

**The impact of health insurance on financial risk
protection in Ningxia, China**



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Thesis submitted for the Degree of
Doctor of Philosophy in Public Health

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Abstract

In 2009 China launched an ambitious health care reform to ensure equal and affordable access to basic health care for all by 2020. The reform was not only a response to changing patterns of disease, rising health expenditures, and widening regional inequalities, but part of a wider strategy to improve the social security system covering residents in order to increase domestic consumption. Its success will be defined by the efficient use of funds in financing and delivering health care.

Against this backdrop, this dissertation evaluates the importance of health insurance characteristics on measures of financial risk protection, household saving and consumption, and preference for health care providers. It uses an experimental design to study the effect of more generous outpatient coverage and a tiered reimbursement structure that sets rates higher at primary care facilities than tertiary hospitals.

While middle income households benefitted most in terms of financial risk protection, poorer and sicker households increased utilization at primary care facilities and food consumption – two pathways by which health insurance can improve health outcomes. This suggests that as outpatient coverage improves those most vulnerable will increase their access to health care, where there was previous underutilization, but not necessarily see an improvement in financial risk protection. The increased cover would also offer greater protection for those already using healthcare, but on its own not necessarily change their utilization patterns or reduce household savings. Looking at the quality-price trade-off in choice of provider reveals that, while at lower levels of household consumption demand for outpatient care is elastic with respect to price, as living standards rise past subsistence, individuals begin to value other provider characteristics. Together, these findings highlight the importance of benefit design and quality improvements at lower levels of care to shift patterns of utilization and ensure health services are accessed cost-effectively. (Thesis word count: ~44,800 plus references and appendices)

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Chapter 1 - *Introduction*

1.1 Background

Motivated by concerns for equity and social protection, low and middle-income countries are increasingly moving towards universal health coverage defined as affordable access for all to quality health care services. There are two kinds of risk in health care – the risk of illness and the risk of partial and/or lengthy recovery from illness. These uncertainties expose individuals to potentially ruinous medical expenditures and loss of earnings during extended sick days. According to the World Health Organization, 150 million individuals worldwide face catastrophic expenditures each year while a further 100 million are pushed into poverty (Evans et al., 2010). Health care payments are catastrophic when they exceed a certain threshold percentage of household consumption; they are impoverishing when they are large enough to drive a household previously above the poverty line below it (Wagstaff, 2008b). Both tend to occur when poverty rates are high, access and utilization of health services substantial and social protection mechanisms absent. It is the presence of this triple threat that often leads to crippling out-of-pocket health expenditures as a share of household consumption (Xu et al., 2003). Moreover, where lost income due to illness is reported, studies find the amount often exceeds the direct financial cost of treatment (McIntyre et al., 2006, Koopmanschap and Rutten, 1994). Overwhelmingly, it is the poor who bear the brunt of this financial burden leading to inequities in access to health care services and health status (Evans et al., 2010). Universal health coverage is an equity-related health policy that aims to divorce ability to pay from need for services and reduce socioeconomic inequalities between individuals of different health need (Olsen, 2011, Sutton, 2002). It is also an instrument of social protection providing a positive social and fiscal externality with an explicit concern to tackle poverty, invest

in human capital, and promote economic growth. Not only are individuals healthier, they are more productive, earn higher incomes, contribute to society, and are less dependent on government support.

1.2 The importance of health insurance

While there are a number of risk management tools that protect against unpredictable economic losses, of central importance to achieving universal health coverage has been the expansion of health insurance. Health insurance or other risk pooling arrangements provide individuals protection against unpredictable health related costs by lowering the out-of-pocket price of otherwise unaffordable health care services and increasing the consumption of additional medical care and other goods when sick because of an income transfer from those who remain healthy to those who become sick (Nyman, 2003, Cutler and Zeckhauser, 2000). Savings is also a consumption smoothing practice in which unspent income from a past time period can be drawn upon to pay for current expenses. As such, savings is another inter-temporal trade – this time between a previously healthy self and a now sick self. The utility derived from equalizing a household's marginal income utility across these two states is similar to the gains from trade that is derived from insurance. However, savings is very often a much more incomplete method as it draws on limited individual resources. Borrowing either informally from family and friends or from formal credit markets is a similar mechanism, except that the trade occurs between individuals based on a sense of expected reciprocity or altruism and interest (Folland et al., 2013, Besley, 1995). The drawback in low and middle income countries is that on the one hand these methods are often limited by scarce resources and unpredictable behaviour and, on the other hand, the collateral and high interest rates necessary to access formal credit markets

often precludes poorer households from taking up loans¹ (Banerjee, 2013). Selling assets such as land or livestock, while another frequent coping strategy, often has devastating long term consequences placing households in an even more precarious economic situation than before (McIntyre et al., 2006). Instead, health insurance provides a more secure form of individual protection against uncertain health related costs because it draws on a greater pool of resources allowing people to transfer income from when they need it less to when they need it more.

1.3 Gaps in the literature

Health insurance is a key instrument to achieving universal health coverage. As a result, there is a substantial literature on the paths to achieving universal health coverage in which expanding health insurance is a dominant feature. The most useful reviews describe how to increase health insurance in terms of the health financing functions of collecting revenues, pooling resources, and purchasing goods (Kutzin, 2000, McIntyre et al., 2005, Ensor, 2001, Hsiao and Shaw, 2007, Mills, 2007, Wagstaff, 2010, Tangcharoensathien et al., 2011).²

In general, three features dominate this literature. First, much more focus has been put on the financing of health insurance – a necessary first step – than on the design and delivery of health care benefits. Yet, fiscal crises in advanced economies and overextended governments in low and middle income economies make efficiency in health care delivery a pressing concern as health care systems globally become

¹ Evidence from a decade of empirical research on microfinance (which is in theory open to everyone due to its lower interest rates and willingness to lend to less familiar borrowers) has also shown that the uptake of microcredit is very low even when no other consumption smoothing instrument exists (Banerjee, 2013).

² More recently, the World Bank has launched the Universal Health Coverage Studies Series (UNICO Study Series) in its support of countries' effort to achieve universal health coverage. So far, 22 countries have been featured highlighting challenges experienced in implementation and tools to inform its further expansion.

increasingly affected by rising health care expenditures. A rapidly ageing population and a growing burden of non-communicable diseases and co-morbidities worldwide highlights the need to focus on prevention and move disease management and long term care from hospital settings to more cost-effective delivery settings. Second, while health insurance is often cited as a tool for economic development, the impact of health insurance is often limited to the traditional benefits of increased utilization of health care services and financial protection while the broader benefits in promoting economic growth are overlooked. By reducing the risk associated with future medical expenses, health insurance also diminishes the precautionary savings motivation of households, encouraging them to spend more on nonmedical goods. Therefore, improved access to health insurance can also affect the saving and/or consumption behavior of households (Wagstaff and Pradhan, 2005). Third, the concern over the affordability of health care services has dominated over concern of other dimensions of access. But health status, predisposing health care preferences, and rising expectations may be just as important in influencing health seeking behavior and patterns of expenditure.

1.4 Why China?

China is no exception to these global trends in both the pursuit of universal health coverage and its treatment of the literature. In 2009, the Chinese government launched an ambitious health care reform plan, pledging to further increase health care spending by US\$125 billion over the next three years in order to ensure equal and affordable access to basic health care for all by 2020. The reform, and in particular its drive to expand health insurance coverage, was not only a response to changing patterns of disease, the rapid escalation of health expenditures, and widening regional inequalities, but part of a wider strategy to improve the social security system covering residents in order to decrease household savings and increase consumption in the

domestic market (State Council. People's Republic of China, 2014). Having reinstated its role in the provision of public goods and given the financial resources China has committed to health care reform, the more pressing concern facing policy makers is the efficient use of those funds in the financing and provision of health care. In response, government officials have encouraged regional innovation in the design of health insurance schemes in order to maximize local impact ensuring individuals access the health care system in the most cost-effective manner.

1.5 Purpose and outline of thesis

It is within this context that I evaluated the importance of health insurance design features on measures of financial risk protection, household saving and consumption behavior, and preference for health care providers in rural China. Specifically, I hope to answer the following three questions:

- 1) To what extent do health insurance design features matter in reducing catastrophic and impoverishing health expenditures?
- 2) Does health insurance reduce the precautionary savings motivation of households and stimulate their consumption?
- 3) Do patient perceptions of health care quality override the health insurance price effect in choice of health care provider?

Chapter two briefly reviews a number of relevant topics all setting the scene for the study. It begins with an exposition on the theoretical basis for considering the demand for health care services in which the role of health insurance is highlighted. It examines methods of evaluating health insurance interventions and briefly summarizes the literature on the impact of health insurance on traditional measures of financial risk protection.

Chapter three provides an overview of the health care sector in China, highlighting in particular the role health insurance has played in its development. Next, it describes the particulars of the study setting and goes into greater detail on how rural health insurance is organized and health care delivered. Finally it explains the intervention on which the next three research chapters – the main body of the thesis – are based.

Unlike most health insurance evaluation studies that compare the impact of health insurance versus no health insurance, chapter four uses an experimental design to look at the effect of a more generous benefit package and the introduction of a tiered reimbursement structure to assess the role of health insurance design features on financial risk protection. As increasingly low and middle income countries move towards expanding their health insurance coverage, the presence or absence of health insurance becomes a non-issue. From a policy perspective, the more pressing concern is how to design health insurance schemes to ensure individuals access the health care system in the most cost-effective manner.

Chapter five extends the evaluation to further test the impact of increased health insurance coverage on household saving and consumption behavior. A well-targeted health insurance scheme not only lowers the price of otherwise unaffordable health care but reduces the risk associated with future medical expenses, diminishing the need for precautionary savings and encouraging households to increase consumption on additional medical care as well as nonmedical goods. This expands the potential benefits of health insurance beyond its traditional domain as an instrument of protection from medical expenditures and provides empirical evidence for health insurance as a strategy to promote economic growth.

Chapter six investigates consumer incentives using cross-county variation in price, as well as other provider specific characteristics such as distance and quality, to explore to what extent patient's perception of health care quality overrides the health insurance price effect in choice of health care facility. If China is to establish a successful referral system that shifts utilization from acute hospital settings to primary care facilities, it is imperative to better understand the determinants of health seeking behaviour in choice of provider. In previous work, the focus has tended to be on the financial barriers to access. But quality preferences are likely to also play a significant role.

Finally, chapter seven synthesizes findings from the three main research chapters, summarizes the study's strengths and main limitations, discusses policy implications both in the context of China and globally, and gives direction for areas of future research.

Chapter 2 - *Literature review*

The following chapter provides a review of the literature relevant to the overall framing of the thesis. The first section lays out the theoretical underpinnings for examining the demand for health care and looks at the expected effect of common factors that influence its consumption such as health insurance. This account is important as the quantity of medical care demanded directly influences the out-of-pocket cost of health expenditures. Section two reviews the evaluation methods literature. Section three summarizes the empirical evidence on the impact of health insurance on traditional measures of financial risk protection and recalls key gaps in the literature.

2.1 The demand for health care

Applying human capital theory³ to the demand for health, Grossman presents health as a commodity that can be produced via inputs of market goods such as health care and time spent on health improving efforts such as exercise. In this view, health is seen both as an investment and consumption good where ultimately the demand for health care is a derived demand for better health (Grossman, 1982, Grossman, 2000). A consumer can then choose an affordable amount of health care and other goods and services based on his or her budget constraint and preferences using a utility maximizing framework.

The demand for health care (HC) is represented as a function of the price of health care services (P_{HC}), the price of substitutes and complements (P_{OT}), income (I),

³ Human capital theory proposes that individuals can improve their productivity and/or future earnings by investing in their stock of education and health.

time (T), health status (HS), health insurance (HI), the quality of health care services (Q_{HC}), and various other demographic and preference characteristics (X').

$$HC = f(P_{HC}, P_{OT}, I, T, HS, HI, Q_{HC}, X')$$

Traditional demand analysis is often conducted in a simplified framework in which only one of the above factors change holding all other things constant – an approach followed here. First, if it is assumed that seeking medical care would restore an individual to full health while forgoing care would result in a lesser utility function then an individual will always choose to seek health care, *ceteris paribus*. Therefore, the demand for health care is health state dependent (Pradhan and Prescott, 2002). Second, assuming elastic demand, a standard budget constraint model predicts the quantity of health care demanded will increase with decreasing price (i.e. a downward sloping demand curve). However, the price elasticity of demand is likely to vary by type of health care service with sicker individuals being less responsive to price (i.e. a steeper demand curve). Third, if instead the price of a substitute health care good increases, for example a brand name drug, then the demand for generic drugs will increase. Conversely, if the price of a complement health care good increases, for instance a necessary differential diagnostic technology, then the demand for health care treatment decreases. Fourth, health care is generally considered to be a normal good, that is, increases in income increase the demand for health care services. Fifth, a decrease in time accessing health care acts in the same way as a decrease in the monetary price of health care services (Folland et al., 2013). Sixth, while vertical product differentiation (differentiation by quality) means that at the same price, all consumers choose the same higher quality health care provider, horizontal product differentiation (differentiation by preferences) means that at the same price, some consumers prefer one health care provider over another (Sutton, 2012). Finally, health insurance or other risk pooling

mechanisms lowers the out-of-pocket price of otherwise unaffordable health care at the point of service and increases income when sick leading to increased utilization of health care services and increased demand for more expensive care (Folland et al., 2013). Taken together, these theoretical predictions are useful in understanding the extent of health related expenditures which is determined by the health seeking behavior of individuals and the quantity of medical care demanded.

Given this framework, in chapter four we might expect the relative decrease of out-of-pocket price for outpatient services following the introduction of a more generous health insurance benefit package to lead to an increase in the utilization of ambulatory services among the sick. We might also expect the health insurance income effect to lead to an increased demand for additional or more expensive care and so a decrease in health expenditures is not always a given. Along the same lines, in chapter five, the health insurance income effect might also lead to an increase in nonmedical consumption. Finally, in chapter six, the tiered reimbursement structure which offers a higher reimbursement rate for lower level primary care facilities than it does for secondary and tertiary care providers might lead to increased demand for primary care facilities – especially among substitute providers. However, disease severity, time, quality, and individual preference are all likely to simultaneously pull demand for health care providers in opposite directions making the implications on health expenditures unclear. As the quantity of medical care demanded directly influences the out-of-pocket cost of health expenditures it is helpful to keep in mind the patient health seeking behavior described in this framework throughout the remainder of the thesis.

2.2 Evaluation methods

Whereas program monitoring ensures that agreed upon targets have been met, impact evaluation looks at what would have happened had the intervention not occurred,

thus attempting to attribute outcomes to the intervention. Yet, inferring a causal relationship from most health system initiatives, including changes to health insurance schemes, is very difficult.

The evaluation problem is that the counterfactual, defined as an individual's outcome had the intervention not taken place, necessary to establish the program's true effect is not observable. That is, the same individual cannot belong to both treated and untreated groups at a given point in time (Jones, 2008). Formally, let d_i be a binary variable indicating intervention status and Y_i our outcome of interest such that

$$Y_i = \begin{pmatrix} Y_i^1 & \text{if } d_i = 1 \\ Y_i^0 & \text{if } d_i = 0 \end{pmatrix}$$

The treatment effect TE_{it} for individual i at time t is denoted as

$$TE_{it} = Y_{it}^1 - Y_{it}^0.$$

The counterfactual, Y_{it}^0 , is unknown.

Policy evaluations often rely on before and after or case-control studies. However, comparing outcomes of treated groups before and after the intervention is misleading. In the absence of a control group that does not receive the intervention it is difficult to predict an accurate estimate of true impact as many factors outside the program may have changed from the time the program was first administered to the time the final outcome was measured. Regression to the mean, a statistical 'group' phenomenon, could further obscure the true effect of the intervention. Even if a perfect test capturing the true value of interest is available, measurement error remains a possibility. If such errors occur when a group of patients are first measured, resulting in extreme or outlier values, then upon subsequent measurements the values will tend to regress to the mean – to their 'true' value (Duflo et al., 2007, Torgerson and Torgerson, 2008).

Comparing control and treated groups when both are eligible to participate (i.e. retrospective case-control studies) could also be misleading when no information is available as to why some people chose to participate and others not. The danger is that selection bias could either over- or under- estimate true impact as important confounders associated with outcome may differ between groups before intervention exposure (Torgerson and Torgerson, 2008). The question then becomes how to devise the counterfactual – the control group that does not receive the intervention but is as similar as possible to the comparison group that does.

There are a number of approaches to assigning control groups to overcome selection bias: i) randomization; ii) selection on observables; iii) selection on time fixed unobservables; and iv) selection on time varying unobservables. Each methods' assumptions, strengths, and weaknesses are discussed in turn below.

2.2.1 Randomization

Randomization is the best method to deal with problems of temporal change, regression to the mean, and selection bias as it controls for, on average, variables that are known and measurable, variables that are known and not measurable, and variables that are unknown and therefore not measurable, by randomly allocating similar individuals to either treatment or control groups. The treatment effect is then simply estimated by a difference in outcome means. Unfortunately, ethical considerations such as withholding a treatment that is potentially beneficial and/or political feasibility and financial constraints often mean that randomized control trials are usually not possible in health system interventions. Even when they are feasible, treatment non-compliance, non-random attrition, control group contamination, and selection due to eligibility remain potential sources of bias. In the absence of randomization, quasi-randomized studies attempt to mimic the characteristics of a randomized control trial, namely

random treatment allocation. What distinguishes the various quasi-experimental methods essentially boils down to how they address selection bias and time trends.

2.2.2 Selection on observables

The first possibility is that, conditional on a set of observable variables X , treatment assignment is as good as random. For this reason, this estimation method is sometimes referred to as selection on observables. The simplest approach is to control for X in a regression framework, making various functional form assumptions. The outcome of interest is regressed on a dummy variable indicating treatment assignment and the observable covariates X are entered as right hand side controls. This requires a rich dataset and assumes no omitted variable bias. Another approach is to match participants according to a set of observable characteristics to form an equivalent control group. This assumes that adjusting for differences in observed pre-treatment characteristics is enough to remove any potential biases between treated and control groups. However, this can be burdensome if conditioning on a large number of variables. In practice, matching is done according to propensity score, a number indicating the probability of being treated given a set of observable characteristics. Both regression and matching methods rely on three critical assumptions:

1. The stable unit-treatment value assumption (SUTVA) states that an individual's treatment and potential outcome does not affect that of another individual. For instance, if the intervention and outcome of interest are health insurance and health care utilization respectively, insured patients might cause doctors to charge uninsured patients more, affecting the utilization patterns of the uninsured. The SUTVA assumption would rule out such interactions or spillover effects.

2. Unconfoundedness states that there are no unobserved characteristics responsible for treatment allocation and potential outcome $(d_i \perp (y_i^1, y_i^0) | x_i)$. This is also known as the conditional independence assumption.
3. The overlap assumption implies that the distribution of observed covariates $X_i | d_i = 1$ is very similar to the distribution of covariates when $X_i | d_i = 0$. It is needed if we are to justify unconfoundedness and estimate a precise treatment effect on a particular subpopulation.

The obvious disadvantage of these approaches is that they assume unobserved heterogeneity in participation is not present (Jones, 2008, Khandker et al., 2010, Duflo et al., 2007).

2.2.3 Selection on time-fixed unobservables

The availability of panel data allows for selection on unobservables to a certain extent. Difference-in-difference methods take into account both observed and time-invariant unobserved characteristics, essentially comparing before and after observations in treatment and control groups. When there is more than one time period or treatment group, fixed effects methods generalize difference-in-difference estimates, regressing the outcome of interest on control variables X including year and group dummies (Duflo et al., 2007). The crucial assumption in both difference-in-difference and fixed effects estimates is that there is a parallel trend for both treated and untreated groups (Jones, 2000). Using instrumental variables (IV) with panel data relaxes this assumption, allowing for unobserved characteristics to be time-variant.

2.2.4 Selection on time-varying unobservables

The IV approach assumes that there is a variable that is strongly related to participation but not the outcome of interest. Allocating people according to this

variable or ‘instrument’ that predicts treatment participation is meant to mimick randomization. The main problem with this approach is finding a good IV that is strongly correlated with treatment assignment but that does not violate the exclusion restriction. Using an IV that is correlated with unobservables affecting the outcome would lead to a biased estimate of treatment effect (Khandker et al., 2010).

Regression discontinuity and pipeline methods are similar to IVs in that they also introduce an exogenous variable that is strongly correlated with participation. In the case of the former, program eligibility criteria are used as variables that are predictive but not analogous with participation to compare outcomes between a narrow band of individuals above and below the threshold, as they are assumed to be comparable. The concern is that results are not generalizable as it only looks at a ‘local’ average treatment effect. In the latter, timing of program implementation is exploited, using eligible groups or geographic regions that have not yet received the treatment. However, unlike IVs, the assignment variable can be correlated to the outcome of interest. In fact a crucial assumption is that the only reason the outcome variable should vary between treated and control groups is due to the discontinuity in the level of treatment (Khandker et al., 2010).

In sum, there are a number of approaches other than randomized control trials that can be used to evaluate the impact of health system interventions – none of which are perfect (Duflo et al., 2007). Given the availability of panel data, chapters four and five use difference-in-difference methods controlling for a number of observable characteristics. A discussion on the likelihood of identifying assumptions holding is discussed in greater detail in the next chapter. Parameters of interest are discussed below.

2.2.5 Average treatment effect

In much of the evaluation literature, usually what is estimated is the average treatment effect (ATE) comparing average outcomes between treated and control groups. This is generally the estimand of choice when an intervention is meant to be widely available to the entire population.

$$ATE = E(Y_{it}^1 - Y_{it}^0)$$

In contrast, the average treatment effect on the treated (ATT) is the average effect experienced only by the sub-population who is actually treated.

$$ATT = E(Y_{it}^1 - Y_{it}^0 | d_{it} = 1)$$

Only if homogeneous treatment effects are assumed is $ATE=ATT=TE$ (Jones, 2008, Angrist and Pischke, 2009).

