group 2 households in both seasons; again the differences would probably have been greater had data been collected in an earlier non-harvest month.

Mean household spending was slightly higher than mean household income in both groups during the non-harvest month (Tables 3.9 and 3.11). It is possible that some households were spending reserves, but is more likely that at this late stage of the non-harvest season some were buying basic household supplies, including food and cooking gas, on informal credit arrangements (*fiado*) with local shopkeepers to be paid off with the first harvest-time wages. It is also possible that the difference is due to the omission of some sporadic components of household income, measurement error or a result of rounding figures up or down.

3.6.6 Sample Household Food Expenditure

Food expenditure data were collected by recall for the month prior to data collection. Respondents were asked to recall how much their total grocery bill came to each week; non-food non-durable items like personal hygiene products were included. As is the case in many contexts, food spending tended to be fairly stable from week-to-week, so recall bias should be minimal (Deaton, 1997:26). Food produced for home consumption, and in-kind food donations received by three very low-income households – a food basket, fresh milk for young children, and packaged staples from neighbours - were not imputed as their values were low; their effect may have been to slightly reduce food spending in those households.

Average per capita food spending increased from the non-harvest to the harvest reference period in both groups, and the increases were statistically significant at the .05 level in the whole sample and Group 1; the Wilcoxon Signed-Rank test suggested that the difference in Group 2 was not statistically significant, but this may again be due to the

lack of power of the test (see p-values in Table 3.12). The increase in food spending reflected the increase in household incomes, as would be expected, especially in those households in which food spending was a large part of the household budget. The increase may also be because in many households energy requirements increased, as more individuals were working and most of them were working longer hours than in the non-harvest month, and many were cutting cane, more physically-demanding than other tasks.

Table 3.12. Mean monthly per capita food spending (US\$) in sample households, non-harvest (August 2006) and harvest (January 2007) seasons, and seasonal differences

	Mean (SD)		
	All households	Group 1	Group 2
No. of households	32	26	6
Non-harvest (August 2006)	29.19(14.94)	32.59(13.88)	14.47(9.97)
Harvest (January 2007)	33.49(16.62)	36.99(15.96)	18.31(9.89)
% increase, non-harvest to harvest	14.7	13.5	26.5
T-score/Z-score*	-2.225	-2.123	-.943
1-tailed p-value	.017	.022	.219

*T-score for paired samples t-test (all households and Group 1); Z-score for Wilcoxon Signed-Rank test (Group 2)

Per capita food spending was again much higher in Group 1 than Group 2 households at both seasonal points. The increase in food spending from the non-harvest to the harvest month was considerably higher in Group 2 than Group 1 households – 26.5% vs 13.5%, again as would be expected given the very low expenditure on food in these households in the non-harvest month. Once again, the seasonal differences, and the differences among households in Groups 1 and 2, would have been greater earlier in the non-harvest season.

3.7 The Household Sub-Sample

A non-random sub-sample of six households was selected from the whole sample in the last phase of fieldwork for the purpose of in-depth observation. The sub-sample was stratified by location-labour group; there were eventually three CP households and one CC household because one CP household had been misclassified. There were nevertheless households from each of the locations, labour groups, location-labour groups

and dietary groups (Table 3.13). One of the CP households was dropped from the larger sample during data analysis because it split during the harvest season; it was retained in the sub-sample as it still provided valuable information.

Table 3.13. Distribution of sub-sample households by location, labour group, location-labour group and dietary group

	No. of households
Location	
Caneto	4
Santana	2
Labour Group	
Permanent	3
Contract	3
Location-Labour Group	
Caneto Permanent	3
Caneto Contract	1
Santana	2
Dietary Group	
Group 1	4
Group 2	2

Within the strata the households were not picked at random. Rather, the following selection criteria were adopted, in the order stated:

- (1) the spouse of the male household head did not work outside the home and was available to spend time with me on a weekday;
- (2) there was at least one child under 18 years, in order to observe household and mealtime dynamics with children present; and
- (3) I had developed a good rapport with the female spouse and felt she would be receptive to the idea of my spending two days in her home, comfortable for the duration of two days, and communicative and forthcoming with information, opinions and feelings.

I also sought to include some large households with high dependency rates in order to observe food distribution in households with low per capita incomes that may have faced serious food insecurity (as defined in Chapter 4). Four of the six households had between nine and eleven members, and three of these were nuclear households with only one wage worker and a large number of dependent children.

It would have been desirable to include two further selection criteria: the presence of both boys and girls within the household; and a mix of households with male and female control over household income. After the above criteria had been applied there were not, however, sufficient households to also meet these criteria. In the end, four of the six households had boys and girls living in the household. In one of the six, household income was controlled by a woman; this was low partly because a higher proportion of women working for wages controlled household income relative to those not working for wages, and the former were not included in the sub-sample.

The sub-sample is not representative of the sample or the underlying population, and there was no intention to generalise findings to either. My observations in these households do nevertheless provide insights into behaviour in other similar households under similar conditions. Household behaviour may have been quite different in households in which a woman worked for wages, and in households in which there were no children or only grown children. It may also have been different to behaviour in those households which I felt would be less receptive to my visit and the idea of observation; these households may, for example, not have been receptive to the presence of health professionals in their homes, or to information from health professionals. All of the women approached agreed to my presence in their homes, and some of those outside the selection asked if they could be included. All but one was comfortable with my presence throughout; the individuals in one household seemed to be uncomfortable during the second day, on which I decided to cut my visit short.

3.8 Conclusion

The information presented in this chapter describes the micro-level ecological and material conditions (at the extra- and intra-household levels on the theoretical framework in Chapter 1) which shape the living and working conditions in households in the research site by location and labour group, and the household characteristics – household demographics, labour relations and occupations, employment, income and expenditure - which shape household food budgets and the food supply in the dietary Groups 1 and 2.

Data on seasonal fluctuations in employment, income and spending presented in this chapter expose the impact of the seasonal rhythms of sugarcane production on the material lives of the rural labour population, especially those who survived on the basis of seasonal contracts. The seasonal differences in income and food spending were statistically significant in Group 1. They were not in Group 2 even though the percentage changes from non-harvest to harvest were larger in Group 2 than Group 1, probably due to the small sample size and the use of a less powerful non-parametric test. Since unemployment was relatively low at the end of the 2006 non-harvest season, the differences between income and spending between the harvest and the earlier non-harvest season would probably have been larger. The detrimental effects of seasonal unemployment on food security and dietary quality, and the way in which seasonality influenced the distribution of food among household members, are examined in later chapters.

The data also illustrate the substantial differences in working and living conditions between Groups 1 and 2. Group 2 contained only unskilled workers, all but one of whom were contract workers who faced high seasonal unemployment, and was made up of larger households with higher dependency rates and lower per capita incomes and spending. The mean household monthly per capita incomes, total expenditures and food expenditures in Group 1 were more than double those in Group 2, and, once again, it is likely that the differences would have been greater in the earlier non-harvest season when unemployment was higher. For these reasons, I denominated Group 2 households as ‘less affluent’ households than those in Group 1, based on the mean group values, although there were also some households with very low incomes in Group 1.

Chapter 4. The Nutrition Transition I: Diet and Health

4.1 Introduction

The ‘nutrition transition’ has been characterised as:

“.....major shifts in the nutritional profile of human populations directly related to modifications in dietary intake and nutrient expenditure patterns.....determined by an interplay of economic, demographic, environmental and cultural changes occurring in the society” (Monteiro et al, 2004:433).

The concept is used as a framework to explain the recent, rapid rise in overweight and obesity in co-existence with persistent undernutrition, and the co-existence of infectious disease with non-communicable, chronic disease, phenomena observed within sub-population groups, and even within households, in the ‘developing’ world⁴⁹ (Popkin, 2002; Doak et al, 2005).

Various studies have demonstrated phases common to the ‘usual’ progression of the transition, as excess weight, which initially affects higher income, urban populations, gradually shifts to lower income, and then to rural, population groups (Doak et al, 2000:2966) - groups in which the burdens of undernutrition and infectious disease have not (yet) receded. Viewed in historical perspective, the current manifestations of the transition in developing countries constitute but one of a number of patterns that have occurred globally (Mintz, 1994); the current transition is characterised by receding famine and emerging degenerative disease (Popkin, 2006). One of the unique characteristics of the present-day transition is the sheer rapidity of changes which took much longer in ‘industrialised’ nations (Popkin, 2002; James, 2008:6).

Under conditions observed in the nutrition transition, excess body weight may occur due to increased energy intakes, often quite small, usually in the form of more energy-dense diets in which complex carbohydrates and plant-based foods are replaced by refined carbohydrates and animal foods, with fats and added sugars as the principal energy

⁴⁹ Lang and Rayner (2007:170) suggest that ‘the nutrition transition’ is but one of a number of theories to explain rises in obesity. I use the concept here much more broadly than they suggest, to encompass social, economic, cultural, technological and biological changes underlying changes in nutrition and health.

source. It may also occur due to decreased energy expenditure due to reductions in physical activity, with active lifestyles replaced by more sedentary forms of work, leisure, and transportation (Popkin, 2002; WHO, 2003; Popkin, 2006).

While generalizations can be made to describe the nutrition transition globally, its manifestations and underlying determinants are highly context-specific. This chapter examines diet, physical activity, food and nutritional insecurity and health in sample households, placing them in the context of the nutrition transition in Brazil. Secular changes in these aspects are examined by relating observations in the sample population to published historical accounts of diet and health among sugarcane labourers in the Northeast and testimonies of survey participants about work, diet and health in their families of origin, covering from ten to fifty years back. It describes nutrition transition conditions across the board because they pertain to all households in the research site irrespective of location, labour group and dietary group. It is based on qualitative data collected in three 24-hour dietary recalls⁵⁰, interviews, conversations and observation. The information on diet and physical activity in the sample population, presented in Sections 4.2 and 4.3, along with data on overweight and obesity presented in Chapter 6, leave no doubt that the nutrition transition has ‘arrived’ in this low-income, rural population. And yet the data in Section 4.4 demonstrate that many households face periodic food shortages, and that most share a poor quality diet with deficiencies in essential micro-nutrients. These factors, in combination with poor environmental health, allow the persistence of infectious diseases, while changes in diet and physical activity pave the way for the onset of chronic, non-communicable disease, outlined in Section 4.5.

4.2 Diet in the Sample Population

4.2.1 Diet

The main meal of the day, at midday, usually consists of one or more staple foods – rice and/or pasta and cassava meal – with stewed beans, usually flavoured with dried beef, and meat or fish cooked separately (fresh, processed and preserved forms of beef,

⁵⁰ Qualitative in the sense that collecting recall data gave me insight into the diet and its distribution in sample households.

chicken and fish). This is the meal at which high status foods - fresh meat and fish - are most frequently eaten. The morning and evening meals are lighter meals, usually composed of cornmeal or bread/crackers with margarine, and fried meat (most frequently dried beef). Inexpensive coarse cornmeal (*fubá*) is central to the local diet, cooked with water to make a thick porridge (*quarenta*) or steamed to make a light 'cake' (*cuscuz*). Water or powdered artificial 'juices' are taken at the midday meal, and heavily-sweetened coffee is taken with the morning and evening meals; water is not in short supply in the *Zona da Mata* region. Between-meal snacks are sometimes eaten in the form of crackers, biscuits, fruit and occasional milk-based drinks and yoghurts. Sundays, holidays and special occasions are often marked with preferred foods and drinks, such as fresh meat (possibly home-produced), pasta, and soft drinks like Coke or *Guaraná*. Very little food is eaten outside the home, and what little is comes from street stalls selling hot dogs, hamburgers and *salgadinhos*.

Children's diets do not differ greatly from those of adults. The duration of exclusive and/or complementary breast-feeding of infants tends to be very short; powdered milks and infant formulas are favoured over breast milk, sometimes from as early as 15 days. The explanation most frequently offered by mothers for such practices, frequently heard from low-income mothers (Lindsay, 2008), was that their breast milk was insufficient in quantity and/or quality due to the poor quality of their own diets, and that their babies only stopped crying from hunger when fed complementary foods. Sugar is added to milk and formula foods, contributing to the development of a preference for highly-sweetened foods from an early age. The process of weaning and the introduction of heavy 'adult foods' (mashed beans, potatoes, rice and meat) without 'transitional' foods is hard for many children. Many show greater interest in processed snack foods (*besteira*) – crackers, biscuits, sweets, packaged snacks, instant noodles and powdered milk products – preferences which are indulged in those households that can afford it; I observed that such foods replaced meals for children of all ages in some households. Children are usually given a meal or snack at school, but the usual fare – biscuits and artificial juices, or corn-based porridge – adds little to the quality of children's diets.

In most households there is some variation in diet during the week, with more expensive and preferred foods eaten earlier in the week (rice, pasta, fresh meat) and cheaper foods eaten later in the week before wages are paid (cornmeal, processed or dried meats). There is generally greater dietary diversity during the harvest season, and in households with higher per capita incomes. But there is little of the day-to-day variation which marks the diets of wealthier peoples. This lack of diversity in low-income diets has been described in other locations in Brazil (Zaluar, 1982; Scheper-Hughes, 1992:149; Florencio et al, 2004) and was observed in a food frequency study undertaken during the II State Health and Nutrition Survey of Pernambuco (Batista Filho and Romani, 2002: 123).

The preference for heavy, filling foods is common in populations with historical or current ‘hunger anxiety’ (Scheper-Hughes, 1992:158; Zaluar, 1982), especially those that rely on their manual labour to earn a wage. In working class Gameleira households, ‘real food’ (*comida*) is a meal with red meat, beans, rice, pasta, and cassava flour, all served together if possible. Meat (especially red meat) and beans occupy a central position in the psyche. They are classified as ‘strong foods’ that fill you up and keep you going (*sustentam*), essential in order to undertake a day’s work. Many would not entertain the idea of the midday meal without beans under all but the most dire circumstances; as one woman said “...if there are no beans I haven’t had a proper meal”. None could imagine a meal without meat or fish: “...eat without meat?; that’s terrible, I wouldn’t be able to”. Fresh red meat is most highly appreciated, more so than other forms of animal protein which are often served in its place – eggs, fish, or sausage; Zaluar (1980:176) observed the same in an urban population in the city of Rio de Janeiro. As one woman told me of the meat she prepared for her husband to take to work:

“I buy a beef steak and fry the whole thing for him.....it’s the size of his lunchbox, the other men are really envious”.

In this context, vegetables are generally perceived not as proper ‘food’ at all, but as a frivolous addition, at best a luxury, which, rather than satiate hunger, do nothing but ‘fool the belly’ (*enganar o estomago*). Castro (1938:53) recalled hearing on a plantation in Pernambuco that ‘we don’t eat vegetables because we’re not lizards which can be fed on

leaves'. Only 3% of the households producing crops for home use grew vegetables. A few vegetables (garlic, onion and tomato) are added to stewed beans as seasoning in most households, but in such small quantities, and then so over-cooked, that they offer little nutritional value; very few households add a wider variety of vegetables in greater quantities.

The consumption of fruit is also very low. Seasonal fruit from trees are eaten (mango, durian (*jaca*), star-fruit (*carambola*), rose apples (*pitomba*), *caja*, *acerola*, *azeitona*⁵¹), but few households spend money to purchase fruits, considered "rich people's food". The absence of fruit and vegetables in the diet is largely an economic question, given that fruit and vegetables tend to be among the most expensive sources of energy (Ruel et al, 2005:7). Many women understand the benefits of eating fruit and vegetables, generally and for specific conditions (for instance, liver or beetroot to help prevent or reduce iron deficiency), and told me that with more income they would buy some fruit and vegetables, as well as more meat and beans.

Similar traits were described for the Brazilian diet at-large in a recent national survey on dietary habits (IBGE, 2004a) which estimated that fruits constituted just 1.6%, and vegetables 0.7% of available calories in household diets (and less still in rural and low-income households), far from the WHO recommendation of 6-7% for each, while sugar made up 13.4% of calories, above the WHO recommended maximum of 10% (Levy-Costa et al, 2005; WHO, 2003). So potentially serious are the consequences of low fruit and vegetable consumption as a risk factor for disorders associated with micro-nutrient deficiencies, as well as chronic disease like cardiovascular diseases and some forms of cancer, that the WHO recently ranked low intake as the sixth main risk factor globally for mortality (WHO, 2003).

⁵¹ A small black fruit with a stone, local to the region, which highly resembles a black olive and is therefore referred to by the Portuguese word for an olive.

4.2.2 Secular Trends in Diet

A comparison of data from metropolitan areas in Brazil in 1974/75 (ENDEF) and 2002/03 (POF)⁵² shows that health-promoting foods, including lean forms of animal protein (fish and chicken), fresh milk, and complex carbohydrates (beans and legumes, roots and tubers), have been replaced by mass-produced, highly-processed foods with higher fat and sugar contents: the consumption of red meat increased by 22%, and processed meats by 300%; the consumption of cookies and soft drinks increased by 400% each (IBGE, 2004b). At the same time, the relatively low participation of fruit remained unchanged (2.2% of calories in 1974/75, 2.4% in 2002/03), and the low participation of vegetables fell further (from 1.1% of calories in 1974/75 to 0.9% in 2002/03) (IBGE, 2004a). These changes characterise what has been termed a ‘modern’ or ‘nutrition transition’ diet, high in ‘energy density’ (calories available per volume) but low in essential nutrients like proteins, vitamins and minerals (Andrieu et al, 2006), unbalanced in contrast to ‘traditional’ diets with minimally processed foods, a varied combination of plant foods and only moderate amounts of animal food (Monteiro, 2009).

Similar changes have clearly taken place in the sample population. Castro described the extremely sparse diet consumed by labourers in the sugar-producing regions of the Northeast in the 1940s – little more than beans, dried beef, cassava and cassava meal, coffee and sugar (Castro, 1946:37); the diet of cane workers in Pernambuco in the 1980s, described by Scheper-Hughes, included rice, bread and pasta during better times, with reliance on coarse cornmeal in ‘leaner’ non-harvest times, with no mention of highly-processed foods other than powdered milk for young children (Scheper-Hughes, 1992:149). Adults in the sample population confirmed that the dietary staples when they were young were home-grown tubers (cassava, yams) and beans, and that mass-produced, highly-processed foods were not available. They described the ‘food-for-work’ (*boia*) system operated on sugar plantations, reminiscent of earlier slave labour – payment at the end of each day in accordance with the amount of work done (land cleared or cane cut,

⁵² The ENDEF survey examined dietary habits only in metropolitan areas of the country, but it is not unreasonable to assume that similar trends have taken place across the country, albeit at a less attenuated pace. The dietary data used in this comparison are based on annual household purchases of foodstuffs converted to kilograms (IBGE, 2004b).

for example), in credit redeemed on the very basic foodstuffs available in the landowner's store. They also confirmed that prolonged breast-feeding was much more common, since most could not afford to buy powdered milk and infant formulas.

The diet in sample households is characterized by excesses of fat (lots of vegetable oil added to staple dishes, fried foods, margarine on bread and crackers, and fatty, processed meats), sugar (in excessively sweetened drinks and biscuits) and refined carbohydrates (white rice, and bread, crackers and pasta made from white flour). Mass-produced, highly-processed foods with high fat, sugar and sodium content – fatty processed meats (*salsicha*, *calabreza*, *mortadela*, and tinned meats), instant noodles, packaged snacks, crackers, sweet biscuits, and artificial powdered 'juices', milks and infant formulas - occupy an important role in the diet. The incorporation of new foods into the diet has helped to reduce the extreme dietary monotony of earlier times, as well as providing greater dietary energy. But although dietary diversity is recognised as an important attribute of a healthy diet (Hoddinott and Yohannes, 2002; Ruel, 2003; Steyn et al, 2006), the dietary modifications of the nutrition transition have done little to offer nutritional improvement for this population; the added variety has come only in the form of processed meats and refined carbohydrates, rather than the addition of new food groups like tubers, fruits and vegetables. These changes have surely contributed to the rise in overweight in a population that, until a generation ago, lived with the real or constant threat of hunger, and is therefore unlikely to think about limiting intake.

Many of the underlying determinants of dietary change associated with the nutrition transition apply in this context. On the supply side are developments in the food system which have made mass-produced foods more available, affordable and desirable than 'fresh' foods. Processed, energy-dense foods have become cheaper relative to fresh fruits, vegetables and meats, as the cost of fats and sugars has fallen (Drenowski and Darmon, 2005; French, 2003; Claro et al, 2007⁵³), in part due to agricultural policies and land use

⁵³ Claro et al (2007:5) showed the following costs for 1,000 calories of energy at Sao Paulo prices in 1998/99: at the low end, sugars R\$0.17, oils and vegetable fats R\$0.27, cereals and derived products R\$0.62, biscuits and cookies R\$0.91, processed meats R\$1.86; at the high end, non-leafy vegetables R\$19.72, leafy vegetables R\$5.55, fresh meats R\$2.74, fruit R\$2.5.

patterns which encourage and subsidise commercial production of commodities like sugar for industrial use and export, rather than small-scale fresh food production for home and local markets (Maxwell and Slater, 2003; Weid, 1997:13).

Mass-produced foods are widely available, distributed through marketing channels with impressive reach into formerly-distant markets (Popkin, 2006). Aggressive and largely unregulated advertising by the food industry, widely transmitted through modern mass media⁵⁴, has been key in facilitating market creation for new products and attaching status to branded foods (Popkin, 2006): 59% of sample households had TV sets⁵⁵, compared to only 29% before 2000, and 44% had satellite dishes. The generalised preference for powdered milk and infant formulas over breast milk is perhaps the most salient and tragic example of market creation for superfluous products. Supermarkets have also played an important role; the proportion of food distributed through supermarkets increased from 10-20% in 1990 to 50-60% in 2000 in Latin America (Reardon and Berdegue, 2002:371). Most sample households purchase their food exclusively in supermarkets in local towns rather than at the weekly farmers' street market.

Demand-side factors in food choices are also important. In these households, with high energy needs for labour and low per capita incomes, foods are chosen largely on economic criteria: mass-produced energy dense foods offer the lowest cost sources of dietary energy (Drewnowski, 2003; Haddad, 2003). At the same time, many households have at least marginally higher per capita incomes than in the past, due largely to wage legislation and tighter employer regulation, general economic growth, smaller household sizes, and a recent, possibly transient, increase in non-harvest employment. Studies of income elasticity demonstrate that additional income in low-income households tends to be allocated to energy-dense foods with high fat and sugar content and the substitution of meats for cereals and of fine cereals for coarse ones, as well as being diverted to non-

⁵⁴ A 2007 study demonstrated that 72% of food adverts on TV were for fast food, sweets and ice creams, soft drinks and artificial 'juices', savoury snacks, and biscuits and cakes, in that order (Opsan, 2007)

⁵⁵ Most of the households without TVs are 'evangelicals' who don't own a TV on religious grounds, but many of those without a TV watch in neighbours' homes.

food purchases (Bouis and Haddad, 1994:209; Popkin, 2002:210; Drewnowski, 2003:838S; Claro et al, 2007:6).

Taste preferences driven by evolutionary biological needs to maximise survival during scarcity, favouring palatable foods containing fats and sugar over traditional, plant-based diets, also shape food choices (James, 2008:9). So too does the power of consumption, in this case of food, to communicate status and superiority, attached to some refined and processed foods through advertising, across and within households (MacClancy, 1992; Maxwell and Slater, 2003; Mendonça and Anjos, 2004).

These developments are largely attributable to the impact of processes of globalisation and neoliberalism upon food systems, as, in the face of saturated industrialised country markets, the liberalisation of direct foreign investment and trade facilitate the creation of new markets in formerly-inaccessible locations (Guthman and DuPois, 2006; Popkin, 2006; Baillie, 2008). The role of industrial capital in the alteration of food habits is hardly new - Mintz (1985;1993:266) proposed that our 'modern consumer society' was built on the creation of mass demand for commodities like sugar, tobacco and stimulant drinks as early as the sixteenth and seventeenth centuries. But such interests exert their influence at a greater pace and intensity, as the far-reaching nutritional consequences of rapid market liberalisation in China demonstrate (Baillie, 2008).

Domestic food production has fallen drastically. Only one fifth of households produced crops of some sort (mainly cassava and beans), and although almost half raised small animals – mainly chickens - the quantities of food produced were negligible in terms of household food requirements; the parents of household heads and spouses produced enough food to meet a much greater share of household food needs in approximately 69% of households. The most common reason for the reduction in home food production is loss of access to productive land around settled areas, as the local mills increase the area of land under sugar cultivation. Heavy dependence on marketed food makes the study population particularly vulnerable to developments in the food system, relative prices of

different kinds of foods, and pressures to consume products advertised by the food industry.

4.3 Physical Activity in the Sample Population

4.3.1 Physical Activity

Physical activity patterns in the sample vary considerably by age, gender and occupation, and so, therefore does energy expenditure. Most men have extremely high levels of energy expenditure cutting cane during the harvest season; even those not cutting cane use high levels of energy, especially due to energy loss through sweating in the hot sun (Chaves, 1980:48). Men operating machinery or in supervisory roles use less. Energy expenditure is lower in the non-harvest season among cane workers who continue to work, due to less arduous tasks and shorter hours. For the unemployed, energy expenditure is reduced significantly. Many men sleep for several hours during the day in the non-harvest season; this may be an energy-saving strategy at a time of the year when food supply is, or has historically been, low; it may have started to contribute to energy imbalance for some whose intake is higher than expenditure. Some men play football during their leisure time, but most engage in sedentary activities, watching sports events, engaging in conversation, watching TV, playing dominos or TV games, and drinking alcohol at neighbourhood bars and stores.

Most women's energy expenditure is much lower than most men's. Women working in the fields use high levels of energy, but they are few in number, and only one of them cuts cane during the harvest. Without the aid of modern domestic technologies, women's domestic work requires a moderate level of physical exertion in washing pans and clothes by hand, cleaning the home, and carrying washing, water, firewood, and the weekly food shopping. For most, physical activity is limited by the cultural expectation that they stay close to home to look after the home and their children. Some women, those dissatisfied with their weight, commented that they have difficulty controlling their weight because in spending so much time at home they get little exercise and are more likely to eat outside meal times. Women's leisure-time activities are sedentary, most usually conversation and watching TV; it is considered inappropriate for girls and women to engage in sports or

strenuous physical activities. The first national survey of leisure-time activity, in 1997, indicated that women were much less active than men in their leisure time, especially rural women (3.1% engaged in leisure-time physical activity for thirty minutes at least once per week, compared to 13.4% of rural men), low-income women (1.3% compared to 12.6% men) and low-educated women (1.3% women compared to 8.3% men) (Monteiro et al, 2003).

There are also significant differences in physical activity between boys and girls. Children of both genders usually go to school by bus, except those who live a short distance from school, and there is no form of physical activity during school hours. In their spare time, groups of boys often wander far away from home, from as young as seven or eight years of age, frequently play football, and sometimes ride bikes and horses. Some are responsible for collecting firewood, which sometimes requires walking considerable distances. Some older girls help with domestic work, but other than that engage mainly in sedentary activities like play and conversation close to home; children of both genders watch TV, but girls tend to spend more time doing so than boys.

4.3.2 Secular Trends in Physical Activity

The most recent national survey of physical activity, in 2009, showed a reduction in the proportion of the Brazilian adult population involved in physical activity at work and in leisure time since 2006 (MS, 2009a). Levels of physical activity have also fallen in the sample population in recent years. Partial mechanization in the cane fields since the early 1990s has reduced the energy expenditure of some men working in the cane, and the reduction in female labour in the cane, as well as the elimination of child labour, have reduced the typical energy expenditure of women and children. The expansion of public motorized transport has reduced the amount of energy spent walking. And leisure-time activity has become increasingly sedentary as the number of households with TVs, satellite dishes, and DVD players has increased.

Broadly-speaking, women are more affected by these changes than men. With the significant decline in the number of women working in the cane, most women expend

much less energy than they did earlier in life, or than their mothers did; none of the men and women in the sample said they had mothers who were or had been overweight or obese. Labour-saving technologies have reduced the amount of physical exertion involved in domestic work in a few households; piped water has obviated the need to collect water, and the use of a gas stove has precluded the need to collect firewood. And a recent study suggests that sedentary ‘screen time’ may have more detrimental effects on female than male adolescent and adult body weight, possibly due to different changes in energy intake during TV viewing, different modifications in energy expenditure in response to ‘screen time’, and/or higher metabolic risk factors among females (Boone et al, 2007).

Children’s physical activity has perhaps also declined with the elimination of child labour and the spread of audio-visual entertainment. But children’s levels of activity are less likely to be affected than those of adults, as many forms of children’s leisure time activity remain unchanged, especially among boys who tend to be very active.

4.4 Food and Nutritional Security in the Sample Population

“The hunger of the Zona da Mata is....the hunger of those who eat every day but of insufficient quantity, or of an inferior quality, or an impoverished variety, which leaves them dissatisfied and hungry.” (Scheper-Hughes, 1992:137).

I use the term ‘food and nutritional security’ in this section as it is conceptualized in the Brazilian Food Insecurity Scale (BFIS)⁵⁶; that food should at all times be of sufficient quantity (to protect against hunger and malnutrition), sufficient quality (safe, and with micro-nutrient adequacy), and adequate in social, cultural and environmental terms (UNICAMP, 2004; Maluf, 2007:20). ‘Food security’ refers to the adequacy of dietary energy, ‘nutritional security’ to the micro-nutrient adequacy of the diet. Implicit in the concept is the notion that everyone should have a sufficient and diverse enough diet to meet their biological needs, *and* feel satisfaction in the food choices within their reach.

⁵⁶ The BFIS is an adapted and validated version of the USDA’s Food Security Scale (Perez-Escamilla, 2006:23).

Despite the changes of the nutrition transition – higher energy intakes and lower energy expenditure – food insecurity continues to be a real threat in many households, especially those with unemployed contract workers during the non-harvest season. Even when the supply of energy is sufficient, dietary variety is low. Many expressed dissatisfaction with the foods available to them and found the diet exceedingly monotonous, and it was not unusual to hear of individuals abstaining from a meal rather than eat more of the same (*fastio*). This dissatisfaction was heightened by the awareness of foods and drinks that they could not afford, advertised on the TV and on display in supermarkets. At lean times, ‘finer’ cereals - rice and pasta — are replaced with the less-valued cornmeal, the only staple eaten three times a day. Cornmeal is regarded with contempt by many who perceive their dependence on it as symbolic of “poor people’s food” (*comida de pobre*), good only for “filling the belly”. When respondents reported eating cornmeal for all three meals on a recall day, they did so with both shame and resignation, stating “*cornmeal yet again*”, “*same old thing again*”. One pregnant woman stated “*I’ll only eat cornmeal when I’m really hungry in the middle of the night*”. Scheper-Hughes’ description of hunger in the Pernambucan *Zona da Mata* (above) was as true at the time of this research as when she wrote in the early 1990s.

4.4.1 Food Security

The first nationally-representative survey to examine food security in Brazil using the BFIS – the National Household Survey (PNAD), 2004 – indicated that in the 90 days prior to the survey, 28.3% of households suffered low or moderate food insecurity (‘fear of food insecurity in the near future, low dietary quality, and/or limited quantity of food’); the proportion that suffered serious food insecurity (‘hunger among children and/or adults’) was 6.5% nationally, and 21.6% among low-income⁵⁷ rural households (UNICAMP, 2004; IBGE, 2006b). Clearly, the shift to a nutrition transition diet, and the rise in excess bodyweight, in Brazil have not signified the end of hunger and food insecurity. A number of studies in Brazil and other countries have shown that low-income,

⁵⁷ Defined as monthly per capita income of up to one-quarter of the minimum salary.

overweight individuals frequently face ‘food insecurity’, including periodic shortfalls in energy intake relative to requirements (Olson, 1999:522S⁵⁸; Florencio et al, 2003).

Table 4.1. Percentage of sample households experiencing food insecurity, season and reason, September 2005 to August 2006

	Percentage (count)		
	All households	Group 1	Group 2
No. of households	32	26	6
Moderate food insecurity	40.6 (13)	38.5 (10)	50 (3)
Serious food insecurity	15.6 (5)	7.7 (2)	50 (3)
Total food insecurity	56.3 (18)	46.2 (12)	100 (6)
Of the households suffering food insecurity 2005-2006:			
Season			
In the 2005-2006 harvest	22.2 (4)	25 (3)	16.7 (1)
In the 2006 non-harvest	77.8 (14)	75 (9)	83.3 (5)
Reason			
Due to unemployment	61.1 (11)	50 (6)	83.3 (5)
For other reasons*	38.9 (7)	50 (6)	16.7 (1)

* Insufficient funds for reasons other than unemployment

I used my own operational definitions of moderate and serious food insecurity, based on the BFIS. Fifty-six percent of sample households in my study declared they had suffered food insecurity during the year prior to the survey (September 2005-August 2006) (Table 4.1). Forty-one percent of households had suffered moderate food insecurity, meaning they bought less food than usual, or cut back on foods they usually bought (for instance, they ate cornmeal three times a day instead of rice or pasta, or the beans were prepared only with water and salt). Sixteen percent had suffered serious food insecurity, meaning that one or more household members went hungry, missing one or more meals, or reducing the amount they ate at meals.

Most food insecurity was seasonal, related to non-harvest unemployment. This was also a period of lower energy requirements among workers, since some were unemployed, and those with work were not cutting cane, but the reduction in income and food availability was not off-set by the reduction in energy needs in most households.

⁵⁸ Defined in Olson’s study as uncertainty about the ability to obtain sufficient food, running out of food, or compromised dietary quality.

In the households that faced food insecurity during the harvest season, it was due to insufficient funds for reasons other than unemployment (late payment of wages⁵⁹, repayment of loans, or allocation of household funds to other expenses – unplanned health costs or other shocks, large purchases, or adult goods), sometimes in combination with high dietary energy needs among labourers cutting cane. With very few households producing food for home use, food was the largest single expense in most households in both seasons, a feature not unusual in poor households in the ‘developing’ world (Deaton, 1997:206). The dependence on purchased foods left households vulnerable to the vagaries of the local labour market, particularly the seasonal reductions in employment and income, as well as shocks due to the illness, injury or death of a wage-earner.

Food insecurity was much higher in Group 2 than Group 1. In Group 1, a little over half of all households had not faced food insecurity during the year. In contrast, all households in Group 2 had suffered moderate or serious food insecurity, most of them due to unemployment in the non-harvest season.

Household food security was self-reported; responses represent the subjective assessment of the respondent (the female spouse), influenced by, among other things, a household’s (or an individual’s) norms and expectations in terms of dietary quantity and variety. The survey asked only about food security at the household level. The data collected do not provide information as to who in the household bore the effects of the shortage in food supply when it occurred.

4.4.2 Nutritional Security

Data on micro-nutrient status in Brazil are scarce. The first, and to-date only, representative survey to examine micro-nutrient deficiencies – the 2006 PNDS – estimated Vitamin A deficiency among children under five at 17.4%, and among women between 15 and 49 years at 12.3%. The same survey indicated anaemia due to dietary iron deficiency among children under five in the Northeast at 25.5%, and among women

⁵⁹ It is not uncommon for mills to pay all or some of their workers late, immediately creating a shortfall in the weekly budget in many households, especially those unable to maintain reserves from one week to the next.

between 15 and 49 years in the Northeast at almost 40% (MS, 2009b). Anaemia among young children is generally attributed to deficiencies of Vitamins A, B12 and C, and folic acid (nutrients essential for the absorption of dietary haem iron) as well as low consumption of dietary haem iron, at a period when requirements for growth, and possible infections, are high (Osório et al, 2001; Osório et al, 2002). Most studies of micro-nutrient deficiencies focus on young children and women; it is widely held that these groups are more vulnerable than others to micro-nutrient deficiencies, with females of all ages more susceptible to anaemia than males, boys at greater risk than girls of Vitamin A deficiency and xerophthalmia, and girls at greater risk than boys of iodine deficiency. A recent review of evidence from many developing and industrialised countries suggests, however, that other age and gender groups may be just as susceptible, depending on highly context-specific factors (Webb, 2002).