2.3 Empirical evidence on the impact of health insurance

The evidence that health insurance decreases out-of-pocket spending and catastrophic expenditure is far from conclusive. Giedion et al. (2013) provide the most comprehensive review of robust studies that exist evaluating the impact of health insurance on financial risk protection. The review classifies studies into four groups based on suitability of the study design, richness of the data, appropriateness of choice of method (mostly with regards to how selection bias was addressed), thoroughness in application of the method, and discussion of findings. Limiting findings to studies from the top two groups using this classification (21 studies out of 53), they find an overall positive impact on out-of-pocket spending in 15 out of 18 studies, on catastrophic expenditures in five out of ten, and on impoverishing expenditures in three out of four. There is also evidence of heterogeneity of impact across socioeconomic groups with the poor and vulnerable populations benefiting most from the introduction of health insurance schemes (Giedion et al., 2013, Moreno-Serra and Smith, 2012a, Escobar et

al., 2010, Acharya et al., 2013). Even fewer studies evaluate the impact of health insurance beyond these traditional measures of financial risk protection in terms of household assets, savings, or broader household consumption. Here the results are more inconclusive with one study finding that health insurance encourages wealth accumulation, three that it discourages it, two that it encourages savings where the quality of health care is poor, and one that it leads to increased nonmedical household consumption (Starr-McCluer, 1996, Hubbard et al., 1995, Jonathan Gruber and Aaron Yelowitz, 1999, Maynard and Qiu, 2009, Guariglia and Rossi, 2004, Jappelli et al., 2007, Wagstaff and Pradhan, 2005)⁴. These findings beg the question of why the evidence on financial risk protection and household saving and consumption behavior is mixed.

First, there is considerable heterogeneity in the variety of health insurance characteristics – i.e. benefit packages, reimbursement rates, ceilings, and deductibles⁵. These features are rarely taken into account in evaluation studies and yet may have important implications on patterns of utilization and consequently health expenditures. Because insured individuals no longer face the full cost of medical care, they may reduce preventive effort to decrease their likelihood of illness or they may consume more than the optimal amount of health care after they get sick. The first behavior is known as *ex-ante* moral hazard, the second as *ex-post* moral hazard (Folland et al., 2013). Cost sharing arrangements attempt to limit these behaviors. Previous health insurance evaluation studies focused more on the presence or absence of health

⁴ An in-depth review of China specific studies evaluating the impact of health insurance on financial risk protection, savings, and nonmedical consumption are presented in chapters four and five.

⁵Benefit packages determine what health care services are eligible for coverage under a health insurance scheme. Deductibles require patients to pay the cost of health care services up until a certain threshold after which a reimbursement schedule, which refers to the percentage of health care costs paid by the insured, goes into effect. Finally, ceilings put a cap on the amount paid per service, visit, or calendar year.

insurance interventions and less on the design or cost sharing characteristics which shape health seeking behavior and influence choice of provider. The seminal RAND health insurance experiment remains one of the only studies to randomize households to health insurance plans of varying co-payment rates to find that as coverage decreased (i.e. the price for the individual went up) the likelihood of any use of medical services decreased (Manning et al., 1987). In low and middle income countries few papers look at the variation in health insurance design and cost sharing arrangements despite the wide heterogeneity between schemes. Ekman (2007) finds that when disaggregating treatment effect by type of health insurance scheme in Jordan there is substantially different impacts on outpatient spending. Heterogeneity of schemes is suspected but there is no discussion on how the plans differ shedding little light on what features are driving the response⁶ (Ekman, 2007).

Second, health seeking behaviour depends on more than just affordability. In traditional economic study, consumer choice is analyzed in a utility maximizing framework in which an individual chooses between alternatives given his/her preferences for the attributes of each alternative and their budget constraint determined by income and the relative prices of goods and services on offer. Yet, in evaluating health insurance interventions, research has mostly focused on how demand changes with respect to the out-of-pocket price of health care, ignoring other aspects of consumer incentives such as quality (Zweifel and Manning, 2000, Folland et al., 2013). But if patients have strong perceptions that the quality of care at tertiary hospitals is better than at primary care facilities then they may choose to bypass lower level care

⁶ China specific studies exploring the impact of plan generosity on health care utilization and expenditure are summarized in chapter four.

despite the higher cost of hospital-based services. Consideration of the price-quality trade-off is often absent.

Finally, interventions solely evaluated in controlled or quasi-experimental settings often do not take into account the complexity of health systems. Health insurance is a prime example of a complex intervention that has the potential for multiple system-wide effects. For instance, the average person generally has less information than providers about both the need for and quality of health care. These informational asymmetries lead to complicated principal-agent relationships in which a patient (the principal) delegates decision making authority to a better informed doctor (the agent). This trust and delegation of freedom of choice rests on the assumption that physicians act in the best interest of their patients. However, in reality, physicians can be quadruple agents attempting to maximize the objectives of the patient, their own self-interest, the insurer that pays them, and society as a whole (Folland et al., 2013, McGuire, 2000). The empirical literature has consistently shown that providers react to financial incentives often in ways that are at odds with cost containment efforts. Supplier-induced demand is a behavior in which physicians provide unnecessary care knowing that insured patients may not bear the full cost thus counteracting the protective efforts of health insurance. The reduction of out-of-pocket health expenditures is therefore not a given (Cutler and Zeckhauser, 2000, McClellan, 2011).

As a result, there is a growing realization amongst health system researchers that stand-alone demand side health insurance interventions divorced from complementary supply side interventions to improve efficiency is unlikely to reduce out-of-pocket health expenditures. Similarly, savings behavior is dependent on more than just health-related risk or uncertainty. Expected income, interest rates, the availability of credit or borrowing opportunities and various other demographic

characteristics and personal preferences all factor into household saving decisions. Evaluation methods that focus on treatment effects and whether an intervention works do little to explain under what circumstance a given intervention will achieve its expected outcomes.

2.4 Concluding remarks

This chapter began with a review of the theory behind the demand for health care services. As the cost of health care expenditures is directly dependent on the amount of health care services used, this analysis is helpful in providing hypothetical predictions in subsequent chapters as changes and variation in a number of health care demand shifters are analyzed. Next, it discussed the methodological problems in evaluating the impact of health insurance interventions and proposed various approaches to addressing the evaluation problem. This helped identify the most robust studies evaluating the impact of health insurance on measures of financial risk protection. A review of the empirical evidence yielded mixed results leading some health researchers to push for more of a health systems approach to evaluation.

Chapter 3 - *Health sector and study background*

The following background chapter is organized in three parts. The first gives an overview of the health care sector in China, highlighting in particular the role health insurance has played in its development. The second section describes the study setting, the Ningxia Hui Autonomous region⁷ (hereafter Ningxia), and goes into greater detail on how rural health insurance is organized. Finally, section three explains the intervention and describes the data.

3.1 Health insurance and the health care sector

Health insurance in China has a long and complicated history. First, it helped transform the delivery of health care, providing near universal health coverage and contributing to impressive health gains that bested the efforts of countries of similar economic development. Then, with its collapse following the economic reforms of the 1980s, it led to impoverishing health expenditures, unaffordable access, and significant regional inequalities.

3.1.1 Pre-market reforms

Before the market reforms of the 1980s, land was distributed into agricultural collectives known as communes. Within each county, communes (10,000 to 80,000 residents) were organized into production brigades of 1,000-2,000 residents – the main rural administrative unit – and smaller production teams of 200-400 residents who collectively produced and managed all goods and grains. The brigades were also responsible for funding and providing basic public services such as education and health care services. Each brigade had 2-5 barefoot doctors who were funded primarily

⁷ Autonomous regions have a higher population of a particular minority. They include Ningxia (Hui), Xinjiang (Uyghur), Tibet (Tibetan), Guangxi (Zhuang), and Inner Mongolia (Mongol).

by a collective fund – the cooperative medical scheme (CMS) – and also from central government subsidies (Sidel, 1972, Bien, 2008). Between 1976 and 1979, ninety percent of all villages had community health insurance (Zhang et al., 2010). It is this system that formed the backbone of free health care for rural populations.

Health insurance was also not limited to rural areas. The labor medical insurance scheme (LMI) was established in 1951 for all employees of state-owned enterprises. It was funded from their operating profits. The worker doctor was the urban area counterpart of the barefoot doctor providing basic medical advice to his fellow factory co-workers. For state employees, the government medical insurance scheme (GMI), established in 1952, ensured access to health care services (Liang and Langenbrunner, 2013).

Universal health coverage, combined with substantial supply-side subsidies towards providers led to massive improvements in health outcomes. Infant mortality dropped from 300 per 1,000 live births in 1950 to 50 in 1980 and life expectancy at birth increased from 35 years in 1949 to 67 in 1980 (Cook and Dummer, 2004, Eggleston, 2012). As China underwent its demographic transition, its population soared in the 1950-60s, so much so that it ultimately led to aggressive population control measures in the 1970s.

3.1.2 Post market-reforms

However, while China may have been considered a positive outlier on a number of health outcomes in 1980, the situation quickly changed with the advent of the market-oriented economic and administrative reforms of the 1980s. China's health care system underwent a number of noteworthy changes. Fiscal decentralization negatively affected the provision of public services, especially in poorer areas. With increasing financial stress, the central government's ability to support local governments greatly

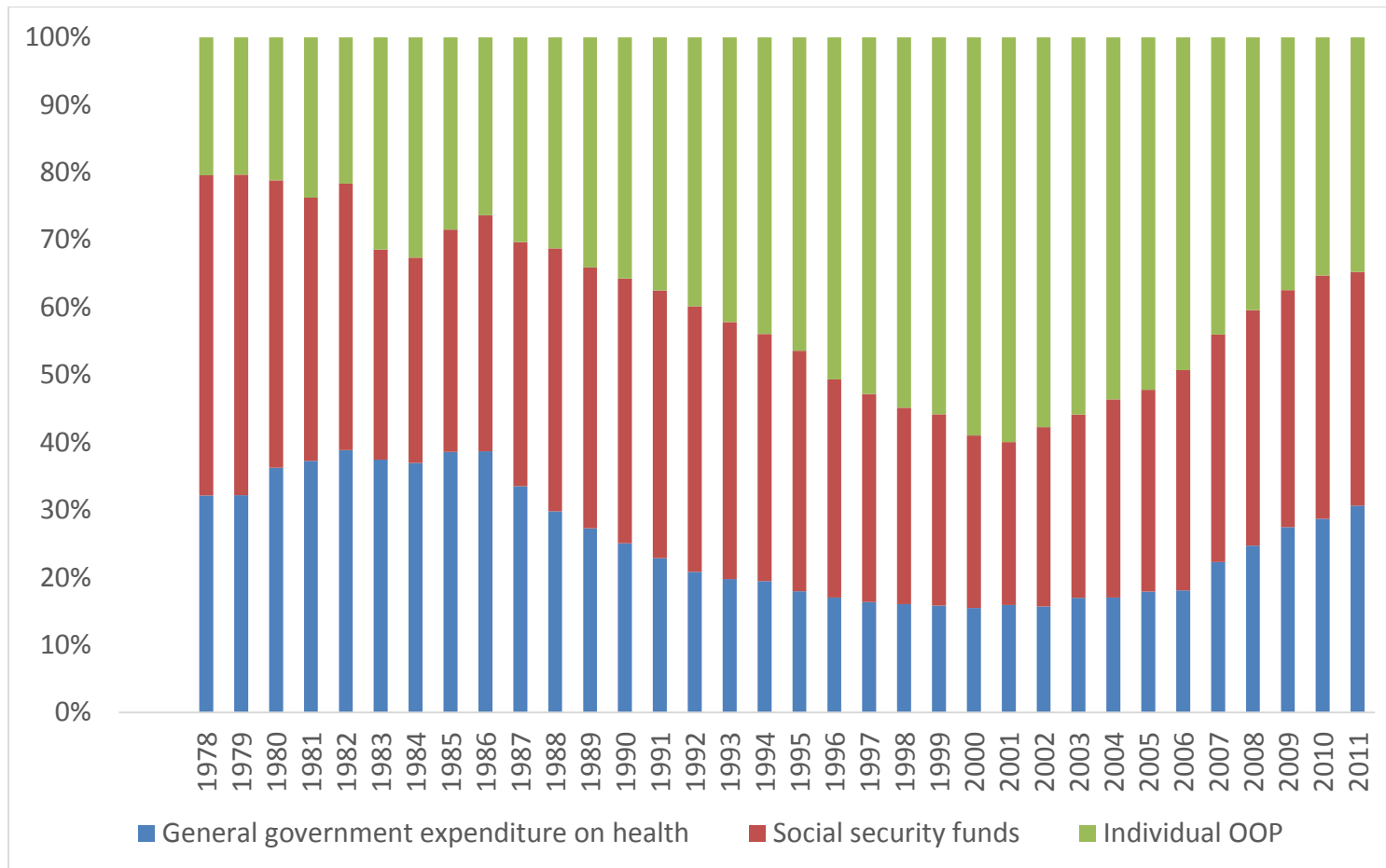
diminished. In rural areas, de-collectivization⁸ led to the eventual collapse of CMSs in most villages. Similarly, the LMI⁹ and GMI faced significant financial trouble throughout the 1980s (Wagstaff et al., 2009b).

At the same time, limited budgetary support of providers combined with fee-for-service payment arrangements created perverse incentives to shift away from low revenue generating primary and preventive services to the over-prescription of drugs and high-tech treatments. Public health institutions also began introducing charges for some services which had previously been free, allowing them to boost their revenues. As a result, by 2000, out-of-pocket expenditure made up for nearly 60 percent of total health spending, growing at an annual rate of 23.2 percent since the beginning of the reforms in 1978 (Figure 3.1). This shift in financing drove the percent of households experiencing catastrophic health expenditures to be among the highest in the region (Yip and Hsiao, 2008, Yip et al., 2012) (Figure 3.2).

⁸ The agricultural commune system was replaced by household-based production.

⁹ Many state-owned enterprises went bankrupt and those that survived cut back employee benefits significantly.

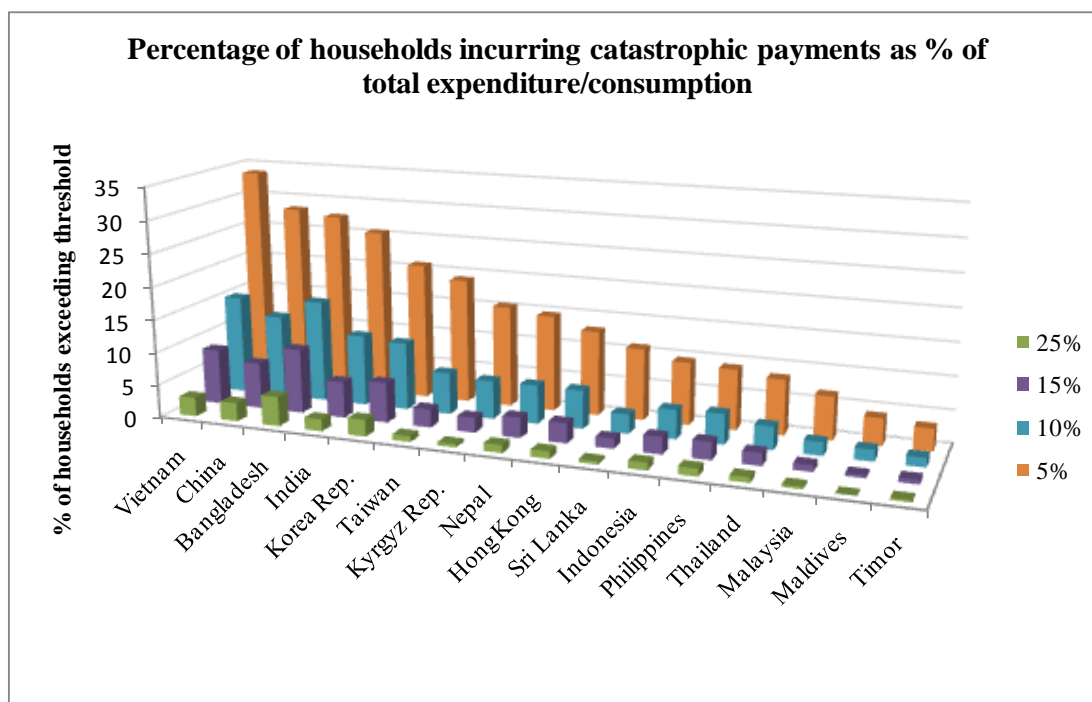
Figure 3-1: Share of total health expenditures (1978-2011)



Note: OOP=out-of-pocket

Source: National Bureau of Statistics (2013)

Figure 3-2: A comparison of regional catastrophic health expenditures



Source: (van Doorslaer et al., 2007). For Maldives, (Anuranga et al., 2009). For Timor, (World Health Organization, 2014) and author's analysis of 2001 Timor *Living Standards Measurement Survey*.

While an average GDP growth rate of 12 percent between 1980 and 2013 (IMF, 2013) lifted nearly 500 million people out of poverty¹⁰ and undoubtedly sustained many of the gains in infant, child, and maternal mortality, wide inequalities emerged with the poorer regions being left behind, unable to generate revenue to fund public services (Dollar, 2007). In 2012, infant and under-five mortality rates were 12.1 and 14 per 1,000 respectively – relatively low compared to other countries at a similar level of economic development (Table 3.1) (World Bank, 2013). But regional differences in wealth and public spending translate into a wide variation across the country where infant and under-five mortality rates can be as much as 2-3 times higher in rural than urban areas (Office of the National Bureau of Statistics, 2012).

¹⁰ Defined as living under \$1 per day in PPP.

Table 3-1: Key health indicators

Indicators	China	EAP countries	Middle-income countries
Per capita GDP, PPP (2012)	9,083	10,926	7,269
Poverty headcount (% living under \$1.25/day) (2010)	11.8 (2009)	12.5*	18.0
Per capita THE, PPP (2011)	432	449	378
Health spending as a share of GDP (%) (2011)	5.2	6.8	5.7
OOP health expenditure as a share of THE (%) (2011)	34.8	25.3	36.3
Life expectancy at birth (2011)	75.0	74.5	69.9
Infant mortality per 1,000 live births (2012)	12.1	16.3	33.8
Under-5 mortality per 1,000 live births (2012)	14	19.6	44.9
Maternal mortality per 100,000 live births (2010)	37	78	190
Attended deliveries (%) (2010)	99.6	-	-
Immunizations DPT (%) (2012)	99.0	91.7	82.0

Notes: EAP=World Bank grouping for East Asia and Pacific region; Middle income=2012 GNI per capita between \$1,036 and \$12,615; * Developing EAP only; OOP=out-of-pocket expenditure; THE=total health expenditure; DPT=diphtheria, pertussis, and tetanus.

Sources: World Bank (2013, 2014); IMF (2013)

What is more, new health challenges require a shift in disease management and skill set. Increasingly sedentary lifestyles, high fat/salt diets, and tobacco and alcohol consumption all contribute to the growing prevalence of diabetes and hypertension and over 80 percent of annual deaths are now made up of non-communicable diseases such as cardiovascular diseases, chronic obstructive pulmonary diseases, and cancers (Table 3.2). This requires a shift in focus of the health care system from acute hospital care to ongoing disease management in more cost-effective settings such as outpatient primary care facilities (Yang et al., 2008).

Table 3-2: Top five killers in 2011

	Disease	Death rate (1/100,000)	Percent
1	Malignant neoplasms	172.3	27.8
2	Heart disease	132.0	21.3
3	Cerebrovascular disease	125.4	20.2
4	Diseases of the respiratory system	65.5	10.6
5	Injury and poisoning	33.9	5.5

Source: Ministry of Health of the People's Republic of China, 2012.

3.1.3 Health reform and the path to universal health coverage

Acknowledging the need for change, health reform in China is being implemented in a highly favorable fiscal climate and under a government that is increasingly committed to investing more in the social sectors. Dramatic growth in the economy has allowed an unprecedented six-fold increase in government health spending from 39,095 to 245,825 (in million constant 2005 PPP) between 1995 and 2010¹¹ (World Health Organization, 2014). This catalyzed the government to launch an ambitious health care reform, pledging in 2009 to further increase health care spending by US\$125 billion over the next three years in order to ensure equal and affordable access to basic health care for all by 2020. Specifically, the five pillars of the health reform committed to i) expanding health insurance coverage to more than 90 percent of the population; ii) increasing public health spending, especially in poorer regions; iii) improving the delivery of primary health care including establishing a referral system from primary health to specialist services and from lower level village and township facilities to upper level county and city hospitals; iv) introducing a national essential medicines scheme; and v) reforming public hospitals (Yip et al., 2012).

With regards to the first aim, the government introduced as early as 1998 the Urban Employee Basic Medical Insurance (UEBMI) scheme – a mandatory scheme covering formally employed urban workers that replaced the defunct LIS. The Urban Resident Basic Medical Insurance (URBMI) scheme later extended coverage to the urban population with no formal employment, schoolchildren, and the elderly in 2007. Finally, the New Rural Cooperative Medical Scheme (NCMS), a government subsidized voluntary health insurance scheme, was phased in to rural county-level

¹¹ Health spending as a share of GDP has been relatively stable over the last decade reaching 5.1 percent in 2010.

jurisdictions between 2003 and 2008. All schemes were meant to: i) address the lack of health insurance following the virtual disappearance of the CMS in rural areas and the cutback in employee benefits in urban areas, ii) control the rapid escalation of health expenditures, and iii) decrease household share of out-of-pocket payments on health care. The policy aimed to first reach wide coverage with a shallow benefit package and then gradually expand the services covered by health insurance. Local governments were also given the autonomy to decide on the policy details of health insurance schemes – that is, define benefit packages and determine provider payment arrangements. As a result, most early NCMS plans covered only inpatient services with high deductibles, low reimbursement rates, and low ceilings (Wagstaff et al., 2009b, Yip et al., 2012). Since, coverage has gradually increased with 96.9 percent of the population covered by one scheme or another in 2011 (Table 3.3).