There is little reason to believe that individuals in the sample population are any less subject to the high prevalence of nutritional deficiencies reported nationally and regionally. The diet described in the last section contains a surplus of energy-dense, nutrient-poor foods and lacks the dietary diversity necessary to ensure nutritional adequacy. Added to this are factors which reduce the availability of micro-nutrients: most households purchase cheaper, poor quality foods with lowered nutrient content such as heavily-salted and fatty cuts of meat and fish much of the time; the nutrients available in fresh foods may be reduced by transport over long distances⁶⁰; the cooking methods most commonly used – over-cooking and frying at high temperatures – lower the nutrient content of foods; and certain food combinations inhibit the absorption of nutrients – such as the effects of coffee and milk on iron intake (McNeill, 1985; Latham, 1997). The high incidence of intestinal parasites among children and adults (reported in Section 4.5) is also reason to expect micro-nutrient deficiencies, and the frequency of child geophagia may contribute to, or be a consequence of, iron deficiency (Reilly and Henry, 2000).

⁶⁰ Much of the fresh fruit and vegetables on sale in supermarkets and the farmers market is imported from the Southeast of Brazil due to the extensive cultivation of sugarcane on most land in the state of Pernambuco.

Micro-nutrient deficiencies impact different age groups in different ways. There is strong evidence to suggest that micro-nutrient deficiencies in children, particularly iron, Vitamin A and zinc, may restrict linear growth, even when energy and protein intake is sufficient (Rivera et al, 2003:4010S). This would provide a highly plausible explanation for the persistence of stunting in populations with sufficient energy supply. Micro-nutrient deficiencies in adults, particularly zinc, folate and antioxidants are believed to contribute to the risk of chronic diseases. It seems that the joint effects of the multiple nutrients provided by fruit and vegetables are particularly important in protecting against cardiovascular disease, diabetes and cancer (Doak et al, 2005; Eckhardt, 2006).

4.4.3 Secular Trends in Food and Nutritional Security

It is impossible to know accurately the trends in food security and micro-nutrient adequacy in Brazil given the lack of longitudinal national data. The 2004 PNAD is the only survey of food security undertaken in Brazil to-date. Time-series data on micro-nutrient adequacy are also scarce. Some regional studies suggest that anaemia, for example, may be declining among children but not among women (MS, 2009b). On the other hand, trend data from two states suggest that anaemia has been increasing among children: anaemia among under fives increased by 116% from 1974/75 to 1995 in Sao Paulo, and by 88% in the same period in Paraíba (Batista Filho and Rissin, 2003).

Many survey respondents in my sample declared feeling much more food secure than they had in the past, as young adults or in their families of origin, when the spectre of hunger was a haunting reality. They told tales of labourers working on empty stomachs in the days of the *boia* system when none of the food paid in-kind by the landowners at the end of the day was left the following morning, or on a more recent occasion because the mill didn't pay some of its workers for eight weeks. Some, I was told, quite literally 'died of hunger' (*morreram de fome*) during the harvest season, unable to ingest sufficient energy to undertake the arduous cane-cutting work required of them in the harvest; dying of hunger may in reality have meant dying of exhaustion and dehydration, conditions potentiated by underlying poor nutrition. There were similar accounts of the deaths of

particularly weak and sickly infants for whom dehydration, dysentery and gastroenteritis may have been the clinical signs of poor nutritional health.

The nutrition transition diet has increased the availability of dietary energy and reduced the incidence of food shortage in many sample households. But the nutrition transition diet tends to be nutrient-poor (Drewnowski and Darmon, 2005): micro-nutrient deficiencies persist, even in households which have overcome constraints on dietary energy and in individuals who are overweight, and they may have increased with the rise in consumption of the ‘empty calories’ provided by industrialised foodstuffs (Bouis et al, 1992:359; Aguirre, 2000:24; Eckhardt, 2006).

The recently-instigated national food fortification programme for the addition of iron and folic acid to cornmeal and pasta may help to reduce anaemia, just as salt iodization has been effective in the control of iodine deficiency (Batista Filho and Rissin, 2003). The distribution of nutrient supplements through health posts and community workers (Vitamin A for pregnant women and children under five, iron for children 6-18 months and pregnant and postnatal women) also has the potential to reduce deficiencies (MS, 2005:8), although distribution by the Health Ministry, and their use in households, was limited.

4.5 The Epidemiological Transition in the Sample Population

The nutrition transition is part of a broader ‘epidemiological transition’ in developing countries in which poverty-related, infectious diseases persist in tandem with the rapid onset of chronic, diet-related, non-communicable diseases in low-income communities, households and individuals (Bacallao, 2000; Monteiro, 2000b).

4.5.1 Infectious Disease

Infectious disease is very common in the sample population. In particular, many young children suffer repeated episodes of diarrhoea, dysentery and gastrointestinal complaints, especially during the winter rains. Children and adults alike suffer a high burden of intestinal infection by parasites: municipal health data indicated that 19.9% of the

Gameleira population was infected with the schistosomiasis flatworm and a further 19.3% was infected with other intestinal parasites in 2006 (Gameleira Schistosomiasis Control Program, 2007). In all of the sub-sample households at least one individual, and more usually several, were reported to have worms, or had been treated for worms in the prior few weeks.

Repeated incidences of infectious disease compromise children's physical growth and cognitive development, and reduce productivity in adulthood by reducing the intake, absorption and biological utilization of essential nutrients (Hall et al, 2008; Jardim-Botelho et al, 2008). Hookworm and the schistosomiasis flatworm feed on their host's blood, increasing the incidence of anaemia (Gryseels et al, 2006:1109). It is quite possible that the load of infectious disease plays a larger role in child stunting and thinness than a shortfall in dietary intake in this population.

Infectious disease is largely a consequence of environmental health hazards in the research locations. Neither location is linked to the public water supply. The drinking water in Santana is known to be contaminated; the Caneto water supply is believed to be safe, but there may be problems of contamination with water handling, transportation and storage. The river water used in both locations for washing clothes, dishes and bodies is polluted by harmful pesticides used in sugarcane cultivation, and contaminated by the freshwater snail which transmits the schistosomiasis (bilharzias) flatworm; infection is particularly high in Caneto – 35% in 2006 (Gameleira Schistosomiasis Control Program, 2007). The complete absence of sanitation infrastructure is a huge health risk in Caneto, with disease transmitted through urination and defecation in the river or on land. Overcrowded housing, particularly in Santana, as well as close contact with potentially disease-carrying animals (chickens, dogs and cats), also generate conditions for the transmission of disease.

Child feeding practices also contribute to the incidence of infectious disease among young children. Early termination of breastfeeding diminishes the transmission of natural

anti-bodies from mother to child, thereby increasing vulnerability to infections due to contamination of complementary liquids and foods (MS, 2002; Lindsay et al, 2008).

Alcohol consumption and tobacco use contribute to poor health in some individuals. Just over 9% of adults (16.4% men and 2.1% women) reported drinking alcohol, mainly rum from sugarcane, two or more times per week; more than half of these reported drinking five or more times a week. Under-reporting of alcohol consumption is common (Deaton, 1997:27), so levels were probably higher. Many drank to excess, usually men; women told me stories of their inebriated fathers, brothers and spouses. Almost 20% of adults (an equal proportion of men and women) smoked two or more cigarettes a day. Heavy use of alcohol and tobacco can cause dehydration, diarrhoea and loss of nutrients, and reduce the absorption and/or post-absorptive metabolism of some nutrients (Berg et al, 2002). Adult smoking may also contribute to child stunting: children's exposure to cigarette smoke is believed to be associated with growth retardation in children under five years (Gonçalves-Silva et al, 2005).

4.5.2 Chronic Disease

The onset of chronic disease is associated with dietary factors like the excessive consumption of fat (especially saturated fat in animal foods), sugar, and refined carbohydrates, particularly in highly processed foods, a lack of dietary fibre and micro-nutrients, insufficient intake of fruit and vegetables, as well as sedentary lifestyles, smoking and drinking excessive alcohol (WHO, 2003; Monteiro, 2009). Chronic disease was the principal cause of death in Brazil in 2007; the proportion of deaths due to chronic disease increased threefold between 1930 and 2006 (MS, 2009a). The II State Survey in Pernambuco reported high levels of indicators associated with chronic disease in the rural population in 1997: 29.7% with high cholesterol, and 25.2% with hypertriglyceridaemia (Batista Filho and Romani, 2002); these indicators have likely since increased.

Only 4.4% of adults in the sample reported chronic disease (hypertension and cardiovascular disease), but since the signs of chronic disease are not always immediately apparent or recognised, there were likely to be a number of undiagnosed cases. Health

professionals working in the municipality told me that the number of cases of chronic disease they attended, particularly Type II diabetes, hypertension and cardiovascular disease, was rising sharply, and some adults in the sample commented on the appearance of new diseases like heart disease, cancers and diabetes. Chronic disease is likely to become much more prevalent among children when they grow up, given the poor quality of some children's diets; the increased incidence of bottle-feeding may also increase the risk of later obesity (Martorell et al, 2001:878S; Owen et al, 2005). It is a sad paradox that largely desirable shifts in the quality of life of poorer populations – greater dietary diversity and palatability, less onerous physical labour, new forms of entertainment – bring with them such potentially-deleterious health consequences (Popkin, 2006).

4.6 Conclusion

There is much evidence to suggest that the intake of dietary energy has increased in this population, that households are less food insecure, and that fewer individuals suffer hunger, than a generation ago. But the increase in energy intake has had deleterious effects for some whose intakes exceed their energy needs, especially those whose physical activity has declined. Many households do however still face food shortage, particularly during periods of seasonal unemployment; some may face shortage during the harvest season, if the high energy needs of workers cutting cane outstrip the dietary energy available.

The introduction of new foods has increased variety in the diet, but has not helped to diversify the diet in a healthy way, adding only highly-processed forms of animal foods and refined carbohydrates. The intake of essential nutrients has also not improved with changes in the diet, and the composition of the diet, in tandem with the high incidence of infectious disease, gives adequate reason to assume that micro-nutritional deficiencies are high.

Diet and health have been described principally at the household-level in this chapter. But the changes in diet, physical activity, food and nutritional security and health associated with the nutrition transition do not affect all individuals in a household alike.

Some individuals are more food secure than others, and have access to more and better foods and more diversified diets than others; the consumption of energy-dense foods has increased more among some than others; some have become less active than others; and environmental risks and lifestyle factors have affected the health of some more than others. These factors combine to determine the physical welfare of individuals, contributing to the rise in excess body weight among some individuals, and the emergence of ‘mixed households’ with under- and over-nourished individuals, in the nutrition transition. Differences in dietary intake, some of which have emerged due to the shift to a nutrition transition diet, also serve to reinforce social differentiation among individuals within and across households; differences in access to food among age-gender groups are explored in the next chapter.

Chapter 5. Gender Roles and Relations in the Research Site

5.1 Introduction

“...households [can] be readily identified as important sites for the reproduction of gendered identities and inequalities....” (Kandiyoti, 1998:135).

Feminists have long debated the origins of women’s subordination in the marketplace and the home, and the links between capitalism and patriarchy (see articles in Young et al, 1981; Folbre, 1994). Simply put, the marriage-based household ‘serves’ capitalism, allowing it to extract profits from the labour force without supporting the costs of labour reproduction, which are borne within the home (Mackintosh, 1981; Kandiyoti, 1998 (above)). Households are organised accordingly, with one partner in the home – universally the woman - bearing responsibility for the work of social reproduction. Such work goes unpaid and unrecognised, and women’s contributions to individual and collective survival and well-being are undervalued. But the origins and construction of patriarchy and gender discrimination in the economy and the home in so many very varied contexts are not so much of interest in this study as are the gender relations within households, shaped by the forces of patriarchal and capitalist relations, and their impact on food distribution.

This chapter examines gender roles and relations in households in the research site. I use the term ‘gender relations’ to describe the relations of power between men and women in households, relations which embody both the material – the division of labour and resources - and the ideological – ideas about the different abilities, desires, attitudes and personality traits of men and women, and which are socially-constructed rather than biologically determined (Agarwal, 1997:1). I draw heavily on qualitative data from conversations, interviews and observation in all sample households, and from the more extensive observation period in sub-sample households, relating my evidence to existing feminist work on gender inequality and the links between gender, power and food, as well as the economics literature on collective household models and intra-household resource allocation. My opportunities to observe household behaviour and gender

relations in the sub-sample were unfortunately limited due to the higher than usual employment in the early non-harvest season of 2007; all men in the sub-sample, including seasonal contract labourers, were working and therefore spent considerably less time at home than would be the case in a more typical non-harvest period. I was nevertheless able to collect rich data on mealtime dynamics and food distribution.

The next two sections of the chapter explore the gender division of household labour and the balance of power within households in the research site. Sections 5.4 and 5.5 consider the control which men and women exert over household resources, particularly income and food, and the extent of male control over food and food-related activities, including food distribution - spheres of female responsibility in which activities and decisions are not necessarily controlled by women. I do not make a distinction between conditions in Groups 1 and 2 – all households are largely embedded in the same overarching macro-level material and ideological conditions – although the difference between the two groups in the proportion of households with some female control over income is explored.

5.2 The Gender Division of Household Labour

Scholars of gender relations in Brazil recognise that while there is great diversity in the form and nature of rural households in Northeast Brazil, patriarchal values and behaviour are by and large the norm (Correa, 1982; Melo, 2002; Fischer, 2002; Fischer, 2003). One of the salient characteristics of households in patriarchal settings is a gender division of labour which allows men to take up waged work in the public sphere beyond the household while women are confined to domestic tasks in the private sphere of the household (Mackintosh, 1981). This has the effect of rendering women financially dependent on men, and of isolating women, thereby limiting their awareness of gender inequalities within and beyond the household (Fischer and Albuquerque, 1997; Melo, 2002; Fischer, 2003).

The gender division of labour in sample households follows patriarchal norms: all men, except the disabled and retired, work for wages outside the household, most women do not. Women bear full responsibility for reproductive work in the home, usually single-

handedly, except in households with older daughters, or in extended families with more than one woman. In this context, 'housework' includes keeping the house and yard clean, collecting water, washing clothes and pots and pans by hand, food shopping and preparation, and the care of children, the elderly, and sick household members; these are laborious and time-consuming tasks, especially in large households with many children, and in a context without 'modern' household technologies. Childcare is perceived as female work with which very few men help, further isolating women who can rarely get out and meet friends, as men do. As in so many developing country contexts, women work longer hours than men (UNDP, 1995); they also have no days-off or holidays. One woman compared her working day to that of her husband

"Sometimes he's back home by 10 or 11 o'clock and that's it. Not for me, my work goes on, I don't have a day off or a holiday".

The few women who work outside the home bear the 'double burden' of waged and domestic work, even if helped by their daughters or other women. Very few men help out with housework or childcare, even if they are unemployed or on holiday and if their spouse is working outside the home; in a conversation about men's and women's work, one man whose wife was working and pregnant said "...cook? ...not me, what are you thinking?" when I asked if he would help his wife with the housework. When men's female 'caretakers' are sick, it is usual to arrange for a female relative or another woman to step in.

The domestic work undertaken by women is unpaid; several women noted that this was very unfair. One said

"Women should get a wage, benefits, a pension. We work as much as men do, or more, we have to do everything three times a day, get up early to cook, then again at midday and then at the end of the day – cook, wash up, feed the children, and also wash clothes and pans, clean the house and so on. It's twenty-four hours a day.....and we look after everyone, children, the older ones, the sick. Ok, men work hard in the fields in the hot sun, but they get paid".

There are a number of reasons for the reduction in the number of women working outside the home – from approximately 52% a generation ago to around 14% in the sample

households. Some women choose not to and can make that choice, where many could not in the past, due to relative increases in household incomes. Until relatively recently, many women worked as ‘helpers’ to their spouses, rather than independently, in order to boost men’s productivity to a level which would earn enough credits at the plantation store to feed the family in the so-called *boia* system. With the advent of legislation pegging a worker’s wages to the minimum wage and protecting workers’ benefits and pensions, most men are usually able to earn enough to provide for their family, though only just in the case of larger families, and sometimes not in the event of crises or unexpected expenses.

But many more women would like to work outside the home, to relieve the drudgery of domestic work, to earn an income and be more independent of their spouses, to buy things for themselves without having to ask their spouses for money, and to cover the expenses of children fathered by earlier partners. Several told me of the strain placed on them when they work outside the home, given their continued responsibility for domestic work; even with the help of older daughters, they get up at 2 or 3am, after perhaps 5 or 6 hours of sleep, to do the bulk of the housework, including the cooking, before leaving for work. They prefer to do this than to be totally dependent, financially, on their spouses.

The barriers to their employment - structural and normative - are many. For those who do not want to work in the sugar fields, the employment opportunities in the small and undynamic Gameleira economy are extremely limited, and most women lack the education, skills and contacts which might help them to access such opportunities. Those who are willing to take unskilled manual jobs in the sugar fields or factories frequently encounter gender discrimination, measures taken by the mills to avoid hiring women because they may require multiple paid maternity leaves and time off for childcare, and rights to such benefits are much more tightly enforced than they used to be (FETAPE Director, 2007); and because they are perceived to be less productive than men in some tasks, like cane-cutting (Caneto Manager, 2007). Mills reportedly required certification of female sterilisation in the past – several women in the sample were forced out of employment because they had not been sterilised. The same has been reported on

plantations of export crops in Northeast Brazil (Fischer and Albuquerque, 1997). While it seems that mills no longer utilise such blatantly discriminatory measures, female employment in the sugar industry is low, and many women feel that they are hired only if no male labourers are available.

There are also barriers to female employment at the household level. As observed in other Latin American contexts (Lomnitz, 1977 in Neuhouser, 1989:688), many men refuse to 'allow' their female spouses to work outside the home; a third of women in the sample worked until they married and then stopped. Men's reasons are varied. For many it is about pride as the household provider, and the correlate loss of honour if a man is perceived as unable to provide for his family, especially in terms of food; the symbolic importance of a man's ability as provider – his identity as the breadwinner – is observed in many contexts in Brazil (Zaluar, 1980; Scheper-Hughes, 1992:148; Fischer, 2002:4; Rotenberg and Vargas, 2004). Many men are aware that their power in the household, material and symbolic, is derived from their wage and, frequently, their position as sole wage worker in the household (Saffioti, 1997), and seek to maintain this imbalance of power.

Most men place high demands on women's domestic responsibilities within a rigid system of gender roles, particularly in regard to the preparation of cooked meals. They expect their spouses to rise early – as early as 3am for men whose work applying pesticides begins early, at 4 or 5am for others - to prepare hot food for them to take to the fields, and then to have a cooked meal ready on their return from work at midday. In one household, a young woman living in her mother-in-law's home got up to prepare her spouse's food even though his brothers' food was being prepared at the same time by their mother or a sister; she explained that it was "her duty". Many men expect a new batch of beans to be prepared daily, even in those households in which food can be kept in the fridge from one day to the next, complaining that beans kept overnight do not taste as good as freshly-cooked beans; cooking beans is a particularly onerous task given the preparation and cooking time required. One woman told me that she needed to go to town on a particular morning, but hadn't gone because the beans wouldn't be ready when her

spouse returned from work: “.....if there are no beans, it’s like the house comes falling down”.

Some men seemed to see women only in the roles of cook and cleaner. One man commented

“Men are meant to be out in the world, women are meant to be in the kitchen. Women are meant to prepare food, clean and tidy the house and yard; a home is no good without a woman. I’ve had a number of wives; those who didn’t have food ready when I got home from work were vagabonds”.

Another stated

“....that’s what’s good about having a woman at home, so there’s hot food when you get home from work”.

A third said that men didn’t learn to cook because

“.....then the woman will get badly-accustomed, will expect the man to cook everyday”.

Many women dislike their role in the household, experiencing it as subordination to others whose needs and preferences they are expected to meet before their own. One woman stated that her spouse said he would “....knock the house down” if food wasn’t ready when he arrived from work, especially if he thought she’d “....been at other people’s doors” – visiting and chatting with her friends. Another asked “....why would he want me if I don’t cook? One woman living in Santana - a permanent mill employee with year-round employment and therefore financially independent⁶¹ - stated that she would not set up home with a man again, after having two partners, because she would no longer be “down-trodden” by a man:

“Men don’t want to help with anything. They say ‘bring me my clothes, bring me some coffee, serve my dinner’. I don’t want another husband. I’m tired of being a slave to men, they expect too much. They have no sense of commitment in the home, with women. Men have freedom, women don’t. Men give orders, treat the woman like a slave. If he doesn’t like his wife then he’ll hurt her to show her that he’s better, more powerful”.

⁶¹ She lived in the household eliminated from the sample because her status as a permanent employee was unique in Santana.

5.3 The Balance of Power Within Households

Gender relations inside households revolve largely around the primordial need to eat: in the conjugal contract (Whitehead, 1981⁶²), men are the ‘breadwinners’, the ones earning an income to buy food for the household; women are the cooks who transform the raw foods provided by men into cooked meals. There is a mutual dependence, but the partners are not equal. Men have a stronger position in the partnership in two ways. First, the opportunity for men to earn an income – and in old age, a pension - gives them the material power which comes of controlling the income in their hands, as well as the symbolic status and power which come of making a tangible economic contribution to household welfare, a contribution valued above and beyond the essential, but non-financial, contributions of reproductive domestic work.

Second, men have stronger fallback positions than women if the partnership were to collapse, and therefore greater bargaining power within the partnership. They can get by without a wife if necessary, relying on the help of female relatives to shop, cook and clean for them, and some found that they were able to cook for themselves if necessary, much as they disliked it. Such was the case when father and grown son remained in a Caneto household after their spouse and mother moved to town with other family members; they were able to cook the basics - meat, cornmeal, rice, and beans, but as the son put it, *“I eat at my mother’s house whenever I can, the food’s much better there than here...”*.

Most women, on the other hand, are not economically viable outside the marriage. Most have no assets, no or low incomes, and few opportunities to work for a wage; without a husband they cannot purchase food for themselves and their children. As one woman put it *“.....if I leave my husband there won’t be any food in the house”*. A few could if, necessary, return to their family of origin and depend on fathers or brothers, but in most cases those households did not have sufficient income to feed more mouths, and most

⁶² Whitehead (1981:88) uses the term to encompass “....the terms on which husbands and wives exchange goods, incomes and services.....within the household”.

women were anyway reluctant to move back to their parents' homes. Given that children almost always stay with their mothers on dissolution of a marriage, and that alimony is rarely paid by children's fathers, women's 'remarriage prospects' (McElroy, 1997; Agarwal, 1997) are less attractive than men's; men who partner a woman with children from a prior relationship may well have to support those children financially.

The rarity of single mothers and female-headed households in the sample, and in the neighbourhoods generally, speaks volumes of the financial difficulties faced by women; separations are commonplace, but are quickly patched up, or new partnerships are set up rapidly. There were no female-headed households in the Caneto sample, although one single mother continued to live in her father's home, and another had recently set up home with a new male partner, after losing her job and her financial independence. In the Santana sample, one woman with five young children got together with a new partner three days after the father of her children left. She explained that

"...some thought that was too quick. But God put him in my path and I wasn't going to refuse, I was in need..."

I was also aware of the plight of several other women in the neighbourhoods who were not in the sample. One woman in Santana returned to the violent partner who had inflicted injury upon her – she was unable to work due to the injury and was not receiving disability benefits, so could not support herself and her son. Another, mother of three, joined with a man twenty-two years her junior in the neighbourhood when he secured employment upon turning eighteen. Given the difficulties providing for themselves, and for their children if the father is not present, women are forced to seek partners, and to stay with partners under all but the direst of circumstances. This is not to say that there are not happy unions; but the harsh reality of economics is an important factor in the establishment and maintenance of households and in the dynamics between men and women.

This imbalance of power is reflected in restrictions placed by men on women's movements and contact with other men through work and other activities. One woman whose mother lived on a different plantation told me she was

"....waiting for my husband to get back from work to ask if I can go to my mother's home".

Another told me that her husband had forbidden her to go on a neighbourhood excursion to the nearby beach. A third told of her spouse's behaviour when there was gossip that she talked with men attending her evening classes in town and might have been having an affair with one of them:

"....he'd hear about it and believe it and arrive home all angry, telling me it wasn't on and I couldn't go to classes anymore".

She pointed to the double standards of men, for whom adultery goes unpunished, saying *"....they think they have more rights than women"*; patriarchal norms in the Brazilian Northeast sanction male adultery as a sign of male virility and masculinity (Fischer, 2003).

There is of course scope for some, albeit small, variation in the intra-household distribution of power across households. Women with an independent income in the form of wages or a pension tend to have a stronger position within their homes, although in one case the woman's wage was controlled by her spouse who made all spending decisions alone. It is also possible that women's control over *Bolsa Família* child benefits strengthens their position in some households, perhaps especially in the households of unemployed contract workers without an income during the non-harvest season; benefits are paid directly to women, drawn with an electronic card in their names at the bank - the programme was deliberately designed to put income into women's hands and thereby increase their power in the home⁶³ (IBASE, 2008) – and without exception, all women told me that they keep this cash, spending it on children's expenses or general household

⁶³ I did not directly measure or explore the issue in my data, but an IFPRI-sponsored study has shown that a similar programme in Mexico – PROGRESA - has increased women's involvement in decision-making with their spouses (Skoufias and McClafferty, 2001).

expenses. There is also variation in the nature of gender roles and relations and the distribution of intra-household power due to the values, beliefs and personalities of the men and women, and the interaction between them, in any given household, shaping the extent to which men insist on enforcing their preferences and the extent to which women find ways to exercise some control over household activities and resources.

All women but one in the sub-sample felt their spouses were in a stronger position than they themselves were. The exception was a woman who normally worked (she was temporarily unemployed at the time of the surveys), received the full *Bolsa Família* benefit (but also had to cover the expenses of six young children) and owned her house in Santana (she originally took possession of the house with a spouse who had since died). She allowed a new partner to move into her house as long as she was allowed to control the majority of both their incomes; if he refused she was able to provide for herself and her children without him. I also heard of an errant case on a return trip to the research site in 2009. One of the sub-sample women whose spouse had threatened to leave her if she went out to work had turned the tables on him. She had secured work in the fields, so she left him and returned to her parents' home, temporarily sending their children to stay with his parents until she had the funds to take them back.

As is so common in many contexts, men's positions are strengthened by their greater physical strength and the tacit acceptance of domestic violence as a means of 'settling disagreements' between spouses (Whitehead, 1994; Lundberg and Pollack, 1997; McIntosh and Zey, 1998). A few women told me stories of the physical violence they had witnessed between their parents, or were aware of in neighbouring households. Some told me of the physical abuse they themselves had suffered in former relationships or from their current spouses in the past. That only one woman recounted present-day incidences of violence likely speaks not of any significant improvement, but rather of the secrecy, fear and shame around such a difficult and sensitive issue. The exception was a woman who talked of the threats of aggression she sometimes suffered from her current spouse when he was drunk; she was probably more willing to talk about it than others because she didn't really fear that he would harm her, and because she and I had built a strong

friendship. My research assistants told me of several cases of domestic violence which they had heard and believed to be true. Some women told me that they ‘censored’ their behaviour with their spouses, because the possibility of violence was always in the back of their minds; a few told me that they stayed with their partners for fear that a different one might be more violent towards her and/or her children.

5.4 Gender Control over Household Resources: Income and Spending

In this context, given the gender division of labour in most households, men usually receive and control far more income than women in the form of wages, pensions, and other employment-related payments, paid in cash at the mills on Friday evenings. Child benefits are paid directly to women, but many households do not receive the benefits to which they are entitled. In those that do, the value of benefits is low relative to income received through employment - the minimum monthly wage paid to unskilled labourers in the non-harvest was US\$135 net, with scope for increases in the harvest season; the *Bolsa Familia* paid US\$29.61 for one eligible child, US\$36.44 for two, and US\$43.27 for three or more children – values that can do little more than support the costs of the children for whom they are paid. Few women receive alimony from previous spouses; of the nine households containing children of absent fathers, only one received alimony in the first survey month, and the value was tiny (US\$2.80 per child). Property and other assets are also frequently under male control.

Decisions about income allocation can impact the composition of the household diet and its distribution within the household, and individual nutritional outcomes. Many studies suggest that men and women make different decisions about the allocation of income to food and other expenses (see, for example, articles in Haddad et al, 1997, including Thomas, 1997 with reference to Brazil). The gender of the individual(s) in control of income in each household was used as a predictor of individual nutritional status and individual intake of high status foods in the regression models presented in Chapters 6 and 7. The impact of the gendered control over household income on intra-household food allocation and individual welfares is explored in Chapter 8.

Income received by men and women was organised and controlled in different ways in different households. Information with which to characterise gendered control over income was extremely hard to collect and classify. Not only was the information clearly sensitive in many households, but the extremely nuanced nature of behaviour in relation to money made it hard to capture and classify the precise dynamics in any household. As government benefits received by women were usually automatically allocated to child and household expenses, only employment-related income was taken into account in the analysis. Income control was classified into three categories: unilateral male control, unilateral female control, and mixed control.

(1) Unilateral male control: income was classified as being under unilateral male control when a man retained his wage income (and that of his spouse in one household) and decided on his own how to allocate it. Some women in these households did not know precisely how much their male spouses earned or how they spent it from month to month, especially during the harvest when incomes were variable. Men contributed part of their income to food and household costs if the woman did not receive any income at all, or if the income she received was insufficient to cover those expenses.

(2) Unilateral female control: income was classified as being under unilateral female control when a man gave his income to his spouse, even if he retained some for personal use, and the spouse determined how to spend the household's income.

(3) Mixed control: mixed control occurred under one of two scenarios. The first was that one or more women in the household received employment income and retained control over it, such that women and men controlled their incomes independently. In practice, in the two households in which this occurred, the woman's wage was used to buy food and other non-durable household goods. The second scenario was that income was pooled and managed jointly by men and women making most spending decisions together. The degree of female involvement in income control in these households varied, but tended to be limited to smaller, day-to-day expenses rather than big purchases.

Under all these scenarios, men and women alike ultimately saw the male spouse's wage as "his money" and gave him the final say on how his wage should be spent if there was a difference of opinion. Men therefore tended to have greater say than their spouses in the purchase of large household items. Some women commented that instead of buying household goods that would facilitate their domestic tasks, such as a gas stove or pressure cooker to cut down the time involved in food preparation, their spouses purchased large items that they wanted, like a new television, a cabinet for the living room, or clothes and shoes for themselves. Other men did spend at least some of the income under their control on goods for the welfare of all or some individuals, such as health costs and medication, maintenance of housing, and household assets.

In all cases, men retained and spent some of their income on private consumption. One woman said:

".....lots of them keep the money and only give their wife a little so that she can buy the food; they spend the rest on drink, cigarettes, gambling..."

Aside from such forms of adult entertainment, men also used their money to buy food outside the home when receiving wages in town, and when drinking with friends, including high status foods such as cheese and barbecued meat, as well as lower status foods like sausage and tinned sardines; this consumption was not captured in the dietary recalls because most women did not know what their spouses had eaten out of the home on any given day.

Most women did not spend money in their control on themselves. At most, a few women occasionally treated themselves to street food, cakes, or carbonated drinks in town. Instead, there was a clear and largely unquestioned expectation that women spend the money they controlled, regardless of its source, on food, kitchen and general household expenses, and their children; in some instances they were forced to do so by men who reduced their contribution to food and household expenditures by the value of female income. The same dynamic has been recognised in the shantytown of Roçinha in Rio de Janeiro (Rotenberg and Vargas, 2004), and in other cultures as varied as the Kusasi

people in Ghana and working class households in Britain (Whitehead, 1981). When women wanted to buy something for themselves, including clothes and cosmetics, they were forced to ask for money from their spouses. The women in the sub-sample households in which men controlled income (five of the six) told me that they preferred to go without than to ask for money, because to do so merely served to underline their subordination and the power differential. Men's privilege in this respect has been observed in other households in Northeast Brazil (Fischer, 2002), and in rural and urban households in Mexico (Baer, 1984).

Table 5.1. Percentage of sample households with male, female and mixed control over household income

	Percentage (count)		
	All households	Group 1	Group 2
No. of households	32	26	6
Unilateral male income control	50 (16)	53.9 (14)	33.3 (2)
Unilateral female income control	25 (8)	15.4 (4)	66.7 (4)
Mixed income control	25 (8)	30.8 (8)	0

Table 5.1 shows the percentage of households falling into each category. Income was under unilateral male control in half of all households, and under unilateral female control in a quarter. With only one exception, women who received wages or a pension were involved in the control of household income alone or with their spouse due to the direct control they had over income paid to them, and/or because the symbolic status and power which comes of working for a wage gave them more say in the use of household income generally. As in so many developing country settings, joint management of pooled income was relatively uncommon (Whitehead, 1981; Haddad et al., 1997:285; Lundberg and Pollack, 1997), occurring in just six of the eight households with mixed income control, or 19% of all households.

As might be expected in a patriarchal setting, unilateral male control was more common than unilateral female control. That some households deviated from this norm – with women in sole or partial control of a part of household income – speaks of the impact of individual values and beliefs on household behaviour with gender relations less rigid than

the norm: some men voluntarily relinquished their ‘right’ to full control over household income; some women carved out space to flout behavioural norms and exercise partial or complete control over household income.

When the sample was split, income was under unilateral female control in a greater proportion of households in Group 2 – 66.7% compared to 15.4% in Group 1. The significantly higher proportion of households with unilateral female control in Group 2 may be due to the higher proportion of households in which women received an income (wages or a pension) in Group 2 (33.3% vs 11.5%). These two were probably related: in the whole sample, 80% of working women had some control over household income, compared to only 36% of non-working women.

It may also be due to a location-specific effect. The majority of Group 1 women lived in Caneto, where houses are occupied on the basis of men’s employment with The Mill⁶⁴; women depend on men in order to have a roof over their heads. All but one of the Group 2 women lived in Santana, where homes are owned by their occupants, regardless of the lack of formal property titles. All of the Santana women in Group 2 (and a number of others) claimed that they owned the house alone or jointly with their spouse; all but one had separated from a spouse and joined with another (younger in four cases out of five) since occupying the house, and all of them had remained in the house (and had not had to ‘buy out’ their former spouses)⁶⁵. These women do not depend on men to have somewhere to live. They also have some control over a valuable asset, giving them greater financial independence from men and greater power in the household.

These two factors may have conspired to give Group 2 women a stronger position relative to men in their households relative to women in Group 1. I also formed the impression, over time, that some of the women in Group 2 occupied stronger positions

⁶⁴ There were no cases in which a house was occupied on the basis of female employment; the two women in Group 1 who worked in the cane lived in a house occupied on the basis of a male relative’s employment – in one case, her husband, in the other, her brothers.

⁶⁵ I did not explore why women were able to remain in their houses when they separated from their spouses. Neuhouser (1989:693) suggests that among the urban poor in Brazil this is the “proper” behaviour, according to gender ideologies, and a man who does not conform – and not all do – is viewed as acting in a “dishonourable” fashion.

than many of the women in Group 1. The woman who had carefully negotiated terms before allowing a new spouse to move in to her home was in Group 2. Another woman in Group 2 stated emphatically, with her spouse present, that “...*I’m the one who gives the orders around here*”; I later discovered that he suffered depression and could not always work, which may have affected the balance of power between them. A third asserted, “...*I earn the money, I make the decisions*”. These examples are anecdotal, but may indicate a real difference between the position of women in their homes in Groups 1 and 2.