However, universal health coverage is not just about the percent of the population that is covered but also the package of services provided and the proportion of costs covered. Cost sharing arrangements in 2010 meant that the insured were still responsible for 50-70 percent of health expenditures (Yip et al., 2012). And while substantial gains have been made in expanding health insurance, the health care system continues to be plagued by waste and inefficiencies in the delivery of health care services as much slower progress has been made on the remainder of the pillars of reform.

3.1.4 The delivery of health care services

Health care service delivery is provided by a network of village clinics offering basic primary and preventive outpatient care¹² and public health services¹³, township

¹² Village clinics are responsible for treating 30 common diseases (such as cold, diarrhoea, hypertension, diabetes, gastritis, toothache, etc.) and prescribing 121 essential drugs.

¹³ Public health services provided at village clinics include health education and promotion, immunizations, infectious disease surveillance and maternal and child healthcare.

health centres treating primary and basic inpatient care, and county hospitals handling tertiary care, specialist services, and difficult cases. However, county hospitals typically provide two-thirds of all health services, including primary care as the referral system has never been well enforced and lower level facilities are often bypassed due to lack of trust in providers and poor quality of service (Eggleston, 2012, Yip et al., 2012). Primary health care and hospital-based secondary and tertiary care largely operate in a fragmented and uncoordinated manner (Yip and Hsiao, 2014).

Government fee schedules that set prices for labor intensive office and hospital visits below cost and drugs and diagnostic technologies above cost create perverse incentives keeping the focus on acute hospital care. Despite removing financial incentives to over-prescribe drugs at primary health care facilities by instituting a zero-profit drug policy and requiring that only drugs from an approved national essential medicines scheme be stocked and prescribed, public hospitals continue to generate nearly half of their revenue from drug income as they are allowed to retain any operating surplus or profits from the sales of medicines and diagnostic tests. And the majority of all health care facilities, including public hospitals, are paid by fee-for-service further incentivizing the increased provision (and overprovision) of services, especially those with higher profit margins (Hanson et al., 2004).

Given the substantial resources China has committed to health care reform, the more crucial question is how to use the additional funding more effectively in the financing and provision of quality health care. As the majority of increased funding has gone into subsidizing health insurance, this thesis focuses on the role of health insurance in achieving the government's stated goals of sustainably providing equal and affordable access to basic health care for all by 2020 (Yip and Hsiao, 2014). These realities are true in Ningxia as they are throughout China.

Table 3-3: Key features of three health insurance schemes

Health Insurance Scheme	UEBMI	URBMI	NCMS
Eligibility	Mandatory for urban employees of state-owned or private enterprises (individual enrollment)	Voluntary for urban residents not eligible for UEBMI such as students, children, elderly, unemployed, disabled, and migrants in some cities (individual enrollment)	Voluntary for rural residents (household enrollment)
Unit of pooling	Prefecture/ municipality	Prefecture/ municipality	County
Managed by	MOHRSS	MOHRSS	NHFPC
Financing	Employers and employees	Government and individuals	Government and individuals
Services covered	Inpatient and outpatient care	Inpatient and critical outpatient care	Inpatient and critical outpatient care
Per capita funding (yuan)	1962.3	268.8	246.2
Inpatient reimbursement rate (%)	88.5	42	<50
Enrollment (% of total population)	18.7	16.4	61.8

Notes: MOHRSS=Ministry of Human Resources and Social Security; NHFPC=National Health and Family Planning Commission
Sources: Liang and Langenbrunner, 2013; Yip et al., 2012.

3.2 Study setting

3.2.1 Geographic and demographic characteristics

Ningxia is located in the northwest of China bordering Gansu, Shaanxi and Inner Mongolia. It has a territorial area of 51,954.40 sq.km and is composed of 22 counties. Twenty four percent of the territory is made up an irrigated plains region in the north, 45 percent of a dry and desert region in the center, and 31 percent of a hilly and mountainous region in the south (Office of the National Bureau of Statistics, 2012).

Annual per capita consumption expenditure was 16,674 and 5,908 Yuan amongst urban and rural residents respectively in 2012. One of the poorest provinces in China, nearly 10 percent of its population live below the poverty line. To address this poverty, regional per capita expenditure on public services is 813 Yuan compared to the national average of 748 Yuan. This translates into 641 Yuan per capita for medical and health care expenditure, well above the national average of 472 Yuan (Office of the National Bureau of Statistics, 2012).

Figure 3-3: Map of Ningxia

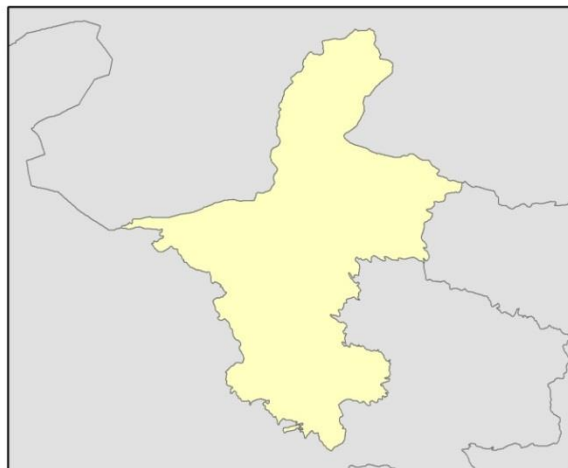


Table 3-4: Key indicators for Ningxia (2011)

Population (10,000)	639.45
Rural population (%)	50.2
Average family size	3.2
Per capita GDP (Yuan)	33,043
Annual Per Capita Disposable Income of Urban Households (Yuan)	17,579
Annual Per Capital Consumption Expenditure of Urban Households (Yuan) (2012)	16,674
Annual Per Capital Net Income of Rural Households (Yuan) (2012)	6,180
Annual Per Capita Living Expenditure of Rural Households (Yuan) (2012)	5,908
Education	
Illiterate or semi-illiterate (%)	15.3
Primary school (%)	33.3
Junior middle school (%)	41.4
Senior middle school (%)	6.8
Special secondary school (%)	1.3
College and higher (%)	1.9
Sources: Office of the National Bureau of Statistics (2012); National Bureau of Statistics (2013)	

3.2.2 NCMS

Before discussing in greater detail how the NCMS operates, it is important to first visit the institutional architecture in which health policy decisions are made in China. At the central level, the State Council, China's executive branch, sets the national agenda and then delegates accountability to related ministries to draw up operational plans for their local executive organs to implement. There are four levels of administration underneath the central government – provincial governments, prefectures, counties, and townships. Fiscal decentralization means that provinces generate their own revenue streams and are responsible for almost all public spending, including health. Each local government is also given the autonomy to decide on the implementation details of national policies, including for instance the provisions of the various health insurance schemes. That is, they can define benefit packages and determine provider payment arrangements¹⁴ (Liang and Langenbrunner, 2013).

¹⁴ Incidentally, it is this feature of the institutional structure that has allowed a number of pilot experiments to evaluate the impact of the introduction of rural health insurance. By weighing the benefits

In the past the UEBMI and URBMI schemes fell under the purview of the Ministry of Human Resources and Social Security (MHRSS) while the majority of NCMS schemes established NCMS management offices under the National Health and Family Planning Commission (NHFPC) – formerly the Ministry of Health and the National Population and Family Planning Commission¹⁵ – while the rest fell either under the MHRSS or under independent commercial insurance agencies. However, the government is gradually moving towards unifying the three medical insurance schemes – starting with unifying the URBMI and the NCMS.

The NCMS collects premiums from households and subsidies from the Ministry of Finance¹⁶ and the Ministry of Civil Affairs (MOCA)¹⁷. It then pays claims to providers who bear upfront the cost of treatment and seek reimbursement later. Households are responsible to providers for co-payments (which may vary depending on the type and level of service frequented) and for the total cost of any treatment not covered under the NCMS benefit package (Cartwright, 2007). The flow of funds is represented in Figure 3.4 (Hu, 2014). The premium contributions by source for Ningxia are presented in Table 3.5.

In 2009, the NCMS premium in Ningxia was divided into a risk pooled fund which covered inpatient services and a limited number of chronic conditions and an individual savings account that could be used to cover outpatient visits. Generally, the amount in an individual's savings account could barely cover a single outpatient visit further encouraging patients to seek care at higher level inpatient facilities as there was

and trade-offs of innovative regional variations of the NCMS scheme (in financing, benefit package, and/or reimbursement schedule) the government of China hopes to maximize local impact.

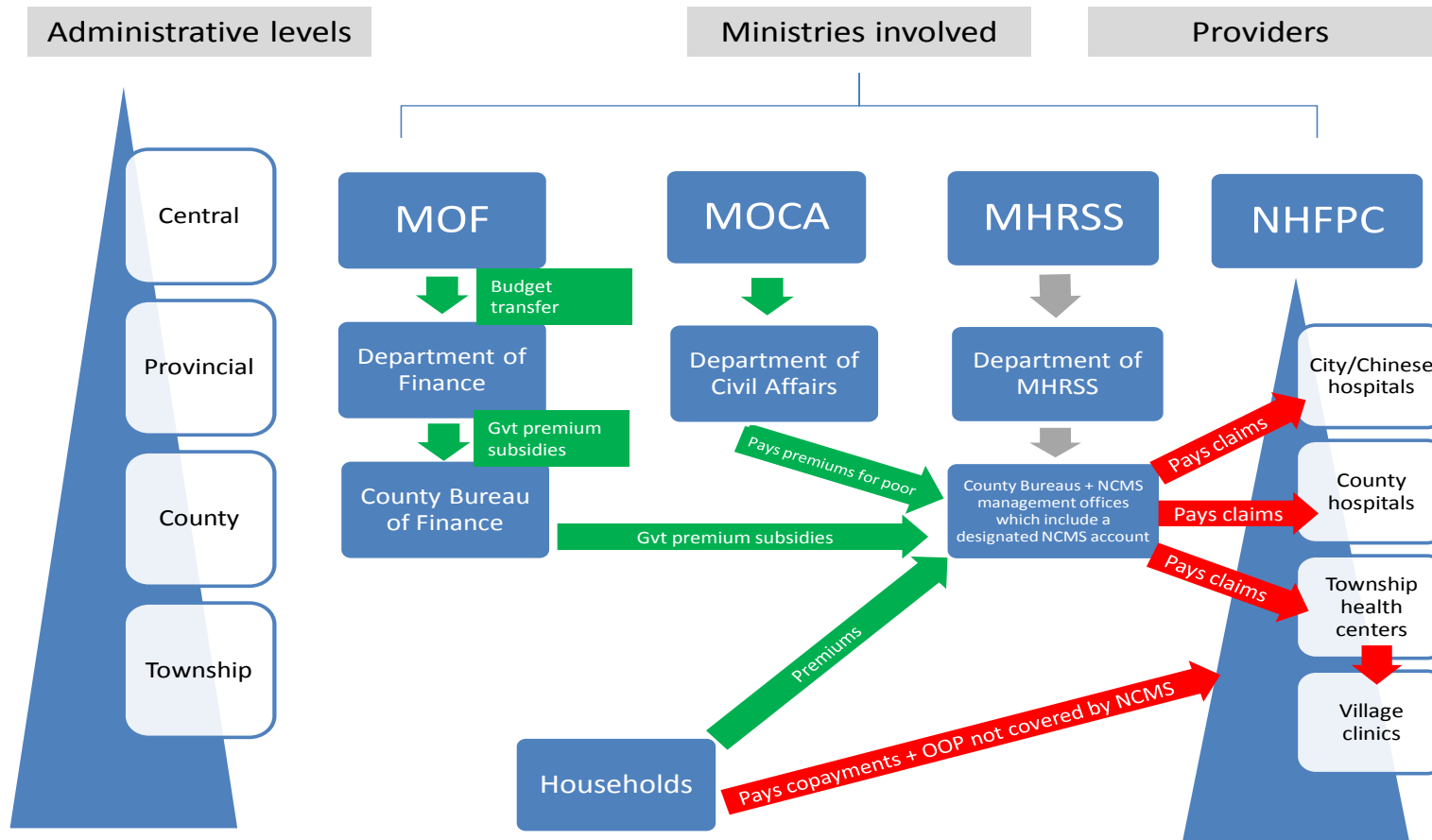
¹⁵ These two entities were combined in March 2013. Previously, only the Ministry of Health was involved in NCMS affairs.

¹⁶ In 2013, the central government contributes the most to household premiums (156 Yuan), followed by the provincial (~86.4-129.6 Yuan) and county (~14.4-57.6 Yuan) governments.

¹⁷ The provincial Department of Civil Affairs and the provincial and county Department/Bureau of Finance pay the premiums on behalf of the poor.

little variation in reimbursement rates between county hospitals and township health centres. These arrangements left scope for improvement in the design of the NCMS benefit package.

Figure 3-4: Flow of health care funds in Ningxia



Notes: MOF=Ministry of Finance; MOCA=Ministry of Civil Affairs; MHRSS=Ministry of Human Resources and Social Security; NHFPC= National Health and Family Planning Commission; OOP=out-of-pocket expenditures.

Table 3-5: Premium contributions in Yuan

	2009	2010	2011	2012
Central government	40	60	124	156
Local government	40	60	76	144
Household	20	20	30	40/170/300

Notes: 1 Yuan=.16 USD; In 2012, households are given a choice of plan.

3.3 Intervention

3.3.1 Project design

Given how the NCMS was organized, the Ningxia project team¹⁸ sought to implement a variation of the existing NCMS scheme in two intervention counties (A and B) that would a) use a single risk pool to fund both inpatient and outpatient services, b) increase reimbursement rates for outpatient services, including drugs purchased at health facilities, and c) set reimbursement rates higher at lower level facilities (i.e. primary care providers) than at county hospitals. A more detailed description of the tiered reimbursement structure for outpatient services for 2009, 2010, and 2011 is presented in Table 3.6. As prices for outpatient services become relatively lower in intervention counties versus comparison counties and lower at village clinics and township health centres than at county hospitals the project aimed to increase funds for primary and preventive care, encourage utilization of lower level primary health care facilities, and provide greater financial risk protection.

At baseline, the average outpatient out-of-pocket per visit cost at village clinics and township health centres was 147 and 218 yuan respectively. Even in comparison counties D and E that offered up to 30 yuan coverage for outpatient services at village clinics, out-of-pocket visit costs averaged 76 and 129 yuan respectively. And in county C, the 40 and 45 percent reimbursement rates at village clinics and township health centres still left average out-of-pocket per visit costs of 248 and 232 yuan. In addition, fifty four percent of our sample self-treated if ill in the last two weeks incurring a per

¹⁸ The Ningxia project is funded by the Gates Foundation and led by researchers from the Universities of Oxford and Harvard in collaboration with local counterparts in Beijing, Fudan, and Ningxia Medical Universities.

episode average self-treated drug expenditure of 200 yuan¹⁹. Under the intervention, drugs received at a health care facility are reimbursable under the total visit bill (i.e. there is no separate reimbursement for drugs and services). However, drugs bought outside of health facilities are not reimbursable. This meant that by increasing outpatient coverage in intervention counties, there was more incentive for individuals to buy drugs at a health care facility following a doctor's visit rather than to self-treat and buy drugs at a pharmacy as more of the cost would be covered under NCMS. Taken together, the situation at baseline meant that the suggested changes in intervention counties offered more generous outpatient and drug coverage than in comparison counties.

¹⁹ Mean and median per visit/drug episode costs across all counties and years are given in Tables 3.7 and 3.8.

Table 3-6: Outpatient benefit package, pre- and post-intervention

General Outpatient		County A			County B			County C			County D			County E		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Deductible (in yuan per visit)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reimbursement rate (%)	VC	0 [†]	65	70	0 [†]	65	70	45	45	60	Pay 1 Yuan and get free access to health care up to 30 Yuan			Pay 1 Yuan and get free access to health care up to 30 Yuan		
	THC	30	50	55	35	50	55	40	40	50	0	0	40	0	0	0
	CTY	0	30	30	0	30	30	0	0	0	0	0	0	0	0	0
Ceiling (in yuan per person, per year)		120	150	200	150	150	200	150	200	260	30	220	220	30	30	40

Notes: VC= village clinic; THC=township health centre; CTY=county hospital; Yuan=.16 USD; †=clinics rated as ‘10 star’ clinics for their quality offer a reimbursement rate of 30 and 35 percent in 2009 in Counties A and B respectively. However in reality, hardly any clinics achieve the ‘10 star’ designation.

Table 3-7: Outpatient per visit cost, by county and year (in yuan)

County	2009		2011		2012	
	Mean	Median	Mean	Median	Mean	Median
<i>Village clinic</i>						
County A	154	80	77	29	70	28
County B	114	60	80	40	159	18
County C	248	80	134	80	106	40
County D	76	30	94	11	125	50
County E	129	50	136	15	125	75
Total	147	60	95	30	81	30
<i>Township health centre</i>						
County A	253	100	157	70	166	81
County B	166	95	132	50	166	40
County C	232	100	258	125	122	45
County D	95	70	153	65	330	155
County E	264	90	195	80	412	130
Total	218	100	173	70	232	98
<i>County hospital</i>						
County A	546	200	626	300	1435	400
County B	665	315	993	390	1195	300
County C	719	300	1424	500	1410	500
County D	371	150	284	220	889	400
County E	760	239	1063	370	1285	500
Total	627	270	876	320	1293	400
<i>Above county hospital</i>						
County A	2267	600	4137	650	5020	680
County B	758	500	2225	1000	2482	1600
County C	1204	800	5392	500	3188	2000
County D	1185	800	950	900	1701	1100
County E	502	400	3098	800	8924	1750
Total	1524	600	3212	1000	4545	1100

Note: In 2009, normalized difference between comparison and intervention counties is -0.0297, 0.0116, -0.0670, 0.1475 at village clinics, township health centres, county hospitals, and above county hospitals respectively. Normalized difference is the difference between treatment and comparison groups normalized by the square root of the sum of the within-treatment group variances. Imbens and Rubin suggest that normalized differences above 0.25 should raise concern, indicating the relative similarity in outpatient per visit cost across groups.

Table 3-8: Drug episode cost, by county and year (in yuan)

County	2009		2011		2012	
	Mean	Median	Mean	Median	Mean	Median
County A	212	73	116	50	165	50
County B	124	60	131	55	171	50
County C	265	100	195	65	228	50
County D	109	25	87	33	177	60
County E	189	80	125	50	174	70
Total	200	70	124	50	181	59

Note: Drug expenditure reflects self-treatment drug expenditure. In 2009, normalized difference between comparison and intervention counties is -0.0242. Normalized difference is the difference between treatment and comparison groups normalized by the square root of the sum of the within-treatment group variances. Imbens and Rubin suggest that normalized differences above 0.25 should raise concern, indicating the relative similarity in drug episode cost across groups.

The same rationale for inpatient services was adopted with higher reimbursement rates at lower level facilities. However, because most early NCMS plans covered only inpatient services, reimbursement rates were already relatively high at baseline to allow for much variation between intervention and comparison counties. A detailed description of the tiered reimbursement structure for inpatient services is presented in Table 3.9 and mean and median per admission costs are presented in Table 3.10.

Table 3-9: Inpatient benefit package, pre- and post-intervention

Inpatient		County A			County B			County C			County D			County E				
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011		
Deductible (in yuan per visit)	THC	90	90	100	100	100	100	50	100	100	70	140	100	70	70	100		
	CTY	160	160	200	200	200	200	150	200	200	140	280	300	150	150	300		
	Secondary OOC	300	300	350	500	600	350	500	300	300	350	500	500	350	350	500		
	Tertiary OOC	300	600	800	500	600	800	500	600	600	350	600	600	350	350	600		
Reimbursement rate (%)	THC	85	85	85	80	80	80	80	80	80	80	80	80	85	85	75		
	CTY	80	80	80	75	65	70	65 county hospital; 75 traditional Chinese hospital; 70 maternal/child hospital; 25 non-contracted			75	70	70	75	70	70	70	
	Secondary OOC	40	50	60	75	65	60				65	35	40	50	35	35	35	50
	Tertiary OOC	40	35	40	25	25	35				40	35	35	35	35	35	35	35
Ceiling (in yuan, per person, per year)	All health facilities	30k	50k	50k	15k	15k	50k	15k	25k	25k	20k	25k	30k	20k	25k	30k		

Notes: VC= village clinic; THC=township health centre; CTY=county hospital; OOC=out-of-county; 1 Yuan=.16 USD

Table 3-10: Inpatient per admission cost, by county and year (in yuan)

County	2009		2011		2012	
	Mean	Median	Mean	Median	Mean	Median
<i>Township health centre</i>						
County A	700	300	651	249	567	291
County B	389	195	462	200	724	315
County C	603	300	1377	300	426	300
County D	362	150	675	295	531	367
County E	614	180	483	297	968	400
Total	539	200	677	270	676	300
<i>County hospital</i>						
County A	1620	1000	1650	1000	1996	1000
County B	1264	800	2070	1260	2625	1202
County C	1927	1405	3088	1500	3064	1950
County D	917	600	2614	896	1611	1078
County E	1984	900	2808	1335	2553	1500
Total	1632	965	2244	1113	2414	1200
<i>Above county hospital</i>						
County A	5592	3000	8630	3500	8153	3900
County B	8425	3700	16941	4750	15852	6000
County C	5487	4175	7501	5000	14539	6650
County D	4084	2150	10914	3588	6718	4200
County E	5966	3950	6516	2350	7392	3855
Total	5918	3000	9731	3800	10126	4400

Note: In 2009, normalized difference between comparison and intervention counties is -0.0178, -0.0955, 0.0946, -0.0704 at township health centres, county hospitals, and out-of-county facilities respectively. Normalized difference is the difference between treatment and comparison groups normalized by the square root of the sum of the within-treatment group variances. Imbens and Rubin suggest that normalized differences above 0.25 should raise concern, indicating relative similarity in inpatient admission cost across groups.