5.5 Gender Control over Household Resources: Food and Food-Related Activities

Without exception in sample households, the kitchen was perceived as female space and women were responsible for food shopping, preparing, cooking and serving meals, clearing the table, and washing cooking and eating utensils. Very few men helped with any of these tasks. But responsibility does not necessarily equate control or power (Counihan, 1998; McIntosh and Zey, 1998), and as Counihan (1998:2) states “men’s and women’s ability to produce, provide, distribute and consume food is a key measure of power”. There were exceptions, but men exercised greater power than women over food and food-related activities in many households in a number of ways.

5.5.1 Food Spending and Food Selection

The amount of income allocated to the food budget was generally decided by men in the 50% of households in which men had unilateral control over income. It was usually also partially or completely determined by men in households with mixed control over income, insofar as in these households the most common pattern was that men retained their own income and ‘forced’ women with income to allocate it to the food budget and other household expenses. Most women felt that more of the household income should be spent on food; they were most frequently the ones to reduce their intake if there was not enough food, sometimes because their spouse had spent some of his income on ‘adult goods’, particularly alcohol. They were also the ones faced with the difficult task of making food last throughout the week until the following pay-day. As one woman said

“....if he only gives me fifty reais to do the shopping, the food will only last until Wednesday”.

The selection of foods was female at the point of purchase in all households except one, in which the male spouse did the food shopping. But where there was scope for choice, in the type of animal protein for example, many women told me they more frequently met their spouses' preferences than their own. One woman in the sub-sample was obliged by her husband to buy fresh beef for his lunch every day, even if they had to go without some other food items; beef was by far the largest single item on the weekly grocery bill, and there was very little left over to buy the chicken which she and the children preferred⁶⁶. Several women told me that if their spouses did not retain part of their income for their own use, there would be money to sometimes buy fruit or cakes as treats for themselves and their children. When this was put to one of the men in a sub-sample household, he replied

“...I'm not going to spend my money on things like that, that's children's food”

and insisted that it was more important to buy meat; this was an income and food secure household with a permanent employee and a low dependency ratio – much of his income was used to fuel his weekend drinking binges. Fischer (2002:8) also noted in her study in rural working class households in Northeast Brazil that men usually determined what foods were bought, even if food was purchased with female income.

5.5.2 Mealtime Dynamics in Sub-Sample Households

I observed a total of sixteen meals in sub-sample households, twelve midday meals (two in each of the six households), and four evening meals. Fewer evening meals were observed due to logistical difficulties; I often could not find a Health Secretariat driver to collect me after the buses stopped running and did not have the resources to pay a private driver. The approach was inspired by a study undertaken in Nepal using structured direct observation of mealtimes in tandem with estimated intakes of all household members (Gittelsohn 1991). I used a semi-structured approach for two reasons. First, I wanted to

⁶⁶ In the food shopping the Friday before my second observation day she had spent 23% of the food budget on beef (2.6kg), 10% on one whole chicken.

be open to observing many facets of behaviour, some of them perhaps unanticipated, rather than just very specific pre-determined aspects. Second, I did not plan to undertake statistical analyses, so did not need standardised data from all households. I eventually observed the following aspects of mealtime behaviour: food preparation and clearing up, eating order, use of utensils, seating arrangements, plate composition and second servings (reported in Section 5.6), and food serving and control over food distribution.

Food preparation and clearing up after the meal were, without exception, undertaken by women, sometimes with the help of an older daughter. When men were at home at mealtimes they were usually served first, or after infants and pre-schoolers. They frequently ate lunch after others because they arrived from work in the early afternoon; food was always reserved for them. Men were always given the largest and best plates (which usually meant glass rather than the plastic plates or food containers given to other household members), and always sat in a chair, frequently at the table. Women, in contrast, were busy with food preparation, serving and clearing up at mealtimes, and almost always ate after others had done so, and sometimes only after they had cleared the table; this same dynamic has been observed in other contexts in Brazil (Saffioti, 1997) and Latin America (Fredersdorf 1993, in Nicaragua; Aguirre, 2000 in Argentina). Two of the six women stood while eating on the occasions their spouses were also present, but sat on a chair when their spouses were absent.

The kinds of differences observed among adults were not observed among boys and girls in the sub-sample households, nor was any of the differentiation by gender from 10 years onwards observed by Gittelsohn (1991) in Nepal, when girls started to fall behind boys on many of the dimensions observed. Boys and girls were served at the same time, except those who had to leave early for school or who arrived home after others had eaten. Infants and preschoolers of both genders were frequently served first, before older children and adults, sometimes with milk or infant formula instead of, or as well as, family food. There was no apparent hierarchy, by age or gender, in terms of the type of plates given to children, nor in seating arrangements on chairs or the floor.

Women usually served food for other household members, and most men wanted and expected to be served. As such, women were essentially the ‘gatekeepers’, regulating the access of different household members to food. At the mealtimes of the Zumbagua in the Peruvian Andes, Weismantel (1988) observed that senior women responsible for serving food expressed their sentiments towards different household members, including sentiments of displeasure, by the order in which they were served, and the contents of their plates; she claimed that women had an important source of power in this way, and could slowly forge change in household relations, over time, by ‘restructuring’ the norms governing gender relations. Neuhouser (1989:692) made similar claims in relation to working-class women in Brazilian cities.

But my observations in sub-sample households suggested that rather than exercising any real autonomy in the apportionment of foods according to their own sentiments and preferences generally, or on any given occasion, many women experienced the serving of food for their spouses as a particularly servile and deferential task, and followed cultural norms and expectations with little more than a ‘mental reaffirmation of the rules’ regarding differential food allocations (Gittelsohn and Mookherji, 1997:175). Mealtimes were, as Delphy (1979) observed among French working class families, occasions for the demonstration of unequal power relations among men and women, and the socialisation of children into the status quo. The difference between the Brazilian women in Neuhouser’s study, cited above, and those in mine, may lie in the participation of the former in the urban workforce and in public interest groups in the community, giving them greater power in their households relative to men.

5.6 Gender, Food Beliefs and Intra-Household Food Allocation

“...everything about eating is a form of communication rich with meaning.”
(Harris et al, 2005:viii).

“Human diet is not instinctive, it’s constructed and learnt, cognitively and ideologically, in social relations.” (Rotenberg and Vargas, 2004:86).

Food consumption plays an important role in the formation and maintenance of identity and self-identity in terms of class, ethnicity and gender, among others (Zaluar, 1980;

Mintz, 1985). As Harris et al (2005) and Rotenberg and Vargas (2004) contend (above), the rich, socially-constructed, symbolic meanings attached to food can state and reinforce the social superiority of some groups, while stigmatising others (see also Canesqui and Garcia, 2005), and may have little to do with nutritional needs. The quantities of food and the frequency with which different kinds of foods are consumed by individuals in Gameleira households served to underline their relative social status.

Men coming from work often ate the midday meal after others in their households; women in sub-sample households always reserved food for them before serving others, sometimes better foods which were withheld from others, and sometimes prepared new foods for them. The men in the sub-sample households were also served larger portions of meat or fish than others at every sitting, sometimes better cuts (the chicken breast rather than wings, feet or neck, for example), and sometimes more expensive, higher status, meats (fresh beef, chicken or fish) while women and children ate lower status, highly-processed, alternatives (such as hot dog sausages or tinned meats). I didn't see men ask for second helpings, indeed some quite often left some food uneaten, but this was a reflection of the big servings they were almost always given.

Women across the sample explained male privileges in the quantity and quality of the food reserved for men as necessary because they worked outside the home. One woman explained why she had eaten hot dog sausages for lunch but prepared fresh fish for her spouse

“...it's important to save better food for him, because the work he does is no joke, and at his age. Sometimes it's almost night by the time he gets home.”

Another explained that when her partner worked away from home during the week

“...he takes half the week's food shopping with him, and more than half the meat – fresh and dried beef, sausage – and we keep the chicken. I think that's fair, he's working and he uses up more [energy]; at home we can always find something to eat”.

Several women remarked that it was important to save food for working men above and beyond others because those not working could always find something to eat, or could “put up with” hunger in a way that those working could not. One said quite simply of her spouse

“He doesn’t like it when the food gets all messed up, his food has to be separated first.”

The coincidence of gender identity and working status in the sample – that most men and very few women worked for wages – obscures the allocation criteria underlying food distribution: was the distribution of more and better foods to workers due to their physiological needs, or to their gender identity as men? In the sub-sample households, all workers were men, all men were workers, and all of them were working during the observation period; this means that I didn’t observe the allocation of food to the men who didn’t work or were unemployed. Nor did I observe the allocation of food to the five working women in the sample; I was told that food was always reserved for them by a mother or daughter in charge of food preparation if they arrived late, but I didn’t observe the portion sizes or the kinds of foods reserved. The quantitative data from the dietary recalls presented in Chapter 7 throw more light on this matter and are discussed in Chapter 8.

Women divided food up on to a plate for each child in all sub-sample households but one, a small household in which there was only one teenage daughter. Children of school age and above were always given the same foods at the meals I observed. Frequently there was also little difference in the quantity of food given to children of different ages and gender. At one evening meal in a household with girls and boys from 5 to 12 years old, the mother dished up equal plates and allowed each child to take any one. Only one mother told me she often gave her sons a bit more than her daughters, because they were more active and roamed further away from home.

Mothers across the sample were seemingly very careful to make sure that children’s meals were ‘fair’ in all respects. I heard over and over again phrases like, *“It’s the same*

quantity for all of them”, “I divide the food up with the same for everyone”, and “They eat the same things”. One commented, talking of when food was in short supply, “....that’s when sharing out the food gets really difficult. Each one gets just a little bit...”, and a father remarked

“.....[the food] must be divided equally among all of them. We can’t have some with full plates while others are crying from hunger”.

It is possible that mothers oversaw the greater needs, quantitatively (at least according to requirements established in nutritional science), of boys over girls of the same age, and of older than younger children. When there were leftovers in the pans, they were served to children who requested more; this was one way of satisfying the bigger appetites of older or more active children. When there were no leftovers, some children may have been left hungry – probably those with greater nutritional needs.

Mothers across the sample stated that when food was short, they always made sure the youngest children, regardless of gender, had something to eat first, even if that meant no more than reconstituted powdered milk, because young children couldn’t understand or handle hunger; Engle and Nieves (1993:319) heard the same in a study of Guatemalan families. One mother said

“... children can’t understand, they don’t know that sometimes there isn’t enough food. We’ve become used to it”,

and another remarked that

“...they can’t handle being hungry, we can handle it but they can’t.....they will only be able to understand when they’re older...”.

These may have been the only conditions under which men were not given priority.

It was most usually women who reduced their consumption, missed meals, and consumed inferior quality foods when food was in short supply; ‘inferior’ foods in the nutrition transition diet usually meant cornmeal (often with added margarine high in saturated fats) instead of rice or pasta, and processed rather than fresh animal protein. The same was

observed by Tonial (2001) in households in the state of Maranhão, Brazil. One woman said

“[A woman] will go without to make sure her children can eat. It’s like the old saying ‘a person stops living for themselves when they have children’... ”.

and another commented of her family of origin that

“....sometimes my mother went without food so she could give what she had to the children. My father never went without, he had to eat to be able to work in the fields”.

Two households in the sub-sample were food insecure on one of the observation days in the early non-harvest season of 2007. Both were large Santana households each composed of two adults, one of whom was a contract worker, and seven children. They usually had no cash reserves and frequently struggled to make the food last all week, even when the sole wage earner in the house was employed. In a Group 1 household, the household head had just secured employment but wouldn’t be paid for another ten days. The food they had would not last and they had no cash reserves. The woman told me that she would be the first to miss a meal, saying *“I’m used to it, I prefer to see the children eat first”*, and explaining that she would lie down during the day so that she didn’t use so much energy or feel unwell from the effects of hunger. Six of the seven children in this household were stunted, but no individuals were thin⁶⁷.

I was also present in a Group 2 sub-sample household on a Friday, when the week’s food was coming to an end and there was no cash to buy more until wages were paid on Friday evening and the food shopping done on Saturday morning. In this household, two of the seven children were stunted and one of those was also severely thin. The woman missed two meals, eating only in the evening, and drinking coffee to stave off her hunger. She explained

“...it’s a habit I got into when I became unemployed, my mother is the same; I’m not going to eat food that I could give to the children... ”.

⁶⁷ In September 2006, at the end of the non-harvest season, when anthropometric measurements were taken; the indicators, cut-off points and reference populations used to assess nutritional status are discussed in Chapter 6.

Neither of these mothers was thin even though they both regularly reduced their dietary intake, even when their spouses were working, and probably more so when their spouses were unemployed⁶⁸. A number of their children were stunted and/or thin, even though their mothers prioritized the children's needs over their own. This likely speaks of the nutritional vulnerability of children whose high nutritional requirements for growth and physical activity may be exacerbated by the high incidence of parasitic infection among children.

Women's consumption was also sometimes restricted by local food taboos when they were in certain physiological states – menstruation, pregnancy, post-partum and lactation – along with that of young children, the sick and the elderly. I heard that the following foods should be avoided by these groups: heavy and oily foods like pork, duck, crab, prawns and some fish, and acidic and heavy fruits like pineapple, lime, mango, *cajú* and *jaca*. Castro (1938) observed these same taboos in the Northeast in the 1930s. They are largely foods which are thought of as 'strong', 'heavy' or 'hot', some with high oil content, and more difficult to digest; some of these meats, seafood and fruits fell into my classification of high status foods. Such restrictions may not have been of great importance in dietary intake and nutritional health – they were infrequently consumed in this population. They were of greater importance symbolically in the constitution of gender relations: based on no sound biological foundation, they gave out a clear message that women were physically inferior to men, with frailties equal to young children, the elderly and the sick.

I heard the same food beliefs and criteria for food allocation among men and women, and boys and girls in my conversations with women and the few men across the sample with whom I spoke: men needed most food, and sometimes deserved better foods, because they were wage workers and household heads; boys and girls of school age should get roughly the same, regardless of age and gender; infants and preschoolers deserved special attention, often eating before others, and should be prioritised at times of food shortage;

⁶⁸ One had a BMI of 19, the other 23 in September 2006; neither was classified as thin (see Chapter 6 for information on anthropometric assessment).

and women frequently ate last, and reduced their intake when food was short. For sure there would have been deviations from these widely-proclaimed norms in some households, some or all of the time, households in which men were not privileged to the same extent, or in which women sometimes or always satisfied their own needs or preferences as often as, or more often than, those of others in their homes. But the mealtime behavior I observed in sub-sample households generally supported the criteria I heard.

5.7 Conclusion

This chapter has addressed some of the key issues in the intra-household portion of the theoretical framework presented in Chapter 1, especially the so-called ‘black box’ of intra-household relations and processes, and the consequent control over household resources among men and women. A number of characteristics in the ‘non-cooperative’ household model proposed by Lundberg and Pollack (1997) may most adequately describe the gender relations and intra-household dynamics in the Gameleira households. Rather than any kind of explicit bargaining around who does what and who gets what, decisions and actions are based on socially-accepted, and largely unquestioned, gender roles and expectations in an unspoken ‘conjugal contract’. In the majority of households, income is not pooled, instead there exists an ‘allowance system’ within a separate spheres scenario: women are responsible for purchasing food and household items, mainly non-durables - if a woman does not have income of her own to cover these expenses, almost always the case, the man gives her a portion of his income, the value of which he decides.

Women have less bargaining power to influence household processes and speak up about labour and resource allocations relative to men, because their fallback positions – the parameters which determine an individual’s opportunities outside the household should the partnership break down - are weaker. Added to this is the threat, or use, of domestic violence by men. For all these reasons, most women remain in households with significant gender inequality; they leave only under the direst of circumstances, and even then run the risk of entering a new relationship in which conditions are no better – or possibly worse.

Most women follow normative food beliefs and criteria in the selection and distribution of foods in their households. Men are usually privileged over women and children in terms of the selection of foods, eating order, the use of plates and seating, and the quantity and quality of food they receive. These privileges are earned on the back of men's roles as wage workers and household heads, their economic contribution to the household, and their control over wage income, bolstered, in some cases, by their physical strength; all but the last are socially-constructed rather than biological differences between men and women. Whether or not these create differences in material terms – in the nutritional and health status of different household members in the nutrition transition – they serve to highlight the higher social status and power of men as the patriarchs in their households.

Chapter 6. The Nutrition Transition II: Nutritional Status

6.1 Introduction

This chapter presents detailed information on nutritional status in the sample population by age-gender group. It reveals the damaging impact of the changes in diet and physical activity described in Chapter 4 on nutritional health: high levels of overweight and obesity among adults, which co-exist with persistently high child under-nutrition in the sample population and even within households - irrefutable evidence of the nutrition transition.

The lowest income sectors of nutrition transition societies are in some respects hardest hit by the changes associated with the nutrition transition. They harbour the fastest rates of increase in overweight, while continuing to bear the highest rates of undernutrition (Mondini, 1996:5; Monteiro and Conde, 2000). Biological processes may help to explain the disproportionate impact of rising overweight on lower income groups. The ‘early origins’ hypothesis suggests that a human body subject to early (fetal or infant) nutritional deprivation may undergo permanent metabolic adaptation in energy use; the risk of overweight and obesity may then be elevated in the face of a relative increase in energy intake in later life (Barker, 1990).

This chapter examines differences in nutritional outcomes by age-gender group and places them in the context of the nutrition transition in Northeast Brazil. Sections 6.2 to 6.6 describe the collection of anthropometric data, the precision and accuracy of the data, and the anthropometric indicators used, and Section 6.7 describes the analyses undertaken. In Sections 6.8 and 6.9 I present empirical data on nutritional status by age and gender in the sample population as a whole, and in Groups 1 and 2, and discuss it in relation to the most recent information on nutritional outcomes and secular changes over the last 35 years in Northeast Brazil. In Section 6.10 I consider the availability of dietary energy in sample households, and in Section 6.11 I explore the recent phenomenon of ‘mixed households’. I conclude with some of the possible explanations for the divergence of nutritional outcomes among age-gender groups in the research context.

6.2 Anthropometry as an Indicator of Nutritional Status

Anthropometry has been widely used as an indicator of nutritional status since the 1950s (see for example Gomez et al, 1956). It is useful for monitoring child growth and the maintenance of 'healthy' body weight in children and adults, thereby identifying nutritional problems which may compromise functional physical and mental capacities, result in adverse health outcomes, and ultimately have a potentiating effect on mortality (Onis, 2000). Nutritional status can also be assessed by biochemical indicators or clinical signs of malnutrition (Gibson, 2005), but anthropometry is the simplest, least invasive and least expensive approach, and is more sensitive to mild malnutrition, for example slowed growth rates, than other approaches (Onis, 2000:1271).

The principal disadvantage of anthropometry is its lack of specificity as an approach to assess dietary adequacy. Anthropometry reflects more than food intake, as an individual's nutritional status is influenced by non-nutritional factors including individual health status, environmental conditions, and inter-individual differences in genetic potential (Onis, 2000; Ulijaszek, 2006). The impact of health on nutritional status is particularly important, especially in early childhood, because disease and infections increase energy and nutrient needs and affect their biological absorption and utilization. Environmental hazards such as contaminated drinking water, lack of sanitation, and overcrowded housing, together with poor care practices and restricted access to health care, can compromise health status and increase nutritional requirements, especially among growing children (Shetty, 2003:4).

In addition, anthropometry reflects only dietary energy; it provides no information about the adequacy of an individual's micro-nutrient intake, nor is it informative about the adequacy of protein intake if energy intake is adequate (Frisancho, 1990). Individuals classified as 'normal' or overweight by anthropometric indicators may suffer from protein and/or micro-nutritional deficiencies if their sources of dietary energy are void of nutrients (Eckhardt, 2006).

6.3 Data Collection Methods and Procedures

Anthropometric measurements were taken in September and October 2006. Measurements in Santana were taken in a 7-day period (September 3-7th) except for one individual; measurements in Caneto were taken in a 13-day period (September 23rd-October 5th), with the exception of two individuals. The three individuals not found at home during these periods were measured 1-2 weeks later. Only one set of measurements was collected, right at the beginning of the harvest season, when most households had received their first one or two weekly wage packets.

Anthropometric measurements were taken in the privacy of each household, using portable measuring equipment. Stature was measured using a free-standing Seca Leicester portable measure, and the recumbent length of children under two years was measured using a Rollameter baby measuring mat, both with 1mm. graduations. Weight was taken using a Tanita WB-100SMA remote display electronic scale with weight increments of 100g. Children unable to stand on the scales alone were weighed with an adult, and the adult's weight was subtracted using the 'tare' weighing function; it was unfeasible to carry a pan scale to weigh infants. One set of equipment was used for all measurements, and the scales were calibrated using a standard weight before use in each household, thereby minimizing potential equipment-related bias in the measurements (Gibson, 2005:13). I received training in anthropometric measurement, using my own fieldwork equipment, from staff at the Oxford Centre for Diabetes, Endocrinology and Metabolism at the Churchill Hospital in Oxford. I then trained my research assistants, using a Portuguese-language procedural manual created from English language measurement protocols, with exercises to maximise inter- and intra-observer standardization (Gordon et al, 1988; Jelliffe and Jelliffe, 1989; WHO, 1995; Cogill, 2003).

Individuals were measured in light clothing (skirt/shorts and T-shirt) after removing shoes and headwear. Stature was measured to the last complete millimetre. The individual's head was positioned in the Frankfort Horizontal Plane, ensuring that full height from the crown to the feet was measured; for young children measured on the baby mat, the soles of the feet were positioned vertical to the body. Weight was taken to

the nearest 100 grams, with the individual standing upright on the scales. When an adult held a young child, the child was held close to the chest. Weights were not standardized in relation to urination and defecation because the purpose was not to assess short-term changes in weight.

In each location, my research assistant took measurements which I wrote down. The birth date of each individual was checked against their birth certificate if possible; almost all certificates were available, so age misreporting was not the problem that it is in some other contexts (Kennedy, 1993:237). The date and time of measurement and the individual's health status⁶⁹ were also noted. Biological age was calculated from date of birth and date of measurement (Gorstein, 1989). Anthropometric measurements were taken as early as possible in the day, and at a similar time for all except two individuals, reducing inter-individual biological variation in stature, due to diurnal compression of the spinal column (Ulijaszek and Kerr, 1999:169), and in weight due to ingestion (Mueller and Martorell, 1988:83). In practise, this meant from 9am to 12 noon, between breakfast and lunch; before breakfast was not feasible since workers eat at 3 or 4am or take their breakfast to the fields⁷⁰. If an individual had eaten lunch before we arrived we returned on another day. Two individuals repeatedly unavailable at this time of the day were measured in the late afternoon.

6.4 Precision and Accuracy of Anthropometric Data

Potential random measurement error was minimized by careful, standardized training, checking of observers' work, and frequent checks on equipment. A degree of random error may nevertheless be present due to intra- and/or inter-observer imprecision in data reading and/or recording, as well as true, albeit small, intra-subject biological variations, due to diurnal compression of the spine, degree of gastric emptying and level of hydration. Of these two factors, measurement imprecision is of much greater concern (Mueller and Martorell, 1988:83).

⁶⁹ Incidences of diarrhoea in the preceding 7 days were noted, given the potential impact of diarrhoea on body weight. There were 5 cases. None of them had borderline weight indicators, so any weight loss that may have occurred had not pushed them into a lower weight category.

⁷⁰ Breakfast is commonly eaten by 7am, and tends to be a light meal, among individuals not working in the fields, so this should not have increased body weights to any significant degree.

An estimation of observers' precision - the technical error of measurement (TEM) - was calculated on the basis of blind repeated measurements collected in quick succession on ten subjects by the three observers (myself and my research assistants). The TEM, the square root of the measurement error variance, was calculated by taking the differences between the observers⁷¹. For height the TEM was .36cm.; for weight, the TEM was 5.8g. (see Table 6.1). Intra-observer TEMs were not calculated; studies show that TEM values for intra- and inter-observer error tend to be similar for measures of height, length and weight (Ulijaszek and Kerr, 1999:170).

The coefficient of reliability (R) was also calculated for random inter-observer imprecision in height and weight measurement in the whole sample; independent of units, the 'R' allows comparison of the relative reliability of the two measures. It is calculated from the total TEM and the sample population inter-subject variance on each measure⁷². 'R' was found to be greater than 0.99 for both height and weight, indicating that the proportion of between-subject variance in the sample population free from measurement error, in other words the proportion of the observed variation due to 'true' biological variation, is over 99%; a coefficient of reliability over .95 is generally deemed acceptable (Ulijaszek and Kerr, 1999:170). However, TEM is age-dependent because the proportion of error is influenced by the absolute size of the dimension measured; the relationship between TEM and height/length and weight tends to be negative, that is, TEM decreases as height/length/weight increase. So a greater proportion of the height/length and weight measurements of small and light individuals is likely to be error, than of the height/length and weight measurements of taller and heavier individuals.

⁷¹ TEM = square root of $((E^N_1((E^K_1M^2) - ((E^K_1M)^2/K)))/N(K - 1))$, where E is 'the sum of', N is the number of subjects, K is the number of observers for the variable taken on each subject, and M is the measurement (Ulijaszek and Kerr, 1999:167).

⁷² $R = 1 - ((\text{total TEM})^2 / \text{SD}^2)$, where SD^2 is the total inter-subject variance for the study (Ulijaszek and Kerr, 1999:168).

Table 6.1. Inter-observer precision and accuracy in height and weight measures, whole sample and by location

Measures	Inter-observer precision (3 observers)		Inter-observer accuracy (2 assistant observers)			
	Whole sample		Caneto		Santana	
	TEM	R	TEM	R	TEM	R
Height (cm)	.3639	.99	.5143	.99	1.0957	.99
Weight (gms)	5.77	.99	11.18	.99	15.65	.99

Potential systematic measurement error was minimized by similar controls over observers' work and equipment. Some systematic inaccuracy may have occurred in the measurement of infants: measurements of recumbent length may be less accurate than measurements of standing height in cases where infants were not still (frequently the case); and the weighing of infants with adults on scales with 100g. gradations precluded attainment of the recommended accuracy of infant weight to within 10g.

Systematic biases in the observers' measurements may also be present in the data. The values reported for precision reveal nothing about the accuracy of our measurements; it is possible that we achieved a high level of precision as a team, achieving measurements close in value, but that our measurements were inaccurate due to systematic errors in our measuring techniques. There is no way to verify our accuracy since the true values of the subjects cannot be known. The usual practice is to assess the accuracy of observers' measurements relative to a 'criterion anthropometrist' or 'well-trained supervisor' (Mueller and Martorell, 1988:85); in the absence of an anthropometrist with greater experience, my assistants' measurements were compared to mine. Since each assistant worked exclusively in one of the two locations, their levels of accuracy can be directly related to the measurements from each location. The TEMs of the assistant in Caneto were .51 cm. and 11.18g. for height and weight respectively; those for Santana were 1.1 cm. and 15.65g. respectively; the level of accuracy was slightly lower in Santana, but the 'R' was greater than 0.99 for both measures in both locations (see Table 6.1). The limits of my own expertise and experience in anthropometry require that these values be treated with some caution.

Even though height and weight measures are simpler than other anthropometric measures, these 'R' values are nevertheless surprisingly high for a team of relatively inexperienced observers. We may have achieved high levels of precision and accuracy in weight measures by using automated electronic scales, and taking care to adjust their level before weighing in each household by using the level gauge. In the case of height measures, it is possible that the R values suggest higher levels of precision and/or accuracy than was really the case. The repeat measures exercise was undertaken in favourable conditions in a health centre with good lighting, and early in the day before other activities; survey measures were taken in sample households, where the lighting was often poor and the ground uneven, and our accuracy may sometimes have been compromised when we became tired from working for several hours and walking in the hot sun. At any rate, the variation due to random errors may largely cancel out in a sample of this size (Ulijaszek and Lourie, 1994). The effect of any remaining random error may have been to increase the variability of height and weight measures in the sample population; any remaining systematic bias may have altered the mean values to a small degree. Overall, though, the levels of precision and accuracy indicated by these estimates allow reasonable confidence in the anthropometric values.

6.5 Anthropometric Indicators, Cut-off Points and Reference Populations

The choice of indicators, cut-off points and reference populations to assess anthropometric data can have a significant impact on the proportions of a population identified as undernourished and overweight (Onis, 2000). Much effort has been dedicated in recent years to the creation of classification systems which accurately identify undernutrition and overweight across the age spectrum and in different ethnic groups, largely due to concerns with the accurate assessment of excess weight.

Table 6.2. Indicators, cut-off points, and reference populations used to classify undernutrition and overweight in the sample population

Anthropometric Indicator	Adults 18+ yrs	Children and Adolescents 0-17 yrs
Short(adult)/ Stunted(child)	Attained Height <-2z of WHO 2007 ^a height at 18 yrs	Height/Age <-2z of: <5 yrs: WHO 2006 ^b 5-17 yrs: WHO 2007 ^a
Thin	BMI, universal cut-off point <18.5 (WHO 1995 ^c)	BMI/Age, cut-offs equivalent to BMI<18.5 at 18yrs: <2 yrs: constructed on WHO 2006 ^b 2-17 yrs: 'Cole population' ^d
Overweight	BMI, universal cut-off point =>25<30 (WHO 1995 ^c)	BMI/Age, cut-offs equivalent to BMI=>25<30 at 18yrs: <2 yrs: constructed on WHO 2006 ^b 2-17 yrs: 'Cole population' ^e
Obese	BMI, universal cut-off point =>30 (WHO 1995 ^c)	BMI/Age, cut-offs equivalent to BMI=>30 at 18yrs: <2 yrs: constructed on WHO 2006 ^b 2-17 yrs: 'Cole population' ^e

Sources: a. WHO, 2007; b. WHO, 2006; c. WHO, 1995; d. Cole et al, 2007; e. Cole et al, 2000.

Table 6.2 summarizes the indicators, cut-off points and reference populations used to classify undernutrition and overweight in this study. Priority was given to the selection of internally-consistent classification systems with similar levels of specificity across the age spectrum in order to facilitate the comparisons across age groups and within households essential to the study of intra-household nutrition (Lindtjorn and Alemu, 1997). I also gave preference to classification systems which categorise weight according to functional and health risks rather than statistical criteria (z-scores, percentiles or percent of median), and to systems which allow comparison with the most recent studies from Brazil and other countries. Individuals are grouped by age, with adults of 18 years and more, and children under 18 years; where reference is made to adolescents, the group encompasses 10-17 year olds⁷³.

The sections that follow describe the classification system used for each height and weight indicator, and the risks associated with abnormal anthropometry in each. It also indicates where biases in the chosen classification systems may have affected the

⁷³ Although the WHO definition of adolescence is 10-19 years (WHO, 2008a), 10-17 years is used here to facilitate the use of reference data, and to permit comparison with other studies which define the cut-off between childhood and adulthood as 18 years of age. There are five individuals in the sample of age 18-19 years, and only one of them falls into an 'abnormal' category for nutritional status, for attained height; their inclusion in the younger or older age group makes little difference to the reporting of survey results.

assessment of nutritional status in this population: (1) adolescent height and weight measures may be under- or over-stated; (2) boy stunting may be understated relative to girls; (3) thinness among men may be overstated relative to women; and (4) women's overweight may be understated relative to men. The first may have affected the age-specific assessments, the other three may have impacted the assessment of gender-specific nutritional outcomes.

6.5.1 Height

Adult stature was assessed relative to the gender-specific mean height of 18 year olds in the WHO, 2007 reference, with a cut-off point of -2 z-scores⁷⁴. Adults of low stature who suffered linear growth retardation in early life may be at increased risk of excess body weight and chronic diet-related diseases, in later life (Barker, 1990; Martorell et al, 2001; Sawaya et al, 2003). The 'early origins' hypothesis suggests that a human body subject to early (fetal or infant) nutritional deprivation may undergo permanent metabolic adaptation in energy use such as impaired fat oxidation resulting in higher fat deposition (Hoffman et al, 2000a), lowered resting metabolic rate and total energy expenditure (Hoffman et al, 2000b), and/or impaired regulation of energy intake (Hoffman et al, 2000c). The positive association between nutritional stunting (a marker of early undernutrition) and subsequent overweight observed in children and adults in a number of nutrition transition contexts, including low-income populations in Brazil, is offered as evidence of such a process⁷⁵ (Popkin et al, 1996; Sawaya and Roberts, 2003; Kruger and Vorster, 2004). There is some evidence to suggest that females may be more vulnerable to the effects of early deprivation than males; Florencio et al (2004) found a closer association between short stature, abdominal obesity and arterial hypertension in women than in men in Northeast Brazil. These hypotheses throw doubt on simplistic explanations of individual energy imbalance and may put paid to earlier propositions of benign adaptation, through stunting, to low levels of intake of the 'small but healthy' hypothesis (Seckler, 1982).

⁷⁴ z-score = the deviation of an individual's value from the median value of the reference population divided by the standard deviation of the reference population (WHO, 2000:32).

⁷⁵ It is possible that BMI overstates excess body weight among stunted individuals since they may have relatively greater trunk length relative to limb length (Sawaya et al, 2003); the data nevertheless remain convincing.

Linear growth in children was assessed by the height-for-age index (length-for-age for children under 2 years), with a cut-off point of -2 z-scores of the WHO age- and gender-specific international growth standard for children under 5 years (WHO, 2006), and of the WHO age- and gender-specific international reference for children 5-17 years (WHO, 2007). The -2z cut-off point is widely accepted as indicating stunting due to chronic, past or ongoing, undernourishment and/or repeated infections. It is widely held that children situated below this point are at risk in terms of physical growth and cognitive development, higher susceptibility to infectious diseases, and lower productivity in adulthood, especially in manual occupations which require physical strength (Haddad and Bouis, 1991; Henneberg et al, 2001; Onis and Blossner, 2003).

Both age groups were assessed using z-score distributions, rather than percentiles or percent of median, in order to provide a fixed point with the same level of specificity in the distributions of the age-group-specific height indicators (WHO, 2000:32).

The WHO 2006 growth standards for children 0-5 years are based on a multi-country⁷⁶ sample of ethnically-diverse, healthy, breastfed children, and are accepted as the most appropriate reference created to-date (Garza and Onis, 2007:142). The WHO 2007 reference for older children, a reconstruction of the NCHS/WHO 1977 reference based on US data from four surveys (see Hamill, 1977:3) is less ideal: the national and ethnic base was limited (US and predominantly white); children in the samples were predominantly bottle-fed, and there was a high level of overweight (Victora et al, 1998); and data from different samples were patched together (Wang et al, 2006:S177). Studies have nevertheless demonstrated that the growth distribution of well-nourished, pre-pubertal Brazilian children is equivalent to the NCHS population distribution (Monteiro et al, 1991; Mondini, 1996; Monteiro et al, 1997). This is probably due to the similarity in growth patterns of pre-adolescent children from affluent populations of different ethnic origins (except, perhaps, Asian children) (Ulijaszek, 2001), and, perhaps, the frequency of bottle-feeding in Brazil.

⁷⁶ Brazil, Ghana, India, Norway, Oman and the US (Garza and Onis, 2007:142).

Growth patterns among children who have entered puberty are not so similar across ethnicities and populations. Human growth is particularly complex during adolescence, when the timing of changes in body proportions and the rate of height and weight gain in the growth spurt are related to maturational rather than chronological age. Maturation is heavily influenced by environmental and ethnically-influenced genetic factors, as well as inter-individual variability (WHO, 1995:268; Ulijaszek, 2001:48; Veiga et al, 2001:82). Among environmental factors, chronic undernutrition can significantly delay puberty onset (Woodruff and Duffield, 2000). Assessment of adolescent height/age and adult height at 18 years relative to the WHO 2007 reference population may overstate stunting if the maturation age, and hence the growth spurt in height, occurs later in the sample population than in the US reference population, due to chronic undernutrition.

6.5.2 Weight

Weight was assessed using body mass index (BMI⁷⁷) in both age groups. For adults, the WHO-recommended (1995) universal, gender-independent cut-off points were used. For children under 18, gender-specific BMI/age was used, as it takes into account gender-specific and age-related changes in the weight to height relationship at different developmental stages more effectively than gender- and age-independent weight-for-height indicators (Cole et al, 2007:1; WHO, 2000:12). Cut-off points linked to the WHO cut-off points at 18 years of age on a multi-country reference population proposed by Cole and colleagues (referred to as ‘the Cole population’⁷⁸) were used. The population represents multiple countries and geographic regions, including developing countries⁷⁹ and is believed to be adequate for populations of European and/or African descent (Cole et al, 2000:5). The data reflect ‘normal’ growth in a healthy population (the national surveys pre-date recent increases in child obesity). The same data cover children from birth through adolescence. And the sample includes at least 200 individuals in each age

⁷⁷ BMI = weight in kilograms divided by height squared in metres (Cogill, 2003:72).

⁷⁸ The reference population was originally created under the auspices of the International Obesity Task Force (IOTF) (Cole et al, 2000), but since its use is also proposed for the assessment of underweight (Cole et al, 2007), it is referred to here as ‘the Cole population’.

⁷⁹ The data-sets are from high and middle income countries: Brazil (1989 PNSN data), Great Britain, Hong Kong, the Netherlands, Singapore, and the US (Cole et al, 2000:1).

and gender group. As recommended, I used the mid-year cut-off point provided for each one-year age band. The system rests on the assumption – as yet unvalidated - that levels of child BMI equivalent to the adult cut-off points at 18 years carry the same health and functional risks of low weight and overweight as those for adults (Cole et al, 2000; Cole et al, 2007). Comparisons of weight status across age groups are made with caution; no procedures exist, as yet, to measure and compare child and adult body mass directly (Popkin et al, 2006:1846).

The use of BMI/age in infants presents particular difficulty because the relationship between changes in length and weight in this age group are especially complex (Conde, 2008; Doak et al 2002:216). For this reason, Cole et al propose cut-off points from age 2 upwards. Given the importance in my study of the anthropometric assessment of all household members, and the desirability of a consistent system across age groups, I constructed gender-specific cut-off points for infants by expressing the Cole cut-off point at 2 years of age as a z-score of the WHO, 2006 distribution, and then extrapolating backwards to create equivalent cut-off points for children under two⁸⁰ (see details in Appendix 5).

The Cole system was used in preference to the ‘traditional’ approach - z-scores relative to WHO reference populations - in order to provide consistency of weight assessment across age groups. It was chosen in preference to recently-published Brazilian cut-off points drawn from 1989 data (Conde and Monteiro, 2006), to allow comparison with studies of co-existing undernutrition and overweight in Brazil and other countries (Doak et al, 2005; Tiwari et al, 2007).

6.5.2.1 Thinness

For thinness in adults, the universal age- and gender-independent cut-off point of BMI<18.5 recommended by the WHO (1995) was used. Adults with a BMI below 18.5 are believed to be at risk of increased morbidity, impaired work productivity, and low-birth-weight offspring in the case of women (Kennedy, 2003:22). Studies have shown

⁸⁰ This was suggested by Professor Cole as the most appropriate approach (Cole, 2008).

that the lower half of the BMI distribution of well-off Brazilian adults (those in households with per capita monthly income of at least one minimum salary) in the 1989 PNSN data superimposed the US NHANES II distribution used to establish the WHO cut-off points (Mondini, 1996:21).

Thinness⁸¹ in children was assessed against age- and gender-specific cut-off points in the ‘Cole population’ equivalent to the BMI cut-off point of <18.5 at 18 years of age. The ‘thinness’ cut-off points were published in 2007 and require validation against other data-sets. I adopted the <18.5 cut-off so that my data are comparable with recent ‘mixed households’ studies⁸² (Doak et al, 2005; Tiwari et al, 2007). Low BMI/age in children indicates thinness due to acute, recent undernourishment and/or infections, much as the traditional weight-for-height indicator.

Adolescent weight has been assessed using the system used for younger children. The timing of the accumulation and distribution of fat occurring during puberty are, however, related to maturational rather than chronological age. Consequently, more mature individuals will have a higher BMI than less mature individuals of the same age; assessment of adolescent weight status using the ‘Cole reference’ may therefore overstate thinness in cases where puberty is delayed by more than 2 years (Cole et al, 2000:5).

6.5.2.2 Overweight

No accurate procedure exists to measure total adiposity directly, because it is diffused in subcutaneous and intra-abdominal fat stores as well as within muscles (Willett et al, 1999). In the absence of any such procedure, BMI, strongly associated with body fat and health risks (Wang et al, 2006), is considered as reliable as other more sophisticated methods to assess body fat, including hydrodensitometry, dual-energy x-ray

⁸¹ The term ‘thinness’ for low weight in children was coined by Cole et al (2007) to differentiate the use of BMI/age from measures of underweight (weight/age) and wasting (weight/height).

⁸² Cole et al propose BMI<17 as the primary cut-off point, because it coincides closely with commonly-used z-score (-2) and percent of median (80%) cut-offs, by gender, when averaged across the six data-sets, whilst also matching the WHO definition of grade 2 thinness in adults (Cole et al, 2007:5); in the Brazilian data-set, a BMI of 17 corresponds to -1.9z for boys and -2z for girls (Cole et al, 2007:3).

absorptiometry, deuterium oxide dilution, bioimpedance, and measures of body circumference and skinfold thickness (WHO, 1995; Willett et al, 1999).

Adult overweight and obesity were assessed against universal BMI cut-off points recommended by the WHO (1995): overweight between 25 and 29.9; obesity equal to or greater than 30. The cut-off points are based on the association between BMI and mortality: the risk of mortality due to chronic disease associated with excess body fat (type 2 diabetes, hypertension, coronary heart disease, cholelithiasis) begins to rise at a BMI of 25 (WHO, 1995; WHO, 2000). The risk of chronic disease actually begins to rise at BMI as low as 22 or 23 (Willett et al, 1991:431).

Overweight and obesity in children were assessed using the age- and gender-specific BMI cut-off points in ‘the Cole population’ linked to the adult cut-offs of 25 and 30 at 18 years (Cole et al, 2000). Cut-off points for infants under 2 years were constructed as described in Section 6.5.2 and Appendix 5. If there were adolescents with early onset of puberty in the sample, they would have a higher BMI/age than less mature individuals and overweight may be overstated.

6.6 Gender Bias in Anthropometric Assessment

Anthropometric assessment by gender, central to the study of intra-household nutrition, can be sensitive to bias in cut-off points or reference populations. The cut-off points used for children are gender-specific and the multi-country, multi-ethnic WHO, 2006 and ‘Cole’ reference populations can be assumed to have minimal bias. The same is not true of the WHO, 2007 population. Svedburg (1988:18) illustrated that the use of two different reference populations in Sub-Saharan Africa (‘Denver’ and ‘well-to-do’ Nigerian children) both indicated greater gender differentials in stunting, with higher still stunting among boys relative to girls, than was the case using the NCHS/WHO 1977 population. If the NCHS/WHO population overestimates growth retardation among girls, the findings of many child nutrition studies may be called into question. The implication for this study is that boys of 5-17 years may actually be more stunted relative to girls than

they appear to be. The same may be true of men's relative to women's height deficits when assessed against the WHO 2007 reference at age 18.

Use of the WHO's gender-independent BMI cut-off points to assess adult weight may also create bias. Monteiro et al (1997) demonstrated that thinness was higher among Brazilian women than men in 1989 using the gender-independent BMI cut-off point of 18.5, but that thinness was higher among men when gender-specific cut-offs created using the gender-disaggregated 5th percentile of NHANES II data, with a lower cut-off point for women, were used; Mondini (1996) found the same using gender-specific cut-off points created using the 5th percentile of 1989 PNSN data. The use of gender-independent cut-off points with the sample data may indicate lower male relative to female thinness than is really the case. Mondini (1996) created gender-specific cut-off points for obesity based on the 95th percentile of 1989 PNSN data, with a lower cut-off point for women. The use of gender-independent cut-off points could indicate lower female relative to male overweight and obesity in the sample than is the case. I chose not to use gender-specific cut-off points so that my data is comparable with other studies using the WHO cut-off points.

6.7 Data Analysis and Logistic Regressions

Infants under six months of age were excluded from the dietary analyses and therefore from the anthropometric analyses. Pregnant women were excluded from weight-related analyses given the lack of reference data for ideal gestational weight (Doak et al, 2002:216).

Indicators were calculated using Epi-Info (CDC, 2007), where applicable, and then imported into SPSS. Results are reported as prevalences below and above the 'normal' range. The interpretation and presentation of anthropometric data in categories creates a false dichotomization of states of function and disease which are, in reality, continuous (Lasker, 1994); some individuals at the lower and upper bounds of "normal" may be at risk, while other individuals classified as "under" or "over" may carry no risk. I chose to report prevalences rather than mean values to facilitate comparison with other studies.

Binary logistic regression was used to control for fixed group and household effects before observing the effects of age group and gender on anthropometric outcomes. The direct entry approach was used ('Enter' in SPSS) in order to observe the effects of each variable after controlling for others. Regressions were run for Groups 1 and 2 combined, as cell sizes were too small to run separate analyses. They were run for each anthropometric outcome with counts in all cells and sufficient expected frequencies (no more than 20% of cells with a count less than five) (Tabachnick and Fidell, 2007:442). The binary outcome variable was the likelihood that an individual did or did not fall above or below the 'normal' range of each indicator. Only models with statistically significant predictors are presented.

Predictors were purposefully selected on theoretical grounds, reflecting my conceptual framework and contextual knowledge, to capture demographic and socioeconomic factors which may have influenced nutritional status (and food allocation, presented in the next chapter). Once selected on this basis, variables were used regardless of their correlation with the dependent variable, allowing for the possibility that an apparently insignificant correlation could become significant when the effects of other variables were held constant (Hosmer and Lemeshow, 1989:86). Multicollinearity was avoided by selecting variables which did not represent similar characteristics. The number of predictors was limited to ensure an adequate observation:predictor ratio, stated in the notes to each model.

The following predictors were used in the regressions⁸³:

(1) Location-labour group

Location-labour group was used to control for micro-level ecological and material conditions which differed across the three groups (CP, CC and SN) described in Chapter 3, particularly economic factors (employment, income, wage differentials, and seasonal

⁸³ The following predictors were considered but discarded in order to retain a high observation:predictor ratio: household size, dependency ratio, per capita income, and schooling of household head and/or female spouse. All are reflected, to a degree, in location-labour group and per capita food spending.

fluctuations in each of these, and the cost of living), and environmental factors (housing conditions, sanitation, and water supply for drinking and washing) which may have influenced nutritional status.

(2) Household per capita food spending

Household per capita food spending, averaged across the harvest and non-harvest seasons, was used to control for household-level effects in the food budget which may have influenced nutritional outcomes. Food spending was used as a proxy for household welfare in the regressions because it is smoother over the long run than income or total expenditure; as the most basic of needs, spending on food is likely to be the least affected by fluctuations in income (Anand and Harris, 1990).

(3) Gendered control of household monetary income

The gender of the individual(s) controlling household employment-related monetary income was used to control for household-level factors in resource control which may have influenced nutritional outcomes if men and women allocated different levels of income to purchase food, and/or the distribution of foods within households, including high status foods, changed when men and women control income. This may have occurred because women had secured some bargaining power in the household, because they themselves earned income⁸⁴ or had created leverage by some other means, and/or due to less rigid gender relations than the norm in some households in which the male head voluntarily relinquished unilateral control over household income.

The classification of gendered income control presented in Chapter 5 was collapsed into 2 categories for the purpose of regression to avoid the problems associated with small samples. Income was classified as being (1) ‘all male’ if it was unilaterally controlled by the male household head, or as (2) ‘female’ if the female spouse had sole or joint control over income, whether earned by herself or others. Receiving money from a male spouse or other household members to buy food, and sometimes other non-durable household

⁸⁴ Female-earned income was not used to proxy for bargaining power in the household because only five women earned an income.

goods, was not counted as female control. Household income was under unilateral male control in 50% of sample households, unilateral female control in 25% of households, and mixed control in 25% of households; females were involved in income control in 50% of households.

(4) Gender and age group

The differences in nutritional status by gender and age group were examined after holding sources of inter-household variation – the first three predictors - constant.

6.8 Nutritional Status in the Sample Population

Given the technical complexities associated with the collection of anthropometric data, its lack of specificity as an indicator of nutritional status, and the biases introduced by the selection of indicators, reference populations and cut-off points, the data presented in this section are treated as an adequate approximation of reality rather than some precise ‘truth’.

What emerges from the data is a clear picture of the age-specific patterns which characterise the ‘nutrition transition’: stunting and thinness among children; short stature among adults who may have experienced undernutrition in early life; overweight and obesity among adults, particularly women, and early signs of overweight among girls; and the appearance of ‘mixed households’ containing individuals with divergent (undernourished and overweight) nutritional outcomes. The similarities between my data and survey data for the Northeast, presented in Section 6.9, suggest that the patterns observed in my data-set are reliable.

6.8.1 Nutritional Status by Age-Gender Group in the Sample Population: Summary Data

Table 6.3 shows the prevalence of undernutrition, overweight and obesity in the sample population. About one in five adults was of short stature, suggesting high levels of historical undernutrition among both men and women, and a possible propensity to excess weight in adulthood. Thinness among adults was negligible – just one man -

somewhat surprising in a population still engaged in heavy manual work. The lack of thinness could be at least partly due to metabolic adaptation to early deprivation.

Table 6.3. Prevalence of undernutrition, overweight and obesity by age-gender group in the sample population

	Percentage (count)			
	Men	Women	Boys	Girls
No. of individuals (height)	41	36	35	40
Short(adult)/stunted(child)	19.5(8)	22.2(8)	20(7)	12.5(5)
No. of individuals (weight)*	41	31	35	40
Thin	2.4(1)	0	11.4(4)	10(4)
Stunted and/or thin(child)	----	----	25.7(9)	20(8)
Overweight not obese	14.6(6)	25.8(8)	2.9(1)	7.5(3)
Obese	4.9(2)	12.9(4)	0	0
Overweight and obese	19.5(8)	38.7(12)	0	0

For indicators, cut-off points and reference populations used, see Table 6.2.

*5 pregnant women excluded from weight indicators

Childhood stunting and thinness were high, especially stunting among boys; the latter may have been higher still relative to girls if there is bias in the WHO 2007 reference population. Much of the child thinness was however mild, falling between the <18.5 and <17 cut-off points: only one child – an adolescent boy – was severely thin using the <17 cut-off point. These patterns suggest that while the high degree of protein-energy deficiency once suffered among rural labouring populations in Northeastern sugar-producing areas (Castro, 1946:127; Chaves, 1980) has largely been overcome in this population, a low level of chronic, continuous or intermittent, shortfall in energy and/or nutrient intake, and/or a high level of intestinal infections, persist among children.

Excess weight was high among adults, and especially women, with combined overweight and obesity of 19.5% among men, and 38.7% among women; the gender differential would be higher still if gender-specific cut-off points were used. Overweight was negligible among boys, but higher among girls; no children were obese.

The anthropometric data were collected at the very beginning of the harvest season, immediately after the period of low seasonal employment and income. It is quite possible that some thin children had suffered the effects of seasonal food insecurity. Adult weights,

on the other hand, appear not to have been negatively affected, insofar as only one adult was underweight. Some women told me that cane-cutters in their households lose weight during the harvest due to their extremely high energy expenditure; it is possible that the level of thinness increased during the harvest among adult labourers at the lower end of ‘normal’ weight who were unable to ingest sufficient calories to meet their high energy needs. Some women told me that they and others in their households whose activity levels do not increase during the harvest gain weight during the harvest season, when incomes and food supplies are greater; it is plausible, then, that the prevalences of overweight and obesity increased beyond the levels in this data-set during the harvest, at least among children and adults not engaged in physically-demanding cane-cutting.

6.8.2 Nutritional Status by Age and Gender in the Sample Population: Regression

Two models with statistically significant predictors are described below. The predictive power of each variable was assessed on the significance level of the Wald chi-square statistic of the *b* coefficient (Sign.(p) in Tables 6.4 and 6.5) (Peng et al, 2002:6). Predictors with a significance level of <.05 are reported in bold and italics, those significant at .1 are reported in bold; confidence intervals of the odds ratios are reported at the .1 level.

6.8.2.1 Age Groups

Differences in child stunting and adult height deficits by age group were not tested, because the latter are a reflection of past nutrition in the adult’s household of origin. Differences in thinness by age group were not tested as thinness among adults was negligible. The model for age differences in overweight (not obese) confirmed, at the .05 level, that adults were more likely than children to be overweight, after holding for group and household effects ($p=.014$, see Table 6.4). There was no high multicollinearity in the model, demonstrated by tolerance levels greater than .1, variance inflation factors (VIFs) less than 10 (Field, 2009:242), and the highest bivariate correlation of .603. There were no outliers (no values greater than 1 on Cook’s distance), but three cases had undue

leverage (greater than 3 times the average leverage value⁸⁵); all values on these cases were found to be correct.

Table 6.4. Significance of regression predictors on adult and child overweight

Predictor	Beta (SE)	Wald statistic	Sign.(p)	90% CI for Odds Ratio		
				Lower Interval	Odds Ratio	Upper Interval
Loc-labour group (CC)		.680	.712			
Loc-labour group (CP vs CC)	.538(.696)	.598	.440	.545	1.713	5.384
Loc-labour group (SN vs CC)	.091(.947)	.009	.924	.231	1.095	5.199
PC household food spending	.012(.028)	.197	.657	.967	1.012	1.060
Female vs male control of household income	-.727(.614)	1.402	.236	.176	.483	1.327
Gender Difference						
Female vs male	.799(.542)	2.172	.141	.912	2.223	5.421
Age Difference						
Children vs adults	-1.582(.646)	5.992	.014	.071	.206	.595

NOTES TO MODEL:

Sample size = 147 adults and children (pregnant women excluded)

Beta (SE) = b-coefficient and standard error

Sign. (p) = Significance (p-level)

CI = confidence interval

Loc-labour group = location-labour group

Constants were included in the model, but are not reported

Betas (SE) and significance levels for age and gender groups refer to the first category in reference to the second (e.g. .799(.542), p=.141 indicates that females are more likely than males to be overweight although the difference is not statistically significant).

Ratio of cases:predictors = 29:1

Hosmer and Lemeshow Goodness of Fit $X^2 = 8.479$, p=.388

6.8.2.2 Gender

Among adults, gender differences in height deficits were tested, even though they are the product of past nutritional deprivation in different households, in order to test if the level of height deficit was higher among women than men, possibly leaving them more subject to ‘early origins’ adaptations: the differences were not statistically significant. Gender differences in adult thinness were not tested because there were no thin women. The model for gender differences in overweight and obesity among adults confirmed that women were more likely than men to be overweight or obese at the .1 level, after holding for group and household effects (p=.051, see Table 6.5). The tolerance levels were greater than .1, VIFs were less than 10, and the highest bivariate correlation was below .6,

⁸⁵ Average leverage value = $(k+1)/n$ where k is the number of predictors, and n is the number of cases (Field, 2009:217).

indicating the absence of multicollinearity. There were no outliers, and no cases had undue leverage.

Among children, gender differences in stunting and thinness were combined in an ‘undernutrition’ model because the cell sizes in each separately were too small; the differences were not statistically significant, possibly because there were no differences in the underlying population, or due to small sample sizes, lending insufficient power to detect medium or small effects⁸⁶. The difference in stunting among boys and girls was higher than that in thinness and combined stunting and thinness; there may have been a real difference in stunting among boys and girls. No model was run for differences in overweight among boys and girls because cell sizes were too small.

Table 6.5. Significance of regression predictors on adult overweight and obesity

Predictor	Beta (SE)	Wald statistic	Sign.(p)	90% CI for Odds Ratio		
				Lower Interval	Odds Ratio	Upper Interval
Loc-labour group (CC)		1.924	.382			
Loc-labour group (CP vs CC)	1.049(.791)	1.761	.184	.778	2.856	10.488
Loc-labour group (SN vs CC)	1.038(1.060)	.958	.328	.493	2.823	16.151
PC household food spending	.023(.030)	.578	.447	.974	1.023	1.075
Female vs male control of household income	-1.666(.678)	6.030	.014	.062	.189	.577
Gender Difference						
Women vs men	1.137(.583)	3.804	.051	1.195	3.117	8.129

NOTES TO MODEL:

Sample size = 72 adults (pregnant women excluded)

Beta (SE) = b-coefficient and standard error

Sign. (p) = Significance (p-level)

CI = confidence interval

Loc-labour group = location-labour group

Constants were included in the model, but are not reported

Betas (SE) and significance levels for gender group refer to the first category in reference to the second (e.g. 1.137(.583), p=.051 indicates that women are more likely than men to be overweight or obese, and the difference is statistically significant at the .1 level).

Ratio of cases:predictors = 18:1

Hosmer and Lemeshow Goodness of Fit $X^2 = 7.171$, p=.518

⁸⁶ The same model run for the larger sample of 176 individuals also did not indicate a statistically significant difference.

6.8.2.3 Significance of Other Predictors

After controlling for other factors, location-labour group was not a significant predictor in any of the models, suggesting that broad economic, social and cultural factors which cross-cut the location-labour groups are more important determinants of nutritional status than the material and environmental differences among the three groups. It is also possible that the constellation of demographic, socio-economic and material characteristics of each location-labour group cancelled out the differences among them. So, for example, there may have been no statistically significant difference in the indicators of child undernutrition in the three groups because higher incomes in Caneto were off-set by lower standard housing and sanitation conditions on the plantation, relative to households in Santana.

Per capita monthly household spending on food was also not a significant predictor in the regression analyses suggesting that social, cultural and environmental determinants of nutritional status are more important than the amount which different households spend to purchase food.

The gendered control of household income was highly significant in the adult overweight and obesity model after holding other factors constant, indicating that adults in households with female control over income were less likely to be overweight or obese. It was not significant in the adult-child overweight model.

6.8.3 Nutritional Status by Age-Gender Group in Groups 1 and 2

Levels of undernutrition, overweight and obesity among age and gender groups in Group 1 were similar to those observed in the whole sample of 152 individuals (Tables 6.3 and 6.6). Adult height deficits were the same among men and women; thinness was marginally higher among men due to one case. Childhood stunting and thinness were higher among boys than girls, although the gender differential in thinness was again negligible. Overweight and obesity were higher among women than men, and may have increased further during the harvest. Overweight was significant, and higher than thinness, among girls but lower among boys.

Table 6.6. Prevalence of undernutrition, overweight and obesity by age-gender group in Groups 1 and 2

Percentage (count)				
Group 1				
	Men	Women	Boys	Girls
No. of individuals (height)	35	30	23	25
Short(adult)/stunted(child)	20(7)	20(6)	21.7(5)	12(3)
No. of individuals (weight)*	35	27	23	25
Thin	2.9(1)	0	8.7(2)	8(2)
Stunted and/or thin(child)	---	---	30.4(7)	20(5)
Overweight not obese	14.3(5)	18.5(5)	4.3(1)	12(3)
Obese	5.7(2)	14.8(4)	0	0
Overweight and obese	20(7)	33.3(9)	0	0
Group 2				
	Men	Women	Boys	Girls
No. of individuals (height)	6	6	12	15
Short(adult)/stunted(child)	16.7(1)	33.3(2)	16.7(2)	13.3(2)
No. of individuals (weight)*	6	4	12	15
Thin	0	0	16.7(2)	13.3(2)
Stunted and/or thin(child)	---	---	16.7(2)	20(3)
Overweight not obese	16.7(1)	75(3)	0	0

For indicators, cut-off points and reference populations used, see Table 6.2.

*pregnant women excluded from weight indicators

In Group 2, the height deficit and the level of overweight were both higher among women than men, and the difference between men and women's weight status may also have increased further during the harvest. Childhood stunting and thinness separately were again higher among boys than girls, but when combined they were higher among girls. No children were overweight.

The levels of under- and overnutrition were different in Groups 1 and 2, but the age and gender differentials were the same. The height deficit and the level of overweight (not obese) were much higher among Group 2 than Group 1 women, although the three cases of female overweight were only moderate (BMIs between 26 and 27), and there were no obese adults. The prevalence of stunting among boys was lower in Group 2 than Group 1, but thinness was higher among boys and girls in Group 2 than in Group 1. Different to Group 1, stunting and thinness combined were higher among girls than boys, due only to two cases of mild thinness among girls. The differences in nutritional outcomes among

age-gender groups were smaller in Group 2 than Group 1: undernutrition persisted among children and there were no overweight children; overweight among adults was low, with BMIs ranging from 25.3 to 27, and none were obese.

There is some evidence of ‘early origins’ adaptation to early-life nutritional deprivation among adults: 25% of overweight or obese adults were also stunted, the same proportion among men and women.

6.9 Nutritional Status in Northeast Brazil

6.9.1 Nutritional Status by Age-Gender Group in Rural Northeast Brazil

Table 6.7. Prevalence of undernutrition, overweight and obesity by age-gender group in rural Northeast Brazil, 2002/03

	Percentage			
	Men 20+ yrs	Women 20+ yrs	Boys* 10-19 yrs	Girls* 10-19 yrs
Stunted ^a	---	---	21.2	15.1
Underweight ^b	4	7.2	3.2	3.8
Overweight ^c not obese ^d	17.8	26	6.8	9.4
Obese	3.2	10.8	0.2	1.5
Overweight and obese	21	36.8	7	10.9

Sources: Family Budgets Survey (POF), 2002/03 (IBGE, 2004a and IBGE, 2006a)

* Data for the rural Northeast were not disaggregated by gender for children 0-9 years old (IBGE, 2006a)

^a Adult height deficits not reported in the 2002/03 POF; stunting, adolescents 10-19 yrs: height/age <-2z of NCHS/WHO 1977;

^b Underweight: adults, BMI<18.5; adolescents 10-19yrs, BMI/age<-2z of 1989 PNSN distribution⁸⁷

^c Overweight: adults, BMI=>25<30; adolescents 10-19yrs, BMI/age=>25<30 at age 18 of 1989 PNSN distribution

^d Obese: adults, BMI=>30; adolescents 10-19yrs, BMI/age=>30 at age 18 of 1989 PNSN distribution

That my data are consistent with the most recent survey data for the rural Northeast (Family Budgets Survey (POF), 2002/03⁸⁸; see Table 6.7), despite some differences between this data and mine in age groupings, the use of indicators and reference

⁸⁷ Distribution published in Conde and Monteiro (2006); BMI/age relative to the Brazilian PNSN is presented because it is thought that the NCHS/WHO (1977) reference population recommended by the WHO (1995) may be inadequate for the assessment of weight status in the Brazilian population (IBGE, 2006a).

⁸⁸ Results of the 2008/09 POF were not available at the time of writing (IBGE, 2010), and the 2006 PNDS reports only on children under five, not disaggregated by gender, and women 15-49 years; the POF 2002/03 data are reported in preference to data for rural Pernambuco collected in the Second Health and Nutrition Survey of Pernambuco (Batista Filho and Romani, 2002) because the latter are from five years earlier, and nutritional outcomes have been changing rapidly in Brazil and the Northeast.

populations, and the 3-4 year interval between data collection, suggests that my data are reliable, despite the relatively small cell sizes, and the lack of statistical significance of age or gender in some regression models.

Having said that, the absence of adult thinness in my sample is surprising, given the prevalence of underweight in the rural Northeast. But the most recent survey results available, the 2006 PNDS, reported a reduction in underweight among women nationally, from 5.2% in 2002/03 to 3.5% in 2006 (IBGE, 2008a), a trend which may hold amongst women, and possibly men in the Northeast, including the research site.

The high level of childhood stunting and the gender differential in my data are replicated among 10-19 year olds in the POF data for the Northeast, nationally (boys 11.3% vs girls 8.3%), and in every region, both urban and rural, and every income level in Brazil (IBGE, 2006a). Scheper-Hughes (1992) found that stunting was higher among boys than girls in the Pernamubuco shantytown that she studied. So although the difference was not statistically significant in my data, there is substantial evidence that boys are more stunted than girls throughout Brazil. And if the NCHS/WHO population does tend to overestimate growth retardation in girls, as suggested by Svedberg (1988:18), the gender differential may be even greater.

Thinness among children in my sample was somewhat higher than in the POF data. This may in part be due to the difference in age range; underweight among younger children, 0-9 years old, in the POF data for the Northeast was higher than among older children at 8.4% (not disaggregated by gender). It may also be due to the use of different indicators and reference populations⁸⁹. The difference between boys and girls in the POF data is negligible, and in my data it was only slight.

The prevalence of overweight and obesity among men and women in my sample is similar to that seen in the POF data, as is the gender differential, with women suffering substantially higher levels of overweight and obesity. Girls are more overweight and

⁸⁹ W/A <-2z of NCHS/WHO 1977 is used in the POF 2002/03 data.

obese than boys in the Northeast data, again suggesting that there is a real gender difference in the region⁹⁰.

6.9.2 Secular Trends in Nutritional Status by Age-Gender Group in Northeast Brazil

Table 6.8. Secular changes in undernutrition and overweight by age-gender group in Northeast Brazil, 1974/75 to 2002/03⁹¹

	Percentage			
	Men 20+ yrs	Women 20+ yrs	Boys* 10-19 yrs	Girls* 10-19 yrs
Stunted ^a	---	---	-68.7	-72.6
Underweight ^b	-52.8	-55.1	-32.7	-10.5
Obese ^c	+385.7	+144.7	+1700 ^d	+314.3 ^d
Overweight ^e and obese	+200.9	+84.6	+391.7	+118.9

Sources: National Survey of Family Expenditure (ENDEF) 1974/75, and Family Budgets Survey (POF) 2002/03 (Monteiro, 2003; IBGE, 2004a; IBGE, 2006^a).

* Data for the rural Northeast not disaggregated by gender for children 0-9 years old

^a Adult height deficits not reported in the 2002/03 POF; stunting, adolescents 10-19 yrs: height/age <-2z of NCHS/WHO 1977;

^b Underweight: adults, BMI<18.5; adolescents 10-19yrs, BMI/age<-2z of 1989 PNSN distribution⁹²

^c Obese: adults, BMI=>30; adolescents 10-19yrs, BMI/age =>30 at age 18 of 1989 PNSN distribution

^d These figures are for obesity among adolescents at *national* level; no data were located for the Northeast

^e Overweight: adults, BMI=>25<30; adolescents 10-19yrs, BMI/age=>25<30 at age 18 of 1989 PNSN distribution.

A comparison of anthropometric data from 1974/75 and 2002/03 for Northeast Brazil (rural and urban combined) demonstrate clearly the trends over time which have given rise to the nutrition transition (Table 6.8). Steady if not spectacular reductions of anything up to around 70% have occurred in adult and child undernutrition. The greater decrease in underweight among adolescent boys than girls, to arrive at a very similar prevalence in 2002/03 (at least in the rural Northeast: Table 6.7), suggests that underweight was higher among boys than girls until recently. Overweight and obesity have increased at alarming rates among adolescents and adults. Higher overweight than undernutrition was first

⁹⁰ Although it is not replicated in national data from 2002/03 (overweight and obesity combined, 19.7% for boys, 18.3% for girls) (IBGE, 2006a).

⁹¹ ENDEF data were nationally representative except for the rural North (IBGE, 2006a). Data are reported for those age groups for which published data was located. Published data for *rural* NE Brazil were not located.

⁹² Distribution published in Conde and Monteiro, 2006; BMI/age relative to the Brazilian PNSN is presented because it is thought that the NCHS/WHO (1977) reference population recommended by the WHO (1995) may be inadequate for the assessment of weight status in the Brazilian population (IBGE, 2006a).

observed among adults at national level in 1989 (Monteiro et al, 2002:111). The much higher increase of overweight and obesity among men and boys suggests that they may catch up with women and girls.

Anecdotal evidence suggests similar trends in the sample population. I heard stories of workers who collapsed or died from the effects of hunger, exhaustion and malnutrition while working in the past, but no-one told me of recent occurrences of such events in the research site. Many women told me that their mothers were shorter and thinner than they were, particularly the mothers who had worked in the sugarcane. And the municipal nutritionist noted that ‘in the last few years’ she had been dealing with more overweight than underweight referrals of all ages (Nutritionist, 2007). Uniform undernutrition in this low-income population, albeit manifest in different forms for different age groups, has been replaced by a divergence in nutritional outcomes, with undernourished and overweight individuals living side-by-side in the population, and even within households.

6.10 The Availability of Dietary Energy in Sample Households

Indicators of nutritional status provide information principally on the adequacy of dietary energy. Despite the levels of food insecurity reported in Chapter 5 and the prevalence of under-nutrition among children reported in this chapter, there are good reasons to believe that there is sufficient dietary energy for *most* individuals *in the majority* of sample households, *most of the time*. That only one adult was thin, and that overweight and obesity were high despite the moderate to high level of physical activity for many, suggest that overall, adults are in energy balance or excess; and it seems unlikely that early nutritional deprivation alone could account for the prevalence of excess weight, even if only a relative increase in energy intake is required to trigger weight gain. It is possible that some adults became thin while cutting cane in the harvest season, but if so, this was likely to affect only a few borderline normal-weight cases. The prevalence of thinness among children may indicate a shortfall in energy intake, but the majority of cases were of moderate thinness; only one child was severely thin. In addition, thinness indicates acute under-nutrition, so the cases of thinness among children may have been

seasonal, at the tail-end of the non-harvest season when the energy supply may have been insufficient in a few households.

The higher level of stunting among children indicates the possibility of chronic, albeit small, shortfalls in dietary intake. But the shortfall may be in micro-nutrients essential for linear growth, particularly of Vitamin A, iron, and/or zinc (Jelliffe and Jelliffe, 1989:61; Rivera et al, 2003:4010S), rather than energy or protein, and micro-nutrient deficiencies may exist without a shortfall in dietary energy in the energy-dense, but largely nutrient-empty, nutrition transition diet in this setting. Growth retardation can also be caused by poor health status in combination with, or even without, energy deficiency, particularly infections which increase nutritional requirements above ‘normal’ estimates; and children are particularly susceptible to the health risks posed by contaminated water, inadequate sanitation, and intestinal parasites. In addition, the incidence of stunting in a child indicates that he or she has confronted shortage at some time in his or her life, but not necessarily at the time the measurement was taken. What’s more, thin and stunted children were spread across sample households rather than being clustered within them⁹³, suggesting that child under-nutrition is an individual, not a household, occurrence, due to individual conditions which may include high physical activity, poor health status, fussy eating habits, and intra-household food allocation, rather than a household-level energy shortage.

These statements do not negate the reality of hunger and undernutrition for some individuals, carrying with them serious functional consequences including arrested cognitive development, reduced capacity to learn and work, and possibly an increased risk of overweight and associated chronic diseases. My conversations with women, and the data on food insecurity, showed that some individuals go hungry sometimes, especially in contract workers’ households in the non-harvest season, and especially in Group 2, half of which had experienced serious food shortage in the year prior to the survey. But such conditions clearly affect a smaller number of individuals than they did just a generation ago.

⁹³ With the exception of one household, in which 6 of the 7 children were stunted.