To evaluate the effect of these changes, counties that adopted the interventions' modified benefit package were compared with counties that maintained benefits under the government NCMS scheme. In all analysis, 2009 is considered as the baseline pre-intervention year and 2011 and 2012 as post-intervention years. Three longitudinal household surveys were fielded in five counties in Ningxia in 2009, 2011, and 2012 (Table 3.11) (Appendix A for questionnaires). They collected information on individual health status, health care utilization, health expenditure, household consumption, and various demographic characteristics. Because all surveys were

collected at the same time of year (February), they reflect mostly the previous year's benefit package.

Table 3-11: Household surveys

County	2009		2011		2012		Follow-up rate (%)	
	Number of households	Number of individuals	Number of households	Number of individuals	Number of households	Number of individuals	Households	Individuals
County A	2,508	11,507	2,498	11,109	2,550	11,848	69.77	63.05
County B	1,320	5,358	1,318	5,030	1,337	5,210	79.97	72.91
County C	1,034	4,663	966	4,274	1051	4736	72.20	64.49
County D	659	3,016	651	2,923	674	3030	82.46	74.10
County E	1,180	5,840	1,180	5,557	1,184	5,754	75.17	66.85
Total	6,701	30,384	6,613	28,893	6,796	30,578	74.36	66.81

Note: Follow-up rate is between 2009 and 2012 (it includes households that are in all 3 survey years and those only in 2009 and 2012).

3.3.2 Are comparison counties good controls?

To minimise the risk of potential confounding trends, counties were selected so that they were as similar as possible to each other. Intervention counties were chosen importantly because they had no other on-going health related project that could cause a potential shock. While there were no other donor/research pilots that could interfere with the outcomes of our intervention, government health reforms continued throughout the country affecting equally intervention and comparison counties (e.g. an across the board increase in government-funded health insurance premiums). Comparison counties were subsequently chosen based on a number of factors. As intervention counties were both in mountainous regions which tend to be poorer and harder to reach by regular means of transport, control counties were similarly from mountainous regions excluding counties that were closer to highways and matched on variables available in the Ningxia Statistical Yearbook (such as share of population engaged in agriculture and mean reported income). Finally, a certain level of support from local government was also factored into the decision. For these reasons, the study was not randomized at the county level. While looking at the similarity of time trends in covariates before 2009 in treatment and comparison groups would provide an additional check for assessing the parallel trend assumption crucial for the identification of treatment effects in subsequent chapters, this data was not available. However, we argue that the study time period is relatively short (covering a period of just two years) for any dramatic deviations in the parallel trend assumption. Furthermore, the project had a permanent presence on the ground ensuring that policies were introduced at the same time and that there were no major shocks that would have affected study outcomes.

To assess similarity between intervention and comparison counties a number of balance tests were conducted at baseline on household characteristics and all main study outcomes explored in subsequent chapters. This is important as our analysis in chapters four and five rely on the validity of the overlap assumption for assessing treatment effects. Table 3.12 investigates the normalized difference²⁰ for each covariate of interest as it is difference in population distributions that is of interest here, not statistical significance – which depends on sample size. As there was no randomization, it is not expected that characteristics be the same but it is necessary to check whether the difference in characteristics between the two distributions is large enough to cause bias. Imbens and Rubin suggest that normalized differences above 0.25 should raise concern. At baseline, households had similar educational attainment, main occupation, health status, health care utilization and health expenditure across intervention and comparison groups. Comparison groups had a slightly higher percentage of households of Hui ethnicity, consumed less food and had less income than households in intervention counties although intervention counties had higher average loans and the difference between groups did not exceed the suggested threshold to require any corrective adjustments to the model (Imbens and Rubin, Forthcoming)²¹.

It is also essential to note that due to China’s household registration system, the *hukou*²², which limits the geographical coverage of NCMS members to their county of residence, and the physical difficulty of mountainous travel, interaction or spillover between intervention and comparison counties is limited. This also has important

²⁰ Normalized difference is the difference in covariates between treatment and comparison groups normalized by the square root of the sum of the within-treatment group variances.

²¹ Tables 3.7, 3.8 and, 3.10 also report at the bottom the normalized difference of out-of-pocket outpatient per visit cost, inpatient per admission cost, and drug episode cost indicating relative similarity at baseline.

²² Established in 1958, the *hukou* system documents population information for the purposes of public resource distribution and benefit entitlements such as health, education, housing, and pensions.

implications for identification of treatment effects as it means that the necessary SUTVA assumption is likely to hold.

Table 3-12: Comparing household characteristics and study outcomes at baseline between comparison and intervention counties

Variable	Comparison		Intervention		Normalized difference
	Mean	Std. Dev.	Mean	Std. Dev.	
<i>Individual characteristics</i>					
Age	29.4	19.5	30.8	19.4	0.05
Female	0.48	0.50	0.48	0.50	0.00
Educational attainment					
No education	0.22	0.41	0.23	0.42	0.01
Elementary education	0.25	0.43	0.25	0.43	-0.01
Middle school education	0.19	0.39	0.22	0.41	0.05
High school education	0.34	0.47	0.31	0.46	-0.05
Has a chronic disease	0.09	0.29	0.12	0.33	0.07
Self-reported health score	74	18	73	17	-0.07
Self-reported health status	3.35	1.00	3.36	1.03	0.01
Ill in last two weeks	0.15	0.36	0.17	0.37	0.03
Saw a doctor	0.46	0.50	0.45	0.50	-0.01
Went to village clinic	0.08	0.27	0.08	0.27	0.00
Went to township health centre	0.12	0.33	0.11	0.31	-0.04
Went to county hospital	0.12	0.33	0.12	0.32	-0.01
Went to out-of-county facility	0.04	0.20	0.05	0.21	0.02
Hospitalized in last year	0.07	0.25	0.07	0.25	0.00
Hospitalized at township health centre	0.33	0.47	0.22	0.41	-0.18
Hospitalized at county hospital	0.42	0.49	0.46	0.50	0.05
Hospitalized at out-of-county facility	0.15	0.36	0.20	0.40	0.09

(Table continues on next page)

Table 3-12: Comparing household characteristics and study outcomes at baseline between comparison and intervention counties (continued)

Variable	Comparison		Intervention		Normalized difference
	Mean	Std. Dev.	Mean	Std. Dev.	
<i>Household characteristics</i>					
Household size	4.71	1.46	4.41	1.46	-0.15
Ethnicity	0.40	0.49	0.56	0.50	0.23
Age of household head	44.28	12.29	45.35	12.41	0.06
Dependency ratio	0.62	0.65	0.52	0.60	-0.11
Under age 15	0.64	0.48	0.55	0.50	-0.13
Over age 65	0.20	0.40	0.20	0.40	0.00
At least one member has chronic condition	0.35	0.48	0.42	0.49	0.11
Education of household head					
No education	0.26	0.44	0.28	0.45	0.03
Elementary education	0.40	0.49	0.40	0.49	-0.01
Middle school education	0.27	0.45	0.27	0.45	0.00
High school education	0.07	0.25	0.05	0.23	-0.04
Occupation of household head					
Unemployed	0.02	0.13	0.03	0.17	0.06
Farmer	0.74	0.44	0.70	0.46	-0.06
Laborer	0.15	0.36	0.19	0.39	0.07
Other occupation	0.05	0.23	0.05	0.21	-0.03
Outpatient expenditure	4089	18387	4364	25651	0.01
Inpatient expenditure	598	2443	668	3298	0.02
Drug expenditure	1732	8171	1572	8767	-0.01
Total health expenditure	6419	22793	6604	31109	0.00
Food consumption	5327	3472	6707	5928	0.20
Total consumption	21803	25689	25955	34571	0.10
Income	7742	7607	11035	12320	0.23
Self-reported savings	127	1025	499	2429	0.14
Calculated savings	-14076	25580	-14802	34425	-0.02
Loan amount	9587	13868	12452	21347	0.11
Has a medical loan	0.22	0.41	0.20	0.40	-0.03

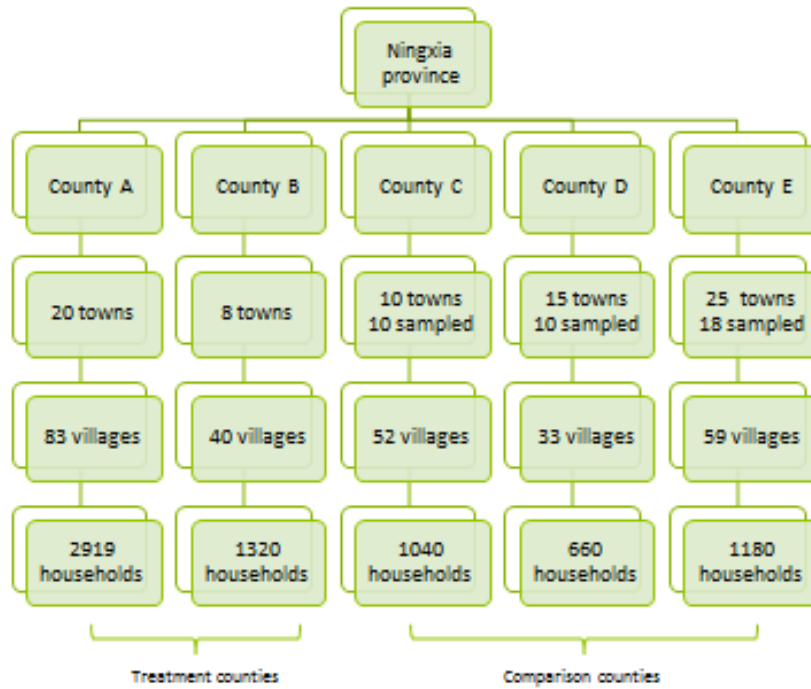
Notes: All variables are dummies except for age, health score, health status, household size, dependency ratio, expenditure, consumption, income, savings, and loan amounts; health score=visual analog scale ruler where 0 is bad health and 100 is good health; health status=5 item Likert scale where 1 is extremely good and 5 is poor; ethnicity=1 if Han, 0 if other; dependency ratio=the ratio of the number of children under 15 and seniors over 65 to working age adults; health care utilization measures are conditional on illness; expenditure, consumption, income and loan measures are annual and in yuan.

3.3.3 Sampling methodology

In both treatment and comparison counties, towns were stratified by income and a weighted sampling scheme was used to randomly select villages and households. In treatment counties, 40 percent of villages in each town were sampled, from which 33 households in each village were randomly selected. In comparison counties, 20 percent of villages were sampled, yielding 20 households per village. A household sample size of 7,000 was targeted to yield approximately 28,000 to 30,000 individuals. In the 2012 survey, newly formed households from the original sample were included, as well as additional households added to replace households that were no longer participating.

Within our two intervention counties, payment to half of the 28 township health centres (and the village clinics underneath their jurisdiction) was also meant to change from fee-for-service to a capitated budget with a pay-for-performance component. Matched-paired randomization was used to ensure that the townships selected randomly to undergo the payment change were as similar as those who had no change to their payment arrangements. The study was designed in a way to disentangle the effect of the insurance benefit package and the provider payment intervention by providing comparisons between three study arms in which the first introduced more generous insurance coverage, the second introduced both more generous insurance coverage and changed provider payment arrangements, and the third acted as a comparison site with neither of the two policy interventions. However, because of delays in the roll-out of the provider payment intervention which was not introduced until 2011, this thesis uses all villages in intervention counties – those where only the insurance intervention was conducted and those where both the insurance and provider payment changes were meant to be conducted.

Figure 3-5: Sampling design



To ensure that there is no bias resulting from significant differences between household attrition rates in intervention and comparison counties a two-sample t-test was conducted where the null hypothesis was that the difference between the mean household attrition rates was zero. We failed to reject the null hypothesis. Results are presented in Table 3.13. While attrition rates are similar between comparison and intervention counties, there could still be differences in the characteristics of households that dropped out between the two groups. Repeating the analysis on a number of baseline characteristics revealed that dropout households are more likely to be of Han ethnicity, are slightly richer, and save more in intervention counties versus comparison counties but similar on other characteristics²³. Results are presented in Table 3.14.

²³ Appendix B1 provides a detailed guideline on the creation of various measurements of living standards used in subsequent chapters.

Table 3-13: Household attrition rates between intervention and comparison counties

Group	Mean	Std. Err.	Std. Dev.	95% Confidence interval	
Comparison	13.72%	0.40%	34.41%	12.94%	14.50%
Intervention	13.39%	0.34%	34.05%	12.71%	14.06%
Total	13.53%	0.26%	34.21%	13.02%	14.04%

Note: t-statistic=0.6388; p-value=0.5230

Table 3-14: Characteristics of households that dropped out between intervention and comparison counties

Variables	Comparison		Intervention		Difference		p-value
	Mean	Std. Err.	Mean	Std. Err.	Mean	Std. Err.	
Age of household head	43.5	0.398	44.1	0.356	-0.6	0.534	0.2768
Education of household head	2.2	0.027	2.2	0.024	0.0	0.036	0.7746
Occupation of household head	1.3	0.018	1.3	0.018	-0.1	0.025	0.0270
Ethnicity	0.4	0.015	0.5	0.014	-0.2	0.020	0.0000
Household consumption	22544	995	25815	847	-3271	1307	0.0124
Total health expenditure	5939	873	6069	702	-131	1120	0.9072
Outpatient expenditure	4063	797	4191	595	-128	994	0.8977
Inpatient expenditure	803	114	810	150	-6	188	0.9734
Drug expenditure	1072	187	1069	194	4	269	0.9894
Income	9392	299	12629	417	-3237	513	0.0000
Self-reported savings	283	56	797	110	-513	124	0.0000

Notes: Household consumption is in Yuan where 1 Yuan=.16 USD.

3.3.4 Data

Finally, the following section briefly describes the health status and health care utilization profile of households at baseline to better contextualize and support work in subsequent chapters. Table 3.15 presents individual health profile and health care utilization statistics in panel A and household level study outcomes in panel B.

In 2009, utilization of health care services when ill was low and households continued to face significant financial barriers in access to health care services. Nearly 40 percent of households had at least one member who had a chronic condition (or 11 percent of individuals sampled) and of the 16 percent of respondents who reported suffering from a health complaint in the last 14 days, only 46 percent sought formal care at a doctor despite a 98 percent NCMS coverage rate.

Table 3-15: Descriptive statistics

Variables	2009			2011			2012		
	Intervention	Comparison	Total	Intervention	Comparison	Total	Intervention	Comparison	Total
<i>Panel A: Health profile and utilization</i>									
Self-reported health score	72.6	74.3	73.4	73.5	74.5	74.0	74.6	72.0	73.6
Self-reported health status	3.4	3.4	3.4	3.2	3.1	3.2	3.2	3.3	3.3
Has a chronic condition	12.2%	9.2%	10.8%	10.3%	8.6%	9.5%	12.0%	12.8%	12.4%
Ill in last two weeks	16.9%	15.1%	16.1%	14.1%	12.8%	13.5%	13.7%	14.1%	13.9%
Saw a doctor	45.3%	46.3%	45.8%	51.6%	50.7%	51.3%	44.7%	45.3%	45.0%
Went to a village clinic	8.0%	7.9%	8.0%	19.7%	14.6%	17.6%	19.2%	14.4%	17.0%
Went to a township health centre	10.6%	12.4%	11.3%	11.2%	13.1%	12.0%	9.6%	13.5%	11.3%
Went to county hospital	11.8%	12.1%	11.9%	9.8%	9.2%	9.5%	10.2%	9.8%	10.0%
Went to out-of-county facility	4.8%	4.2%	4.5%	3.6%	3.3%	3.5%	3.5%	3.0%	3.3%
Hospitalized in last year	7.0%	7.0%	7.0%	6.9%	7.4%	7.1%	6.9%	7.3%	7.1%
Hospitalized at township health centre	22.0%	33.4%	27.0%	19.6%	30.8%	24.7%	16.9%	22.9%	19.7%
Hospitalized at county hospital	45.7%	41.9%	44.0%	55.9%	46.7%	51.7%	53.2%	48.2%	50.9%
Hospitalized at out-of-county facility	19.9%	15.1%	17.8%	20.3%	16.8%	18.7%	25.7%	22.5%	24.2%

Notes: Health score=visual analog scale ruler where 0 is bad health and 100 is good health; health status=5 item Likert scale where 1 is extremely good and 5 is poor; remaining variables are binary dummy variables. *Table continues on next page.*

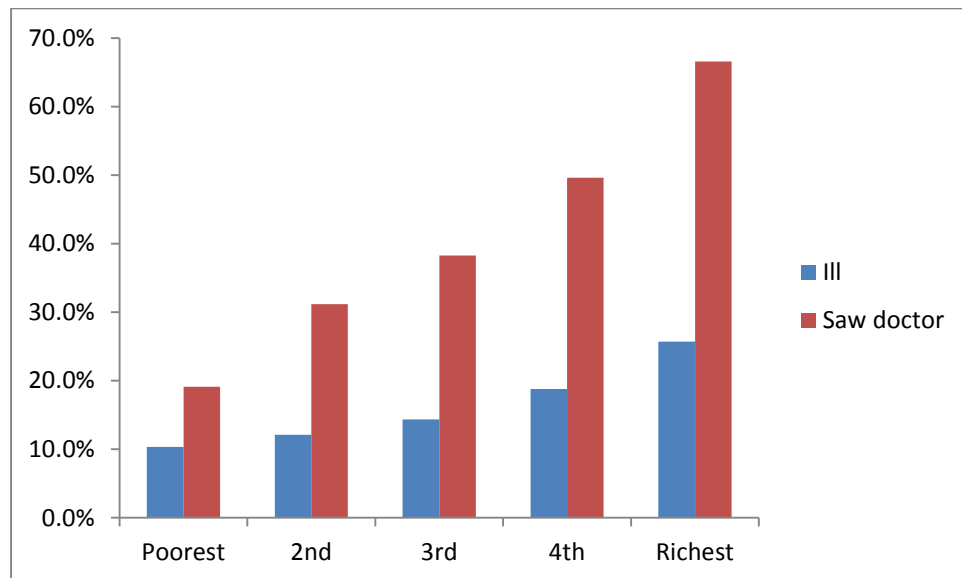
Table 3-15: Descriptive statistics (continued)

Variables	2009			2011			2012		
	Intervention	Comparison	Total	Intervention	Comparison	Total	Intervention	Comparison	Total
<i>Panel B: Study outcomes</i>									
Total household outpatient expenditure	4364	4089	4246	3843	4049	3930	6318	6245	6287
Total household inpatient expenditure	668	598	638	948	999	970	1187	1160	1176
Total household drug expenditure	1572	1732	1640	446	547	489	945	1492	1179
Total household health expenditure	6604	6419	6524	5237	5596	5389	8450	8897	8641
Catastrophic expenditure (10% threshold)	32.0%	32.3%	32.1%	23.1%	25.5%	24.1%	23.9%	30.0%	26.5%
Impoverishing expenditures (\$1.25/day poverty line)	5.0%	7.1%	5.9%	2.7%	4.1%	3.3%	1.8%	3.6%	2.6%
Impoverishing expenditures (\$2.00/day poverty line)	10.0%	12.3%	11.0%	5.6%	6.5%	6.0%	5.1%	8.2%	6.4%
Total household consumption	25955	21803	24175	31589	28458	30265	39239	35124	37478
Took out loan	73.3%	72.8%	73.1%	56.5%	63.4%	59.5%	59.7%	66.0%	62.4%
Took out loan for medical reason	20.4%	22.1%	21.1%	14.4%	16.6%	15.3%	23.5%	28.1%	25.4%
Loan amount	12463	9634	11253	15710	14109	15031	18536	16324	17588
Poverty headcount (\$1.25/day poverty line)	16.8%	25.2%	20.4%	10.3%	17.3%	13.3%	8.2%	12.7%	10.1%
Poverty headcount (\$2.00/day poverty line)	40.9%	55.8%	47.3%	29.5%	41.2%	34.5%	25.2%	34.2%	29.1%
Income	11035	7742	9626	18712	14350	16869	19831	16105	18227
Self-reported savings	499	127	340	1484	708	1156	1262	1368	1297

Notes: Expenditure, consumption, loan amount, and self-reported savings are annual and in yuan; remaining variables are binary dummy variables.

While there was little variation in health status and health seeking behavior across the study counties, there was significant variation according to socioeconomic status. Figure 3.6 indicates that the burden of disease lies with richer households. But self-reported health indicators must be interpreted with caution as perceptions and knowledge of illness vary across respondents. A positive relationship has often been noted between the incidence of reported illness and income (Gertler et al., 2000). Therefore, lower reported morbidity among the poor does not necessarily translate into better health status for poor households. However, what is important is that poorer households are much more likely to forgo treatment. Tellingly, the most common reason given for not seeking treatment was financial difficulties – cited by 55.9 percent of respondents for outpatient services and 77.4 percent for inpatient services.

Figure 3-6: Access to health care by quintile in 2009



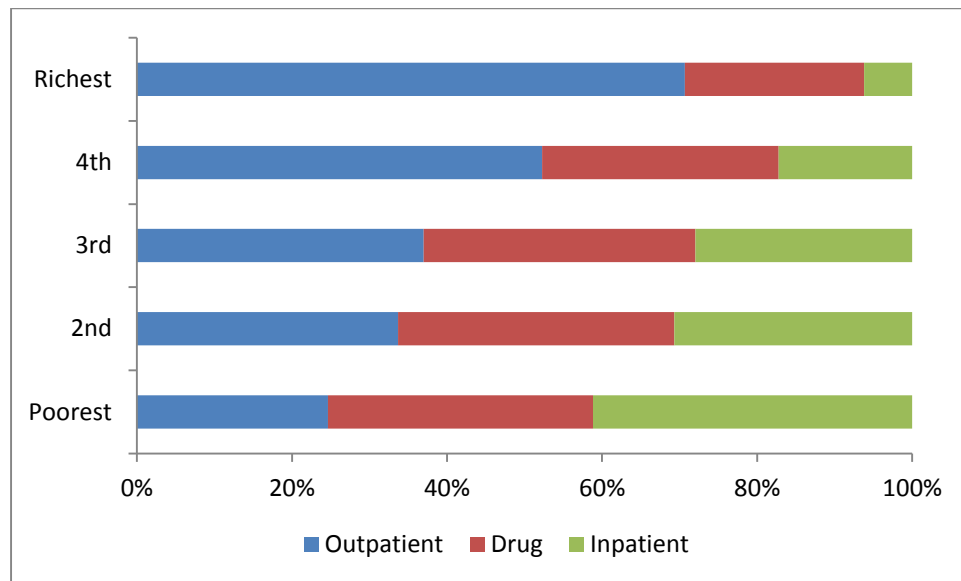
Notes: Graph represents outpatient utilization; Ill=ill in last two weeks; Saw doctor=Conditional on ill, saw formal doctor; quintiles defined using household consumption.