6.11 ‘Mixed Households’: Undernutrition and Overnutrition Within Households

The prevalence of dissociation of nutritional outcomes within households has been used as an important marker in the evolution of the nutrition transition⁹⁴ (Mondini, 1996; Monteiro et al, 1997). Studies have reported prevalences of ‘mixed households’ of 11% for all Brazil in 1989 (Doak et al, 2005), 9% in a Sao Paulo shantytown in 1995 (Sawaya et al, 2003), and 30% in a ‘very-low-income’ homeless camp in Maceio in 1999⁹⁵ (Florencio et al, 2001:280). It is likely that the prevalence of mixed households in low-income populations in Brazil has increased since these studies, given ongoing increases in overweight.

In the sample population, 18.8% of households were ‘mixed’, meaning they had stunted children and/or thin individuals, and overweight individuals⁹⁶. The most common pattern in my sample, and studies in Brazil and other locations (Doak et al, 2005; Garrett and Ruel, 2005), is the co-existence of underweight/thin or stunted children with non-elderly, overweight women. The prevalence of mixed households was much higher in Group 2 than Group 1 - 33.3% (2 households) vs 15.4% (4 households), due to the high proportion of overweight women in Group 2.

6.12 Conclusion

The data presented in this chapter leave no doubt that nutrition transition conditions prevail in the population of this study. In both dietary groups, stunting and some thinness persisted among children, more so among boys than girls, and although the gender difference in undernutrition was not statistically significant in my sample, regional survey data show that there is a real difference in stunting among boys and girls. Child under-nutrition co-exists with high levels of excess weight among adults, especially women,

⁹⁴ Dugdale (1985) was one of the first to suggest the use of ‘family anthropometry’ to assess intra-household factors governing nutritional profiles, although at that time he pointed only to the co-existence of underweight and normal weight.

⁹⁵ The higher level in this study is largely because a BMI ≤ 20 was used as the cut-off point for adult thinness. Some of the prevalences reported here are based on slightly different indicators and cut-off points, but the co-existence of divergent nutritional outcomes is nevertheless undeniable.

⁹⁶ Adults of short stature were not included in the undernourished category, because their height deficits represent past nutritional processes.

unheard of a generation ago; the differences in overweight between adults and children, and in overweight and obesity among men and women, were statistically significant, indicating that these differences exist in the underlying population. These conditions prevail across the sample, although less so in Group 2: no children were overweight, and the level of overweight among adults was much lower than in Group 1. The divergence of nutritional outcomes and the emergence of mixed households in this population and others like it may be explained by a combination of biological and social factors.

The divergence of nutritional outcomes in the nutrition transition may partly be explained by age-specific biological factors which impact individual health status and shape nutritional requirements. It seems that some adults with reduced capacity to metabolise energy-dense foods due to early nutritional deprivation have become overweight in response to dietary change, while some children continue to suffer chronic, albeit small, shortfalls in energy and nutrient intake or absorption during critical windows of development, due to weaning difficulties, high energy needs for growth and physical activity, and their particular vulnerability to environmental health risks caused by overcrowding, contaminated drinking water, poor sanitation, and food- and water-borne parasites (Popkin et al, 2006:1852).

Gender-specific biological factors may partly explain why females are more prone to excess weight than males: females have a higher propensity to store body fat (on average, 27% of total female body weight compared to 15% in men (Paeratakul et al, 1999:865)), quite possibly for evolutionary reasons, allowing women to bear the high nutrient costs of reproduction (Power and Schulkin, 2008); successive pregnancy-related weight gains may gradually increase the level of excess weight for some women (WHO, 2000; Castanheira et al, 2003:S62); early pregnancies, before the mother's body is fully-developed may increase the risk of overweight (Gigante et al, 2005); and females may be more vulnerable to the effects of early deprivation than males (Florencio et al, 2004). The 2008 Stock Conference on gender differences in obesity recognised that more work is needed to understand the biological and social determinants of excess weight among males and females (Lovejoy et al, 2008).

Social factors may interact with these age- and gender-specific biological factors. Excess weight has become a problem among adults partly due to increases in energy intake which have occurred with the dietary changes of the nutrition transition in combination with reductions in physical exercise. The difference in excess weight among men and women in this population is at least partly due to different activity patterns. Fewer men than women are overweight because their work requires much more physical energy than that of women. The eight overweight men in the sample were employed in occupations involving lower energy expenditure than most men. Five were semi-skilled rural workers operating machinery or in supervisory roles, the other three were unskilled rural workers who didn't cut cane during the harvest seasons. The difference between the levels of overweight in men and women may have increased further in the harvest season when some women's weights were reported to increase, due to higher incomes and bigger food supplies, while some men cutting cane lost weight due to increased activity and energy expenditure.

The higher level of stunting among boys than girls may also be at least partly due to gender-specific energy-expenditure patterns, with boys using more energy than girls in sports and physical activities. Differences in activity patterns may also leave boys more vulnerable than girls to infectious diseases which increase nutritional requirements and contribute to undernutrition, as many of them spend more time out of the home than girls, frequently playing barefoot, and sometimes in the river.

As my theoretical framework in Chapter 1 suggests, it is highly plausible that food allocation within households also provides at least part of the explanation for divergences in nutritional outcomes and the emergence of the 'mixed household' in low-income populations. Whether this is so in sample households is addressed in the chapters to follow.

Chapter 7. Intra-Household Food Allocation: Is There Bias?

7.1 Introduction

“Proportionately unequal distribution [of food] is found in many societies all over the world.” (Hartog, 1973:9)

This chapter examines data on dietary intakes to address my first research question: are there gender and/or age biases in intra-household food allocation in the research context? The focus in this chapter is on the outcomes of intra-household food allocation; Chapter 8 examines the processes behind these outcomes and asks whether allocation behaviour is discriminatory.

I examine the frequency of individual consumption of high status foods based on three 24-hour dietary recalls. ‘High status foods’ are non-staple foods which add variety and taste to otherwise monotonous diets. They are more expensive than staple foods, and their consumption communicates differentiated status and privilege among individuals within and beyond households. They are particularly useful to differentiate consumption in households in nutrition transition settings in which the availability of staples is sufficient to overcome household energy constraints. Other studies that have used similar concepts were cited in Section 1.4.

The frequency of consumption of high status foods is first presented by age-gender group across the sample in the ISFS – Individual Status Foods Score. Consumption of high status foods is then expressed as an intra-household index, the RISFS - Relative Individual Status Foods Score, with each individual’s consumption related to others in their households: a ‘fair share’ of high status foods within the household is that which is at least equal to the average frequency of high status foods consumption in the household.

My hypotheses on the nature of age and gender biases expected in the distribution of high status foods, and the theoretical framework underlying them, were presented in Chapter 1. Briefly, they are: (1) gender bias among adults, with men favoured over women; (2) no gender bias among children; (3) seasonal modification of age bias, with children’s scores

improved relative to men and women at non-harvest, although men remain the most privileged group in the household, and lower differentiation among age-gender groups (Group 1); and (4) similar patterns in less affluent households with lower availability of high status foods, with children's scores improved relative to men and women, although men again remain the most privileged group in the household, and lower differentiation among age-gender groups (Group 2). The first two hypotheses are examined via logistic regression, with the significance of differences among age-gender groups tested after controlling for household fixed effects in pooled and non-harvest models in Group 1 households. The last two hypotheses are explored by comparing the seasonal changes among adults and children from the harvest to non-harvest seasons in Group 1, and the differences between adults and children's scores in Group 2.

Finally, I ask whether the observed differences among age-gender groups within households can be characterised as biases. Difference was defined in Chapter 1 as “the inter-individual variation in the consumption of high status foods to be expected on the basis of random idiosyncratic personal preferences and random daily variation in diets”. Bias was defined as “consistently inequitable access to food among different categories of people within the household, whether or not it creates nutritional disadvantage”. I draw a distinction between difference and bias among age-gender groups on the basis of two criteria: (1) the magnitude of the differences in the RISFS, and (2) the consistency of indications of difference on both the ISFS and the RISFS and at different seasonal points. The following sections describe data collection and analysis, the indicators used to assess the intra-household distribution of high status foods, and details of the logistic regressions. Results showing the differences among age-gender groups are presented in Section 7.6, and in Section 7.7 I discuss whether the differences observed can be characterised as biases.

7.2 Data Collection Methods and Procedures

The data used to explore dietary intake are from three 24-hour dietary recalls, conversations and semi-structured interviews with women, some men and key informants, and sub-sample household observation.

Conversations, interviews and household observation probed to understand such issues as infant and child feeding, differences in consumption among boys and girls and men and women, preferred foods with higher status, and the relationship between food and physical work. I used an iterative, open-ended process in which ongoing qualitative and quantitative data collection and analysis informed each other (Ivankova et al, 2006); initial questions were explored in exhaustive fashion while new ones were introduced as they emerged. Observations in the sub-sample households were particularly useful for ‘validating’ behaviour against rhetoric (Ellen, 1984). The qualitative data gleaned in this way have been crucial in informing and contextualising the quantitative recall data on dietary intakes and are explored in greater depth in Chapter 8.

Dietary recalls were recorded on standardized data sheets by interviewing the food preparer, in all cases the female spouse of the male household head, about the consumption of all household members in the 24-hour period to midnight of the previous day. Interviews were conducted in the respondents’ homes; on many occasions other household members were present and provided information about their consumption.

Three twenty-four hour recalls were taken. The first two were taken during the harvest season (between September and November 2006), the third was taken in the non-harvest season (March to April 2007), in order to capture seasonal variation in dietary intake. They were taken on non-consecutive days as consumption on consecutive days is unlikely to be independent (Willett, 1998:41). Each recall was taken in one of three weekday groups in order to capture the potential variability in intake at different times of the week: the weekend (Saturday-Sunday), when variety was likely to be higher after the weekly Saturday morning food shopping, and more highly-valued foods may have been consumed to mark the weekend; mid-week (Monday-Wednesday), when the household diet may already include fewer high status foods; and the end of the week (Thursday-Friday), when the weekly food supply was likely to be dwindling, and perishable foods were no longer available in households without refrigeration, leaving lower diversity and less-valued foods.

Quantities of foods were not recorded, instead, all foods and beverages consumed on the recall day were listed for each individual, so that the frequency with which each individual ate high status foods could be observed. My motives for adopting this approach, rather than weighing or estimating quantitative intake and assessing dietary adequacy, were largely methodological. The collection of quantitative data is burdensome for researcher and respondent, may compromise cooperation, and is extremely time-consuming and resource-intensive, thereby limiting the household sample size, and the scope for statistical analysis, under all but the most generous of budgets (see for example Graham, 2003). It requires a high level of technical expertise, and the potential for measurement error is greater than with other methods (Gibson, 2005:113). There is also significant scope for behavioural modification (Ulijaszek, 2004). In contrast, the recalls allowed the collection of data with a sufficient level of detail (more than that attained through the use of dietary histories or food frequency questionnaires) in a relatively quick and inexpensive way, in line with my resource constraints, and the approach was sufficiently non-invasive and low burden to ensure high cooperation, and good accuracy and precision.

The decision to assess the frequency of consumption of certain foods allowed me to circumnavigate some of the thornier technical problems related to the assessment of dietary adequacy. The first of these is the weighing of food before consumption, and of left-overs, and the adjustment of weights for such things as water content and cooking method (McNeill, 1985). The second is the conversion of foods to nutrients using food composition tables: the nutrient content of foods can vary considerably, depending on factors like growing and breeding conditions, even within a small geographical area, and are altered by storage and cooking (McNeill, 1985:53; Dop, 2003).

The third difficulty is the assessment of individual nutrient adequacy in relation to estimated nutritional requirements⁹⁷. Assessment of energy adequacy involves estimation

⁹⁷ Dietary requirements and recommendations have in recent years become increasingly sophisticated and complex: see Gibson (2005: chapter 8) for a description of existing reference levels and their evaluation in

of individual energy ingestion and individual energy expenditure in basal metabolic rate and physical activity (McNeill, 2003). The assessment of micro-nutrient sufficiency is no less problematic, based on imprecise 'safety-net values' derived from the average amount of each nutrient required per capita in a healthy population (Ulijaszek, 2004:124), and affected by the bioavailability of nutrients in particular foods consumed, interactions among foods, and inter- and intra-individual variations in nutrient digestion and absorption (McNeill, 1985; Buzzard, 1998; Gibson, 2005).

7.3 Precision and Accuracy of Recall Data

Potential errors in the recall data were minimised by quality control techniques. These included ensuring a comfortable interview environment and using standardized prompts to help respondents remember details and to ensure that consistent information was collected across households, asking, for instance, about between-meal snacks and whether children consumed the same as adults. There may nevertheless be errors in the recall data, including both random and systematic errors in the data reported by respondents. These include memory error - mainly omissions, especially of snack foods, 'add-ons' (such as margarine added to bread, crackers or cornmeal), and less frequently consumed foods (Buzzard, 1998); under-reporting or reporting of perceived socially-acceptable intake - both generally in the population, and selectively by overweight individuals - especially of foods containing fats and carbohydrates, snacks and alcohol (Gibson, 2005:109); and ignorance, on the part of the respondents, of foods eaten by other household members away from the household, particularly men who sometimes used money from their income to buy street foods in town. The recalls may also have failed to adequately capture consumption of episodically-consumed foods (Subar et al, 2006). The impact of such errors is likely to be a slight downward bias on the recorded consumption of status foods. 'Pseudovalidation' studies, comparing recall data with weighed records, observations and videotapes have however demonstrated reasonably good accuracy in dietary recalls (Gibson, 2005: 153).

individuals and population groups, and Sheffer and Taylor (2008) for a recent review of Dietary Reference Intakes (DRIs).

Random errors may also have occurred in data recording and entry. These were limited by pre-testing the recall form and practising questions in non-sample households, ensuring consistency in the administration of the form in different households and over time, checking data on the day of the recall, and using strict coding to maximise the accuracy of data entry in SPSS.

7.4 Dietary Indicators

7.4.1 Individual Status Foods Score (ISFS)

Food distribution in the household was assessed on an ‘Individual Status Foods Score’ (ISFS). A composite indicator was created in order to observe the distribution of a set of high status foods including foods eaten at meals and as snacks, thereby allowing for the possibility of different consumption patterns by different age-gender groups. The indicator is deconstructed in Chapter 8 to examine the distribution of specific groups of high status foods.

The indicator was constructed on the basis of the number of times an individual ate a portion of a high status food on each recall day; portion size was not taken into account. An individual’s ISFS could range from 0, for individuals who ate no high status foods, to infinity, theoretically, in the sense that an individual could eat high status foods as frequently as their biological capacity would allow. The data were collated to create an indicator for each of the harvest and non-harvest seasons, and a pooled indicator.

I classified foods as high status foods after fieldwork on the basis of information collected in interviews, conversations and observation within households. They included foods that respondents said they would buy more of if they could spend more on food, the foods that were enjoyed on special occasions, the foods which I observed to provide the most pleasure, and the foods offered to me as a guest (see foods in Table 7.1)⁹⁸. Meat, fish and dairy were included because animal source foods are generally recognised as

⁹⁸ Industrialised snacks and drinks which have become more accessible to low-income households were considered but excluded because they are generally recognized as ‘junk’ (*besteira*) rather than high status foods. Alcohol was not included, although its consumption may indicate status, because it is not usually available to children.

carrying more status than plant foods (Gittelsohn and Vastine, 2003); equally, fresh forms of animal protein are more highly valued than their lower quality preserved or processed alternatives (FAO, 1990:13). Dairy products (mainly sweetened yoghurts), non-local fruits (rarely consumed by anyone) and sweet foods (usually cream biscuits - *biscoitos recheados*) were thought of as treats, eaten as between-meal snacks in some households when money allowed.

Table 7.1. Categories and individual foods included in the Individual Status Foods Score (ISFS) indicator

Categories of high status foods	Individual foods in each category
Fresh meat ^a	Fresh beef, beef liver, minced beef, chicken, chicken liver, pork.
Fresh fish and crustaceans	Fresh fish and shrimp
Fresh dairy products ^b	Fresh milk, cheese, yoghurt, cream, ice-cream
Non-local fruits	Grapes, plums, apples, pears
Shop-bought sweet foods	Shop-bought cakes, desserts (bottled preserved fruit, milk-based desserts (<i>pudim</i>)), cream-filled biscuits, milk/fruit-based sweets

a: Excludes offal (except liver) and highly processed meats, which are less highly valued.

b: Excludes powdered milk products, margarine (used for cooking or as an 'add-on'), and eggs, as none were perceived as high status foods. Breastmilk is not included, as it is not available to all, neither is it conceived of as having high status.

My classification was corroborated by empirical evidence on the social value of foods in other studies in Southern Brazil (Newkirk et al, 2009:296), and at national level (Levy-Costa et al, 2005), and in a recent study suggesting that since 1991 Brazilians have come to include dairy products and some fruits (not abundantly-available fruits like oranges, bananas and mangos) in their perception of high status foods than used to be the case (Newkirk et al, 2009). The foods included are very similar to those classified as high status in other locations (see for example, Gittelsohn, 1991; Bouis and Peña, 1997).

Foods were included in the indicator due to the status attached to them in this setting, regardless of their nutritional value. Most of the foods are nevertheless 'health-promoting', as long as they are consumed in moderation. Fresh and whole animal source foods - meat, fish and dairy products – are recognised as making an important contribution to nutrition, particularly of protein and important micro-nutrients like Vitamin A and iron (Gittelsohn and Vastine, 2002; Ruel, 2003); heavily-processed and

preserved animal foods, especially meats formed of inferior remnants, with added fat, sodium, and preservatives, instead of contributing important nutrients, provide ingredients detrimental to health (Monteiro, 2009). Fruits are also important sources of micro-nutrients and dietary fibre (Latham, 1997). Sweet foods generally do not add nutritional value to the diet beyond calories, but in moderation can add to dietary variety and satisfaction. Individuals eating high status foods only infrequently were likely to have a less varied and lower quality diet than those eating them more frequently, composed mainly of processed and preserved animal source foods, starchy staple foods, and possibly local fruits.

There were particular theoretical reasons for my decision to assess the consumption of high status foods rather than some individual foods or nutrients, or foods grouped by another characteristic. Differentiation within households is more likely to occur in the distribution of high status foods than in the distribution of basic foods which satiate hunger (Bouis and Peña, 1997). The consumption of high status foods is therefore a particularly useful indicator to differentiate consumption within households in a nutrition transition context like this one in which many households previously caught up in calorie-hunger have overcome their energy constraint and incorporated some high status foods in their diets.

The assessment of the intra-household distribution of high status foods is also more straight-forward than the assessment of dietary adequacy because, unlike nutritional requirements, which vary according to age and gender, individual physiological status, and physical activity, there are no physiological reasons for some individuals to consume high status foods more frequently than others; the nutrients needed for a healthy diet are all contained in lower status foods available in the local diet, such as beans, potatoes, vegetables, local fruits, and staples fortified with micro-nutrients⁹⁹. It is therefore easier to compare the consumption of high status foods across age-gender groups.

⁹⁹ Most households used cornmeal and pasta fortified with iron and folic acid, and salt with added iodine.

Lastly, the use of an indicator based on high status foods acknowledges the symbolic power of food to communicate and reinforce social differentiation, status and power across and within households (Counihan, 1998; Mintz and Du Bois, 2002). It also recognises that eating desirable foods is as much about hedonistic pleasure and satisfaction as it is about survival and functional well-being. High status foods are more expensive than other foods, and have much higher income elasticities (Hoddinott and Yohannes, 2002:35; Bouis and Peña, 1997:180), and as such, they tend to be more frequently consumed by more privileged individuals.

7.4.2 Relative Individual Status Foods Score (RISFS)

I used an intra-household index, ‘Relative Individual Status Foods Score’ (RISFS), to explore the distribution of high status foods within households. The index was calculated for each individual as ‘individual status foods score (ISFS)’/‘household status foods score (HSFS)’, where the individual score is the mean daily number of times an individual ate a high status food during the recall days (ISFS), and the household score is the mean of all household members’ ISFSs; it is a measure of each individual’s access to high status foods relative to other household members over the reference period.

A score of 1 indicates that an individual consumed high status foods the same number of times as the household average, indicating an equitable share. A score of >1 indicates that an individual ate high status foods more frequently than the average in the household, and a score of <1 indicates that an individual ate high status foods less frequently than the average in the household. A score of 0 indicates that an individual ate no high status foods.

The RISFS is analysed as a binary variable, with individuals classified as having a score (1) below 1, or (2) equal to or greater than 1. The first category, those individuals with less than a ‘fair share’ within the household, is the category of interest. No distinction is made between the 2 groups in the second category, those with shares equal to or greater than their household average.

Indices of intra-household food distribution have variously been used as a measure of equity or ‘fair shares’ within households, usually to assess the distribution of dietary adequacy (Abdullah and Wheeler, 1985; Nelson, 1986; Haddad, 1987; Chaudhury, 1988; Wheeler and Abdullah, 1988; Wheeler, 1988; Harriss, 1990), but in some cases to examine the distribution of non-staple and preferred foods (Bouis and Peña, 1997; Peña, 1998; Luo et al, 2001; Rahman and Bouis, 2009). They are valuable because they make full use of the intra-household data collected, as opposed to the analysis of cross-sample age-gender groups in which an individual’s data is not related to that of other household members (Wheeler, 1991:74).

7.5 Data Analysis and Logistic Regressions

Analyses were undertaken for four age-gender groups: men and women 18 years and over, and boys and girls under 18 years of age. Infants aged under 6 months at the time of any of the recalls were excluded from the analyses since they consume only a limited range of foods¹⁰⁰. Pregnant and lactating women were included in the analyses. My conversations with these women revealed that they tend to eat larger quantities of food, if available, but do not have access to different foods, including higher status foods, due to pregnancy or lactation. Treatment of missing recall data, and the demographic composition of the resulting sample and Groups 1 and 2, were described in Chapter 3.

Foods consumed from a source other than the household food supply (at a relative’s home, at church or in town) were included in analyses, in order to reflect access to foods regardless of the source; to exclude them might suggest that some individuals had less frequent access to status foods than was the case. Almost all foods consumed were from household food supplies, hence the respondent was almost always able to report each individual’s intake; there were only 7 meals (of a total 1377 meals included in analyses) for 7 individuals for which the respondent was unable to report consumption, because the individual had eaten away from the home. As the profiles of these individuals are mixed and random, and since data for only one of nine meals is missing for each individual, no

¹⁰⁰ In households with infants under 6 months, the HSFS was calculated with the household size less the number of infants.

adjustments have been made. This may have had a small downward bias on these individuals' consumption of high status foods. The only exception was food bought and consumed by men at bars and in town on Friday evenings when they collect their wages, as women usually did not have this information. This may have had a small downward bias specifically on men's consumption of high status foods

School-provided food was excluded from analyses because respondents were often unable to report whether and what children had eaten at school. The kinds of food provided at schools - mostly snacks like plain biscuits with reconstituted artificial drinks – made no addition to the consumption of high status foods. Foods from the household supply which children took to school were included.

Data from the three recalls were pooled by first calculating the mean of the two harvest recalls, and then calculating the mean of the harvest mean with the non-harvest data, thereby giving equal weight to harvest and non-harvest intakes. Intake was averaged in this way in order to 'smooth' intra-individual daily variability in intake and approximate each individual's habitual intake of all but the most episodically-consumed foods. The impact of seasonality on dietary intake was assessed by comparing the harvest and non-harvest recalls. Non-harvest estimates may have been slightly less accurate than harvest-time estimates, due to higher intra-individual variability in the estimate of dietary intake based on one day alone. This should not however present a serious problem in this context given that diets were not particularly varied from one day to the next, especially in the non-harvest season.

Binary logistic regression was used to control for the fixed effects of group and household membership – factors which may create differences in the RISFS across households – in Group 1, in order to observe and test the statistical significance of differences among age-gender groups within households. The binary outcome variable was the likelihood that an individual was or was not deprived of a 'fair share' of high status foods within the household. Groups 1 and 2 were not combined for pooled or harvest regressions so that seasonal modifications in the harvest and non-harvest

regression results in the larger group could be identified. The small size of the Group 1 sample may have diminished the power of the regressions to detect statistically significant differences among age-gender groups. Regressions were not undertaken for Group 2 because cell sizes were too small to give reliable parameter estimates.

The procedures followed for the selection of predictors, the motives for their selection, and full descriptions of the predictors were presented in Chapter 6. The same predictors were used here – location-labour group, household per capita food spending, gendered control of household monetary income, and gender and age group - in order to observe their impact on food distribution within households. For household per capita spending on food, the season-specific data presented in Chapter 3 were used for the harvest and non-harvest models, and the average of the two was used in the pooled model. For gendered control of household monetary income, men controlled income unilaterally in 54% of Group 1 households, females had sole or joint control in 46% of Group 1 households.

The effects of gender and age group on intra-household food allocation were examined separately in the first iteration of each regression model, and were then replaced by a composite age-gender group variable in order to reveal the differences among men, women, boys and girls. The specific hypotheses examined were presented in Chapter 1 and recapped at the beginning of this chapter.

7.6 Differences in Food Allocations among Age-Gender Groups

Summary statistics for Groups 1 and 2 are presented separately in this section. I first present summary data showing the frequency of consumption of high status foods, and the percentage of individuals with a relative score of high status food consumption below one, by age-gender group in Group 1 before removing household and group effects; the observed differences among age-gender groups in these analyses may be due to differences across rather than within households. I then review the differences in relative scores among age-gender groups after removing the effects of group and household membership in regression. Harvest and non-harvest data for Group 1 are compared in

order to observe seasonal modifications. Lastly, Group 2 harvest data are compared to Group 1 harvest data in order to observe differences among age-gender groups when high status foods are in short supply. I talk about differences among age-gender groups, rather than biases, at this stage, and consider whether such differences can be considered biases in the following section.

7.6.1 Individual Status Foods Scores (ISFS) (Group 1)

Table 7.2. Mean daily Individual Status Foods Scores (ISFS), pooled, harvest and non-harvest seasons, and seasonal differences by age-gender group in Group 1

	Mean*(SD)				
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
Pooled	1.66(1)	1.8(.98)	1.58(.82)	1.29(.83)	1.9(1.25)
Harvest	1.75(1.26)	1.71(.94)	1.48(1.04)	1.66(.99)	2.17(1.89)
Non-Harvest	1.58(1.24)	1.89(1.43)	1.67(1.18)	.91(1)	1.64(1.05)
Seasonal Differences (%)	-9.7	+10.5	+12.8	-45.2	-24.4

* numbers do not sum exactly due to rounding

The low frequency of daily high status foods consumption in sample households is striking: the whole sample mean (Groups 1 and 2 combined) in the pooled data was just 1.35 (not shown)¹⁰¹. The data are right-skewed, with most individuals eating high status foods infrequently. The highest score in the sample was nine, the lowest was zero.

Table 7.2 presents the mean daily Individual Status Foods Scores by age-gender group in Group 1 without controlling for household or location-labour group effects. Among adults, men consumed high status foods more frequently than women, while among children, girls consumed high status foods more frequently than boys, in the pooled data. By age, adults were more privileged than boys but less privileged than girls. The only difference between the pooled and harvest data was that the women's mean score fell below that of boys, and women had the lowest mean frequency of high status foods consumption, in the latter.

¹⁰¹ All scores are rounded up to 2 decimal points.

The particularly privileged position of girls at harvest was partly due to two high outliers¹⁰² which were checked and found to be correct. Downward adjustment of these scores to the next highest value lowered the girls' mean from 2.17 to 2, still the highest mean score of all age-gender groups. All subsequent analyses were done without adjusting the outliers.

The Group 1 mean was lower at non-harvest than at harvest (1.58 vs 1.75), suggesting that high status foods were less available in the non-harvest season. The gender differentials within age groups were unchanged across seasons. By age, adults fared better than children in the non-harvest season, with their frequency of consumption of high status foods actually increasing (by 10.5% for men and 12.8% for women), while that of boys and girls declined (by 45.2% and 24.4% respectively). It seems, then, that men and women were both privileged in relation to children in the non-harvest season.

7.6.2 Relative Individual Status Foods Scores (RISFS): Summary Data (Group 1)

Table 7.3. Percentage of individuals with Relative Individual Status Foods Score (RISFS) below one, pooled, harvest and non-harvest seasons, and seasonal differences by age-gender group and age group in Group 1

	Percentage (count)				
	Age-Gender Groups				
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
Pooled^a	46(52)	34.3(12)	56.7(17)	60.9(14)	36(9)
Harvest	41.6(47)	42.9(15)	46.7(14)	47.8(11)	28(7)
Non-Harvest	39.8(45)	34.3(12)	46.7(14)	52.2(12)	28(7)
Seasonal Difference (%)	-4.3	-20	0	+8.3	0
	Age Group only				
		Adults	Children		
No. of individuals		65	48		
Seasonal Difference (%)		-10.3	5.6		

a: The counts and percentages on the pooled data do not fall exactly between the harvest and non-harvest data due to the process of categorisation of the raw scores¹⁰³.

¹⁰² Defined as >1.5 inter-quartile range above the upper quartile (Agresti and Finlay, 1997:64); see Chapter 3.

¹⁰³ By way of illustration, an individual with scores of 2.2 (harvest score of 1) + 0.2 (non-harvest score of 0) has a pooled score of 1, an individual with scores of 1.6 (harvest score of 1) + 0.2 (non-harvest score of 0) has a pooled score of 0.

Table 7.3 shows the percentage of individuals consuming high status foods with less frequency than the average within their household, by age-gender group and age group in Group 1 without controlling for household or location-labour group effects. A lower percentage indicates that individuals in the age-gender group have a more favoured position within their households. The age-gender patterns in the pooled data replicate those of the ISFS, except that men do slightly better than girls. Men still do better than women, and girls still do better than boys. When the girls' RISFS was adjusted after lowering the group ISFS mean (see Section 7.6.1), the group RISFS mean was unchanged, and so, therefore, was the RISFS categorisation.

The differences from harvest to non-harvest in the index suggest that while the percentage of women and girls with less than fair shares remained the same, men benefited within their households, with a 20% decrease in the percentage deprived than at harvest, while the position of boys further deteriorated, with an 8% increase in the percentage deprived at non-harvest. When age groups are aggregated, the percentage of adults decreased by 10.3% while the percentage of children increased by 5.6%; adults are again privileged in relation to children in the non-harvest season. The same gender differentials within age groups persisted in the non-harvest data, with men in a more privileged position than women, and girls more privileged than boys. By age, girls enjoyed a privileged position relative to adults in their households; boys, however, became even more deprived than adults in their households.

7.6.3 Relative Individual Status Foods Scores (RISFS): Regression (Group 1)

Three regression models were constructed, one each for the pooled, harvest and non-harvest data. No predictors were statistically significant in the harvest data, so only the pooled and non-harvest models are presented. Tolerance values greater than .1 and Variance Inflation Factors (VIF) less than 10 indicated the absence of multicollinearity in the regression models, and all bivariate correlations were below .6. There were no

outliers in either model (no values greater than 1 on Cook's distance) and no cases had undue leverage on the model (greater than 3 times the average leverage value¹⁰⁴).

The predictive power of each variable was assessed on the significance level of the Wald chi-square statistic of the *b* coefficient (Sign.(p) in Tables 7.4 and 7.5) (Peng et al, 2002:6). Variables with a significance level of <.05 are reported in bold and italics, those with a significance level of <.10 are reported in bold; the significance levels of several age-gender comparisons in the pooled model fell just outside the .05 cut-off point. For this reason, the confidence intervals of the odds ratios are reported at the .1 level.

The effects of age and gender, separately, on the RISFS were not significant in either of the models¹⁰⁵. This is most likely because there were similar percentages of deprived men and girls on the one hand, and women and boys on the other, such that each cancelled out the other. The age and gender variables were therefore replaced with a composite age-gender group variable.

7.6.3.1 Age-Gender Groups in the Pooled Model

In the pooled model the gender differences between men and women and boys and girls were statistically significant, and age differences persisted within gender groups, as men did better than boys and girls did better than women. All of these differences were statistically significant at the .1 level (see Table 7.4). The only age-gender comparisons which did not yield significant results were those between men and girls, and women and boys. That most of the differences were statistically significant despite the small size of the sample indicates that there are real differences in households with Group 1 characteristics beyond the sample.

¹⁰⁴ Average leverage value = $(k+1)/n$ where *k* is the number of predictors, and *n* is the number of cases (Field, 2009:217)).

¹⁰⁵ In the pooled model, significance of age group = .950, significance of gender = .917; in the non-harvest model, significance of age group = .775, significance of gender = .646

Table 7.4. Significance of regression predictors on pooled Relative Individual Status Foods Score (RISFS), Group 1

Predictor	Beta (SE)	Wald statistic	Sign. (p)	90% CI for Odds Ratio		
				Lower Interval	Odds Ratio	Upper Interval
Loc-labour group (CC)		.724	.696			
Loc-labour group (CP vs CC)	-.385(.523)	.542	.462	.288	.680	1.609
Loc-labour group (SN vs CC)	.225(.720)	.098	.754	.383	1.253	4.094
PC household food spending	-.005(.024)	.048	.827	.956	.995	1.035
Female vs male control of household income	1.089(.474)	5.278	.022	1.362	2.971	6.478
Gender Differences						
Women vs men	-.971(.531)	3.347	.067	.158	.379	.907
Girls vs boys	1.264(.636)	3.950	.047	1.243	3.539	10.072
Age Differences						
Boys vs men	-1.122(.600)	3.501	.061	.121	.326	.873
Girls vs men	.142(.573)	.061	.805	.449	1.152	2.956
Boys vs women	-.151(.599)	.064	.801	.321	.860	2.305
Girls vs women	1.113(.588)	3.584	.058	1.157	3.043	8.001

NOTES TO MODEL:

Sample size = 113

Beta (SE) = b-coefficient and standard error

Sign. (p) = Significance (p-level)

CI = confidence interval

Loc-labour group = location-labour group

Constants were included in the model, but are not reported

Betas (SE) and significance levels for age-gender groups refer to the first category in reference to the second (e.g. -.040(.390), p=.917 indicates that females are more likely than males to have a score of <1, although the difference is not statistically significant).

Ratio of cases:predictors = 28:1

Hosmer and Lemeshow Goodness of Fit $X^2 = 5.338$, p=.721

7.6.3.2 Age-Gender Groups in the Non-Harvest Model

There is less evidence of differences among age-gender groups in the non-harvest than the pooled model (see Table 7.5). Gender differences were statistically significant only among boys and girls. Age differences were statistically significant only among women and girls. The difference between men and boys was not statistically significant, and the differences between men and girls, and women and boys, remained insignificant; there could be small differences which were not detected due to the sample size. These findings nevertheless suggest that girls retained a privileged position relative to women and boys in the non-harvest recall, while overall the differentiation among age-gender groups at non-harvest diminished.

Table 7.5. Significance of regression predictors on non-harvest Relative Individual Status Foods Score (RISFS), Group 1

Predictor	Beta (SE)	Wald statistic	Sign. (p)	90% CI for Odds Ratio		
				Lower Interval	Odds Ratio	Upper Interval
Loc-labour group (CC)		.063	.969			
Loc-labour group (CP vs CC)	-.100(.532)	.035	.851	.378	.905	2.170
Loc-labour group (SN vs CC)	-.132(.693)	.036	.849	.280	.877	2.740
PC household food spending	-.021(.024)	.803	.370	.941	.979	1.018
Female vs male control of household income	1.045(.464)	5.075	.024	1.326	2.842	6.094
Gender Differences						
Women vs men	-.547(.527)	1.077	.299	.243	.578	1.377
Girls vs boys	1.245(.650)	3.674	.055	1.193	3.475	10.117
Age Differences						
Boys vs men	-.789(.600)	1.731	.188	.169	.454	1.218
Girls vs men	.456(.596)	.586	.444	.592	1.578	4.204
Boys vs women	-.242(.596)	.165	.684	.295	.785	2.091
Girls vs women	1.003(.603)	2.769	.096	1.012	2.728	7.354

NOTES TO MODEL:

Sample size = 113

Beta (SE) = b-coefficient and standard error

Sign. (p) = Significance (p-level)

CI = confidence interval

Loc-labour group = location-labour group

Constants were included in the model, but are not reported

Betas (SE) and significance levels for age and gender groups refer to the first category in reference to the second (e.g. .183(.419), $p=.646$ indicates that females are more likely than males to have a score of ≥ 1 , although the difference is not statistically significant).

Ratio of cases:predictors = 28:1

Hosmer and Lemeshow Goodness of Fit $X^2 = 4.784$, $p=.780$

7.6.3.3 Significance of Other Predictors

The regression models indicated that after controlling for other factors, location-labour group had no effect on RISFS in the more affluent Group 1 households. The lack of difference among individuals from different groups suggests, as was the case in nutritional outcomes, that broad economic, social and cultural factors which cross-cut location and labour group, such as cultural and social norms about the way food should be distributed, are more important determinants of food distribution patterns than the material and environmental differences among the three groups.

Per capita monthly household spending on food was also not a significant predictor of RISFS suggesting, again, that social and cultural factors are more important than economic ones in determining food allocations.

The gendered control of household income was however a significant predictor in both models: individuals in households with some female involvement in the control of income were almost three times more likely to score one or more on the RISFS (shown by odds ratios of 2.97 in the pooled model and 2.84 in the non-harvest model).

7.6.4 Individual Status Foods Scores (ISFS) and Relative Individual Status Foods Scores (RISFS) (Group 2)

The ISFS and RISFS are presented only for the harvest recalls for Group 2 – the group of larger, less affluent, and less food secure households – because no individuals in these households ate high status foods on the non-harvest recall. As cell sizes are small, and there were too few cases to run meaningful regressions, estimates may be less reliable than in Group 1, and the results are presented as suggestive of how high status foods were shared in households with lower overall availability of such foods, without removing household effects; differences among age-gender groups within households may therefore have been smaller than they appear. Location-labour effects, also not removed, are largely irrelevant, since all but one Group 2 households were in Santana. The exception, a CP household, had a profile similar to some of the poorer Santana households: it was one of the largest households and had a high dependency rate, its' per capita income and food spending fell in the bottom half of the Santana distribution, and it had suffered serious food insecurity in the year prior to the household survey.

The mean daily ISFS was especially low in these households, even at harvest time (.97). The gender differences in Group 2 were similar to Group 1, with men privileged over women, and girls over boys, but the differences were very small (see Table 7.6). Men and girls once again had relatively high scores, but in this group, boys had a higher mean score than women. There is evidence here to suggest that children fared as well as men (almost, in the case of boys), and better than women, in less affluent households.

Table 7.6. Mean Individual Status Foods Scores (ISFS) at harvest by age-gender group in Groups 1 and 2

	Mean (SD)				
	Group 1				
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
Group 1 Harvest	1.75(1.26)	1.71(.94)	1.48(1.04)	1.66(.99)	2.17(1.89)
Group 1 Non-Harvest	1.58(1.24)	1.89(1.43)	1.67(1.18)	.91(1)	1.64(1.05)
	Group 2				
	All	Men	Women	Boys	Girls
No. of individuals	39	6	6	12	15
Group 2 Harvest	.97(.41)	1(.45)	.92(.67)	.96(.4)	1(.33)

The mean score of each age-gender group was lower in Group 2 than its corresponding group in Group 1 at harvest, and even at non-harvest, with the exception of boys. The lower differentiation across age-gender groups in Group 2 than Group 1 at harvest (.08 points rather than .69), suggests that differences among age-gender groups were attenuated when the supply of high status foods was limited.

Table 7.7. Percentage of individuals with Relative Individual Status Foods Score (RISFS) below one, harvest, by age-gender group in Groups 1 and 2, and age group and gender in Group 2.

	Percentage (count)				
	Group 1(a): Age-Gender Groups				
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
Group 1 Harvest	41.6(47)	42.9(15)	46.7(14)	47.8(11)	28(7)
	Group 2(a): Age-Gender Groups				
	All	Men	Women	Boys	Girls
No. of individuals	39	6	6	12	15
Group 2 Harvest	12.8(5)	33.3(2)	33.3(2)	0(0)	6.7(1)
	Group 2(b): Age Group and Gender				
	All	Adults	Children	Males	Females
No. of individuals	39	12	27	18	21
Group 2 Harvest	12.8(5)	33.3(4)	3.7(1)	11.1(2)	14.3(3)

In contrast to Group 1, boys were the most privileged group on the RISFS in Group 2, with none scoring below parity. The difference between boys and girls was very small, and there was no difference among men and women. Comparison of Group 1 and Group 2 illuminates possible income effects, with men and girls privileged at higher income levels, while at lower income levels, boys did at least as well as girls, and both did better than men and women. When the data are grouped by gender and age group (2(b) in Table 7.7) it seems that the differences by gender were small, but that children fared considerably better than adults in these lower-income households.

That a much lower percentage of individuals in every age-gender group in Group 2 than Group 1 was deprived of a 'fair share' again supports the hypothesis that intra-household differences diminished when high status foods were scarcer.

7.7 Is There Bias in the Intra-Household Allocation of High Status Foods?

As I first suggested in Chapter 1, it is important to determine at what point the differences in the consumption of high status foods among individuals within a household are more than just the random differences to be expected among individuals. To do so allows us to recognise biases within households, and then – as I do in my last chapter – to consider whether the biases are due to discriminatory allocation behaviour.

Random differences among individuals may be due to idiosyncratic personal preferences – an individual may dislike the taste of socially-valued fresh red meat or dairy products, and chose to go without them. They may also be due to the random preferential treatment of one or more individuals in the household, sporadic or constant, regardless of their age-gender identity. An element of difference is also introduced by the daily variation in an individual's consumption – higher than for the consumption of less-valued foods - which is not captured on a small number of recalls. Such differences, random in nature, should not translate into significant and consistent differences in the consumption of high status foods among age-gender groups within households.

Since most studies conflate difference and bias, no empirical work to differentiate the two concepts in quantitative terms was uncovered. I suggest that two kinds of measures, in combination, may be useful for this purpose.

The first are quantitative measures of the magnitude of differences among age-gender groups within households on the RISFS, with the following cut-off points. For the Group 1 data for which regressions were run on the RISFS, I use the odds ratio (OR) as a measure of effect size (Tabachnick and Fidell, 2007:463), with a cut-off point of 100% to distinguish between ‘expected’ differences and biases; this is equal to an odds ratio equal to or greater than two for those variables in which the coefficient is positive, or equal to or less than .5 for those which are negative. The difference must also be statistically significant at the .1 level, indicating that the difference probably exists in the underlying population. For the seasonal changes in Group 1, and for the Group 2 RISFS data for which regression could not be undertaken, a difference of 150% is used; this is more generous than the cut-off point for the odds ratio to compensate for the non-independence of cases clustered in households.

Secondly, I propose that the consistent occurrence of the same differentials among age-gender groups across the sample on the ISFS and within households on the RISFS, and at different seasonal points, can also be interpreted as evidence of bias. The indicators are similar but not identical measures: the ISFS indicates the frequency of individuals’ consumption of high status foods in absolute terms in age-gender groups across the sample; the RISFS expresses individuals’ consumption in relation to other household members. So, an individual could score highly on the ISFS yet not on RISFS, if other household members ate high status foods as, or even more, frequently; conversely, an individual could have a high RISFS but a low ISFS, if he/she consumed high status foods much more often than others in the household, but the household average was low. The ISFS indicator represents differences in consumption without controlling for household effects in regression, but the direction of the differences observed is informative.

7.7.1 Bias in Group 1

In the Group 1 pooled RISFS data (Table 7.4), all of the odds ratios of the statistically significant differences are of such magnitude that the differences can be characterised as bias: by gender within age group, among men and women (OR=.379), and boys and girls (OR=3.539); by age, among men and boys (OR=.326), and women and girls (OR=3.043). There were fewer biases at non-harvest – only between boys and girls (OR=3.475) and women and girls (OR=2.728)¹⁰⁶. The percentage changes from harvest to non-harvest suggest that there was also an age bias, with adults doing more than 150%¹⁰⁷ better than children within households.

In addition, the patterns of the ISFS and the RISFS in the pooled and the non-harvest data were consistent: men and girls scored highest, with the exception of the non-harvest ISFS, where women scored marginally higher than girls; the differences among men and girls in the regression analyses were not statistically significant. The same can be said of women and boys, with boys consistently scoring lowest, with the exception of the harvest ISFS, where they scored higher than women; again the differences between women and boys in regression were not statistically significant¹⁰⁸. There is little doubt that, on these criteria, the differences observed in Group 1 can be characterised as bias.

7.7.2 Bias in Group 2

In the Group 2 RISFS at harvest-time (Table 7.7), there was no apparent difference in the position of men and women, and only a small difference among boys and girls, insufficient to be characterised as bias; the difference between males and females grouped was less than 150%¹⁰⁹. Age differences were however of significant magnitude to be characterised as bias, with children more than 150%¹¹⁰ better off than adults, a differential borne out between both boys and girls relative to adults.

¹⁰⁶ The odds ratio between men and boys in the non-harvest data, is of sufficient magnitude to be classed as bias according to my criteria (OR=.454), but the difference is not statistically significant.

¹⁰⁷ 470% (ratio of adults to children).

¹⁰⁸ For the two differences that were significant in the pooled data but not the non-harvest data – among women and men, and boys and men - the coefficients in the non-harvest data nevertheless indicate differences in the same direction.

¹⁰⁹ 129% using the same ratio calculation.

¹¹⁰ 900% using the same ratio calculation.

The patterns on the ISFS and RISFS were not, however, entirely consistent. Gender differences on both the ISFS and the RISFS were insignificant, so were differences by age on the ISFS. On the RISFS, however, a significant age bias existed, with both boys and girls doing better than men and women. This lack of consistency could be real, with children faring better only *in relation to* adults in their households. It could also be due to the small group sizes. In this case, more credence is given to the magnitude of the differences by age group in the RISFS, since the intra-household measure is the one of interest.

7.8 Conclusion

My hypotheses about the existence and nature of biases in the intra-household allocation of high status foods (RISFS) were presented in Section 1.5 and the Introduction to this chapter. In the Group 1 pooled data, as expected, a gender bias among adults within households existed, with men privileged over women. Contrary to expectations, a gender bias also existed among children, with girls in a privileged position relative to boys. Among adults and children in Group 1, the similar scores among women and boys were expected; but the position of girls, who were as privileged as men and much more so than women, is a surprise. That all of the differences underlying these gender biases were statistically significant, despite the relatively small sample sizes and the risk of Type II errors, provides strong evidence that the biases existed in the underlying population.

Gender biases persisted at non-harvest, although the difference between men and women was not statistically significant. The expected seasonal modification of age differentials in favour of children was not, however, observed: while the position of men in their households improved and those of women and girls were unchanged, the position of boys appeared to deteriorate, although the difference between men and boys was not statistically significant in the non-harvest regression model. That fewer of the differences among age-gender groups were statistically significant in the non-harvest model supports the hypothesis that when the supply of high status foods is constrained, there is less differentiation in their distribution within households.

I hypothesised that gender biases in Group 2 would reflect those in the more affluent Group 1 RISFS, but the data in Table 7.7 suggest that there were no gender biases of any importance among adults or children. The age differentials in this group do however support the hypothesis that in less affluent households, children fare relatively better than adults. The hypothesis that intra-household differences diminish when high status foods are scarcer is supported by the much lower percentage of ‘deprived’ individuals in Group 2 than Group 1.

The biggest surprises uncovered in the data are the relatively deprived and privileged positions, respectively, of boys and girls within households in Group 1. These positions give rise to a curious gender-related change of fortune over the lifecycle: females were privileged as children, yet relatively deprived in adulthood; conversely, males were relatively deprived as children, but privileged as adults. Yet boys fared as well as others in their households in the less affluent households in Group 2.

In my next chapter I explore possible explanations for the biases observed in the intra-household allocation of high status foods, and examine the behaviour underlying allocation outcomes. I also ask whether biases in allocation operate not only to symbolise differential status among household members, but also contribute to the nutritional outcomes among different age-gender groups, and to the divergence in nutritional outcomes among age-gender groups observed in the nutrition transition in this context.

Chapter 8. Intra-Household Food Allocation Behaviour: Is It Discriminatory?

8.1 Introduction

“Within any culture, no item of food is ideologically innocent.” (Whitehead, 1994:117).

“Food represents us; it sends our distinctive messages.” (Mintz, 1994:103).

This chapter addresses my second research question: can intra-household food allocation behaviour be characterised as discriminatory in the research context? Discriminatory behaviour is defined as “behaviour which has the effect of creating, expressing and maintaining intra-household inequalities in power and status, whether or not it creates nutritional inequality”. Separation of the concepts of bias in allocation outcomes (discussed in the last chapter) and discrimination in behaviour (discussed in this chapter) helps us to understand why and how inequalities arise within households, and illustrates that bias can arise for reasons other than discriminatory practices.

I look first at the gender biases found among adults and children in Groups 1 and 2, and then at age biases observed during seasonal reductions in the consumption of high status foods (by comparing harvest and non-harvest data in Group 1), and in less affluent households with lower availability of high status foods (by comparing Group 2 with Group 1). I focus primarily on findings in Group 1 because the sample is much bigger, and data more reliable, than in Group 2. I relate my findings to theories and empirical findings elsewhere about gender and age relations in patriarchy, the connections among food, gender and power, the significance of gendered control over household income, and parental investment in their children. In so doing I highlight the symbolic power of food consumption to shape identity, status and social relations, and to maintain and communicate power, expressed in the statements drawn from Whitehead and Mintz (above), as well as its contribution to health and well-being.

I draw heavily on my qualitative data to explore and explain the quantitative findings reported in the last chapter, including data collected during periods of household

observation in the six sub-sample households, and semi-structured conversations about diet and eating habits with women in almost every sample household. I relate my findings to empirical evidence and theoretical propositions from other contexts.

The next section of the chapter presents a breakdown of the ISFS indicator into its constituent food groups (meat, fish, dairy, fruits and sweet foods) in order to show where the differences in the consumption of high status foods among age-gender groups lie. Sections 8.3 to 8.5 explore a number of possible explanations for the gender and age biases (or lack of) in Groups 1 and 2 and ask, in each case, whether the behaviour underlying bias is discriminatory. In Section 8.6 I revisit my theoretical framework and consider its' efficacy to explain intra-household food allocation behaviour and outcomes using quantitative and qualitative data. Finally, in Section 8.7 I consider whether the intra-household allocation of high status foods may contribute to the divergence of nutritional outcomes among age-gender groups in the nutrition transition.

8.2 Breakdown of the Individual Status Foods Scores (ISFS) Indicator

I begin my discussion of the findings reported in Chapters 6 and 7 with a breakdown of the ISFS indicator into its' constituent food groups: fresh meat, fresh fish, fresh dairy, non-local fruits and shop-bought sweet foods (Tables 8.1 and 8.2). Breakdown of the indicator adds to the understanding of age-gender differences in consumption by demonstrating where the differences lie. Different kinds of foods occupy different roles in the everyday diet; some are eaten as part of a meal, others are between-meal snack foods, for example.

Different kinds of foods also carry very different meanings, and some carry more meaning and status than others. Their consumption signifies differential status among consumers. Meat has a particularly loaded symbolic meaning in many cultures. Fresh meat was by far the single most consumed type of high status food in all age-gender groups and in both dietary Groups in the sample households; the frequency of consumption of the other food groups was low in all groups. There was also more

differentiation among age-gender groups in the consumption of fresh meat than any other food group.

The breakdown of the pooled, harvest and non-harvest ISFS data by age-gender group in Group 1 and the harvest data in Group 2 are presented in the tables that follow. The data are discussed later in the sections on gender and age bias in each group. It is worth stressing, again, that the ISFS indicator shows differences among age-gender groups *across the sample*, rather than within households (which the RISFS does), and that the indicator shows the *frequency*, not the quantity, of consumption of high status foods.

Table 8.1. Mean daily frequency of consumption of high status food groups and rank by age-gender group, Group 1 pooled, harvest and non-harvest seasons

Mean* (rank)					
Pooled Data					
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
High status food groups					
Fresh meat	.95	1.17(1)	.89(3)	.68(4)	.97(2)
Fresh fish	.12	.13(2)	.11(3)	.17(1)	.07(4)
Fresh dairy	.21	.15(3)	.13(4)	.16(2)	.41(1)
Non-local fruits	.06	.03(4)	.06(2)	.04(3)	.12(1)
Shop-bought sweet foods	.3	.24(4)	.27(3)	.29(2)	.41(1)
Data partially grouped					
Fresh meat and fish	1.07	1.3(1)	1(3)	.85(4)	1.04(2)
High status snacks ¹	.56	.42(4)	.46(3)	.49(2)	.93(1)
Harvest Data					
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
High status food groups					
Fresh meat	.96	1.13(1)	.86(3)	.8(4)	.98(2)
Fresh fish	.12	.09(3)	.09(3)	.25(1)	.1(2)
Fresh dairy	.25	.15(4)	.16(3)	.2(2)	.54(1)
Non-local fruits	.09	.06(4)	.09(2)	.08(3)	.17(1)
Shop-bought sweet foods	.33	.27(4)	.31(3)	.35(2)	.4(1)
Data partially grouped					
Fresh meat and fish	1.08	1.22(1)	.95(4)	1.05(3)	1.08(2)
High status snacks ¹	.67	.47(4)	.55(3)	.63(2)	1.1(1)
Non-Harvest Data					
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
High status food groups					
Fresh meat	1.04	1.29(1)	1.11(2)	.57(4)	1.04(3)
Fresh fish	.13	.23(1)	.15(2)	.09(3)	0(4)
Fresh dairy	.16	.17(2)	.11(4)	.13(3)	.22(1)
Non-local fruits	0	0	0	0	0
Shop-bought sweet foods	.23	.2(3)	.22(2)	.13(4)	.39(1)
Data partially grouped					
Fresh meat and fish	1.17	1.52(1)	1.26(2)	.66(4)	1.04(3)
High status snacks ¹	.39	.37(2)	.33(3)	.27(4)	.61(1)

*numbers do not sum exactly due to rounding

1- snacks = dairy, fruit, sweet foods

Table 8.2. Mean daily frequency of consumption of high status food groups and rank by age-gender group, Group 2 harvest season

Mean* (rank)					
	All	Men	Women	Boys	Girls
No. of individuals	39	6	6	12	15
High status food groups					
Fresh meat	.63	.75(1)	.67(2)	.54(4)	.63(3)
Fresh fish	.15	.25(1)	.08(4)	.21(2)	.1(3)
Fresh dairy	0	0	0	0	0
Non-local fruits	.01	0(2)	.08(1)	0(2)	0(2)
Shop-bought sweet foods	.18	0(4)	.08(3)	.21(2)	.27(1)
Data partially grouped					
Fresh meat and fish	.78	1(1)	.75(2)	.75(2)	.73(4)
High status snacks ¹	.19	0(4)	.17(3)	.21(2)	.27(1)

*numbers do not sum exactly due to rounding

1- snacks = dairy, fruit, sweet foods

8.3 Gender Bias and Discrimination in Group 1

8.3.1 Gender Bias and Discrimination among Adults in Group 1

As hypothesised, there was an indisputable bias in favour of men over women in the proportion of each group with an equitable or greater share in the frequency of consumption of high status foods within households (RISFS) in Group 1. Men also had higher ISFS scores than women across the sample in the pooled, harvest and non-harvest data. When the pooled ISFS is deconstructed we see that men ate fresh meat and fish more frequently than women and children. Women ate high status fruits and sweet foods more frequently than men, but only marginally so, and the frequency was low for all. These findings are backed up by my observations, during mealtimes, that men tended to get high status foods, particularly fresh meat, more frequently than women, and to get bigger portions of them. Men may have eaten high status foods still more frequently than their scores suggest if they purchased and consumed high status foods outside the home with resources under their control which were not captured in the recalls.

It is not insignificant that men should eat fresh animal source foods, especially meat, more frequently and in greater quantity, than women and children. The same has been observed in many other settings (see for example Delphy, 1979 (France); Gittelsohn, 1991 (Nepal); Engle and Nieves, 1993 (Guatemala); Luo et al, 2001 (China); Sudo et al,

2006 (Nepal); Rahman and Bouis, 2009 (Bangladesh)), and in Brazil (Scheper-Hughes, 1992). Animal source foods, and especially meat, are among the most prestigious and coveted foods in virtually all cultures (FAO, 1990:1). In Brazil, as in so many locations, they function as class markers, differentiating the rich from the poor by their ability to consume them on a daily basis (Zaluar, 1980; Rotenberg and Vargas, 2004; Canesqui, 1976), and tend to become a larger part of the diet as income increases (observed in the 2002/2003 POF data (Levy Costa et al, 2005:4)). In the labouring populations of Northeast Brazil, including the sample population, the role of meat and fish in the diet has changed over time, from a small addition to bean stews (Castro, 1946), to the most central component of a meal, when resources permit, and women stated that it was still the first foodstuff of which they would buy more if they could spend more on food.

The consumption of animal source foods, especially meat, has a similar function within the household, serving to differentiate among individuals of different social status; as such, they are usually more subject to preferential allocation in the household than any other foods (Gittelsohn and Vastine, 2003:4036S). This is perhaps all the more so since differential consumption at mealtimes is generally more visible to all in the household than is the consumption of high status snack foods between meals. And as fresh forms of animal protein have become more available to households than they used to be – due to relative rises in income and the ability of many to purchase a fridge – so they have become the most highly-valued of all. That men ate fresh meat and fish more frequently and in greater quantities than women and children was instrumental in expressing their power and authority relative to others in the home.

Men's superiority over women was also demonstrated symbolically at mealtimes – men were served by women, were frequently served first when present at mealtimes, got the best plates and seats, and did none of the work associated with cooking or clearing up. Their superiority was further underlined by the degree of control they exercised over food-related activities like the allocation of income to the food budget, food choices, the extent to which their preferences were heeded, their expectations as to when and how food was prepared, and the opportunity they had to buy food outside the home. Food

taboos limiting women's intake of some foods, socially-constructed with no biological foundation, served the same function by representing women as 'the weaker gender', equivalent to small children, the sick, and the elderly.

Workers' needs or gender bias?

Many women rationalised the differences in men's and women's diets, and men's greater access to fresh meat and fish, on the basis of men's needs for heavy manual labour. Some remarked that it was important to reserve food for men going out to work over and above all other household members because, *"those going out to work have to eat"*, *"....at home you can always find something [to eat]"*, *"....it is easier for those at home, we don't need so much..."* and *"...those of us who are at home can put up with [being hungry], can fend for ourselves"*.

The prioritization of wage workers' food needs is surely a sensible and logical strategy in times of shortage, to ensure that a worker has the energy to work and earn an income, thereby protecting the household's means of sustenance and ensuring that all have something to eat (Wheeler 1988). This was almost certainly the case in the sample population in the not-so-distant past when sugar workers were paid in-kind; the amount of food received directly reflected the work done. It was sometimes the case in some households during the surveys. But the issue here is the consumption of high status foods, and when households faced shortage, when food stocks were low, high status foods were generally not included in the diet – such was the case in some households, those in Group 2, on the non-harvest recall day.

Further examination of the RISFS data suggests that men's privileges were derived not from their need or role as wage workers, but from their gender identity. The increased frequency with which men ate high status foods, and the decrease in the proportion of men with an RISFS below one, in the non-harvest season, when many men were unemployed and all worked less – even as women's work in the home continued unaltered - suggests that male privilege was not about their needs as workers. That women seemed always to bear the brunt of shortage when it occurred by reducing their

intake and missing meals, even when their spouses were unemployed, is further evidence that men's privileges were not about need¹¹¹.

Further evidence confirms that privileged access to high status foods was not about wage workers' needs or a reward for their economic contribution to household welfare. Firstly, women workers in Group 1, all but one of whom undertook manual labour in the fields as well as housework, appeared not to have the same privileges as male workers in the same household. Of the three women in Group 1 who worked for a wage, one (an unmarried woman living with her family of origin) had ISFS and RISFS¹¹² scores in the pooled data equal to her retired father and lower than her working brothers; the ISFS and RISFS scores of the other two working women were, in both cases, consistently lower than their working spouses. The same was true of the ISFS scores on fresh animal source foods. In no case did a female worker score as well as a male worker.

Secondly, all three working women appeared to eat high status foods no more frequently than their non-working counterparts in other households – in fact, all of the working women consumed a less than equitable share of high status foods in their households in the pooled data, compared to 51.9% of non-working women¹¹³. This evidence is based on very small sample sizes given the small number of working women, but is consistent enough to strengthen the conclusion that the biases in favour of men were due to their gender identity rather than their needs as workers. Fischer and Albuquerque (1997:18) similarly observed that increased female employment on export crop plantations in Northeast Brazil did not improve women's status or increase their decision-making power in the household. It may be that improvements in the positions of women in their homes and in their own welfare, require more generalised economic activity by women in society (as for example Svedberg (1988) has reported in parts of Africa) than just a few exceptions to the rule.

¹¹¹ Although this could be construed as a long-term strategy to preserve wage workers' health.

¹¹² This analysis uses the individuals' raw RISFS scores not reported in the thesis.

¹¹³ There may be other confounding variables that account for this difference, such as household per capita income or women's education.

The same kind of preferential treatment of men in food allocation – whether or not they work or earn an income - is widely-reported in the literature, in many different contexts (Chimwaza, 1982 (Malawi); Abdullah, 1983 (Bangladesh); Whitehead, 1994; Counihan and Kaplan, 1998; Gittelsohn et al, 1997 (Nepal); Gomna and Rana, 2007 (Nigeria); Rahman and Bouis, 2009 (Bangladesh)) and in the many studies in Brazil cited in Section 1.5). There are of course exceptions, studies that have indicated that food allocation can work in favour of women under some conditions – a study of dietary energy adequacy among men and women in India by Vijaraghavan et al (2002) for example – but they are few.

What happened when women had some control over household income?

One of the principal propositions of collective household models is that the allocation of household resources may be determined by the gender of the individual(s) with most bargaining power. This hypothesis has been tested in different contexts with a number of different proxies for the relative power of men and women within households, including workforce opportunities outside the home, the value of assets or income, control over income, and education, all of which can represent the spouses' ability to survive if the household were to split. I used control over income as a proxy in this study because so few women worked for wages or received income of any sort aside from child benefits.

Table 8.3. Percentage of individuals with pooled Relative Individual Status Foods score (RISFS) below one in households with male and female income control by age-gender group in Group 1

	Percentage (count)			
	Men	Women	Boys	Girls
No. of individuals	35	30	23	25
Unilateral male income control				
No. of individuals	15	14	15	15
% (count) with RISFS<1	40(6)	64.3(9)	80(12)	40(6)
Some female income control*				
No. of individuals	20	16	8	10
% (count) with RISFS<1	30(6)	50(8)	25(2)	30(3)

*Households in which income was controlled unilaterally by a woman or partially together with a man

The data in Table 8.3 suggest otherwise. In households in which women had some control (unilateral or mixed) over household income, the percentage of women with a less

than equitable share in the frequency of consumption of high status foods improved in absolute terms, falling from 64.3% to 50%. In fact, all age-gender groups improved when women had some control over income. But women remained as disadvantaged in relation to men as they were in households with male control over income.

There could be several factors which, alone or in combination, could explain why women's control over income did not translate into an improvement in their consumption of high status foods relative to men. It is possible that women did have more power in the households in which they had some control over income and chose not to consume high status foods as frequently as others in their households, for example by missing meals eaten by their spouses and children when food was short, without feeling that they must do so due to inferior status. There may be confounding variables not accounted for in this bivariate analysis, like location and labour group, household size, dependency ratio and per capita income; women's welfare – in this case their consumption of high status foods - may have improved when they had some control over income only in households with certain characteristics, for example in households with lower or higher than average per capita income.

It is also possible that gendered control over income is inadequate as a proxy for relative intra-household power among men and women in these households, such that women's control over income did not give them more power relative to their spouses; there may be individual-level variables other than control over income which would better predict men's and women's power in households, such as their education.

Patriarchy and gender relations

I talked at length with many women about the differences in diet amongst individuals in their households. Despite the pro-man bias in the consumption of high status foods apparent in the data, many claimed not to perceive differences of any importance or to feel deprived relative to their spouses. It is tempting to conclude that women were labouring under false impressions, their subordination internalized to the point at which they were blind to their own deprivation and colluded with the norms and behaviours that

allowed it to persist, much as, for example, Kabeer (1988) observed in Bangladesh, and Sen (1990) has suggested more generally. They were, after all, the ones preparing and serving food, facilitating men's access to high status foods while going with less themselves.

And yet I was surprised by the number of women who questioned traditional gender roles and responsibilities and were vocal about the inequalities they perceived in other arenas of their lives. They expressed resentment at the subservient roles they were forced to accept in their domestic work, with long hours, no rest days, and no pay or benefits. They were frustrated at the barriers in and outside the home that prevented them from taking up paid work, at their financial and material dependence on men, and at their lack of voice and decision-making power in spending decisions and priorities. And they were aware that they were the weaker party in the household, without the means to feed themselves and their children without their spouse, and ultimately subject to threats of, or real, violence.

Many were also conscious that inequalities in the household mirrored gender discrimination in the marketplace, society and the state. A number of them recognised the gender discrimination in the sugar labour market and the failure of the state and trade unions to enforce legislation for equal rights; they recognised that the mills preferred to employ men, and that women were never hired in to, or promoted to, semi-skilled or supervisory positions. They were also aware of the gendered nature of social rules and norms: that different standards were applied to extra-marital sex indulged in by men and women; the lack of police action against domestic violence; and the failure of the authorities to enforce men's legal obligation to pay alimony for the support of their children. To repeat the sentiment that I heard from a number of women: "*Men want to have more rights [than women] ...*".

Not all women felt and expressed these sentiments. Some were unaware of the inequalities of gender relations in their homes and their communities. They accepted and colluded with, as Sen (1990:140) puts it, "shared notions of extended entitlement, deeply

embedded in legitimacy”, in this case the entitlement of men to control and consume more resources than women. There were some who felt valued in their homes, who did not feel subordinate to their spouses or, in some cases, actually felt more powerful than their spouses. This was, in some cases, because their spouses chose not to take advantage of norms which offered them the opportunity to dominate women and enforce their own interests and preferences; some of the women who worked for wages, and some others who had partial or full control over household income, may have been in this situation.

Some women felt in a stronger position relative to their spouses than the majority because they had carved out space to resist and contest normative expectations and to act with greater autonomy in their own activities, if only in small ways: women who refused to submit to their spouses’ demands around food, to prepare only certain dishes, to prepare beans everyday, or to rise long before dawn to prepare food which could as easily be prepared the night before; others who were able to imprint their preferences on household spending priorities; one who successfully negotiated her position in the home on the basis of her assets and earning potential before allowing a new spouse to move in; another who walked out on her spouse because he refused to let her go out to work.

Whether these acts of resistance had the power to create any meaningful change over time is, in my view, questionable. Nothing I observed struck me as capable of “restructuring” gender relations, to use Weismantel’s phrase (1988), over the years, of changing the status quo in women’s favour. They struck me, rather, as individual expressions of resistance that fell within the parameters of the normative universe, modest “everyday forms of resistance”, a term lifted from Scott (1985) by Kandiyoti (1998:141) in her discussion on gender, power and resistance.

I felt, rather, that most women, although able to recognize their own interests and aware of the inequalities in their environment, could not find the space and the resources to exercise any significant kind of resistance. They lived in particularly difficult circumstances. Isolated in their homes, they had very little opportunity to come together, articulate shared understandings of their condition and take collective action to contest

and alter the status quo. Without any form of economic or productive activity – not even any significant domestic food production - they were particularly dependent on fathers, brothers and spouses, materially and symbolically. There had been no external intervention, orchestrated by a grassroots or non-governmental organization, which could create the consciousness and confidence necessary for collective action around gender (and other) interests (Agarwal, 1997). Instead, they lived in conditions which they felt had pertained for decades, centuries even; their mothers laboured under similar conditions, and so did their mothers' mothers, and they were socializing their children to accept the same norms.

Why did women not experience a sense of deprivation in the differences in the consumption of high status foods between men and women, even though so many experienced and expressed sentiments of subordination and discrimination in other aspects of their lives? There are perhaps several, linked, explanations. One is that the everyday behaviour of distributing and eating food is so completely habitual and ingrained, that it goes unquestioned – as Delphy (1979:226) stated with regard to the French working class, “the shares are fixed once and for all”. This would be akin to Bourdieu's notion of ‘doxa’, of behaviour which is a natural and self-evident part of the social order, not recognized as open to questioning let alone contestation (Bourdieu (1977) in Agarwal, 1997:15).

A second is that the differences were easily rationalized on the basis of workers' needs - an age-old adage that workers need more, quite possibly well-founded in times of austerity and the operation of the *boia* system – and that, under subsequent conditions of higher incomes and less food scarcity, this rationalization had unwittingly been translated into workers needing – and sometimes deserving - more high status foods. Thus, the criteria underlying food distribution was apparently gender-neutral, and only happened to privilege men as they were the wage workers. This explanation is linked with the social construction in the research context of the notion of ‘work’ as wage work undertaken outside the home; in this framework, women's work in the home was not perceived as ‘real’ work, carrying with it neither needs nor deserves. As such, gender discrimination

was more difficult to perceive in food distribution than in other arenas like work and money.

A third piece of the explanation may be that in a population in which all forms of animal protein were, until recently, in short supply, the consumption of greater quantities of lower status meat and fish products – dried, processed, tinned – than in the past may have been perceived as reasonable consolation in the absence of sufficient more-highly valued fresh ones for all, such that women hardly conceived of their diets as inferior, if at all, relative to men's. This could account for at least part of women's silence on men's privilege in the consumption of fresh animal source foods.

Was allocation behaviour discriminatory?

To restate, behaviour is characterised as discriminatory if it “has the effect of creating, expressing and maintaining intra-household inequalities in power and status”. The distribution of high status foods among women and men within households did exactly this. Founded on no biological, material or functional reason, men's greater access to high status foods was a symbolically-loaded social construction, one of a myriad of behaviours which constituted male gender identity in adulthood as superior in status and power relative to women, in tandem with symbolic expressions of differential social value like women's subservient role at mealtimes and their lack of autonomy in food-related activities.

That I define allocation behaviour as discriminatory even though most women appeared not to perceive meaningful differences in the allocation of high status foods could expose me to accusations of the application of etic standards of gender relations, inappropriate in this context. But I would contend that behaviour was discriminatory because it was just one piece of a much bigger system of gender inequality and discrimination of which most women were acutely aware, but which they felt powerless to change; discrimination within the household simultaneously reflected and reinforced gender ideologies and valuations of worth and self-worth among men and women in the broader environments in which households were embedded. To quote Kandiyoti (1998:135), the household was

a “site for the reproduction of gendered identities and inequalities”. Added to this, the differences between men and women in the consumption of high status foods were more symbolic than they were material, impermeable to change as labour demands on men changed; it was an integral part of fixed gender roles that women should, for example, reduce their consumption in food shortage.

8.3.2 Gender Bias and Discrimination among Children in Group 1

The proportion of children with an equitable or greater share in the frequency of consumption of high status foods within their households (RISFS) in Group 1 is clearly biased in favour of girls. Girls also have higher ISFS scores than boys across the sample in the pooled, harvest and non-harvest data, and the difference in the frequency of consumption of high status foods between boys and girls in the pooled data is much greater than that between men and women, .61 difference, compared to .22 for adults (rising to .73 in the non-harvest data) (Table 7.2). The breakdown of the pooled ISFS shows that girls ate from all food groups more frequently than boys, with the exception of fish, which was very infrequently consumed. Girls ate high status snack foods – dairy, fruit and sweet foods – more frequently than boys and adults.