For outpatient care, the most frequented health care provider is county hospitals followed by township health centres, village clinics, and out-of-county facilities although the percent of patients seeking care at village clinics would see the greatest increase over time, eventually overtaking county hospitals as the most frequented

outpatient facility. For inpatient care, county hospitals were responsible for the majority of admissions – half by the end of the study period.

To better understand the extent of catastrophic and impoverishing health care expenditures it is helpful to first look at the level and distribution of health expenditures. On average, OOP health expenditures made up 13.8 percent of household consumption, the majority of which was going towards outpatient services (7.1 percent) and drugs (4.1 percent). The distribution of health expenditures by type of service also differed according to living standards. Figure 3.7 shows that while the bulk of poorer households' spending was on inpatient services, richer households spent more on outpatient care. In contrast, socioeconomic inequality in self-treated drug expenditure was less apparent. Richer households seem more likely to make use of primary and preventive care services to treat illness before their condition worsens. Consequently, their spending is focused on outpatient rather than inpatient services. On the other hand, the poor might have less flexibility in seeking out care for acute and chronic diseases, which, if left untreated, may worsen to the point of requiring hospitalization. It may also be that the higher reimbursement rates for inpatient care incentivizes poorer households to seek hospital admission instead of ambulatory care.

Figure 3-7: Variation in type of out-of-pocket health expenditure by living standard in 2009



Ningxia, like the rest of China also has a high incidence of catastrophic health payments. Thirty two percent of households were spending more than 10 percent of their household consumption on health. And health expenditures increased the poverty headcount by 5.9 percent at the \$1.25/day poverty line from 14.5 percent to 20.4 percent. Twenty percent of households also reported having taken out a loan for medical reasons.

Unsurprisingly, the distribution of health expenditures, including catastrophic expenditures was concentrated among the rich as they have greater flexibility in their household budget to fund health expenditures and likely have more access to savings and other consumption smoothing mechanisms – an issue we explore in chapter five. Health expenditures were not driving anyone in the poorest quintile into poverty because households were either already beneath the poverty line or were unable to pay for healthcare and therefore likely forgoing care when sick (Table 3.16). This is consistent with the international literature within the Asian region where out-of-pocket payments among low- and middle-income countries increasingly take up a larger share of richer households’ consumption while poorer households forgo treatment at the expense of their health (Rannan-Eliya and Somanathan, 2006). The pen’s parade

graph²⁴ in Figure 3.8 shows that for poorer households very small payments may already be too costly for them to risk seeking care. The longer ‘drips’ on the right hand side graphically show that higher out-of-pocket payments are made by richer households with higher per capita consumption (O'Donnell et al., 2008). While there was much less variation across consumption groups with regards to the percent of households who responded having taken out a loan for medical reasons, here too richer households were more likely to borrow perhaps as they are more reliant on future income and the ability to pay back loans.

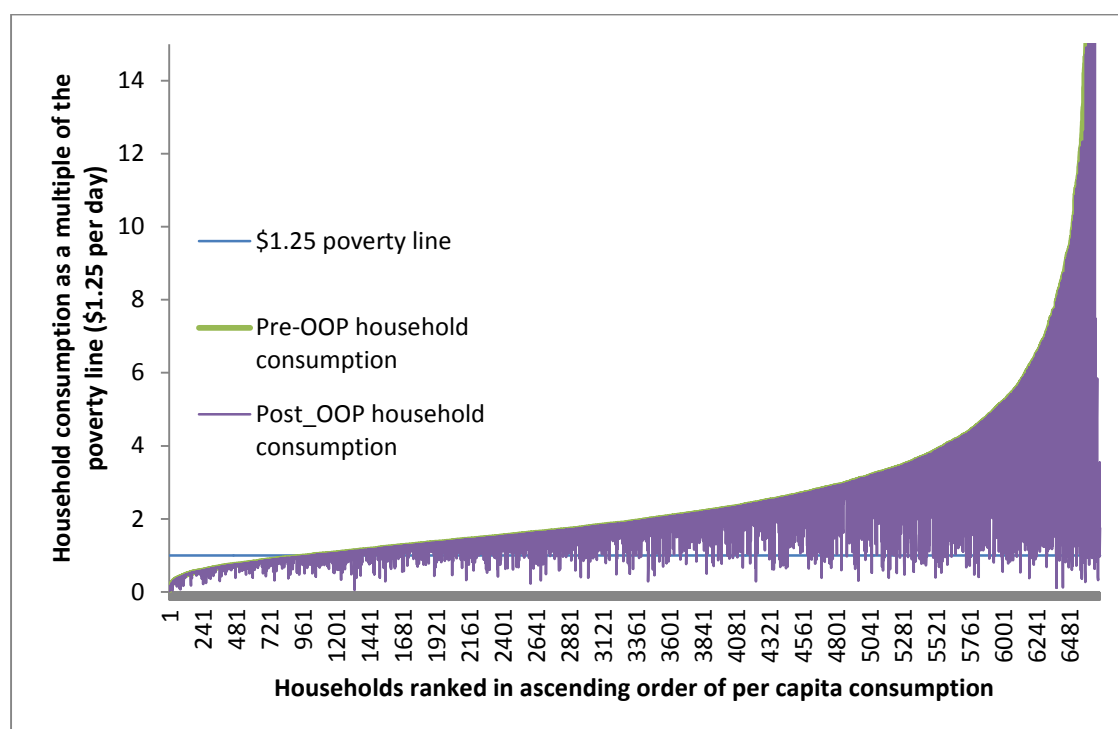
Table 3-16: Health expenditures by quintile in 2009 (whole sample)

	Q1	Q2	Q3	Q4	Q5
Outpatient	85	307	611	2197	18035
Drug	118	325	580	1284	5896
Inpatient	142	280	462	724	1582
Total health expenditure	345	912	1653	4205	25513
Catastrophic headcount (10%)	15.5%	21.9%	29.7%	40.1%	53.4%
Impoverishment (\$2.00/day)	0.0%	7.6%	17.4%	14.9%	14.9%
Medical loan	17.7%	20.4%	21.1%	22.5%	23.7%

Notes: Expenditures in yuan. Impoverishment defined as the percent of households who fall beneath the \$2.00/day poverty line following health expenditures.

²⁴ The Pen's parade plots pre- and post-payment per capita consumption on the y-axis against households ranked in ascending order by pre-payment consumption on the x-axis.

Figure 3-8: Pen's parade for 2009



Notes: OOP=out-of-pocket health expenditure; pre-health spending poverty headcount=14.5%; post-health spending poverty headcount=20.4%; per capita consumption in yuan.

Health expenditures, including catastrophic and impoverishing payments, and medical loans were also concentrated amongst households reporting at least one member with a chronic condition reflecting the need for continued and costly health care over time. Chronic disease households spent on average 3.2 times more on health expenditures than households with no chronic conditions – this translates into 23.1 versus 8.0 percent of their total household consumption respectively.

Therefore, despite the introduction of the NCMS scheme in 2003 and a high coverage rate in 2009, households continued to face significant financial barriers in access to health care suggesting that either the coverage provided was not enough or that it was poorly targeted.

Table 3-17: Health expenditures by chronic disease status in 2009 (whole sample)

	Chronic	Non-chronic
Outpatient	7312	2307
Drug	2891	849
Inpatient	1019	396
Total health expenditure	11222	3552
Catastrophic headcount (10%)	51.4%	19.9%
Impoverishment (\$2.00/day)	18.3%	6.3%
Medical loan	29.5%	15.8%

Notes: Chronic disease status is defined as at least one member of the household reporting a chronic condition. Impoverishment defined as the percent of households who fall beneath the \$2.00/day poverty line following health expenditures. Expenditures in yuan.

3.4 Concluding remarks

This background chapter described the health sector in China, highlighting key issues facing its health care system. Confronted with changing patterns of disease, the rapid escalation of health expenditures, widening regional health inequalities, and substantial waste and inefficiencies in the delivery of health care services China must improve the performance of its health care system to meet the needs and expectations of its population. This chapter introduced the setting in which we conduct our experiment – a variation on the NCMS scheme implemented by local government tailored to more accurately reflect disease burden and encourage the cost-effective use of providers. It conducted a number of baseline tests to assess the validity of choice of comparison counties as good comparators and of the SUTVA, overlap, and uncounfoundness assumptions necessary for identification of treatment effects in subsequent chapters. Finally, it ended with a description of health status and health care utilization at baseline to help explain findings in subsequent chapters.

Chapter 4 - *The impact of health insurance on financial risk protection: do design features matter?*

4.1 Introduction

Following nearly four decades of market-oriented health care, China dramatically reinstated the government's role in the health care sector in 2009 committing to significantly increase health care funding by an additional one percent of GDP (State Council, People's Republic of China, 2014). Since, more than half of this additional funding has gone into subsidies for health insurance explaining its rapid expansion to cover nearly 98 percent of the population by 2011 (Yip et al., 2012). However, households continue to face significant financial barriers in access to health care suggesting that either coverage is not sufficient or that it is poorly targeted. The following chapter aims to better understand the impact of health insurance design features on financial risk protection within the context of rural Ningxia. Unlike most health insurance evaluation studies that compare the impact of health insurance versus no health insurance, this account looks at the effect of a more generous benefit package and the introduction of a tiered reimbursement structure to assess to what extent health insurance design features matter.

Benefit packages, reimbursement rates, ceilings, and deductibles – the variety and interaction between these plan characteristics are rarely taken into account in evaluation studies. Yet they may have important implications on patterns of utilization (e.g. whether to seek preventative or curative care, outpatient or inpatient services, public or private providers) and consequently financial risk protection. As increasingly low and middle income countries move towards expanding their health insurance coverage, the presence or absence of health insurance becomes a non-issue (Evans et al., 2010). From a policy perspective, the more pressing concern is how to design health

insurance schemes to ensure individuals access the health care system in the most cost-effective manner.

In China, given that the focus of NCMS coverage is on inpatient services and that the majority of health care is provided by county hospitals, the intervention in this study varied NCMS cost-sharing arrangements to increase funds for primary and preventive care and encourage a move from hospital-based care towards a more integrated primary care-based system that refers complicated and specialist cases to hospitals as needed. What follows is an evaluation of the impact of these changes on out-of-pocket spending, catastrophic and impoverishing expenditures, and the need for medical loans.

The chapter is organized as follows. Section two presents a brief literature review of work evaluating the impact of rural health insurance in China. Section three recalls the intervention design features relevant to the analysis and defines key outcomes of interest. Section four highlights the estimation strategy. Section five reports main findings. Section six discusses limitations and finally, section seven concludes.

4.2 Literature review

A growing body of literature has attempted to measure the impact of initial NCMS pilot counties on health care utilization and financial risk protection. Wagstaff et al. (2009a) conducted one of the first quasi-experimental studies to examine these outcomes. They found increased outpatient visits and inpatient admissions amongst NCMS participants compared to individuals in non-NCMS counties. However, OOP payments increased both per outpatient visit and for inpatient care. Similarly, Lei and Lin (2009) and Liu and Tsegai (2011) find some increase in outpatient utilization but no change in OOP spending between NCMS and non-NCMS participants. To explain

this, the authors point to the shallow coverage of early NCMS schemes and provider payment methods that encourage the overprovision of health care.

As the NCMS evolved, the government subsidy per person more than tripled, increasing from 80 to 300 Yuan between 2008 and 2012. This allowed a reduction in co-payments for priority diseases and an expansion of benefits. The percentage of counties covering general outpatient care increased from 29.1 percent in 2008 to 78.8 percent in 2010 (Yip et al., 2012, You and Kobayashi, 2009). This is an important change considering nearly three quarters of the disease profile is made up of chronic conditions – not to mention the growing prevalence of diabetes and hypertension – all of which require on-going disease management generally provided in an outpatient setting (Yang et al., 2008). Yet, only one study (Powell-Jackson et al., 2014) evaluates the impact of NCMS post 2007 on utilization, and none look at financial risk protection.

Hou et al. (2013) and Brown and Theoharides (2009) use cross-sectional data, introducing measures of plan generosity to examine how variation in NCMS design across counties influence health seeking behavior. Both find that utilization increases with plan generosity however there is no evidence that out-of-pocket spending decreases. Wagstaff et al. (2009a) also look at variation in NCMS coverage. They use panel data and introduce measures of plan generosity as control variables finding no clear impact based on scheme generosity or NCMS model type²⁵.

²⁵ Hou et al. (2013) use two measures of plan generosity. The first uses predicted average reimbursement rates obtained from regressing actual claims data reimbursements for each provider on official reimbursement rates, copayments, and ceilings. The second standardizes average reimbursement rates given individual expenditures and the reimbursement rules they should have been subject to. In both cases weighted averages of all facility specific measures are calculated producing a single measure for each county. Brown and Theoharides (2009) use deductible amount, logged ceiling, and the average daily inpatient expenditure as measures of plan generosity. Finally Wagstaff et al (2009a) use NCMS expenditure per capita and dummy variables identifying plan type (inpatient only, inpatient+catastrophic outpatient, inpatient+pooling account for outpatient, inpatient+household account for outpatient) to measure plan generosity.

Yip and Hsiao (2008) and Yip et al. (2008) instead take on a different approach to accounting for differences in NCMS schemes. They compare two insurance schemes with similar premiums using a pre-/post-, intervention/comparison set up. The first, a predominant form of early NCMS providing high deductible coverage of catastrophic inpatient care and limited coverage of outpatient services using a medical savings account (MSA). The second, a community-based rural mutual health care (RMHC) plan providing first-dollar coverage for outpatient and inpatient services and drugs but with a lower ceiling. Compared with individuals with no insurance, they find that the RMHC plan provides greater access to outpatient care while the NCMS plan has no impact on access to care. They also find that the RMHC provides more protection from impoverishment than the NCMS plan compared to the non-insured. Finally, Powell-Jackson et al. (2014) use the same study design that is described in this thesis finding that intervention counties with increased outpatient coverage led to increased outpatient utilization at village clinics compared with counties receiving the government NCMS plan.

Overall, while the evidence on health care utilization is more consistent across studies indicating NCMS increased utilization, the results for financial risk protection are mixed – partly due to the variation in NCMS design across counties and the limited cover for outpatient care in early NCMS designs. This chapter offers a number of important contributions. First, it gives an update on NCMS performance since its dramatic increase in coverage and is the only study to evaluate its impact on various measures of financial risk protection post 2007. Second, rather than looking at insurance versus no insurance, it goes one step further in identifying the impact of more generous outpatient coverage and adds to the debate on how best to design health insurance benefit packages for maximum gain.

A recent review article summarizes the current body of knowledge on the impact of the NCMS on health care utilization and catastrophic expenditure (You and Kobayashi, 2009). A summary of these studies' methods, coverage period, and main outcomes is provided in Table 4.1.

Table 4-1: Summary of findings evaluating the impact of NCMS

Study	Period/coverage	Method	Utilization	Findings
(Wagstaff et al., 2009a)	<ul style="list-style-type: none"> •2003 to 2005 •15 counties across 12 provinces 	<ul style="list-style-type: none"> •DiD with matching comparing NCMS vs non-NCMS participants •Measures NCMS generosity using NCMS expenditure per capita and dummy variables for NCMS model 	<ul style="list-style-type: none"> •Increased OP and IP utilization overall •No impact among poor •Increased IP utilization among rich •No clear impact based on scheme generosity or NCMS model type 	<p>OOP/catastrophic spending</p> <ul style="list-style-type: none"> •Increased both OP and IP OOP spending overall •Increased OP and IP OOP spending mostly among the rich •No clear impact based on scheme generosity or NCMS model type
(Lei and Lin, 2009)	<ul style="list-style-type: none"> •2000 to 2006 •36 counties in 9 provinces 	<ul style="list-style-type: none"> •Use multiple estimation strategies - individual FEs, IVs, and DiD with propensity score matching - to compare NCMS participants vs non-NCMS participants 	<ul style="list-style-type: none"> •Increased OP preventative care •No impact on overall use of formal care •Decreased use of traditional Chinese doctors 	<ul style="list-style-type: none"> •No impact on OOP spending
(Brown and Theoharides, 2009)	<ul style="list-style-type: none"> •2006 •30 counties in Anhui and Jiangsu 	<ul style="list-style-type: none"> •Nested logit model using cross-sectional data analyzing variations in the design of NCMS 	<ul style="list-style-type: none"> •Hospital use increases with declining copayments and rising ceilings 	-
(Yip et al., 2008)	<ul style="list-style-type: none"> •2002 to 2005 •3 townships in a Western province 	<ul style="list-style-type: none"> •DiD combined with propensity score matching comparing RMHC and NCMS participants respectively to a control group with no health insurance 	<ul style="list-style-type: none"> •RMHC increased OP utilization at VC and THC and decreased probability of selfmedication •RMHC had no impact on IP utilization •NCMS has no impact on access to care 	-
(Yip and Hsiao, 2009)	<ul style="list-style-type: none"> •2006 •3 townships in a Western province 	<ul style="list-style-type: none"> •Simulation methods to measure effect of an MSA/catastrophic coverage plan and RMHC plan on impoverishment 	-	<ul style="list-style-type: none"> •MSA/catastrophic plan reduced impoverishment by 3.5-3.9%, compared to a 6.1-6.8% reduction under RMHC

Table continues on next page

Table 4-1: Summary of findings evaluating the impact of NCMS (continued)

Study	Period/coverage	Method	Findings	
			Utilization	OOP/catastrophic spending
(Liu and Tsegai, 2011)	<ul style="list-style-type: none"> •2004 to 2006 •36 counties in 9 provinces 	<ul style="list-style-type: none"> •Propensity score matching with a bounding approach to compare NCMS participants with non-NCMS participants by region and income level 	<ul style="list-style-type: none"> •Increased OP utilization overall in Eastern and Western China •Increased OP at VC in Eastern and Central China •Increased utilization for poor 	<ul style="list-style-type: none"> •No overall impact on medical spending •Decreased IP expenditure and catastrophic expenditure among the rich only
(Zhong, 2011)	<ul style="list-style-type: none"> •2008 •Gansu and Zhejiang 	<ul style="list-style-type: none"> •Two part model using cross-sectional data to examine effect of immediate reimbursement compared to delayed reimbursement 	<ul style="list-style-type: none"> •Immediate reimbursement significantly increases likelihood of OP care •Both OP and IP negatively associated with coinsurance rates 	-
(Hou et al., 2013)	<ul style="list-style-type: none"> •2006 to 2008 •6 counties in Ningxia and Shandong 	<ul style="list-style-type: none"> •Pooled regression using cross-sectional data comparing NCMS generosity measured by copayments, reimbursement rates, and ceilings 	<ul style="list-style-type: none"> •Increased OP and IP utilization the more generous the scheme •SPA more effective than MSA •For IP, enrollees choose providers with more generous reimbursements 	<ul style="list-style-type: none"> •No effect on full sample •Conditional on use, decreased share of OOP OP spending •Conditional on use, increased spending per hospitalization and OOP spending per IP stay
(Powell-Jackson et al., 2014)	<ul style="list-style-type: none"> •2009 to 2011 •5 counties in Ningxia 	<ul style="list-style-type: none"> •DiD comparing NCMS participants vs NCMS participants of a more generous OP benefit package •Looks at impact of a tiered reimbursement structure on utilization patterns at different facility levels 	<ul style="list-style-type: none"> •No impact on seeking formal care overall •Increased OP utilization at VC •No substitution from IP to OP care or from THC and CTY to VC 	-

Notes: OP=outpatient; IP=inpatient; OOP=out-of-pocket; VC=village clinic; THC=township health centre; CTY=county; FE=fixed effects; IV=instrumental variable; DiD=Difference-in-difference; RMHC=rural mutual health care; MSA=medical savings account; SPA=social pooling account.

Babiarz et al. (2010) use health facility data covering 25 counties across 5 provinces from 2004 to 2007. They find no clear relationship between NCMS and use of medical care and some evidence suggesting a reduction in OOP expenditure and the need to borrow or sell assets to pay for medical care (Babiarz et al., 2010). Huang et al. (2010) also focus on the provider side using a longitudinal survey of 24 township hospitals in six counties in Shandong's Weifang prefecture between 2000 and 2008. They find NCMS increases activity and patient flow at township hospitals.

4.3 Intervention and outcomes of interest

As the intervention used a single risk pool to fund both outpatient and inpatient services, increased reimbursement rates for outpatient services, and set reimbursement rates higher at lower level primary care facilities than at higher level county hospitals, an increase in financial risk protection in intervention counties A and B is hypothesized as prices for outpatient services become relatively lower than in comparison counties C, D and E. It is further expected that this change be driven by decreases in outpatient and drug spending as a share of total household consumption.

Because reimbursement rates were already relatively high at baseline for inpatient services, the intervention was not able to introduce much variation in plan coverage between intervention and comparison counties. As a result, *a priori*, it is not expected to lead to much difference in expenditure patterns between intervention and comparison counties. Still, it is included in the analysis as it may provide supporting evidence to suggest whether there is any substitution from inpatient to outpatient spending. It can also provide a nice specification test for the model – households in intervention and comparison counties should experience similar levels of financial protection for inpatient services.

It is often assumed that if a health care payment is made, then households are able to afford health care. But how are health expenditures related to ability to pay? The two most widespread measures of financial risk protection in health are the catastrophic headcount and impoverishment because they attempt to measure the burden of out-of-pocket health spending on household consumption. Both measures are dichotomized outcomes simplifying the interpretation of what it means to have high out-of-pocket health expenditures.