Many studies of intra-household food allocation which examine gender differences among children, whether in the distribution of high status foods, or foods and nutrients more generally, identify no gender bias among children in Latin America (see for example Leonard, 1989 (Peru)); Engle and Nieves, 1993 (Guatemala); Backstrand et al, 1997 (Mexico); Graham, 1997 (Peru), and in other regions (Gittelsohn, 1991 (Nepal, until 10 years of age)); Panter-Brick, 1993 (Nepal); Gundersen et al, 2007 (Zimbabwe)), and a number of studies identify pro-boy bias (for example, Chen et al, 1981 (Bangladesh); Gittelsohn, 1991 (Nepal, from 10 years on)). The only studies I uncovered which demonstrate pro-girl bias in the distribution specifically of high status foods were from the Philippines. Two studies using the same data indicated that girls consumed more foods from nine groups of non-staple foods (referred to as ‘preferred’ foods) than boys, including meat and fish (Bouis and Peña, 1997; Peña, 1998), another indicated that girls ate more meat, fish and dairy (Rahman and Bouis, 2009). Rahman and Bouis (2009:21)

attributed their findings to “...an attitude of gender equality ...deeply-rooted in social norms” in the Philippines, at least in relation to Bangladesh, where they identified pro-male bias – men and boys – on the same indicators.

Why were boys not favoured?

It would seem reasonable to expect that, as Rahman and Bouis suggest, gender biases among children might reflect broader social norms related to gender ideology. My data deviate from this expectation: I find bias against boys relative to all other groups in the household, in a population with strong anti-female inequality among adults.

There may be a sound material explanation for the lack of pro-boy bias in this context. It is often posited that underlying pro-boy bias is a parental strategy to invest differentially in children who will bring material benefits in term of parents’ present or future economic security in a web of extended family systems (Rosenzweig and Schultz, 1982; Sen, 1984b). In cultures where the bride’s family must pay a dowry to the groom’s, and patrilocal traditions dictate that the new couple reside with the groom’s family, there are strong incentives to invest in a son. He will bring assets to the family when he marries, and a daughter-in-law who will work in the home, while his labour and income remain with the family (Gittelsohn, 1991; Miller, 1997; Messer, 1997); to care for the physical well-being of a daughter under these conditions is, as Kabeer (1988:101) puts it, ‘watering the neighbour’s tree’. This is the case in much of South and Southeast Asia. The reverse is true of cultures with brideprice and matrilineal traditions, as pertain in much of Africa, and more so when women are involved in agricultural production (Svedberg, 1988).

Neither of these practices carry weight in this context. There is no real asset redistribution at marriage: at most, girls make a modest collection of kitchenware and bed linen for their home when they marry - the ‘*enxoval*’, rather like a ‘bottom drawer’. Nor is there a strong matrilineal or patrilocal tradition: some couples live with either set of parents until they can establish a home of their own, usually for only a short period. Concern with future economic security could nevertheless predict son preference: almost all boys start

earning a wage at eighteen, and it is usual for grown men to stay with their families of origin until they marry. But most marry young, new couples almost always set up their own home, most start a family of their own very quickly, and sons rarely help their parents financially; the only case in the sample households was one in which both parents were alcoholic and permanently unemployed. The financial advantage of having a son is thus short-lived and did not seem to operate as an incentive to take better care of boys.

But while these factors may help to explain the absence of a pro-boy bias, they do not explain the pro-girl bias. There may instead be several factors which each contribute to the explanation of pro-girl bias in the consumption of high status foods, related to intra-household gender relations and parental preferences in the welfare of their children, and practical issues related to the consumption of high status foods.

Do parents prefer sons or daughters?

Most mothers told me very explicitly that they shared food equally among their children. Even when I asked very specifically if children of different ages and gender were given different foods, I heard repeatedly that all children, once they reached school age, received much the same. During household observations, I noted that this applied equally to quantity and type of food, including high status foods. In the sub-sample households which were not facing any kind of constraint on the observation days, quantities of food were distributed largely on the basis of each child's interest and appetite, but the same kind of animal protein – fresh or not - was always given to every child. Zaluar and Scheper-Hughes have both observed similar practices in other low-income populations in Brazil (Zaluar, 1980:178; Scheper-Hughes, 1992:163). There were a few occasions on which high status foods were not shared among all children, but these did not occur at meals at which all children were present. These occurrences are discussed a little later. In the Group 1 sub-sample household facing serious food insecurity on both observation days, I watched the mother very carefully apportion all foods, more or less the same for all, with little regard for age, gender, body weight, size, or level of activity, except for two preschoolers, who received milk or infant formula as well as a smaller amount of the family food.

Mothers were using what Engle (1990) has called an 'Equality Rule', with relatively equal portions of the same foods given to all children, independent of any notion of need by age, gender or other individual characteristics. They were using what Farmer and Tiefenthaler (1995) describe as an 'equal split in input' in their study of fairness concepts used by parents under resource constraints, rather than an approach which favours proportional input according to need, or equality in outcomes like health, both of which could result in different distributions of food, including high status foods.

This apparent preference among mothers to treat their children equally in the distribution of food, including high status foods, seems to contradict the ISFS and RISFS indicators which show girls privileged relative to boys. And yet the regression results presented in Chapter 7 (Tables 7.4 and 7.5) seem to provide support for mothers' claims: individuals in households in which women had some control over household income were almost three times more likely to score one or above on the intra-household index of high status foods (pooled and non-harvest data). In other words, it seems that when women exercised some control over household resources, high status foods were distributed in a more egalitarian fashion than in those households in which men had unilateral control over household income.

The cross-tabulation presented earlier (Table 8.3) also suggests that almost the same proportion of boys and girls had an inequitable share in the consumption of high status foods (25% vs 30% respectively) when women had some control over household income; when men controlled household income unilaterally, there was a much larger discrepancy, with girls faring much better than boys on the RISFS index (80% vs 40% respectively). Again, this bivariate analysis does not control for confounding variables at the household or individual levels, such as household income and composition, or children's birth order (Haddad et al, 1996). The magnitude of the discrepancy in the boys' scores nevertheless suggests there is an important difference.

Much of the empirical evidence testing parental preferences in the allocation of household resources suggests that parents tend to favour their same-gender children: boys fare better when fathers have more power in the household, and girls do better when women have more power (Thomas, 1991 (Ghana, US and urban Brazil); Godoy et al, 2006 (Bolivian Amazon)). The few studies of intra-household resource allocation undertaken in Brazil largely support this finding. Thomas (1990, 1991) demonstrated that fathers favoured sons and mothers favoured daughters in the allocation of unearned income in urban settings in the Northeast, using children's anthropometric indicators as the outcome, on the basis of representative survey data collected in 1974 and 1986. Emerson and Souza (2007) showed, using nationally-representative data from 1998 covering all urban and most rural areas of Brazil, that each parent favoured the same-gender child when deciding whether to send their sons and daughters to school or to work, using parents' relative education as a proxy for power. They suggest that, since education and income are highly correlated, their results indicate the selective investment of household resources towards boys by fathers and towards girls by mothers.

A number of explanations are offered for this same-gender preference among parents. One is that given the traditional gender division of labour and other activities within households, parents are likely to spend more time with, and therefore benefit more materially and psychologically from, their same-gender offspring in work and leisure activities (Thomas, 1991).

But in his 1990 study, mentioned above, Thomas uncovered different results for rural areas. The 1977 data he reviewed revealed no effects of parental gender. The 1986 data suggested that maternal education had a positive effect on both sons' and daughters' heights, with a possible, but small, bias towards sons. This is consistent with the way in which mothers were seen to behave in my sample. On the other hand, Thomas found no evidence of paternal preferences in rural areas. Evidence of fathers' preferences for girls was not found in the literature for Brazil or elsewhere.

It seems, then, that when mothers had some say in the use of income, they were able to share food relatively equally among their children. Mothers in households in which the father controlled income were less able to assert their preferences and share food equally; in these households, fathers demonstrated a strong preference for their daughters. I do not have an easy explanation for fathers' preferences towards their daughters, if they existed; nothing I heard in interviews and conversations, none of the behaviour I observed in households, explained why or how fathers channelled high status foods to their daughters. It is possible that high status snack foods were somehow conceived of, and distributed, differently than other household resources, perhaps as treats rather than a resource essential to survival, offering the means for fathers to demonstrate favouritism towards girls; I may not have been privy to such behaviour on the part of men because they were so infrequently present during observation days. Or perhaps girls more than boys were allowed to eat from their fathers' plates, at the same time as their fathers ate, or when fathers had finished eating. I twice observed a child eat from the father's plate during household observation, once a boy, and once a girl. But to have an impact on the data required that mothers were aware of it, and reported it on the dietary recalls; I did not probe for such information as it did not occur to me as a source of differentiation in girls' and boys' diets.

It is also possible that there was an income effect; perhaps fathers' preferences for their daughters appeared at higher income levels when high status foods were more available and could be allocated differentially (this is explored further in the Group 2 data). There may also have been an age effect, whereby fathers favoured daughters in certain age groups, or below or above a certain age. To explore these hypotheses would require more observation time in households with mothers and fathers present, more time spent with fathers, and a bigger dataset in which data disaggregated by age could expose meaningful trends.

Practical reasons for pro-girl bias

Some of this evidence suggests that the rigid gender ideology which governs the distribution of food among men and women simply does not hold among boys and girls.

In the absence of strong cultural rules, other, more practical factors which came to light during household observation in the sub-sample may have been significant.

The first concerns children's consumption of snack foods. Girls scored highest on food groups which were largely eaten as between-meal snacks – fresh dairy products like yoghurts, non-local fruits, and sweet foods like cream biscuits - while boys' scores were very similar to their parents. I observed three girls consuming high status foods between meals in the sub-sample households, and no boys. On one occasion, a young infant was given a yoghurt when no other children were at home; this could have been age- rather than gender-related, and an infant boy would perhaps have received the same. On another, two sisters were given cream biscuits while their brothers were playing somewhere out of the home. It is possible that girls consumed snacks more frequently than boys simply because the former tended to stay at or close to home while the latter roamed much further away, as Chimwaza (1982) observed in Malawi.

Meat and fish were consumed only at mealtimes, and boys and girls were given the same forms of meat or fish during all of the sub-sample meals I observed. Differences in the consumption of meat and fish appeared when children missed a meal at which high status fresh meat and fish were consumed. The three occasions I observed occurred because: a child wasn't hungry after eating a late lunch (a girl); another, a fussy eater, refused to eat (a boy); and a third had to leave for school before the meal was ready (a girl). It is possible that boys missed meals more frequently than girls, sometimes for random reasons which were likely to even out, and sometimes because they went further away from home, introducing a systematic bias. One mother told me, for example, that her sons frequently went far from home into the woods, looking for firewood and/or fruit, and sometimes ate fruit – durian fruit especially, which has a high energy content – instead of coming home to eat in the middle of the day. It is also conceivable that if boys arrived late for meals, after others had eaten, they were given non-fresh kinds of meat or fish in place of fresh ones which had already been finished; I saw this happen in one sub-sample

household. It seems unlikely that these occasions alone could account for the difference between girls and boys, but they may be a part of the explanation¹¹⁴.

Why did mothers claim to distribute food equally when the data indicate that girls were favoured in the allocation of high status foods? A number of factors could explain the discrepancy. First, it is possible that mothers told me what they wanted me to believe, or even what they themselves wanted to believe, but this was not my impression; the behaviour I observed backed up their claims. Secondly, they may have told me their preference, even if they could not always honour it. Thirdly, it is possible that when mothers were aware of differences, they interpreted them as random events like a child missing a meal or eating from his or her father's plate. Fourthly, they may have been reporting their impressions of mealtime behaviour without thinking about between-meal consumption.

Was allocation behaviour discriminatory?

I concluded that the privilege in favour of girls in the distribution of high status foods was not about creating and expressing inequalities in power and status among boys and girls, and therefore was not discriminatory. Unlike the case of adults, there were no other consistent indications of girl privilege within households. There were no overt signs of boy or girl preference on the part of parents; as Scheper-Hughes (1984:539, 1992) observed in the Alto do Cruzeiro, most men and women said they had no particular preference. For those planning small families, the ideal combination was a 'couple' (*casal*) – a boy and a girl. But a couple with no sons was not considered unfortunate¹¹⁵, neither was a couple without daughters. In conversations with men and women, future work and income contributions were never mentioned.

¹¹⁴ There was a further bias in favour of girls in some households. When girls helped their mothers in the kitchen they sometimes helped themselves to small pieces of meat or fish as they were prepared. This was not captured in the recalls; mothers may not have known, and if they did may have considered it irrelevant, and I did not ask because it did not occur to me until household observations. Quantities were likely to have been very small, although Scheper-Hughes (1992:145) observed the same phenomenon in the Alto do Cruzeiro shanty town in Pernambuco, and believed that it contributed to the better nutritional status among girls.

¹¹⁵ Such was the case of a woman in Santana who had six daughters and no sons.

The apparent privilege of girls in the distribution of high status foods did not carry over into the allocation of other household resources, or to other forms of household behaviour. Mealtime observations in the sub-sample households indicated no discernible differences in the treatment of boys and girls: children of both genders were usually served at the same time, unless there was a practical reason for some to eat earlier, they were generally given the same foods, they used the same kinds of plates, and they sat randomly on chairs or the floor.

The same was true in other aspects of childcare. The mean duration of exclusive breast-feeding among children who were no longer breastfed, reported by mothers, was higher among girls than boys in Group 1 – 2.7 months for girls, 1.8 for boys. The differences seemed to be for random reasons like the preferences of individual mothers, most of whom did not breastfeed for long, largely due to beliefs that their breast milk was insufficient to satisfy their young infants. If anything, the differences could be construed as a privilege in favour of boys who received complementary foods at a younger age; the value of exclusive breast-feeding went unrecognised in this population. Nurses and community health workers noticed no differences in the medical attention sought for boys and girls in the community, at the health post or the municipal hospital. School attendance was also even amongst boys and girls.

It seems that patriarchal values did not translate into gender discrimination among children; the same is seen in other settings, including those with stronger patriarchal traditions such as Nepal, where Gittelsohn (1991:1152) observed “patterning of food allocation separate for adults and children”, with the gender differences among adults not reflected at all among young children, and not to a great extent among older children. Rather than an indication of discrimination, girls’ greater access to high status foods appeared to be due to a combination of practical factors largely related to differences in children’s activity patterns, and perhaps some favouritism for daughters on the part of their fathers at mealtimes, which was not part of a broader system of inequality or discrimination within households and in the environments in which they were embedded.

The analysis of all children from six months to seventeen years old together oversimplifies a complex reality, making it impossible to tell when the more rigid gender rules and forms of discrimination of adulthood come into play. It may be that boys were treated preferentially in some age groups, or from a certain age onwards, as observed in other contexts (in Nepal from ten years of age (Gittelsohn, 1991)). Equally, changes in the frequency of consumption of high status foods may come about for different reasons and at different times among males and females, related to changes in their status when they enter puberty, start to work, marry, or set up their own home. Differential treatment of boys and girls at different ages may also have varied across households according to factors like per capita income. A larger sample permitting disaggregation by age group would allow a more nuanced picture and the more precise identification of changes across the lifecycle.

8.4 Gender Bias and Discrimination in Group 2

The Group 2 results may be less reliable than those in Group 1 due to the smaller sample size - which means there is a higher possibility that the observed differences are random, and because they are based on two dietary recalls not three - which may introduce an extra element of intra-individual variability in the intake of high status foods. For these reasons, my discussions of Group 2 findings are briefer, and the conclusions I draw are tentative.

8.4.1 Gender Bias and Discrimination among Adults in Group 2

The frequency of consumption of high status foods among men and women on the harvest recall in Group 2 was not biased: an equal proportion of men and women had an equitable or greater share in the frequency of consumption of high status foods within their households (RISFS), and the mean daily frequency of women's consumption of high status foods (ISFS) was only slightly lower (.08) than that of men across the sample. The ISFS breakdown shows that the small difference between men and women was due to men's more frequent consumption of fresh meat and fish (.25 difference), which was

partly offset by women's more frequent consumption of high status snack foods (.17 difference).

I advance two propositions which could be tested in a larger data-set. The first is that, as hypothesised, high status foods may be more equitably shared in less affluent households with less frequent access to them. The second is that, as I suggested in Chapter 5, women were in a stronger position relative to men in their households in Group 2 than Group 1, and this translated into, among other things, a more equitable share of high status foods relative to men than in Group 1.

Is the distribution of high status foods more egalitarian in less affluent households?

Table 8.4. Percentage of individuals with Relative Individual Status Foods score (RISFS) equal to one by age-gender group in Groups 1 and 2

	Percentage (count)				
	All	Men	Women	Boys	Girls
No. of individuals	113	35	30	23	25
Group 1 Pooled	14.2(16)	20(7)	16.7(5)	4.3(1)	12(3)
Group 1 Harvest	16.8(19)	20(7)	20(6)	8.7(2)	16(4)
Group 1 Non-harvest	33.6(38)	25.7(9)	36.7(11)	26.1(6)	48(12)
	All	Men	Women	Boys	Girls
No. of individuals	39	6	6	12	15
Group 2 Harvest	64.1(25)	50(3)	50(3)	66.7(8)	73.3(11)

The data in Table 8.4 suggest that the percentage of individuals with an RISFS equal to one, those consuming high status foods with the same frequency as the household average, is much higher in Group 2 than in the pooled, harvest, and non-harvest data for Group 1, suggesting that there was less inequality at lower income levels, when high status foods were less available (the same is true of Group 1 when high status foods were less available on the non-harvest recall).

As Bouis and Peña (1997) have suggested in other settings, it may be that greater differentiation in dietary intake, including the intake of high status foods, occurred as sample households became better off, energy constraints were overcome, diets became more varied, and more high status foods were purchased - developments of the nutrition

transition which were more likely to have occurred in Group 1 households than the less food secure Group 2 households. This could account, at least in part, for the absence of gender bias among Group 2 adults.

Did women's consumption of high status foods improve relative to men's because women were in a stronger position in Group 2 households?

That there was no gender bias among adults in Group 2, the group in which a higher percentage of women worked and/or controlled income, would seem to bear out one of the central hypotheses of household bargaining models: that women with an independent income or control over income or assets, are likely to have more power and higher status relative to men in their households than women without, and/or are more likely to have improved outcomes – in this instance in access to high status foods.

Table 8.5. Percentage of individuals with harvest Relative Individual Status Foods score (RISFS) below one in households with male and female income control by age-gender group in Group 2

	Percentage (count)			
	Men	Women	Boys	Girls
No. of individuals	6	6	12	15
Unilateral male income control				
No. of individuals	2	2	4	8
% (count) with RISFS<1	0(0)	0(0)	0(0)	0(0)
Unilateral female income control*				
No. of individuals	4	4	8	7
% (count) with RISFS<1	50(2)	50(2)	0(0)	14.2(1)

*No Group 2 households had mixed income control

Disaggregation of the RISFS data into households with unilateral male and female income control seems to confirm this hypothesis (see Table 8.5). The percentage of women with an RISFS below one was in fact higher in the households in which women were in control of income than in those with male income control - 50% vs 0% – but so too was the percentage of men – also 50% vs 0%. So while in Group 1 a higher percentage of women than men scored below one in households with both male and female control of income, in Group 2 the percentage of men and women scoring less than one was the same in both. In addition, in the two Group 2 households in which women worked, the male worker had higher ISFS and RISFS scores than his working spouse in

one case, but in the other, the female worker had higher scores, again suggesting that working women in this group may have been treated on a par with working men, in contrast to the evidence in Group 1. So the hypothesis of collective household models that women's welfare improves when they have more power in their households may stand up to empirical testing in this group even though it did not in Group 1.

Was allocation behaviour discriminatory?

In some regards the household behaviour underlying the distribution of high status foods among adults seemed to be less discriminatory in Group 2 than Group 1: more women worked, more women controlled household income, and women ate high status foods as frequently as the men in their households.

But other factors suggested to me that food-related behaviour in these households was discriminatory, that it was as instrumental in demonstrating differential status among men and women as it was in Group 1 households. Men still ate high status meat and fish with more frequency than women, and the differential was almost as big as in Group 1 (.25 compared to .33 in the Group 1 pooled data). During one of the meals observed in Group 2 sub-sample households, the male household head ate fresh fish when the mother and children ate *mortadela*, and the recalls from the observation days showed that in both Group 2 sub-sample households the male household head was served a high status form of animal protein at breakfast while others ate a low status meat. Both also received significantly larger portions of low status meats served on both days than others in their households. This difference is important given that access to fresh animal products is a particularly powerful symbol of status. The mealtime dynamics observed in Group 2 households were also no different to those in Group 1, serving to exemplify the social superiority of men over women in the same way.

Ultimately, these households were embedded in the same, largely discriminatory, environments with patriarchal gender relations in and beyond the household. Some of the women in these households were just as vocal about the inequality and discrimination in other areas of their lives as those in Group 1, and were just as constrained by the material

conditions of their lives. Household behaviour was largely dictated by cultural norms impermeable to small variations in material conditions like lower or higher household income.

8.4.2 Gender Bias and Discrimination among Children in Group 2

As was the case among Group 2 adults, there was no bias in the frequency of consumption of high status foods among Group 2 girls and boys. A slightly higher proportion of boys than girls had an equitable or greater share in the frequency of consumption of high status foods within their households, although the difference was small; girls ate high status foods slightly more frequently than boys across the sample, but again the difference was very small (.04). The difference was mainly due to the slightly more frequent consumption of sweet foods among girls. Girls' consumption of snack foods was much lower in Group 2 than Group 1, and neither girls nor boys consumed fresh dairy products or non-local fruits. Girls and boys ate fresh animal source foods with almost the same frequency, although girls ate more meat and boys ate more fish; both consumed fresh meat and fish with about the same frequency as women.

These results are in line with my original hypothesis of no gender bias among children. It is in some ways surprising not to see parents investing in boys in these less affluent households, especially in the households of contract workers, as they were less secure economically, than Group 1 households, and might look to grown working sons for support. The results are again based on very few observations so are no more than suggestive of the way in which high status foods were shared in less affluent households. I propose and discuss briefly how the lower availability of high status foods may have eliminated the sources of gender bias among children which existed in Group 1.

Is the distribution of high status foods among children more egalitarian in less affluent households?

As with adults, there appears to be an income effect on allocation behaviour among children, with lower differentiation between boys and girls than at higher income levels; the data in Table 8.4 show that the percentage of boys and girls with an RISFS equal to

one was much higher in Group 2 than in the Group 1 pooled, harvest and non-harvest data. Such an effect among children was reported by Sen and Sengupta (1983), with gender bias among children under five years higher in the more prosperous of two villages in their study.

In the case of children, this may largely have been because snacks were consumed less frequently (see Table 8.2), eliminating one of the sources of pro-girl bias in Group 1; so although girls spent more time at home than boys, it did not give them an advantage in the consumption of snack foods. When snack foods were available, boys ate them almost as frequently as girls. Most of the high status food consumption in this group was of high status animal foods at mealtimes; during my observations in Group 2 sub-sample households, high and low status forms of animal protein – a high status meat was only served to children at one of the eight meals observed – were shared equally among children. Boys may have consumed animal source foods as frequently as girls in this group because they missed meals less frequently – because between-meal snacks were consumed less frequently and perhaps because there was a constraint on the food supply and children were hungrier. Under these conditions, there was less scope for bias.

What were parental preferences in this group?

The data presented in Table 8.5 show little evidence of son or daughter preference on the part of parents: boys and girls fared equally in households with unilateral male income control; in households with unilateral female control, boys did slightly better than girls, as was the case in Group 1.

The absence in this group of the daughter preference among fathers seen in Group 1 may be due to an income effect on daughter preference which disappeared at lower income levels, perhaps quite simply because there wasn't the leeway in household incomes and food supplies to incorporate high status foods and distribute them in a way that expressed favouritism.

That girls fared less well than boys in households with unilateral female control over income seems to be nothing more than a random effect in a small sample. There was only one girl in a household with female income control with an RISFS score below one and she was the only child in the household – there were no boys with higher scores. She scored one on one of the recall days and below one on the other.

Was allocation behaviour discriminatory?

There was no evidence of discriminatory behaviour among children in Group 2; there was no gender bias in the intra-household allocation of high status foods, neither did I observe discriminatory behaviour at mealtimes, or in terms of child care, in sub-sample households. Just as the children in Group 1, children in these households were also immune to the patriarchal values which governed food distribution among Group 1 men and women.

8.5 Age Bias and Discrimination

8.5.1 Age Bias and Discrimination in Seasonal Shortage (Group 1)

I hypothesised that children's scores would improve relative to adults when incomes, food spending, and the availability of high status foods fell in the non-harvest season as a strategy to protect children's nutritional needs at a time when the food supply was constrained. This is based on the understanding that fresh and whole animal source foods and fruits contribute to nutrient adequacy, child growth, and positive health outcomes both independently, and via their contribution to dietary diversity (Gittelsohn and Vastine, 2003; Ruel, 2003). Given the limited diversity of the local diet, individuals not eating high status foods were likely to be eating a less diverse diet composed mainly of poorer quality animal protein, beans and staples.

But the percentage changes from harvest to non-harvest on the RISFS suggest that the changes were biased in favour of adults, with a 10.3% decrease in the proportion of individuals with an RISFS score below one, while among children there was a 5.6%

increase (Table 7.3)¹¹⁶. When the RISFS data are disaggregated by age-gender group, it is clear that girls did better than all other groups within their households, with the lowest proportion (26.9%) of individuals with an RISFS below one, and this proportion was unchanged on the non-harvest recall. Boys, on the other hand, had the highest proportion of individuals with an RISFS below one on the harvest recalls (47.8%), which increased further (to 52.2%) on the non-harvest recall. The proportion of men with an RISFS below one fell from 42.9% to 34.3% from the harvest to the non-harvest recall, and the proportion of women remained unchanged (46.7%).

The ISFS data (Table 7.2) show that the reduction in the mean daily frequency of consumption of high status foods across Group 1 - from 1.75 to 1.58 - occurred among children, with a 45.2% reduction among boys, and a 24.4% reduction among girls; the frequency of consumption among adults actually increased, by 10.5% among men, and 12.8% among women.

So there is no evidence that children's intakes of high status foods were in some way 'protected' in this non-harvest period. Yes, girls remained in the most favourable position relative to others in their households, but their consumption of all high status foods except fresh meat fell, and the increase in fresh meat was small (.06 difference). Among boys, however, not only did their positions within their households deteriorate, but their consumption of every high status food fell, and they ate all foods, except fresh fish and dairy (which were anyway very infrequently eaten), less frequently than all other age-gender groups. The frequency of men and women's consumption of fresh meat and fish, on the other hand, increased.

Were early non-harvest conditions in Group 1 atypical?

The relatively small decrease in the overall frequency of consumption of high status foods (a difference of .17) and the increase in the frequency of consumption of fresh meat and fish, indicate that food shortage was not a problem in the majority of Group 1

¹¹⁶ I use the percentage changes from the harvest to the non-harvest data rather than the statistically significant differences in the regression at non-harvest in order to show the direction and magnitude of the seasonal changes.

households in the early non-harvest period of 2007. That there tends to be a seasonal effect in employment, incomes, and food spending in the research sites was demonstrated in Chapter 3. Unemployment was nevertheless lower than is usual at the beginning of a non-harvest season, and most households were not in great financial difficulty. Many of the unemployed workers were in CP households in which at least one worker was employed, and the unemployed contract workers in these households, and others in Caneto and in Santana, were likely, at this early stage (the harvest ended in the second week of February and the recalls were taken in March and early April), to have some reserves on hand from their contract termination payments, paid in early March.

What was perhaps as important in understanding the availability and distribution of high status foods in the early non-harvest of 2007 was householders' perceptions that things were going to improve further during the non-harvest season. There was a great deal of optimism around the prospect of greater employment, and households may have spent contract termination payments more quickly than they otherwise would, buying, amongst other things, more high status foods than they would normally buy at this time of the year.

Under these conditions, parents probably felt no pressing need to 'protect' their children's diets. Rather, it seems that there was a redistribution in the purchase and consumption of high status foods in the early non-harvest season. Children's consumption of high status foods fell largely because the consumption of high status snack foods fell across the board. It was perhaps habitual to reduce snack foods, perceived as non-essential extras, at this time of year, and the habit went unquestioned despite the unusual optimism. The increased consumption of fresh meat and fish among adults, on the other hand, may have reflected the higher than usual employment and the optimistic outlook for the non-harvest season.

It is nevertheless surprising that women fared well in the non-harvest season relative to children in Group 1. On the harvest recalls, women ate fresh meat and fish less frequently than all other groups, and scored lowest on the ISFS and as low as boys on the RISFS. On the non-harvest recall, their consumption of fresh meat and fish increased, and they

scored higher on the ISFS, than boys and girls. My observations during the non-harvest season throw no light on the matter; not once did I observe a woman eat fresh meat or fish while serving inferior quality animal products to her children. It is possible that women reacted to my presence and censored behaviour that might, in their view, appear unfair or socially-undesirable. It may represent a deviation from the norm in this anomalous non-harvest season.

Why the position of boys relative to others within their households deteriorated from the harvest to the non-harvest recalls, while others improved or remained unchanged, is also unclear. Part of the explanation offered for the bias in favour of girls in Group 1 may apply; in this non-harvest season there were still enough high status foods around to express favouritism towards girls, by whatever mechanisms were operating; and boys may still have missed meals more frequently than girls.

Was allocation behaviour in the non-harvest season discriminatory?

The particularly big differences between men and boys in the changes in the consumption of high status foods from the harvest to the non-harvest recalls were due to boys' lower consumption of all high status foods, and especially fresh meat and fish. The biggest differences lay in the consumption of the most highly-valued animal foods; this may again represent the operation of discrimination, with allocation behaviour serving once more to illustrate men's superiority. Girls seem to have been immune to this particular expression of discrimination due to their relatively privileged access to high status foods, including fresh meat, in the recall data of this atypical non-harvest season. The mealtime behaviour described in Chapter 5 - the differential treatment of men and children - served to underpin the differences in status among men and children.

8.5.2 Age Bias and Discrimination in Less Affluent Households (Group 2)

High status foods were eaten much less frequently in Group 2 than Group 1 and children's scores were better than adults; there was a significant age bias in favour of children on the Group 2 RISFS, with boys and girls both doing better than men and women. The same bias was not apparent on the ISFS, where the difference across all age-

gender groups was just .08; evidence, again, of lower differentiation among age-gender groups across the sample in less affluent households. In other words, the bias in favour of children occurred only in relation to adults *within* the same households; inspection of the raw RISFS scores showed that all children but one, a girl, ate high status foods as frequently as, or more frequently than, others in their households. This explains why boys had a lower mean ISFS score than men and girls, and yet no RISFS scores below one. Men still ate fresh meat and fish more frequently than women and children, while children ate high status snack foods more frequently than adults.

Given the small sample size in Group 2, I briefly discuss two questions. The first is ‘did children fare better relative to adults in their households compared with children in Group 1 because women were in a stronger position in Group 2 than Group 1 households?’ The second is ‘was the distribution of high status foods in this group geared towards protecting children’s nutritional needs?’.

Did children fare better relative to adults in their households because women were in a stronger position in Group 2 households?

Were children’s outcomes better relative to adults in Group 2 than Group 1 because women had more power and status relative to men in their households than women in Group 1, and could allocate resources to enhance family welfare? At first glance the evidence seems to contradict this hypothesis: disaggregation by gendered income control (Table 8.5) indicates that no individuals in the households with male income control scored an RISFS below one. This may be reason to take issue with the so-called ‘booze and cigarettes’ argument that men use resources for their own interests, including ‘adult goods’, as Whitehead and Kabeer (2001) do. They cite evidence from various studies in sub-Saharan Africa that men sometimes spend resources under their control on expenses related to welfare – of children and all in the household - like health and education, clothing and housing.

On the other hand, the evidence does support the hypothesis that women were concerned specifically with children’s welfare if, as is possible, there were insufficient high status

foods for everyone in the households with female income control on the recall day. The data suggest that in these households the available high status foods were given to children rather than adults: four adults and only one child consumed high status foods less frequently than the household average.

Were the allocation patterns in Group 2 a strategy to protect children's nutritional needs?

Mothers were careful to protect the diets of their youngest children when food was short in quantitative terms: they tended to give milk and family food to infants and pre-schoolers before serving older children (a strategy also observed by Gittelsohn (1991)). Their care did not seem to extend to the distribution of high status foods when their availability was limited. Boys and girls of all ages ate fresh meat and fish with the same frequency as women but less frequently than men, and women and children of all ages were sometimes served low status meat or fish when men received high status ones, as I observed in one of the sub-sample households. Men were also served larger portions of high and low status forms of animal foods than others in the sub-sample households.

The breakdown of the ISFS indicator reveals that while men ate high status animal foods more frequently than children in Group 2, children in this group ate more sweet snacks with little nutritional value – mainly cream biscuits – than adults. Mothers may not have recognised a distinction in the impact on nutrition and health between the fresh animal source foods eaten by men and the inferior quality animal foods eaten by women and children, even if they were conscious of the different status these foods carried. Alternatively, mothers may have been aware of the superior nutritional value of fresh animal source foods, but the cultural imperative to reserve the best meat and fish for the men in the household overrode their concern to protect their children's diets. This is highly plausible given the strength of cultural rules related to adults' diets.

Was allocation behaviour discriminatory?

The age biases observed on the RISFS index in Group 2 were not underpinned by discrimination in favour of children; children's consumption of high status foods did not

signal superiority in status over adults. If anything, closer examination of the distribution of high status foods among adults and children suggests, again, that the distribution of the most coveted foods – fresh meat and fish – was instrumental in underlining men’s higher status in the household. So, too, were the privileges in favour of men at mealtimes.

Much as Delphy (1979) observed among very low-income rural families in France, men (but not women) fared better than children in the differentiated consumption of the most highly-valued resources, including high status foods, at even the lowest levels of income. In this sense, behaviour surrounding the distribution of high status foods among adults and children in less affluent households can be characterised as discriminatory in favour of men, as it functioned to express and maintain their superior status in relation to children.

8.6 Theoretical Framework Revisited: Using Quantitative and Qualitative Data to Model Intra-Household Food Allocation Behaviour

My theoretical framework, presented in Chapter 1, draws heavily on economic models of household resource allocation behaviour developed to conceptualise the location and operation of power within households (the distribution of power represented in the central box of the framework). It was elaborated taking into account four facets of household economic theory which describe household food-related behaviour in the research context: (1) the incomes of household members were only partially pooled, or not at all; (2) the preferences of household members in aspects such as income allocation, spending priorities, and dietary composition were not the same; (3) the individual(s) with the most bargaining power could exercise greater control over household resources and choose to enforce their personal preferences; and (4) these preferences varied, to some degree, by gender, such that the allocation of resources, and the individual outcomes shaped by those allocations, were determined by, amongst other things, the gender of the individual(s) allocating resources.

I used gendered control over household income as a proxy variable to explore the relative power of men and women in their households. My starting point was that male control

over household income and spending was the norm, given the macro-level values, institutions and structures which determined that men usually had stronger fallback positions, and therefore more bargaining power, than women. I did not examine the specific reasons for which some households deviated from this norm. In some cases it may have been because women made an economic contribution to the household, earning an income for example, although in these cases the same question persists: why, contrary to the norm, did a few women work for wages outside the home? In others it may have been because women had partial or full control over an asset, such as the women who owned their homes in Santana. Both of these factors could enhance women's status in their households and strengthen their fallback positions and bargaining power relative to men, thereby giving them the power to assert partial or complete control over the use of household income. In other cases it may have been due to the variation in intra-household gender relations which occurs within even a relatively homogenous population: some men relinquished their automatic right to control the household economy, and some women were able to assert their influence over household finances.