Catastrophic headcount is defined as the number of households whose total out-of-pocket health expenditure (THE_i) as a proportion of total household consumption (C_i) exceeds a given threshold (z)

$$CH = \frac{1}{N} \sum_{i=1}^N E_i$$

where E_i is defined as 1 if $\frac{THE_i}{C_i} > z$ and 0 otherwise, and N is the sample size. Typical thresholds range from 5 to 25 percent for health care payments as a percentage of household consumption.

Impoverishment measures the absolute impact on poverty by comparing household consumption (C_i) before and after total out-of-pocket health expenditures (THE_i). If z_{pov} is the poverty line, then the pre-payment poverty headcount is given by

$$H_p^{pre} = \frac{1}{N} \sum_{i=1}^N E_i^{pre}$$

where E_i^{pre} is an indicator defined as 1 if $C_i < z_{pov}$ and 0 otherwise, and N is the sample size. Similarly, the post-payment poverty headcount is given by

$$H_p^{post} = \frac{1}{N} \sum_{i=1}^N E_i^{post}$$

where E_i^{post} is again an indicator this time defined as 1 if $C_i - THE_i < z_{pov}$. The poverty impact due to out-of-pocket health payments is then simply

$$H_p = H_p^{post} - H_p^{pre}$$

Typical poverty lines include the \$1.25/day; \$2.00/day; and the national poverty line (O'Donnell et al., 2008).

While the catastrophic framework provides relative measures of the impact of high health expenditures, the alternative impoverishing approach measures the absolute

impact on poverty. So for example, a rich household that is classified as having incurred a catastrophic expenditure because it spent a large percentage of its household consumption on health care may not necessarily be impoverished because it remains above the poverty line. Similarly, a poor household may not need to incur a large health expenditure to be impoverished. As seen in chapter three, at baseline, catastrophic expenditures were being incurred mostly by richer households, presumably because they could afford the large expense. Households in the lowest quintile were also not being impoverished by health expenditures, because they were likely forgoing care. Therefore, these two approaches should not be seen as mutually exclusive in analyses measuring the degree of financial protection of health systems, but rather as complementary as they tell different stories. Still, the simplicity in interpretation of these binary measures comes at the cost of a loss of information and is subject to arbitrary cutoffs and thresholds.

For this reason, total out-of-pocket health expenditure²⁶ is also considered as an outcome of interest. It also lends tangible economic significance to the magnitude of coefficients. It is an aggregate of outpatient, inpatient, and self-treated drug expenditures. Outpatient and drug expenditure had a recall period of 2 weeks and inpatient expenditure a recall period of one year. All out-of-pocket payments were scaled to the same recall period as the consumption measure, namely one year. Finally, the percentage of households who reported having taken out a loan for medical reasons is considered as it gives a sense of the alternative coping strategies available to households when faced with a health shock. Taken together, these outcome measures

²⁶ Out-of-pocket expenditures by households are defined as direct spending by households, after deduction of third-party payments such as insurance (Rannan-Eliya R. P., 2008).

provide a comprehensive account of the level of financial risk protection afforded by our intervention.

In order to calculate the above described measures, it is necessary to define a measure of living standards, the catastrophic threshold, and the poverty line. Total household consumption was constructed using information from the consumption module. This is described in full detail in Appendix B1. It is an aggregate of food, non-food, durable goods, and housing. Rather than choosing a single arbitrary catastrophic threshold, results are conducted for thresholds ranging from 5 to 25 percent. Similarly, results are conducted for a range of poverty lines: \$1.25, \$2.00 per person per day. Each poverty line was converted to local currency using 2005 Purchasing Power Parity (PPP) and inflated to the survey year. The result was then multiplied by 365 days to convert it to the same time period as the consumption measure. As a comparison (and to check the plausibility of these poverty lines) the analysis was also done in relation to the national poverty line set in relation to a consumption bundle that provides for basic needs (Table 4.2) (Deaton and Grosh, 2000, Deaton and Zaidi, 2002, Rannan-Eliya, 2008).

Table 4-2: Poverty lines (in Yuan)

	2009	2011	2012
Poverty line 1 (\$1.25)	1882	2164	2207
Poverty line 2 (\$2.00)	3011	3463	3531
National poverty line	1196	2300	2300

Notes: 1 Yuan=.16 USD; Derived using data from IMF (2013) and World Bank (2014).

4.4 Estimation strategy

The effect of health insurance on financial risk protection between counties that adopted our interventions' modified benefit package and counties that maintained benefits under the government NCMS scheme is estimated using difference-in-

difference methods that control for observable and unobservable time-invariant household fixed effects. Formally, the linear model is then given by

$$y_{it} = \alpha + \delta_i + \lambda_t + d_{it}\tau + X'_{it}\beta + \varepsilon_{it}$$

where δ_i and λ_t are household and year fixed effects, d_{it} a binary variable indicating intervention status, τ the average treatment effect, and X'_{it} a vector of observed time varying covariates (Angrist and Pischke, 2009). Household control variables include household size, ethnicity, dependency ratio, age of the household head, age of the household head squared, whether the household has at least one member who has a chronic condition, education level of the household head, and occupation of the household head. As mentioned in chapter two, identification of treatment effects relies on the assumption that there are no spillover effects, no endogeneity, and sufficient overlap between observed covariates in treatment and comparison groups. Chapter three section 3.3.2 discusses why these assumptions are likely to hold.

Standard errors are corrected for village level clustering relaxing the assumption that disturbance terms are independent and identically distributed within villages. Adjusting for clustering on the county level is not advised with only five counties. Wooldridge (2003), Kezdi (2004), and Cameron, Gelbach and Miller (2008) all warn that with a small number of clusters, inference using cluster-robust techniques may be incorrect more often than not. For this reason, we cluster standard errors on the village level (Wooldridge, 2003, Kezdi, 2004, Cameron et al., 2008). However, in the event that there are any macro level shocks at the county level, we checked robustness of results by collapsing the data into two time periods, a pre-intervention and a post-intervention period, essentially ignoring time series information. This method is suggested by Bertrand et al. (2004) as a solution to conventional difference-in-difference standard errors that may understate the standard deviation estimators. This

solution performs well when the number of time periods is small and policy changes occur at the same time for all treated counties – which is the case in our study (Bertrand et al., 2004).

Due to events beyond our control, the outpatient reimbursement rate of comparison county C was increased in 2011 to a level similar to that of our intervention counties. For this reason treatment effects between our treatment counties (A and B) and comparison counties D and E are differentiated from the effect between county C and comparison counties D and E.

4.5 Results

4.5.1 Estimation results

Table 4.3 shows household level estimates of average treatment effect on out-of-pocket health expenditures. While the intervention decreased outpatient, self-treated drug, and total health expenditure by 23, 52, and 24 percent respectively relative to comparison counties in 2012, the results were only significant for self-treated drug expenditures. It is not entirely surprising to see a significant effect on self-treated drug spending and not on outpatient expenditure. Increased coverage of outpatient services, which includes the coverage of drugs on the NEML, might lead to greater utilization of outpatient services were there was previous underutilization of health care facilities in favor of self-treatment. A shift from self-treatment to outpatient services would mitigate the effect of increased outpatient coverage provided by the intervention.

Table 4-3: Health expenditure treatment effects

	Outpatient	Drug	Inpatient	THE
2011	84.19 (811.4)	-516.6*** (186.6)	569.5*** (183.5)	137.1 (822.5)
2012	3,367 (2,094)	138.6 (298.2)	461.9*** (136.4)	3,967* (2,107)
Treatment effect 2011	115.3 (1,104)	-519.0** (243.9)	-74.71 (210.3)	-478.5 (1,162)
Treatment effect 2012	-1,009 (2,947)	-818.2** (352.5)	249.7 (177.3)	-1,577 (2,985)
Comparison group mean at baseline	4089	1732	598	6419
Intervention group mean at baseline	4364	1572	668	6604
Observations	19,511	19,511	19,511	19,511
Number of households	8,464	8,464	8,464	8,464

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. Counting county C as a comparison county decreases the magnitude of effects and removes significance on drug expenditures. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, occupation of household head, and a dummy for whether the household has a member with a chronic disease. Estimates with the full list of control variables are presented in Appendix C1. The unit of observation is the household. Health expenditures in yuan. THE=total health expenditure. *** p<0.01, ** p<0.05, * <0.1.

Table 4.4 presents three additional measures of financial risk protection – the catastrophic treatment effect at the 10 percent threshold in the first column, the impoverishing effect at the \$2.00 day poverty line in the second column, and the percent of households having reported taking out a loan for medical reasons in the third column. While the intervention had limited impact on health expenditures, I find negative and significant effects on these measures, increasing in magnitude with one more year of program implementation. In 2012, the catastrophic headcount, that is, the percentage of households spending more than 10 percent of their total household consumption on health care expenditures decreased by 8.9 percentage points (or a relative decrease of 28 percent) in intervention counties relative to comparison counties D and E. Because by construction, there is a possibility that the decrease in catastrophic expenditures could be driven by household consumption increasing more than the decrease in health

expenditures, the analysis is repeated holding total household consumption constant at baseline levels. Results are robust to these changes (with an even larger treatment effect) indicating that there would still be a significant decrease in catastrophic expenditure in intervention versus comparison counties because of the increased protection provided by the benefit design (results are presented in Appendix C2).

Similarly, increased health insurance coverage resulted in a percentage point decrease of 3.2 from a baseline value of 10.0 of households falling into poverty due to health expenditures in treatment counties – a relative decrease of 32 percent. Medical loans also decreased by 25 percent in intervention counties.

Larger households and having a household member with a chronic disease also significantly increases health expenditures as well as the percentage of households with catastrophic and impoverishing expenditures. These results make sense. First, the more members in a family, the greater the probability that they will experience a health event. Nearly a fifth of families have members above age 65 and more than half have at least one child under the age 15. Both of these groups are more likely to need health care for illness or injury than working age populations. Second, because patients with chronic conditions seek long term care for on-going disease management, we would expect them to have higher health expenditures because of greater utilization. Estimates with the full list of control variables are presented in Appendices C1-C3.

Table 4-4: Catastrophic, impoverishing, and medical loan treatment effects

	Catastrophic headcount 10%	Impoverishing impact \$2.00/day	Medical loans
2011	-0.0102 (0.0171)	-0.0312*** (0.0111)	-0.0320** (0.0154)
2012	0.00861 (0.0184)	-0.0174 (0.0124)	0.0823*** (0.0159)
Treatment effect 2011	-0.0617*** (0.0204)	-0.00763 (0.0134)	-0.0245 (0.0177)
Treatment effect 2012	-0.0889*** (0.0223)	-0.0316** (0.0137)	-0.0512*** (0.0183)
Comparison group mean at baseline	0.3227	0.1225	0.2207
Intervention group mean at baseline	0.3200	0.0998	0.2035
Observations	19,511	19,511	19,511
Number of households	8,464	8,464	8,464

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to holding consumption constant at baseline value, collapsing the time series information into pre and post intervention periods, and using a nonlinear specification. Counting county C as a comparison county decreases the magnitude of the effect but significance is retained. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, occupation of household head, and for catastrophic and impoverishing regressions a dummy for whether the household has a member with a chronic disease. Estimates with the full list of control variables are presented in Appendix C3. The unit of observation is the household. Health expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

4.5.2 Further analysis

4.5.2.1 Heterogeneous treatment effects

Because at baseline health expenditures as well as catastrophic and impoverishing payments were concentrated among better off households we explore whether treatment effects are heterogeneous across households of different living standard. Table 4.5 presents estimates by household consumption where quintiles are held constant at baseline values. Overall, the intervention provided greater financial risk protection for households in the middle quintiles, significantly decreasing catastrophic expenditures, impoverishing payments, and medical loans between 31-49 percent in the second and third quintiles. It also lead to an increase in out-of-pocket health expenditure amongst the richest group. This is not entirely surprising for two

reasons. First, as described in chapter three, poorer households spent more on inpatient care while the health care payments of the rich were on outpatient services. However, the intervention predominantly focused on increasing coverage for outpatient care. Second, while health expenditures, and in particular outpatient expenses, increases with consumption, the amount by which health care payments as a share of total household consumption exceeds the 10 percent threshold and the health care payment needed for households to be pushed into poverty is necessarily smaller among households in the second and third consumption quintiles compared with the richest households. This means potential greater gains for those in the middle of the socioeconomic distribution as richer households would need to see much larger decreases in overall health expenditure to experience improvement in these two threshold based measures.

Table 4-5: Heterogeneity in treatment effects of various measures of financial risk protection – by household consumption

Dependent variables	Q1	Q2	Q3	Q4	Q5
<i>Total Health Expenditure</i>					
Treatment effect 2011	-855.3 (1,305)	1,052 (1,841)	4,423 (3,691)	807.5 (2,596)	6,754 (4,806)
Treatment effect 2012	-2,203 (2,310)	77.31 (1,434)	9,537 (11,163)	-13,880 (13,057)	9,561* (4,960)
Comparison group mean at baseline	359	946	1600	5040	33066
Intervention group mean at baseline	329	880	1695	3703	21992
<i>Catastrophic headcount at 10% threshold</i>					
Treatment effect 2011	0.0256 (0.0367)	-0.0747* (0.0379)	-0.111** (0.0441)	0.0973** (0.0465)	0.00682 (0.0492)
Treatment effect 2012	0.00721 (0.0387)	-0.0717* (0.0373)	-0.153*** (0.0502)	0.0632 (0.0514)	-0.00449 (0.0529)
Comparison group mean at baseline	0.1624	0.2212	0.2733	0.4632	0.6432
Intervention group mean at baseline	0.1471	0.2163	0.3162	0.3644	0.4825
<i>Impoverishment at \$2.00 poverty line</i>					
Treatment effect 2011	0.0245 (0.0199)	-0.00500 (0.0235)	-0.0470 (0.0325)	0.0321 (0.0333)	0.0858** (0.0430)
Treatment effect 2012	-0.0121 (0.0209)	-0.0298 (0.0265)	-0.0823** (0.0321)	0.0341 (0.0347)	0.0792* (0.0438)
Comparison group mean at baseline	0.0000	0.0794	0.1700	0.1909	0.2418
Intervention group mean at baseline	0.0000	0.0731	0.1770	0.1231	0.1061
<i>Medical loans</i>					
Treatment effect 2011	-0.0132 (0.0390)	-0.0719** (0.0294)	-0.0525 (0.0333)	0.0206 (0.0384)	0.0616 (0.0437)
Treatment effect 2012	-0.0374 (0.0360)	-0.112*** (0.0374)	-0.0663* (0.0385)	-0.0217 (0.0402)	0.0504 (0.0492)
Comparison group mean at baseline	0.1766	0.1791	0.2100	0.2584	0.3263
Intervention group mean at baseline	0.1784	0.2278	0.2122	0.2043	0.1947
Observations	3,186	3,370	3,416	3,383	3,428
Number of households	1,288	1,325	1,322	1,331	1,315

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). Consumption quintiles held constant at baseline values with Q1 being the poorest and Q5 the richest. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, occupation of household head, and for total health expenditure, catastrophic and impoverishing regressions a dummy for whether the household has a member with a chronic disease. The unit of observation is the household. Health expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

Next, because the intervention's health insurance design increased coverage of outpatient services, especially at primary care facilities which are meant to provide ongoing disease management, we might expect chronic disease patients to benefit more, especially considering that, at baseline, health expenditures, including catastrophic and impoverishing payments, and medical loans were concentrated amongst households reporting at least one member with a chronic condition. Table 4.6 examines treatment effects for measures of financial risk protection by chronic disease status. The results show that it is households without any chronic disease members that are most responsive to the intervention, although here, significance remains only among chronic disease households for catastrophic expenditures and non-chronic disease households for medical loans when collapsing the time series information into pre and post intervention periods. There is also a marked difference in spending patterns between chronic disease households and those seeking treatment for other health related conditions – unexpected findings given the design of the benefit package. However, an increase in coverage of outpatient services need not necessarily cause expenditures to drop if the demand for primary and preventative services is elastic with respect to price or, put differently, if there was previous underutilization of services because of financial barriers to access. At baseline, poorer households were already very close to their subsistence consumption level and likely to forgo health care services to avoid impoverishment. Therefore, greater outpatient coverage could lead to increased utilization of services and consequently increased health expenditures both by those previously unable to afford health care but also by those seeking additional health care services. This can be checked to some extent by looking at patterns of health care utilization.

Table 4-6: Heterogeneity in treatment effects of various measures of financial risk protection – by chronic disease status

	Total health expenditure		Catastrophic headcount at 10% threshold		Impoverishment at \$2.00 poverty line		Medical loans	
	Chronic	Non-chronic	Chronic	Non-chronic	Chronic	Non-chronic	Chronic	Non-chronic
Treatment effect 2011	3,310 (4,783)	654.3 (1,338)	-0.110** (0.0463)	-0.00183 (0.0234)	0.00603 (0.0323)	0.000235 (0.0131)	0.00315 (0.0355)	-0.0257 (0.0197)
Treatment effect 2012	2,091 (11,171)	-2,830** (1,202)	-0.0908* (0.0468)	-0.0644** (0.0275)	-0.0238 (0.0300)	-0.0261* (0.0154)	-0.00688 (0.0405)	-0.0480** (0.0219)
Comparison group mean at baseline	12518	3197	0.5478	0.2037	0.2195	0.0713	0.3374	0.1590
Intervention group mean at baseline	10419	3852	0.4925	0.1956	0.1608	0.0558	0.2687	0.1565
Observations	7,329	12,182	7,329	12,182	7,329	12,182	7,329	12,182
Number of households	4,739	6,809	4,739	6,809	4,739	6,809	4,739	6,809

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). Chronic disease status is whether household has at least one member with a chronic disease. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Significance remains only among chronic disease households for catastrophic expenditures and non-chronic disease households for medical loans when collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, and occupation of household head. The unit of observation is the household. Health expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

4.5.2.2 Utilization

While the focus of this chapter is on financial protection, it is helpful to also look at patterns of utilization. As mentioned before, an increase in health expenditure could conceivably reflect the many households who were previously forgoing needed care to avoid impoverishment but who can now access health care services.

In a companion study, Powell-Jackson et al. (2014) find using the first two years of our survey data that while the intervention did not increase outpatient utilization overall, it did increase use of outpatient services at village clinics by 47 percent in intervention counties relative to comparison counties – the facility level which offered the greatest potential reimbursement for drugs on the NEML. However, while utilization increased at village clinics there was no apparent substitution from higher level facilities to lower level facilities hinting that the price incentive of the tiered reimbursement design was not enough to redirect patterns of utilization from expensive higher levels of care to less costly primary care settings²⁷. Extending the analysis to 2012 data, I find similar results to Powell-Jackson et al. (2014).

One explanation for why there might be sustained utilization of higher level facilities is if demand for specific types of services at county and out-of-county hospitals is price-inelastic, especially if those services are simply not provided by village clinics and township health centres. There might also be additional unaddressed demand-side barriers – individuals may not yet have been made aware of the tiered reimbursement structure or may rely on family members or friends when choosing medical providers. In the 2012 survey, when asked what health care facility offered the highest reimbursement rate for outpatient services, only 22 percent of respondents

²⁷ In 2012 median outpatient per visit cost of care was 37 times lower at village clinics than at out-of-county facilities and median cost of admission was 15 times lower at township health centres versus out-of-county facilities according to our survey (Tables 3.7 and 3.10).

answered village clinics, 40 percent did not know, and the rest answered incorrectly. The pattern was similar for inpatient services, with 22 percent answering township health centres, 45 percent not knowing, and the rest answering incorrectly. Nearly 75 percent of respondents did not know that for inpatient services, having a referral would increase reimbursement rates.

Finally, I also look at utilization of outpatient services by quintile and chronic disease status to see whether findings can shed additional light to the financial risk protection analysis. Tables 4.7-4.9 show that it was poorer households and those with chronic conditions who were most responsive.

While the probability of seeing a doctor conditional on being ill in the last two weeks was not significant overall, there was a significant increase among the poorest households (a 103 percent increase). And while the intervention increased utilization at village clinics overall, utilization increased by 183 and 191 percent respectively in the bottom two quintiles. Patients with chronic conditions were 14 percent more likely to see a doctor in intervention counties relative to comparison counties after two years of implementation – a number that increases in magnitude and significance when collapsing the time series information into pre and post intervention periods to check for robustness of results. Village clinics saw an increase in utilization both among chronic disease patients and those seeking care for other reasons relative to comparison counties, but township health centres saw an additional 51 percent increase in use among chronic disease patients relative to their counterparts in comparison counties. This perhaps partly explains the increase in total health expenditure among chronic disease households in intervention counties relative to comparison counties suggesting that previously many of these households did without needed care.

Table 4-7: Saw doctor – by household consumption

	Q1	Q2	Q3	Q4	Q5
Treatment effect 2011	0.159** (0.0632)	0.108 (0.0708)	0.0799 (0.0726)	0.141** (0.0611)	0.162** (0.0673)
Treatment effect 2012	0.151* (0.0776)	0.141 (0.0873)	0.0112 (0.0730)	0.129* (0.0741)	-0.0382 (0.0692)
Comparison group mean at baseline	0.232	0.360	0.387	0.532	0.672
Intervention group mean at baseline	0.146	0.273	0.379	0.472	0.662
Observations	1,793	2,062	2,232	2,437	2,817
Number of village effects	224	238	250	243	237

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, village fixed effects, and robust standard errors clustered at the village level (in parentheses). Consumption quintiles held constant at baseline values. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods and increases significance in both Q1 and Q2. Control variables included are household size, ethnicity, age, age squared, education, occupation of household head, whether household is headed by a female, household wealth, nearest distance to each type of facility, and a dummy for whether individual has a chronic disease. Measures of utilization are conditional on being ill in the past two weeks. The unit of observation is the individual. *** p<0.01, ** p<0.05, * <0.1.

Table 4-8: Village clinic utilization – by household consumption

	Q1	Q2	Q3	Q4	Q5
Treatment effect 2011	0.0268 (0.0503)	0.0380 (0.0506)	0.0667 (0.0513)	0.0496 (0.0485)	0.104* (0.0601)
Treatment effect 2012	0.0732 (0.0581)	0.122** (0.0595)	0.0429 (0.0445)	0.0716 (0.0533)	0.0270 (0.0511)
Comparison group mean at baseline	0.050	0.088	0.067	0.098	0.086
Intervention group mean at baseline	0.040	0.064	0.089	0.084	0.093
Observations	1,793	2,062	2,232	2,437	2,817
Number of village effects	224	238	250	243	237

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, village fixed effects, and robust standard errors clustered at the village level (in parentheses). Consumption quintiles held constant at baseline values. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, age, age squared, education, occupation of household head, whether household is headed by a female, nearest distance to each type of facility, and a dummy for whether an individual has a chronic disease. Measures of utilization are conditional on being ill in the past two weeks. The unit of observation is the individual. *** p<0.01, ** p<0.05, * <0.1.

Table 4-9: Utilization of outpatient facilities – by chronic disease status

	Saw doctor		VC		THC		CTY		OOC	
	Chronic	Non-chronic	Chronic	Non-chronic	Chronic	Non-chronic	Chronic	Non-chronic	Chronic	Non-chronic
Treatment effect 2011	0.0943** (0.0475)	0.0675 (0.0413)	0.0473* (0.0263)	0.0774** (0.0308)	0.0453 (0.0302)	0.00113 (0.0289)	0.0446* (0.0239)	0.0232 (0.0221)	0.00503 (0.0175)	-0.0134 (0.0130)
Treatment effect 2012	0.0650 (0.0438)	-0.0114 (0.0476)	0.0490* (0.0269)	0.0766** (0.0329)	0.0518* (0.0271)	-0.0526 (0.0329)	0.0182 (0.0243)	0.00599 (0.0227)	-0.00172 (0.0154)	-0.0141 (0.0134)
Comparison group mean at baseline	0.488	0.444	0.075	0.083	0.132	0.118	0.125	0.118	0.043	0.041
Intervention group mean at baseline	0.470	0.437	0.066	0.094	0.102	0.109	0.135	0.102	0.053	0.043
Observations	5,353	7,668	5,353	7,668	5,353	7,668	5,353	7,668	5,353	7,668
Number of village effects	268	268	268	268	268	268	268	268	268	268

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, village fixed effects, and robust standard errors clustered at the village level (in parentheses). Chronic disease status is defined by a dummy variable for whether an individual has a chronic condition. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods and actually increases significance among chronic disease patients who saw a doctor in the last two weeks and used county hospitals. Control variables included are household size, ethnicity, age, age squared, education, occupation of household head, whether household is headed by a female, household wealth, and nearest distance to each type of facility. Measures of utilization are conditional on being ill in the past two weeks. The unit of observation is the individual. *** p<0.01, ** p<0.05, * <0.1.

4.6 Limitations

Before moving on to a discussion of findings it is important to clarify a number of limitations. While out-of-pocket spending and catastrophic and impoverishing expenditures are commonly used in measuring financial protection in health care systems, they rely on a number of key assumptions. First, they focus on health care payments and do not account for the loss of income associated with illness. Second, they cannot distinguish between households that draw upon their savings to finance often unexpected medical care and those that have no such reserves. Third, they do not capture those that forgo treatment at the expense of their health because they either do not have access to health care facilities or they cannot afford it. Fourth, they frequently only capture the direct cost of treatment and medication while ignoring cost of transportation, time costs, and informal payments (Wagstaff, 2008a, Giedion et al., 2013). On the one hand, not accounting for the full economic consequences of illness, such as loss of income or indirect costs, is likely to lead to underestimates of financial risk. On the other, ignoring alternative coping mechanisms and sources for out-of-pocket health care financing will overestimate the catastrophic impact of health expenditures (e.g. spending 10 percent of household consumption on health expenditures may not be as crippling for a rich household that has access to savings and loans as it is for a poor household).

One may argue that income loss due to medical illness is better captured within the domain of broader social protection schemes and therefore justifiably omitted in these measures. In our sample, loss of income averaged an additional 1,931 Yuan over the three year study period estimated crudely from survey reported measures of average

number of work days lost due to hospitalization and annual income²⁸. With regards to informal payments, in rural settings these often go unreported and the wage rates necessary to compute the time cost of seeking care rests on many arbitrary assumptions. Finally, while our survey does not adequately identify the source of health care financing, it does record household savings and the reason households have taken out loans. Here we also use the percentage of households having taken out a medical loan as an additional measure of financial risk protection. In the following chapter, we take a closer look at household savings and consumption of nonmedical goods. Being able to examine the extent to which these alternative coping mechanisms have the ability to cover for health care spending and lessen catastrophic and impoverishing expenditures would lend a different meaning towards the ‘cost’ of illness with the caveat that doing so may imply subjective or arbitrary value judgements.

With regards to the loss of information from the omission of those that forgo treatment, this can be checked to some extent by a complementary study of health care utilization. However, how that information may be incorporated to adjust the underestimates of traditional measures of financial risk protection is yet to be determined. Increasingly researchers have been advocating for a more multidimensional approach to financial risk protection. However, better methods and measures alike are still under development (Ruger, 2012, Lu et al., 2009, Moreno-Serra et al., 2011, Moreno-Serra and Smith, 2012b, Wagstaff, 2008b).

4.7 Concluding remarks

In comparing an intervention which instituted cross-county variation in the benefit design of the NCMS package with that of the local government, this chapter

²⁸ Sixty two percent of individuals who were advised they needed to be hospitalized took at least one day off work due to hospitalization (average for three years).

evaluated the impact of key health insurance characteristics on financial risk protection – namely, the impact of a more generous benefit package and the introduction of a tiered reimbursement structure. Results show that while there was limited impact on health expenditures, increasing outpatient coverage decreased catastrophic and impoverishing expenditures overall as well as the percentage of households taking out loans for medical reasons. Financial risk protection was most evident amongst middle income households but findings were less robust in finding impact amongst chronic disease households. This is partly explained by the fact that chronic disease patients and the poor are most responsive to the price of health care as it is their utilization at the village clinic level that increases significantly compared to others when a more generous outpatient benefit package is provided. Overall, the poor and patients with a chronic condition are also more likely to see a doctor when sick in intervention counties compared to comparison sites. On the one hand, this suggests that as coverage of outpatient services improves those most vulnerable and in need will increase their access to health care where there was previous underutilization but not necessarily see an improvement in financial risk protection. On the other hand, the increased cover would offer greater protection for those already using but not necessarily change their utilization patterns.

This has important policy implications as it highlights the significance of health insurance design features in removing financial barriers to access and suggests that China's focus on low probability, high cost inpatient care over high probability, low cost outpatient care may be misguided as a growing number of prevalent chronic conditions are left without coverage in outpatient settings. These findings are also relevant globally as low and middle income countries look to expand coverage of health care services. Many health insurance schemes first cover inpatient care reasoning that

catastrophic and impoverishing health expenditures are more likely to occur from expensive hospital services. Drugs essential for the maintenance of common non-communicable diseases, including chronic conditions, are either not covered or have considerable out-of-pocket cost sharing arrangements. However, there is increasingly more evidence that health insurance benefit packages that provide coverage for outpatient services for chronic conditions and drugs provides better protection from catastrophic out-of-pocket health expenditures (Lagomarsino et al., 2012). If the policy goal is to reduce inequity in financial burden, there may also be a case for offering fee exemptions or subsidies targeted towards the most vulnerable rather than a single reimbursement rate aimed at the whole population.

Additionally, there is strong evidence to suggest that as countries complete their epidemiological transition, experience growth in income, and expand insurance coverage, patients will seek care higher up on the service provider ladder (Wagstaff and Lindelow, 2008, Yip et al., 1998, Manning et al., 1987). The utilization analysis hinted that there might be further possible gains to financial risk protection as the price incentive of the tiered reimbursement design was not enough to redirect patterns of utilization from expensive higher levels of care to less costly primary care settings. This may be due to the severity of disease and the need to access secondary or tertiary care. Manning et al. (1987) found that cost-sharing had a small and insignificant effect on inpatient spending suggesting that for more serious conditions individuals may be less responsive to price (Manning et al., 1987). But it may also be due to individual preferences in choice of provider.

These issues are explored further in chapter six which extends the focus of research to include dimensions of access to health care services beyond affordability. However, before proceeding to what drives individuals' decisions in choice of provider,

the next chapter examines household savings and consumption behavior to better contextualize the impact of the intervention on financial risk protection.

Chapter 5 - *The effect of increased health coverage on household savings and consumption*

5.1 Introduction

While the previous chapter assessed the role of health insurance within the health sector – in reducing catastrophic and impoverishing health expenditures and shifting patterns of utilization – this chapter looks at the broader implications of a more generous and targeted health plan on household saving and consumption behavior. The government of China’s health care reform, and in particular its drive to expand health insurance coverage, was not only a response to changing patterns of disease, growth in catastrophic health expenditures, and widening regional inequalities, but part of a wider strategy to improve the social security system covering urban and rural residents alike in order to increase domestic consumption and maintain strong economic growth (State Council, People's Republic of China, 2014). In the last two decades, there has been great concern from macroeconomists and policy makers alike in understanding China’s high household savings behavior and weak consumption.

In 2012, China’s gross national savings rate was more than half of its GDP and nearly 20 percentage points higher than other upper middle income countries (World Bank, 2014). Almost half of total national savings is attributed to household savings with the government and enterprise sectors contributing 11.4 and 30.6 percent respectively (National Bureau of Statistics, 2013)²⁹. This has led to private consumption that is substantially lower than any country group comparison (Table 5.1). High savings, which has translated into high investment, has increasingly grown as a

²⁹ Household, enterprise, and government saving made up 24.8, 20.0, and 5.8 percent of GDP respectively in 2011.

share of GDP to a level that some experts suggest is unsustainable in order to maintain economic growth (IMF, 2012, Lee et al., 2012).

Table 5-1: National saving rate and consumption as percent of GDP (2012)

	Gross savings	Household final consumption expenditure	General government final consumption expenditure
China	51	35	14
Low income	24	78	10
Lower middle income	27	65	12
Upper middle income	31	52	15
High income	20	61	19
World	22	60	18

Source: World Bank (2014)

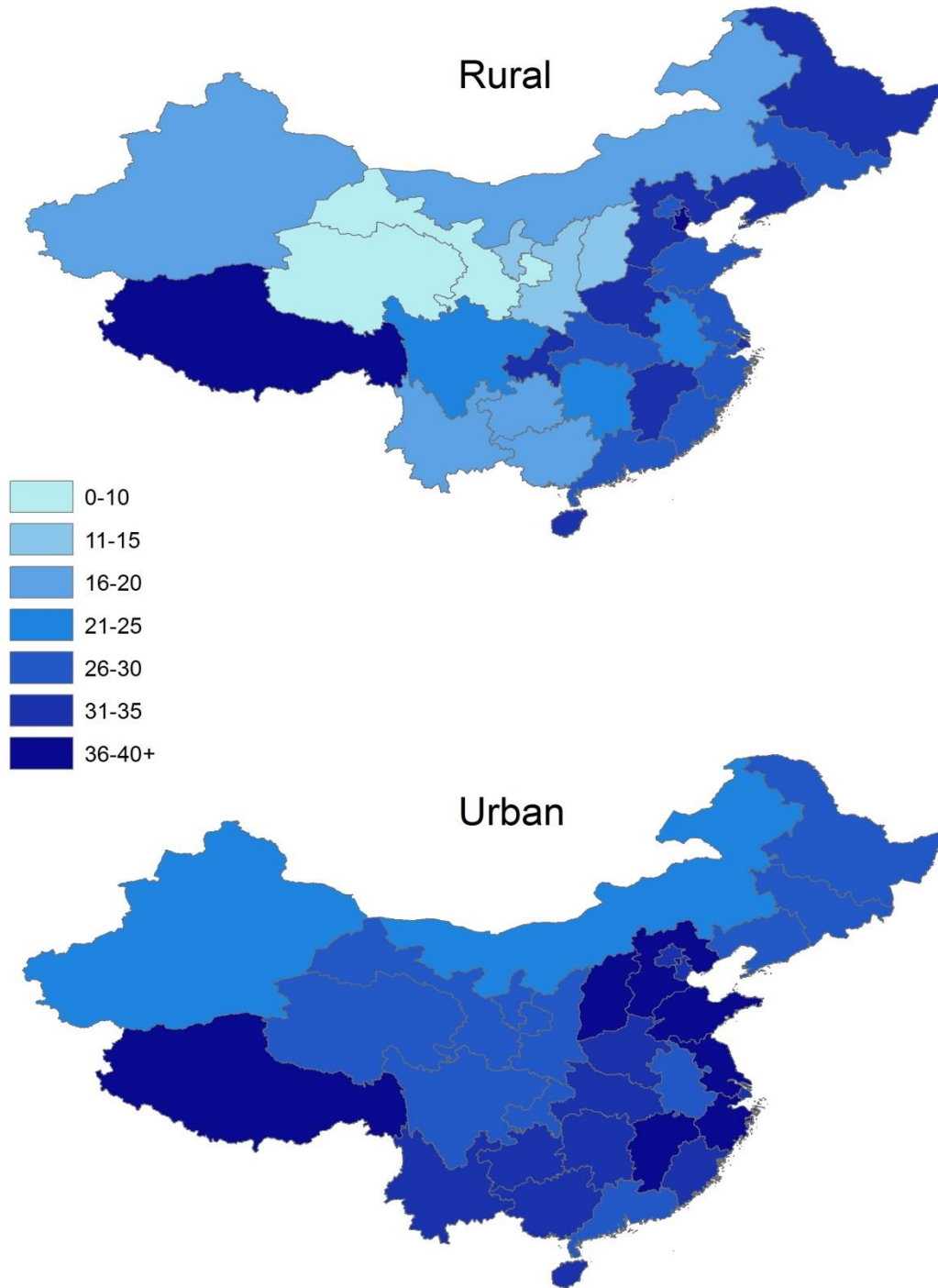
Strategies for rebalancing China’s economy have invariably called for a reduction in household savings and an improvement in household purchasing power and living standards (Blanchard and Giavazzi, 2005). In response, the government has moved towards improving social safety nets with ambitious pension and health care reforms to diminish the precautionary savings motivation of households, encouraging them to boost private consumption.

China’s dramatic increase in household savings coincided with the economic reforms of 1978 and the dismantling of the old social security network. As seen in chapter three, the share of total health expenditure shifted from predominantly publicly funded sources to crippling private out-of-pocket spending by the late 1990s and early 2000s. At the same time, although household saving hovered around 5 percent between 1953 and 1978, it dramatically increased reaching a peak of 33 percent in 1994 before settling at 25 and 32 percent among rural and urban households respectively in 2012 despite wide variation between urban and rural households as well as across regions where on average rural households and Western provinces save less than their urban and Eastern/Central counterparts (Figure 5.1) (Modigliani and Cao, 2004, National Bureau of Statistics, 2013).

This chapter extends the evaluation of the modified health insurance scheme to further test its impact on household saving and consumption behavior. Again, using a difference-in-difference approach, households with more generous insurance coverage are compared with households with less health coverage. Given China's desire to shift towards increased domestic consumer spending, assessing the role of health insurance in household saving and consumption behavior is fundamental in weighing its importance as an instrument of change. It also contributes to a greater understanding of the financial risk protection analysis of the previous chapter by examining alternative coping mechanisms and sources for out-of-pocket health care financing.

The chapter is organized as follows. Section two provides a brief literature review of the determinants of savings literature in China. Section three lays out the conceptual framework, outlines key variables and data issues, and revisits the revised estimation strategy. Section four presents results, section five discusses the studies' limitations, and finally section six concludes.

Figure 5-1: Household saving rates in percent, 2012



Source: Calculated from National Bureau of Statistics (2013)

5.2 Literature review

Most previous studies attempting to understand China's high household saving rate take the life cycle or permanent income hypothesis approach. Both stem from the same idea, namely individuals allocate their consumption over time given expected income so that the very young and the very old dissave when income is low or nonexistent and middle aged individuals save when income is high in order to enjoy future consumption following retirement. This yields the typical hump-shaped (or inverted U-shaped) age-savings profile. Papers that look at future income growth, age dependency, fertility, interest rates, and inflation as determinants of household savings are all made relevant within this framework (Kraay, 2000, Modigliani and Cao, 2004, Horioka and Wan, 2007, Banerjee et al., 2010, Choukhmane et al., 2014).

Chamon and Prasad (2010), finding an atypical U-shaped age-savings profile in which younger and older household heads save more, suggest an alternative precautionary saving or buffer-stock approach where households save to protect themselves from unforeseen risk. They argue that the need to save following the loss of generous housing, pension, unemployment, education, and health benefits help explain much of the rise in household saving rates as well as the non-traditional age-savings profile (Craig et al., 2008).

While a number of studies have incorporated precautionary motives into standard life cycle models (Meng, 2003, Ang, 2009, Bussiere et al., 2013) a few have also tried to determine the role of precautionary saving directly – the central problem being how to identify an observable, exogenous, and variable measure of risk (Browning and Lusardi, 1996). Jalan and Ravallion (2001) extracted household specific income risk measures from a first stage income regression estimated on household panel data which is then used as a regressor to measure the effect on portfolio

effects – i.e. whether households with greater income risk held greater unproductive liquid wealth as opposed to bank deposits, farm capital, livestock, or housing and consumer durables. Feng et al. (2011) use the policy changes to the pension system in the mid-1990s as an exogenous variation in pension wealth to measure the effect on household savings. And He et al. (2014) use reforms to state-owned enterprises (SOEs) in the late 1990s and the subsequent change in unemployment between SOE workers who experienced widespread layoffs and government workers who retained job security as a natural experiment to measure the effect of income uncertainty on precautionary savings and wealth accumulation (Jalan and Ravallion, 2001, Feng et al., 2011, He et al., 2014). However, no paper has assessed the role of health insurance and risk in terms of future health expenditures in reducing precautionary savings in mainland China³⁰.

Chou et al (2003, 2004) are pioneering studies using the introduction of National Health Insurance (NHI) in Taiwan in 1995 as a natural experiment to exploit the variation in uncertainty among different insurance policies prior to the reform when only government sponsored employee insurance provided comprehensive health coverage. They find that the introduction of NHI reduced households' precautionary saving and increased their consumption (Chou et al., 2003, Chou et al., 2004). Kuan and Chen (2013) also look at the introduction of NHI in Taiwan confirming NHI's negative impact on household saving and finding that the reduction is greatest amongst high savers (Kuan and Chen, 2013). They argue that by including both savers and

³⁰ Outside of China, Starr-McCluer (1996) finds that contrary to predicted theory, insured households maintain much higher levels of wealth than comparable non-insured households in the US. Hubbard et al (1995) and Gruber and Yelowitz (1999) find that asset or means-based insurance eligibility discourages wealth accumulation especially amongst low income households. Maynard and Qiu (2009) also find a differential savings disincentive amongst Medicaid households that is significant only in middle quantiles. Guariglia and Rossi (2004) and Jappelli et al (2006) suggest that where quality of health care is lower precautionary savings is higher despite free universal health coverage in both the UK and Italy. Finally, Wagstaff and Pradhan (2005) find that the introduction of health insurance in Vietnam led to an increase in nonmedical household consumption.

dissavers in their analysis their study adds to Chou et al. (2003, 2004)'s who exclude households with negative and zero savings giving rise to a sample selection problem. By taking the natural logarithm of income minus the natural logarithm of consumption they are able to include all households in their sample. However, this workaround is no different to arbitrary $\log(\text{savings}+1)$ transformations commonly used in studies to bypass the selection problem in that it mixes two separate effects: i) the effect of health insurance on whether households choose to save and ii) the effect of health insurance on households' potential savings. This chapter confronts the selection problem directly by dealing with both data generating processes using a two-part model. Finally, Bai and Wu (2014) tell their precautionary savings story by looking at the impact of NCMS on nonmedical consumption between NCMS and non-NCMS households between 2003 and 2006. They argue that if the increase in nonmedical consumption found in NCMS participating households is caused by a reduction in out-of-pocket health spending then there should be no change to total consumption. Yet, there is no significant impact on out-of-pocket health expenditure among NCMS households and the NCMS effect on total household consumption is larger than on nonmedical consumption. They use these findings to infer that the added consumption represents a decrease in precautionary savings – without actually measuring household savings *per se* (Bai and Wu, 2014). Instead, this chapter looks directly at household savings, food and nonmedical consumption together to give a more complete account. It is central in establishing the effectiveness of the government's strategy in expanding health insurance to reduce savings and increase consumption. It also provides further empirical evidence of the role of precautionary savings and, in particular, health insurance in the determinants of saving literature. Here too, it is not simply the presence or absence of health insurance that is being examined, but rather the variation in health

plan benefits between counties identifying specifically the effect of more generous health insurance coverage.

5.3 Conceptual framework, key variables and estimation strategy

Again, we use the intervention described in chapters three and four as an observable, exogenous, and variable measure of risk so that intervention counties offer increased coverage of outpatient services. As seen in chapter four, households in intervention counties had increased financial risk protection measured by catastrophic and impoverishing health expenditures and a decrease in medical loans. Here, our interest lies in whether this increased financial protection is translated into decreased household savings and/or increased non-medical consumption.

5.3.1 Conceptual framework

Our conceptual framework is based on the buffer-stock model derived by Deaton (1991), Carroll (1997, 2004), and others from an intertemporal model of consumption behavior under uncertainty. The model suggests that households strive for a target buffer-stock of wealth m^* as a form of self-insurance against shocks to income. Actual savings then becomes a function of the difference between actual wealth m and m^* such that households will increase their savings if $m < m^*$ (the precautionary motive for savings) and decrease their savings if $m > m^*$. The determinants of target wealth are commonly expressed as $m^* = f(U, R, \Delta Y, B, X)$ where U is uncertainty or risk, R is the interest rate, ΔY is expected income growth, B is the availability of credit or borrowing opportunities, and X is a vector of demographic characteristics including preferences. It is expected that the impact of increased uncertainty, higher interest rates, and limited credit opportunities would be associated with higher household target wealth. In contrast, a positive outlook

on future income is associated with lower target wealth (Deaton, 1991, Carroll, 1997, Carroll, 2004).