My quantitative data indicate that individual outcomes – the relative share of high status foods (RISFS) – differed by age-gender group in households with male or female control over income. Both RISFS regression models indicated that individuals in households with some female control over income were almost three times more likely to have a score of one or more, after controlling for location-labour group and per capita spending on food. The bivariate analyses in this chapter further suggest possible associations between the gendered control of income and the distribution of high status foods among age-gender groups.

My findings are consistent with the propositions of theoretical work and empirical evidence presented in other studies (for example, Engle 1990; Thomas, 1997; Quisumbing and McClafferty, 2006) that children's outcomes improve relative to adults', and relative to children in households with male income control, when women have some control over household income and resources: in Group 1, children's RISFS scores were better in the households with some female control over income relative to children in

households with male income control, and were equal to or better than adults' scores within households with female income control; in Group 2, children's scores were the same in households with male and female control over income, with the exception of one girl, and were better relative to adults within households with female control. The evidence on women's outcomes, shown to improve relative to men when women have some control over household resources (see review by Smith et al, 2003), is less conclusive: in Group 1, women's scores were better in households with female controlled income relative to those with male control, but their scores did not improve relative to men's in the households with female income control; in Group 2, the group in which some women seemed to have a stronger position relative to the men in their households, men's and women's scores were the same in households with male and female income control, and the scores of both deteriorated to the same degree in households with female income control relative to those with male control.

The impact of gendered income control on food allocation outcomes was not central to my research questions or my hypotheses, and I did not purposefully collect qualitative data to explicitly explore what happened differently in households with male or female control over income. My data nevertheless enable me make some propositions as to the differences in behaviour underlying allocation outcomes when men and women controlled household income, based on reported and observed behaviour.

The data suggest that men's and women's preferences relative to income allocation and food selection differed; many women, principally those in households with male controlled income, reported that if they had their way they would spend more money on food, and would buy different foods. When women were able to follow these preferences they may indirectly have created the conditions for the more equitable distribution of high status foods by spending more income on food and buying more high status foods, or by changing the composition of the diet without spending more, for example by purchasing greater quantities of a cheaper form of fresh animal protein (chicken rather than beef for example), such that there was enough for all to consume some of the high status food. Or they may have shared food in different ways, without buying more food

or changing the composition of the household diet, simply by distributing the available high status foods more equitably. In some of these cases, women may have been able to assert their own preferences, contrary to their spouses' wishes, in a non-cooperative scenario; in others, with more flexible and cooperative gender relations than was the norm, men may willingly have accepted and supported distribution practices which did not favour themselves due to their status as workers or their adult male identity.

But what about the distribution of food among boys and girls in Group 1 households in which girls were apparently privileged when men controlled household income? I do not have data to clarify how men showed a preference towards girls in the distribution of high status foods, as snacks or at meals. In the five sub-sample households in which men controlled household income, I heard the same rationale from men and women – that food should be shared equally – or, from one man, that food distribution was the mother's responsibility. I did not observe any instances in which men treated girls preferentially, although this could be because men were so infrequently present during my observation periods. Nor did I observe men interfere with, or object to, the way in which mothers shared food among children when I was present.

I also did not observe more egalitarian behaviour in the sub-sample household in which the woman controlled income; on the contrary, this was the household in which girls received a high status snack food while their brothers were out of the home.

So my qualitative data throw some light on the behavioural processes underlying differences in food allocation outcomes in households with male or female control over income, observed in the quantitative data, but the picture is incomplete. A fuller explanation would require longer periods of household observation in more homes when men are at home (evenings, weekends, and at times of higher unemployment), and more interaction with men to understand their perspectives and preferences, in a random sample of households with male and female control over income.

8.6.1 Limitations on the Modelling of Household Economies

There are several limitations to this kind of approach to the modelling of household economies. The first is theoretical. Such models are at risk of oversimplifying complex and nuanced human behaviour, and imply stereotypical gender welfare preferences around the allocation of household resources. As Whitehead and Kabeer (2001) have shown in other settings, and as I have shown with respect to this population (Chapter 5), not all men spend income on non-essential goods which could be spent to improve the household diet or welfare, and not all men exert control over food-related activities in order to meet their own preferences. Equally, not all women are purely and selflessly altruistic in relation to the use of household resources and food-related activities, and not all deny their own interests; in the sample households, some women resisted male demands, and a few felt as, or more, powerful than their spouses. The variations occurred due to differences in individual and household characteristics which have not been explored in this study, differences which may sometimes have occurred within the same household, under different levels of resource constraint, or with changes in household size and composition.

This approach to household modelling is also limited by methodological difficulties. The use of a single proxy variable to capture and operationalise intra-household power relations is a further simplification of complex behaviour. In households classified as having ‘unilateral’ male or female income control, an individual of the other gender may have had some influence on the way income was allocated. In households with ‘mixed’ income control, the nature and extent of female involvement in income control may have varied considerably across households, and in any given household under different scenarios and over time. More sophisticated models built on larger data-sets than mine can handle a larger number of predictors, as well as interactions among predictors (see, for example, Haddad, 1987; Peña, 1998). In so doing, they can identify confounding or modifying variables and provide a more nuanced picture of household resource allocation behaviour under different conditions, uncovering, for example, if girls are treated preferentially in households with higher incomes. The challenge is to combine

quantitative data in a large enough sample to allow the development of more sophisticated models with the collection of qualitative data, so that the researcher has a solid understanding of the research context and its subjects, and can characterise intra-household processes as well as outcomes.

8.7 Intra-Household Food Allocation and Nutritional Outcomes in the Nutrition Transition

There is no reason to believe that intra-household food allocation behaviour has changed with the nutrition transition. On the contrary, the cultural norms and the household dynamics underlying food allocation have proven to be deeply-embedded and largely impermeable to exogenous material change or variation. But the incorporation of new foods into the diet has increased the scope for differentiated consumption among age-gender groups within the household. Is there a link between the intra-household allocation of high status foods and nutritional status in each age-gender group in the nutrition transition?; can the divergence in nutritional outcomes among age-gender groups and the emergence of mixed households be explained by differences in the allocation of high status foods?

It would be misleading to seek a direct relationship between the allocation of high status foods and nutritional outcomes. This is because nutritional status reflects individual energy intake relative to energy requirements defined by age and gender, physical activity and health status; the status foods indicators show the distribution of high status foods not dietary energy. It is nevertheless noteworthy that the two groups with poorer RISFS and ISFS scores – women and boys – also have higher prevalences of abnormal nutritional status.

Excess weight is higher among women than men. This may come about partly because women reserve high status foods for men, such as fresh animal source foods, while they consume inferior foods with higher energy density, such as highly-processed animal source products (similar connections have been made in Brazil (Tonial, 2001) and Argentina (Aguirre, 2000)). It may also be that a high energy diet is more damaging to

women for two reasons: one, because physical activity has declined more among women than men; and two, because women have a greater biological propensity to store body fat than men.

Stunting is higher among boys than girls. This condition pre-dates the nutrition transition, but persists despite the increase in dietary energy in the nutrition transition diet. It may largely be explained by higher requirements among boys than girls due to higher energy expenditure and higher burdens of disease among the former, not compensated for by boys' consumption of inferior, and possibly energy-dense, foods like processed meat products. Patterns of food allocation among children may also be partly responsible. The greater nutritional needs of boys may go unrecognised; the Equality Rule of food distribution followed by most mothers is likely to leave boys underfed relative to their needs. Boys' lower consumption of high status foods may also leave them short of certain micro-nutrients essential to linear growth, like iron, Vitamin A and zinc (Rivera et al, 2003).

These propositions apply broadly across the sample; all households and individuals are affected in some way by the changes and consequences of the nutrition transition. Individuals in Group 2 households may as yet be less affected than those in Group 1; high status foods are consumed less frequently so there is less scope for differentiation in their distribution, and there is less divergence in nutritional outcomes among age-gender groups. They may be at an earlier stage of the nutrition transition, or they may follow a different path.

8.8 Conclusion

The evidence presented in this chapter strongly suggests that biases in the allocation of high status foods among age-gender groups, according to factors like identity, role, status and economic contribution to the household, emerge at higher income levels, when high status foods are more available. It also suggests that food allocation has a different meaning among adults and children.

Among adults, biases in food allocation in favour of men, especially of fresh animal products, operate as a discriminatory mechanism to create, express and maintain the superior status men enjoy in their homes and communities due to their gender identity. The biases are rationalised as material and gender-neutral – to meet the needs of men as wage workers – but the resistance of allocation practices to material variations, when men are unemployed or less active for example, point to the potency of the underlying symbolism. That women's scores did not improve relative to men's when women had some control over household income in Group 1 is further evidence of the strength of cultural practices. The biases observed are part of a much bigger system of gender inequality and discrimination among adults in which women lack autonomy, even in the food-related activities for which they are responsible, and are expected to defer to men's wishes and demands.

Among children, the bias in favour of girls in Group 1 is not indicative of broader systemic inequality and discrimination among boys and girls. Women have more autonomy in the distribution of food among children and are concerned to share food in an egalitarian fashion and on altruistic principles; there is no evidence that food is distributed with, for example, future economic returns of children in mind. Biases may come about at higher income levels with greater availability of high status foods for practical reasons and possibly some favouritism, but they are not expressive of the patriarchal norms so potent among adults. What is not clear is at what stage of the lifecycle patriarchal norms begin to govern food allocations, reversing the fortunes of males and females from childhood to adulthood.

Among adults and children, the changes in the distribution of high status foods across seasons in Group 1 favoured adults, but this may not be representative of usual seasonal modifications. In the less affluent Group 2 households, children were favoured over adults within their households. In both groups, and in both seasons in Group 1, however, men's higher consumption of the most prized foods – fresh animal source foods – was once again symbolic of men's power and authority in the home.

The biases in the allocation of high status foods discussed in this chapter may be one of several social factors which, in combination with biology, have led to diverging nutritional statuses and mixed households in the research setting. The implications of my findings for policy and future research, in terms of intra-household food allocation and its effects in the nutrition transition, are discussed in the Conclusion to the thesis.

Chapter 9. Conclusion: Key Findings, Policy Implications and Further Research

My thesis examines food allocation and nutritional outcomes among cane workers in rural Northeast Brazil. Anthropometric data show that undernutrition and overnutrition coexist in the study population, and often within households – a consequence of the changes in diet and physical activity linked to the nutrition transition. Food allocation was examined using an indicator of the frequency of consumption of high status foods - non-staple foods which are considered more desirable than staples because they add variety and taste to an otherwise monotonous diet. The sample was split into two groups: in Group 1 households high status foods were eaten on all three dietary recalls; in Group 2 households no-one ate high status foods on the non-harvest recall.

I examined whether food allocation was biased in favour of some age-gender groups, and then considered whether the behaviour underlying allocations was discriminatory. Bias was defined as “consistently inequitable access to high status foods among different categories of people within the household, whether or not it creates nutritional disadvantage”; discrimination was defined as “behaviour which has the effect of creating, expressing and maintaining intra-household inequalities in power and status, whether or not it creates nutritional inequality”.

To conclude, I review the principal findings of my study, discuss some of the policy implications of the study, and consider possible avenues of further research.

9.1 Key Findings

As many researchers of intra-household resource allocation have observed, allocation behaviour and outcomes tend to be highly context-specific. Some of the key findings from this study, those that are supported by both quantitative (including statistically significant) data and qualitative evidence, may nevertheless hold in other similar settings, particularly settings in ‘middle income’ countries which have undergone changes in diet, physical activity, and nutritional outcomes linked to the nutrition transition. These

findings, taken with the detailed ethnographic description of contextual conditions, may contribute to the development of theory in such settings. I highlight five key findings of this study below.

(1) Food allocation practises serve different functions among adults and children.

Gender biases among adults in the intra-household allocation of high status foods, particularly fresh animal source foods, were underpinned by deeply-entrenched discriminatory behaviour in favour of men. Women are responsible for food distribution and food-related activities, but have little autonomy in the distribution of foods among men and women due to the rigid cultural rules governing food allocation in adulthood. Gender biases among children, where they existed (biases in favour of girls in Group 1), were largely due to differences in activity patterns among boys and girls, possibly in combination with some individual favouritism towards girls, rather than discriminatory behaviour. Food distribution and food-related behaviour operate as a powerful medium to signal and maintain differential social status among men over women, but not among boys and girls, who have equal status in this population.

(2) Food allocation across the age spectrum shifts under some conditions but still expresses men's superiority in the household. Children's intakes of high status foods were not protected in the modest level of seasonal shortage experienced in Group 1 households in the early non-harvest season of 2007, but they would perhaps be protected under more accentuated seasonal shortage if, unlike on this occasion, adult consumption of high status animal foods did not increase. The intake of high status foods was biased in favour of children in relation to adults within the less affluent Group 2 households, but occurred largely due to children's consumption of high status sweet snack foods. In both Groups, the preferential distribution to men of the most coveted foods - fresh animal source foods - nevertheless served to underline their superiority over children as well as women in their households.

(3) Biases in food allocation increase with income and the higher availability of high status foods. The existence and magnitude of gender and age differences and biases¹¹⁷ in the intra-household allocation of high status foods increased with income, as household energy needs were met and more high status foods were included in household diets. This was observed in the differences in the consumption of high status foods in Group 1 households in the harvest and non-harvest periods, and in the more affluent Group 1 households relative to Group 2 households. In other words, at higher income levels differential consumption becomes instrumental as a status marker, where differential status exists within households. This is likely to be the case in many households in nutrition transition settings in which patriarchal social relations are reproduced within households, and may partly explain the emergence of divergent nutritional outcomes and ‘mixed households’.

(4) Gender relations and control over household resources do matter. Gender relations and dynamics within households affected intra-household food distribution and nutritional outcomes. In this context, incomes were not pooled. When women had some control over household incomes: (1) individuals were more likely to receive at least a fair share of high status foods, and the distribution of high status foods was more likely to be egalitarian; and (2) adults were less likely to be overweight. Women may have greater control over household income and other resources when they work for wages or have control over a valuable asset, or in households with more flexible ideas about gender than are the norm.

(5) Bias can exist independently of discrimination. Separation of the concepts of bias and discrimination shows that bias in the intra-household allocation of food is not always underpinned by discriminatory behaviour. This was the case in the observed bias in favour of girls relative to boys in Group 1. The bias was not an expression of differential social status among boys and girls, rather it was due to differences in activity patterns, which meant that girls stayed closer to home and ate more snack foods, in combination

¹¹⁷ With the exception of the bias in favour of children relative to adults in their households (the RISFS) in the lower income Group 2 households.

with some individual favouritism towards girls which, I have argued, is not a piece of broader systematic discrimination in favour of girls.

9.2 Policy Implications

Development policies and interventions aim, usually, to improve individual welfare, and individual welfare is mediated, most of the time, through social institutions, especially the household. But policies built on the assumption that strategies to tackle poverty and malnutrition at the household level will improve the welfare of all individuals in the household are likely to founder; collective models of household economies have exposed the fallacy of such approaches (Haddad et al, 1997). Understanding intra-household resource allocation behaviour, complex strategies to confront poverty like changes in household size and composition, and household responses to specific initiatives, increases the likelihood that public policies and resources will reach those for whom they are intended.

Two broad income-related strategies, implemented simultaneously, could help to increase the consumption and improve the distribution of high status foods within households. The first may appear to contradict my opening statements. Policies and interventions to increase household incomes are an essential step to increase access to health-giving, high status foods, generally more expensive than highly-processed foods, thereby improving the diets of all in the household. Many women understand the links between diet and health, and the beneficial effects of specific foods, and would use additional income to purchase them. Not all individuals would benefit equally, and biases among age-gender groups may increase, but my data show that the consumption of high status foods was higher among all age-gender groups in the more affluent Group 1 than the lower income Group 2 households.

There is, however, no easy route to increase the incomes of rural labouring households in the small and undynamic Northeastern rural economies which revolve around monocultural sugar production and highly-concentrated land ownership. Radical structural reforms such as land reform would help, together with measures to support and

subsidise small farm production and marketing. But such reforms require a high level of political will to resist the pressures of powerful vested interests – including mill owners and the sugar and ethanol industry. Incentives for the re-investment of profits in the local economy could also help to revitalise local economies. Payment of unemployment benefits to seasonal workers during the non-harvest period, as the Pernambuco state government presently does, should help, although it does little more than level the living standards of seasonal workers' households with those in permanent mill employees' households.

The second strategy is to get more income into female hands; my data suggest that more income is spent on food, food is more equitably shared, and adults are less likely to be overweight – suggesting that diets improve - when women have some control over income. It is also difficult to see how to increase income under women's control, at least in terms of earned income, in an economy with such limited labour opportunities and strong male resistance to women's wage labour. The Lula government has acknowledged the importance of the identity of the recipient of welfare payments, and the positive role women play in household welfare, by paying *Bolsa Familia* benefits directly to women. It might help to pay unemployment benefits directly to the female spouses of male workers together with *Bolsa Familia* payments, thereby increasing the income under women's control.

Gender discrimination in adulthood lies at the heart of a number of the issues addressed in the thesis. It is created and reproduced in social structures, from high-level public and private institutions all the way down to households, and so strongly embedded as to be impermeable to change in the short run. Women's status relative to men generally increases when they are economically active (Smith et al, 2003), but the creation of income-earning opportunities for women in a small-scale rural economy like Gameleira is not straightforward, nor is the elimination of gender discrimination in the sugar industry. One of the conditions of receiving the *Chapeu de Palha* benefit in Pernambuco

is attendance at seminars on gender relations¹¹⁸ (Globo, 2010). These may have an impact in the long run if men learn that they do not lose out when power within households is shared, if women recognise that they are legitimately entitled to equal access to household resources, including food, and to work and leisure opportunities outside the household, and if all acknowledge the fundamental value of domestic work to the well-being of all (Sen, 1990). Seminars and other interventions to improve women's status must be conducted in a way which does not create conflict between men and women and increase the incidence of domestic violence.

The potential of changes in the legal environment to improve women's status and alter intra-household dynamics should not be underestimated. Changes in divorce laws, child support laws and property rights, for example, can help not only to improve the welfare of women and children in the event of dissolution of the household but, perhaps more importantly, to strengthen women's fallback positions, and therefore their bargaining power and access to resources, within households. These are what Alderman et al (1997:282) term 'long-reach policy handles'. Active state enforcement of existing and new legislation - police and judicial action against domestic violence for example - is as important as the enactment of new laws.

Designing policies and programmes with intra-household dynamics in mind brings its' risks. Care must be taken to avoid unintended negative consequences within the household, such as the redistribution of income or resources away from the intended beneficiaries, or conflict and the use of physical strength and violence to enforce preferences. It is important to learn from experiences in other locations, such as the PROGRESA programme in Mexico which also pays benefits to women as a means to increase their decision-making power and control over households resources (see Skoufias and McClafferty, 2001). The high context-specificity of household behaviour does, however, limit what can be transferred from elsewhere, and context-specific

¹¹⁸ If they happen and if men and women attend them; not all of the conditionalities associated with the *Bolsa Familia* benefit – adult literacy for example – were offered to or taken up by the sample households receiving benefits.

research into household responses to different policy initiatives, including the evaluation of pilot programmes, should underpin the introduction of new initiatives in Brazil.

My findings also have implications for public health, nutrition and food policies in the nutrition transition. One of the biggest policy challenges of the nutrition transition is how to tackle under- and overnutrition simultaneously in the same populations, and even the same households. Different policies must be designed with different age-gender groups in mind. It is essential, for example, that the importance of children's intake of sufficient energy and nutrients to meet their requirements for healthy growth and activity does not get lost among initiatives to lower the energy intakes of some adults. One of the most basic and essential approaches to overcome child undernutrition is public investment in infrastructure to reduce environmental health risks which contribute to disease, particularly among children, by improving sanitary infrastructure and the quality of drinking water¹¹⁹. Evidence that early undernutrition contributes to later obesity in populations with energy-dense diets reinforces the need to combat undernutrition among children.

Existing governmental programmes have the potential to help reduce micro-nutritional deficiencies. Most sample households consumed staples with added iron and folic acid. The distribution of Vitamin A and iron supplements to pregnant and postnatal women and young children should also help, although their distribution to municipal Health Secretaries by the federal Ministry of Health was erratic at the time of the surveys, and not all individuals who received them took them. Given research findings on the distribution of micro-nutritional deficiencies across age-gender groups in numerous locations (Webb, 2002), it may be necessary to consider whether the distribution of supplements should be extended to other age-gender groups.

Strategies to reduce overnutrition need to be aimed at adults in the first instance, and especially, but not exclusively, women - recent data show that excess weight has

¹¹⁹ The Gameleira municipal government was drilling a new well in Santana to overcome problems of water contamination when I visited in 2009.

increased at a faster rate among men, boys and girls than among women since 1974/75 (Monteiro, 2003; IBGE, 2004a; IBGE, 2006). A number of policy initiatives can help to improve dietary quality for all and prevent or reduce the incidence of overnutrition among those at risk by promoting the consumption of high quality, fresh and whole sources of animal protein, as well as tubers and whole grains, fruit and vegetables, while reducing the consumption of heavily-processed, energy-dense foods. These include strategies on the supply side such as agreements with the food industry to reduce the fat, salt and sugar content of industrialised foods, regulation of the advertising of highly processed foods, and appropriate food labelling. Some such initiatives are being promoted within the Ministry of Health's National Food and Nutrition Policy (PNAN) (Portal da Saúde, 2010).

On the demand side, information on diet and health can be communicated through a number of fronts, including mass media campaigns on TV, via local health professionals, especially community health workers, and in schools. This should include information with the potential to modify the intra-household allocation of certain foods, such as the importance that all household members, not just men, eat good quality, fresh animal source foods instead of highly-processed meat products. Information about, and support for, exclusive breast-feeding for infants to six months of age is also paramount, not only to promote adequate infant nutrition and reduce the intake of contaminated infant foods, but also to allow the reallocation of income from powdered milk and infant formulas to foods for other household members.

Measures to create the conditions and motivation for domestic food production, for example by subsidising access to the necessary material inputs (land close to home – which may require the cooperation of mills - credit, technical assistance, water, implements, seeds and so on), could also help to increase the consumption of healthy foods. Subsidised inputs should be available to women independently of men. Domestic food production would also reduce expenditure on food, especially important in the non-harvest season when incomes are low but workers have more time and energy.

It is also important to raise awareness of the importance of physical activity for long-term health, and to create environments to encourage activity for those with sedentary work and lifestyles, such as safe and well-lit places to walk or run. This should include the promotion of culturally-acceptable forms of physical activity for women and girls.

9.3 Further Research

My study raises a number of questions related to the intra-household allocation of food (and other resources) in patriarchal settings which warrant further exploration:

- what are the most effective pathways to enhance women's status and power in the household, and their access to and control over household resources, including food?;
- does the source of women's power and status (earned or unearned income, control over assets, education and so on) affect the nature and extent of their power?;
- does the source of income under female control (earned income versus government benefits) affect the nature and extent of their power?;
- under what circumstances do men voluntarily relinquish the privileges granted to them by identity and role?

Some of these suggest questions directly relevant to the research setting:

- does payment of *Bolsa Familia* benefits to women increase their power in the household?¹²⁰;
- is the power of women receiving benefits greater when male contract workers are unemployed and do not contribute income to the household?¹²¹;
- do men withhold their income when women receive income and can cover regular household expenses such as food and non-durables?;
- what happens differently in resource and food allocation when men or women are in control of household income, for example, what are the mechanisms underlying favouritism towards girls in households with male control over income?

¹²⁰ See IBASE (2008) for early findings on the impact of *Bolsa Familia* on gender relations.

¹²¹ This may no longer be a valid question in households receiving unemployment benefits throughout the non-harvest season.

More context-specific empirical work is needed to address these and other issues, and it needs to come from mixed method approaches which undertake extensive survey data collection, or use existing large data-sets, *and* provide rich contextualisation and insight into household behaviour. There is no quick and easy approach to this work. It requires the development of trust with research subjects, the negotiation of access to households, and the development of a level of rapport and comfort which allows the researcher to spend long periods of time observing and discussing sensitive issues, particularly in contexts in which food and eating are coloured by the possibility of shortage, and/or dissatisfaction and shame. Consequently, it is resource-intensive in terms of time, funds, and skills. In this study, for example, more resources would have allowed me to spend more time in household observation, particularly at times when men were present in the home (evenings, weekends, periods of unemployment), and more time in conversation with men, in a larger sub-sample of households which included households with female control over income.

A larger sample than the one in this study would increase the robustness of the quantitative data and help to test hypotheses and identify areas for further exploration in three ways. First, it would increase the observations in specific categories – households which fit into Group 2, and individual working women, for example. Second, it would allow the disaggregation of age-gender groups into smaller age bands in order to explore changes throughout the lifecycle helping, for example, to identify when gender-related fortunes in the allocation of high status foods change (when does male deprivation in childhood turn into privilege in adulthood?). It would also have allowed further differentiation within age-gender groups (does men's privilege vary across the life-cycle, according to their roles as adults in their family of origin, household heads, and fathers, or their status as permanent or contract workers?). Third, with a larger data-set, more complex regression models could be developed to handle more predictors without losing the power to detect differences, and to allow for interaction terms. It would have been valuable, for example, to explore the interaction between gendered income control and intra-household food allocation (the RISFS) in different age-gender groups at different income levels. The collection of individual dietary intake data in a nationally-

representative sample for the first time in Brazil in the 2008/2009 POF offers researchers an exciting new opportunity to explore intra-household food allocation in different regions and socio-economic classes, and different kinds of households, although it is limited by the exclusion of children under the age of ten (Sichieri et al, 2008).

There are other dimensions which also need to be advanced in relation to our understanding of intra-household food allocation. One is the development of longitudinal studies which can capture dynamic processes like household formation and dissolution, changes in household size and composition in the short and long run, and changes in the intra-household balance of power over time (Alderman et al, 1997). Such studies would add to our understanding of the determinants of change and the identification of elements of intra-household relations and processes which are open to modification in the medium and long run.

Another is further research into the sensitivity of different dietary indicators - dietary diversity or quality, or specific foods and nutrients, for example – to identify biases among age-gender groups. The choice of indicator depends largely on the objectives of the study, the context in which it is undertaken, and the skill-sets available. I have argued that an indicator of the consumption of high status foods was appropriate in this study given my combined interest in the symbolic meanings as well as the biological immediacy of food, and the conditions of the nutrition transition. The use of a different indicator might have changed my results significantly. The bias in favour of girls in Group 1 might have disappeared, for example, if snack foods were not included in the status foods indicator.

Finally, there is a need for more theoretical work and more meta-analysis that can transcend the context-specific nature of empirical studies and point to patterns and trends under certain conditions. This includes more work on food allocation in nutrition transition settings to enhance our current understanding of the determinants of excess weight and the emergence of mixed households among some population groups, and to test appropriate policy responses. For this to happen, studies must be couched in rich

empirical contextualisation, allowing researchers, policymakers and practitioners to assess the ‘transferability’ of theoretical propositions and policy responses from one context to another.

All of these areas for further research – empirical and theoretical - require not only mixed methods approaches, as I have already argued, but also inter-disciplinary approaches involving, whenever possible, the collaboration of researchers from different disciplines able to work at the interface between the social and physical sciences. This thesis is one example of the ways in which inter-disciplinary inquiry and a mixed methods approach can provide valuable insights into food allocation within households.

Appendix 1. Household Survey Topics

Household Identification

Household number
Location
Name(s) of respondent(s)
Date

Household Members

Name
Relationship to household head
Gender
Date of birth
Marital status
Living in the house this calendar month?
Race
Religion

Individual Anthropometric Measurements

Date (if different to household survey)
Time
Current health status (sick or injured?)
Had diarrhea in the last 7 days?
Pregnant? If so, how many months?
Weight
Height/length

Individual Schooling and Work

How many complete years of schooling?
Currently studying?
Able to sign name?
Occupation/job (primary and secondary)
Types of work contract
Has a signed contract?
Worked how many days during last calendar month?

Housing and Household Goods

Is home owned, rented, or other?
If the home is not owned, to whom does it belong?
What are the walls made of?
What is the floor made of?
What is the roof made of?
How many bedrooms are there?
Is there: electricity, a working fridge, a working stove (what type?), a working TV, a satellite dish, a working radio, a working sound system, a working telephone?

Is there a bathroom in or outside the house?
If there is a bathroom, what kind of drainage system does it have?
Is there running water in the house?
Are there water shortages?
What is the origin of drinking water?
How is drinking water treated?
Is there a water filter?
How is household rubbish disposed of?

Household Food Production

Do household members have access to land where they can plant food crops or raise small animals?
If they do, is the land owned, rented or other? How much land is available?
If they do, how is the land used?; crop, area, food production for home use at what time of year?
Do they raise animals for home use?; what kind, how many?
If they have access to land but don't use it, why not?

Household Food Availability

What were the sources of household food during the last calendar month?
Were there days during the 12 months to the end of last month on which there wasn't enough food for everyone to eat sufficiently?
If there were, what was the most frequent reason for the lack of food?
If there were, in what period(s) were you short of food: harvest and/or non-harvest?

Household Economic Conditions

What was each household member's monetary income in the last calendar month? From what sources?
Did any household members receive non-monetary payments or benefits during the last calendar month? If so, how much and from what sources?
What assets did the household have in the last calendar month? Do they belong to particular household members; if so, who? What was the monetary value of the assets in the last calendar month?
What were the household's expenses during the last calendar month? If they benefited only some household members, who?
Was the household monetary budget balanced in the last calendar month (income less expenses)?
How is the household budget organized? Is income pooled, kept separate, or a combination?
If some household members keep some or all of their income separate from the household budget, who and how much?
Who makes decisions about household expenses?
When there is a shortfall in the household monthly budget, what do they most frequently do?

Individual Health and Lifestyle

Takes regular medication? If so, for what health condition?

Currently sick or injured? If so, did the individual receive healthcare, and where?

Drinks alcohol? If so, how many times per week?

Smokes cigarettes? If so, how many per day?

Infant Health (Under Fives)

Breastfeeding/was breastfed?

If never breastfed, why not?

If no longer breastfed, stopped at what age?

If breastfed, is/was infant also frequently given powdered milk (at least once per week)?

Is/was infant frequently given foods which are different to other household members (at least once per week)? If so, what?

Received Vitamin A supplement in the last 6 months?

Ever been hospitalized? If so, for what?

Women's Reproductive Health (15-49 Years)

Been pregnant how many times?

How many pregnancies ended in early termination?

How many born children died? Of what?

Uses contraceptive? If not, why not?

Who decides whether or not she uses contraceptive?

Appendix 2. Key Informants

Health and nutrition:

Nutritionists and economists in the federal universities of Pernambuco (UFPE), Rio de Janeiro rural university (UFRRJ) and São Paulo (USP).

Coordinator of Gameleira *Pastoral da Criança*

Caneto school cook and teachers

Municipal Health Secretariat staff members:

- Municipal Health Secretary
- Secretariat Coordinator
- Family Health Programme doctors, nurses and community health workers
- Nutritionist
- Coordinator of Schistosomiasis Control Programme
- Secretariat drivers

Working conditions in the sugar industry:

Caneto plantation manager

Caneto field supervisor

Secretary, Gameleira Rural Workers' Union (*Sindicato dos Trabalhadores Rurais de Gameleira*)

Director, Pernambuco Agricultural Workers' Federation (*Federação dos Trabalhadores na Agricultura do Estado de Pernambuco-FETAPE*)

The Mill Human Resources Director

Appendix 3. Mealtime Observation Schedule

Form completed for each meal

Who prepared the food?

Did anyone help? If so, who?

Did those involved in food preparation eat while preparing food?

Was the food served by one person/several people, or did some or all household members serve themselves?

In what order were household members served?

How did the person/people serving divide food up, eg plated all food and then distributed, served each household member individually, reserved certain foods for certain individuals etc.?

Did all household members eat at the same time, or at different times?

For those eating at the same time, were some served before others?

Did household members sit together or in separate groups while eating? If in groups, what was the composition of the groups?

Did some household members eat from the same plate?

Did some or all household members have the opportunity to have a second serving, if there was still food available? If so, who? Were any household members prevented from having a second serving?

Did some household members have (greater) access to high status foods? If so, who?

Who cleared the table and cleaned up after the meal?

Appendix 4. Adjusted Values on Household Characteristics

Table A.1 presents the values for household size, economic dependency rate, the value of assets, non-harvest income and non-harvest expenditure after adjusting outlying values to one unit above or below the next most extreme value (see Section 3.6).

The following outliers were adjusted:

Mean household size: 4 high outliers in Group 1

Mean economic dependency rate: 1 high outlier in Group 1

Mean value of assets: 2 high outliers in Group 1, 1 low outlier in Group 2

Mean non-harvest income: 1 high outlier in Group 1

Mean non-harvest expenditure: 1 high outlier in Group 1

Table A.1. Values on household demographics and economics after adjusting for outliers in Groups 1 and 2

Mean (SD)		
	Group 1	Group 2
Household size	4.23(1.68)	---
Economic dependency rate	2.32(1.41)	---
Value of assets (US\$)	133.45(179.15)	280.76(11.9)
Non-harvest income (US\$)	52.15(27.29)	---
Non-harvest expenditure (US\$)	52.81(24.03)	---

Appendix 5. Construction of BMI/Age Cut-off Points for Infants Under Two Years

Table A.2. Cole et al reference population BMI/age at two years, and equivalent, WHO (2006) Z-scores for BMIs of 16, 17, 18.5, 25 and 30 at 18 years, boys and girls

BMI at 18 years	16	17	18.5	25	30
Boys					
Cole et al BMI/age equivalent at 2 years ^a	13.37	14.12	14.92	18.41	20.09
WHO, 2006 z-score equivalent ^b	-2.21	-1.44	-.7	1.92	2.91
Girls					
Cole et al BMI/age equivalent at 2 years ^a	13.24	13.9	14.83	18.02	19.81
WHO, 2006 z-score equivalent ^b	-2.35	-1.66	-.78	1.67	2.75

a. Cole et al, 2000 and Cole et al, 2007

b. WHO, 2006

The following steps were taken to construct cut-off points for infants 0-2 years old, equivalent to the BMI adult cut-off points of 16, 17, 18.5, 25, and 30.

1. Cole et al (2000; 2007) published cut-off points at 2 years for BMI/age equivalent to a BMI of 16, 17, 18.5, 25 and 30 at 18 years of age were expressed as z-scores of the WHO (2006) BMI/age distribution, using the following formula for the calculation of BMI/age z-scores (WHO, 2006:302), based on the LMS method (Cole and Green, 1992):

$$z = [y/M(t)]^{L(t)-1} / [S(t)*L(t)]$$

where

y = the Cole et al BMI/age value

M = median, WHO 2006 distribution

t = age of child in days

L = Box-Cox power, WHO 2006 distribution

S = the coefficient of variation, WHO 2006 distribution

The values for M, L, and S for ages 0-24 months in the WHO (2006) BMI/age distribution were obtained from the WHO Anthro software webpage (WHO, 2008b). The WHO (2006) z-score equivalent for each BMI/age are shown in Table A.2.

2. The cut-off values of BMI/age at ages 0-24 months for each z-score (z) were then calculated using the following formula:

$$y = [M(t)*(z*S(t)*L+1)]^{1/L(t)}$$

3. Each infant under 2 years was classified using the newly-constructed BMI/age cut-offs, using the mid-month cut-off point for each month, in order to be consistent with the method used for selecting cut-offs for older children (Cole et al, 2000:5).

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