The health insurance intervention decreases the risk associated with future medical expenses by lowering the cost of out-of-pocket expenditures. Following the theoretical priors discussed above, it is expected that households in intervention counties will increase their savings if below their target wealth and decrease savings if above relative to households in comparison counties. Households in intervention counties are also hypothesized to increase their consumption of nonmedical goods and services relative to comparison county households, assuming that most goods are considered normal.

5.3.2 **Dependent variables**

The main outcomes of interest are nonmedical household consumption and household savings. Non-medical consumption is defined as total household consumption less all health expenditures. However, given that poorer households spend a greater share of their budget on basic necessities such as food leaving little left over for other goods and services, household food consumption – a component of nonmedical consumption – is also considered to see how much of the expected increase in nonmedical consumption is due to an increase in food consumption (O'Donnell et al., 2008). Appendix B1 gives details on how these measures were constructed.

For savings, two measures are used as an added cross-check. The household surveys collected data on income and consumption as well as a direct measure of household savings by asking families how much money they were able to save in the last year. Therefore, the first measure is simply self-reported household savings. The second measure follows standard practice in the development literature and defines savings as household disposable income less household consumption. The mean,

median, and distribution of main study outcomes and their components are presented in Table 5.2. A few things immediately stand out: i) median consumption is double that of income; ii) average self-reported savings is modest; iii) calculated savings reveals significant dissaving; iv) average values are significantly affected by the magnitude of outliers; and v) skewness is substantial in all variables. While this may seem like cause for concern, it is not unusual in the development literature.

Table 5-2: Mean, median, and distribution of household income, savings, and consumption (across three years)

Study outcomes	Mean	Median	Standard deviation	Minimum	Maximum	Skewness
Income	14905	10000	17285	0	400000	4.9429
Savings (self-reported)	913	0	4877	0	200000	13.5004
Savings (calculated)	-15617	-9131	57353	-5180870	359820	-45.9232
Loans	22574	10000	39753	0	1000000	9.9489
Total household consumption	30673	20830	58939	0	5230870	44.2343
Total household non-medical consumption	23807	17850	21927	0	360320	3.5997

Note: In Yuan, 1 Yuan=.16 USD

There are a number of issues that mean our consumption measure will likely be overestimated relative to income³¹. For instance, there are a few items making up the consumption aggregate that have recall periods of less than one year whereas income has a one year recall. The consumption measure is also much more detailed and includes individual level expenditures from the health module. There is a substantial literature documenting the underreporting of events over longer recall periods. Similarly, a number of studies find that less aggregation or longer item lists in consumption modules yield higher and more accurate estimates of total household consumption (Deaton and Grosh, 2000). Even more important, households in our survey are predominantly involved in agricultural activities and the concept of income may not be understood, confusing personal with business transactions. Cash income in rural China is also only a small part of household income as household resources are largely based on in-kind transactions. It is widely acknowledged that household surveys generally produce estimates of income that are significantly less than estimates of consumption (Deaton, 1997). Therefore, it follows that savings, calculated using survey-based estimates of income and consumption, would result in a significant proportion of households with negative savings – more than $\frac{3}{4}$ of households in our surveys. This is also observed in applied work (Deaton, 1989, Deaton, 1997).

5.3.3 Independent variables

Cultural norms in China mean that children are required to take care of their elderly parents and there is a greater tendency for multiple generations to live together. Therefore, it is important to take into account household composition. Since we are looking at saving behavior at the household level, both saving by the working age

³¹ In general, survey-based consumption measures are more likely to be underestimated than overestimated. However, income is even more underreported than survey measures of consumption.

members of the family and dissaving by the very young and old are reflected³². Age of household head and the dependency ratio³³ become important control variables. The literature predicts that the higher the age dependency ratio, the less likely the household is able to save. Additional measures of risk and uncertainty are captured by whether the household has at least one member who has a chronic condition, and occupation of the household head. We predict the presence of a chronic condition and farming as the household head's main occupation as having a negative association to savings and a positive association to consumption. Financial literacy is proxied by education of the household head, where increased education has been associated with positive savings (Gersovitz, 1988, Besley, 1995).

5.3.4 Estimation strategy

To estimate the impact of more generous health insurance coverage on households' nonmedical consumption, the same estimation strategy as in chapter four is used – difference-in-difference methods which allow both household δ_i and year λ_t fixed effects to be taken into account. Formally, the impact of the intervention is estimated by the linear regression:

$$y_{it} = \alpha + \delta_i + \lambda_t + d_{it}\tau + X'_{it}\beta + \varepsilon_{it}$$

where y_{it} represents total nonmedical consumption for household i and time t , d_{it} is a binary indicator identifying participation in intervention counties, τ is the average treatment effect, and X'_{it} is a vector of observed time varying covariates which include household size, ethnicity, dependency ratio, age of the household head, age of the household head squared, whether the household has at least one member who has a

³² This may partly account for the modest savings reported by households as saving from the workers and dissaving from the non-workers cancel out.

³³ The dependency ratio is defined as the ratio of dependents (people younger than 15 or older than 64) to the working-age population (those aged 15-64).

chronic condition, education level of the household head, and occupation of the household head (Angrist and Pischke, 2009). Standard errors are again corrected for village level clustering and here too we check for robustness of results by collapsing the data into two time periods in case conventional difference-in-difference standard errors understate the standard deviation of treatment effects. A review of chapter three section 3.3.2 reminds why the assumptions needed to ensure treatment effect identification are likely to hold.

To estimate the effect of the intervention on household savings, a different methodology is used. The overall difference in average savings is assumed to be made up of a participation effect – whether households chose to save – and a conditional-on-positive effect – by how much they saved. Therefore, to accommodate both parts of the data generating process, deal with the large number of zero savers, and the skewed nature of the data, savings behavior is analyzed using a two-part model (Mihaylova et al., 2011). In the first part, a probit model is used to model the probability of positive savings where a binary indicator is equal to 1 if there is positive savings and 0 otherwise. In the second part, the dependent variable is logged household savings regressed using OLS conditional on the sub-sample of positive savers using the same specification as above for food and nonmedical consumption.

5.4 Results

5.4.1 Descriptive statistics

Table 5.3 presents descriptive statistics on saving and consumption patterns by household head's age, education, occupation, and wealth quintiles³⁴. The percentage

³⁴ I use the asset index measure to form wealth quintiles. Asset or wealth indices are often used as a proxy for long-run or permanent economic status rather than transitory income, expenditure, or even consumption measures (Filmer and Pritchett, 2001).

of positive savers, shown in the first two columns, is low regardless of the saving measure used. This percentage tends to be higher amongst better off households and working age household heads before dropping after age 60 and lower amongst less educated household heads, farmers and the unemployed. The next four columns show non-zero mean and median savings in Yuan. As expected, better off households save higher amounts, as do household heads with more education and that are in their prime working age years. Among positive savers, savings represent a non-negligible share of income (30 to 33 percent depending on the savings measure used) despite households still spending nearly a third of their household budget on food consumption.

Table 5-3: Saving and nonmedical consumption by household characteristics, whole sample, three year average (in Yuan)

	% who save		Non-zero self-reported savings		Non-zero calculated savings		Mean nonmedical consumption	Mean food consumption	Mean total consumption
	Self-reported	Calculated	Mean	Median	Mean	Median			
All	10.18	19.34	8486	5000	11835	6380	23807	7462	30675
Age of household head									
21-30	11.51	24.13	7449	5000	10366	5930	19758	6555	24640
31-40	10.68	20.57	8461	5000	10954	5980	23910	7339	30449
41-50	10.11	18.00	9854	5000	13995	7312	29093	8284	35601
51-60	10.17	19.54	8652	5000	12152	6960	23132	7792	29859
61-70	9.24	16.80	5823	3000	10311	5600	16904	6441	26965
71-80	6.74	15.77	6445	3000	8099	4447	13996	5097	23041
81-90	3.03	15.15	1500	1500	4610	1399	13552	5245	20161
Education of household head									
No education	6.7	15.96	7386	4000	9668	5100	19519	6657	26772
Elementary school	9.81	18.47	7445	4500	11534	6380	23366	7488	30204
Middle school	13.41	22.64	9752	5000	13012	7190	27674	8110	34510
High school and above	12.27	23.88	10170	5000	14227	6500	26626	7621	32294
Occupation of household head									
Unemployed	6.26	14.43	5189	3000	8119	4600	14438	5093	24173
Farmer	9.62	16.46	8351	5000	11736	6160	24056	7772	30978
Laborer	10.87	27.05	8175	5000	10625	6125	23321	6741	29305
Other	16.93	32.56	11291	6000	17142	10675	27912	7389	36247
Assets									
Quintile 1	3.68	12.90	3025	2000	6920	3540	14085	5397	21534
Quintile 2	6.32	15.64	4027	2000	8025	4890	18193	6327	24708
Quintile 3	8.06	17.68	5949	3000	9770	5280	22161	7167	29409
Quintile 4	12.51	22.86	7275	5000	10987	7070	26671	7947	32927
Quintile 5	20.37	27.63	12604	8000	18312	10520	37932	10473	44802

Note: 1 Yuan=.16USD

5.4.2 Estimation results

Table 5.4 presents estimation results for household food and nonmedical consumption – columns two and four logs the two dependent variables as an added robustness check. We find that households in intervention counties spend significantly more than those in comparison counties. Food and nonmedical consumption increased by 23.7 and 16.2 percent respectively from the average baseline value in intervention counties after two years of implementation although results for household nonmedical consumption lose significance when logged. These results suggest that the added coverage provided by the modified health insurance design is helping households meet a more desired food consumption level. Compared to the only other study that measures the impact of NCMS on nonmedical consumption, the increase on nonmedical consumption is much higher. Bai and Wu (2014) find that compared with non-participating NCMS households, insured families spent 5.6 percent more on nonmedical consumption or 586 yuan. However, their results are based on a panel from 2003-2006 – a time when NCMS only applied to inpatient services and offered very limited coverage.

Table 5-4: Food and nonmedical consumption treatment effects

	Food	(ln)Food	Nonmedical	(ln)Nonmedical
2011	490.4** (244.9)	-0.0166 (0.0494)	5,121*** (552.5)	0.256*** (0.0292)
2012	1,245*** (223.1)	0.189*** (0.0396)	8,458*** (578.0)	0.411*** (0.0272)
Treatment effect 2011	1,565*** (312.9)	0.310*** (0.0574)	2,325*** (745.2)	0.0504 (0.0344)
Treatment effect 2012	1,590*** (301.1)	0.202*** (0.0464)	3,135*** (1,052)	0.00879 (0.0330)
Comparison group mean at baseline	5327	-	15385	-
Intervention group mean at baseline	6707	-	19351	-
Observations	19,511	19,487	19,511	19,508
Number of households	8,464	8,460	8,464	8,464

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, occupation of household head, and a dummy for whether the household has a member with a chronic disease. Estimates with the full list of control variables are presented in Appendix C4. The unit of observation is the household. Expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

The next section presents estimation results for self-reported and calculated savings. Table 5.5 show the results from the first part of the two-part model – the participation effect – indicating that the intervention increases the probability that households in intervention counties will become positive savers by 0.0342 and 0.0276 relative to households in comparison counties depending on whether the self-reported or the calculated savings measure is used. This corresponds to increases of 38 and 19 percent respectively from baseline values in the intervention counties.

Table 5-5: Part 1, the participation effect – whether households save

	Self-reported savers	Calculated savers
2011	0.0504*** (0.0131)	0.0990*** (0.0147)
2012	0.0227 (0.0132)	0.0572*** (0.0129)
Treatment effect 2011	0.0296* (0.0139)	0.00963 (0.0149)
Treatment effect 2012	0.0342* (0.0153)	0.0276* (0.0141)
Comparison group mean at baseline	0.038	0.126
Intervention group mean at baseline	0.090	0.147
Observations	19,511	19,511

Notes: Each column is a different regression. Regressions are estimated by probit (marginal effects presented), using three waves of household survey and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. Estimates with the full list of control variables are presented in Appendix C5. The unit of observation is the household. *** p<0.01, ** p<0.05, * <0.1.

However, conditional-on-positive savings, Table 5.6 indicates that there is no significant effect on the amount of potential household savings regardless of whether the self-reported or calculated savings measure is used. This is perhaps because borrowing remains an important alternative coping strategy available to households when health shocks occur. Chapter three highlighted that nearly two-thirds of households reported having outstanding loans according to the household survey and medical care was given as the number one reason for having taken out the loan. In 2012, a quarter of households had borrowed money for medical reasons specifically within the last six months alone. Interestingly, the median amount of outstanding loans roughly makes up for the shortfall between income and consumption seen in Table 5.2. Also relevant is the fact that the intervention led to a 25 percent decrease in the likelihood that households would have positive medical loans in intervention counties relative to comparison counties (from chapter four). If borrowing and saving are seen

as substitute methods of coping with health risk, the decrease in medical loans may also explain why there is less need for household savings.

Table 5-6: Part 2, conditional on positive savings effect – how much households save

	Self-reported savers	Calculated savers
2011	0.411 (0.326)	0.474** (0.178)
2012	0.203 (0.444)	0.641*** (0.180)
Treatment effect 2011	0.0255 (0.329)	0.132 (0.212)
Treatment effect 2012	0.338 (0.449)	0.0188 (0.217)
Comparison group mean at baseline	3309	6192
Intervention group mean at baseline	5534	9477
Observations	2015	3827
Number of households	1692	2998

Notes: Each column is a different regression. The dependent variable is logged savings. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, occupation of household head, and a dummy for whether the household has a member with a chronic disease. Estimates with the full list of control variables are presented in Appendix C10. The unit of observation is the household. *** p<0.01, ** p<0.05, * <0.1.

Taken together, household consumption and savings results suggest that on average households are likely below their target wealth. If households are already at their budget constraint then it makes sense that the intervention would allow for increased spending on food and nonmedical consumption but not affect potential savings (and instead decrease borrowing for medical reasons). Given that in chapter four middle-income and non-chronic disease households benefitted most in terms of financial risk protection, we might expect these groups to consume more nonmedical goods and services. These heterogeneous effects are explored below.

5.4.3 Further analysis

5.4.3.1 Heterogeneous treatment effects

Table 5.7 shows that food spending increased significantly across all households in intervention counties compared with comparison counties. However, relative to baseline values, consumption increased most in the third, fourth, and first quintiles by 56, 43, and 41 percent respectively and least amongst richest households (+15 percent), indicating that the added coverage provided by the health insurance intervention relieves households' budget constraint and represents substantial welfare gains. Nonmedical consumption instead saw the most significant increase relative to baseline values amongst households in the last three quintiles. On the other hand, there was no differential effect in savings across socioeconomic standing – whether on the likelihood that households would save or conditional on positive savings (results not shown). These results remain robust to logging the dependent variables and collapsing the time series information into pre- and post-intervention periods.

Table 5-7: Food and nonmedical consumption – by household consumption

	Q1	Q2	Q3	Q4	Q5
<i>Food consumption</i>					
Treatment effect 2011	1,776*** (489.3)	2,267*** (378.8)	2,836*** (482.1)	2,980*** (628.0)	1,341* (794.0)
Treatment effect 2012	1,147*** (433.8)	1,741*** (400.2)	3,183*** (468.4)	3,185*** (622.9)	1,670** (778.1)
Comparison group mean at baseline	3117	4995	6348	6573	6558
Intervention group mean at baseline	2771	4549	5694	7441	11254
<i>Nonmedical consumption</i>					
Treatment effect 2011	985.1 (1,109)	4,193*** (1,281)	4,396*** (1,337)	8,802*** (1,640)	7,065*** (1,906)
Treatment effect 2012	-112.8 (1,322)	2,299* (1,192)	6,889*** (1,656)	8,282*** (2,215)	9,138*** (2,621)
Comparison group mean at baseline	6995	11698	15730	20051	28769
Intervention group mean at baseline	6736	11387	15212	20878	36206
Observations	3,186	3,370	3,416	3,383	3,428
Number of households	1,288	1,325	1,322	1,331	1,315

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). Consumption quintiles held constant at baseline values. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to logging the dependent variable and collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, occupation of household head, and a dummy for whether the household has a member with a chronic disease. The unit of observation is the household. Health expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

While we might have expected food and nonmedical consumption to increase more amongst nonchronic disease households since they experienced greater financial risk protection in chapter four, we find that not only are households who have at least one member suffering from a chronic condition utilizing more health care (chapter four) but they also spend more on food (+32 percent). However, the increase in nonmedical consumption in intervention counties, which may be viewed as discretionary spending, is, as expected, larger among nonchronic versus chronic disease households (25 versus

16 percent). Here too, there is no impact on savings by chronic disease household status (results not shown).

Table 5-8: Food and nonmedical consumption – by chronic disease status

	Food		Nonmedical	
	Chronic	Non-chronic	Chronic	Non-chronic
Treatment effect 2011	2,389*** (474.2)	1,048*** (377.3)	4,823*** (1,230)	1,467 (978.7)
Treatment effect 2012	2,131*** (444.5)	1,489*** (392.7)	3,080** (1,275)	4,926*** (1,536)
Comparison group mean at baseline	5430	5272	15364	15396
Intervention group mean at baseline	6613	6774	18692	19826
Observations	7,329	12,182	7,329	12,182
Number of households	4,739	6,809	4,739	6,809

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). Chronic disease status is whether household has at least one member with a chronic disease. The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to logging the dependent variables and collapsing the time series information into pre and post intervention periods. Control variables included are household size, ethnicity, dependency ratio, age of household head, age of household head squared, education of household head, and occupation of household head. The unit of observation is the household. Health expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

These findings highlight the benefits of increased health insurance coverage beyond its traditional role in increasing financial risk protection from health related expenditures. In the end, financial risk protection is a desirable goal not only because it allows access to health care services and increases the likelihood of treatment compliance by making it more affordable but also because it may improve health by protecting nonmedical consumption, especially food consumption – another pathway in which increased health insurance coverage may lead to better health outcomes (Giedion et al., 2013, Wagstaff and Pradhan, 2005, Quimbo et al., 2011).

5.4.3.2 Where does the extra money come from?

Finally, if the intervention had limited effect on decreasing total health expenditure but encouraged increased food and nonmedical consumption amongst

intervention counties, a natural question to ask might be from where is the extra money coming from?

In chapter four, we saw that medical loans decreased by 25 percent in intervention counties relative to comparison counties. This may be responsible for the increase in nonmedical consumption as households in intervention counties are less likely to worry about making loan payments in the future. Instead of health insurance leading to decreased savings and increased nonmedical consumption because of the reduction in risk of future medical expenditures, health insurance leads to decreased borrowing for medical loans and increased nonmedical consumption. Given that more than a third of our sample live underneath the \$2.00/day poverty line, nearly two-thirds reported having taken out a loan, and less than a fifth have positive savings it is not surprising that we see an impact on borrowing rather than saving as households are likely living beneath their wealth targets with limited ability to increase their savings.

In a recent paper, You (2015) uses a panel dataset and a regression discontinuity design in a poor northwest province to find that borrowing from rural credit cooperatives in China complements NCMS in improving child health outcomes through two pathways: i) by providing additional financial inducement for households to use health care under limited NCMS cover, and ii) by being able to smooth food consumption caused by health shocks (You, 2015). These findings lend support to the role that reduced medical loans might play in increasing food consumption in our sample.

5.5 Limitations

As mentioned in chapter four, one limitation of our household survey is that we are not able to account for how medical expenditures were financed – whether from current income, from selling assets, from borrowing, or from savings. Being able to

account for the source of funding would allow us to better weigh the extent of welfare gains from the increase in food and nonmedical consumption amongst households in intervention counties – for instance in the event that these households were previously limiting consumption to pay for health expenditures.

Additional concerns include the measurement of key variables used in this analysis. Households in our sample are predominantly involved in agricultural activities and cash income is likely to reflect only a small part of total household income. Comparing survey measures for income, consumption, nonmedical consumption, and savings with official statistics for rural Ningxia using data from the China and Ningxia Statistical Yearbooks for 2012 yields relatively comparable median estimates for total household consumption and nonmedical consumption, similar estimates for mean calculated savings, but underestimates total household income (Appendix C7). To the extent that our income measure is an underestimate, this would translate into an underestimate of our calculated savings measure and the percentage of households with positive savings (National Bureau of Statistics, 2013).

5.6 Concluding remarks

This chapter examined the effect of additional health insurance coverage on households' saving and consumption behavior using the variation in plan generosity across intervention and comparison counties as a measure of variable risk. Households in intervention counties significantly increased food and nonmedical consumption relative to comparison counties. In contrast, the intervention had no impact on potential household savings conditional on positive savings despite increasing the likelihood of positive savings amongst households in intervention counties suggesting that rural households in Ningxia are living very close to their budget constraint and below desired

wealth targets. This is perhaps not surprising given the realities of this poor rural sample. That the added food consumption benefits are driven by chronic disease households and households in the bottom four quintiles reinforce the important welfare enhancing outcomes of health insurance that are often not considered when discussing the costs and benefits of health insurance schemes. Specifically, the equity implications that added insurance provides substantial welfare gains amongst households living close to subsistence levels but much less for better-off households may mean that low income economies have much more potential to gain by decreasing health risk compared to higher income economies. Food consumption is also considered a pathway to better health further compounding the benefits of increased outpatient coverage.

Still, in terms of achieving the government of China's objectives of decreasing household savings and increasing nonmedical consumption, increasing health insurance coverage is only a half success, as considerable risk still remains. The main occupation of the head of the household for the majority of our sample is farming, a field in which there is great inherent income uncertainty. And, regardless of occupation, the average per capita annual income is still very low, around US\$2,595 expressed in 2012 purchasing power parities³⁵. While income has grown rapidly nationwide, it has declined as a share of GDP by close to 13 percent between 1990 and 2008 (Woetzel et al., 2009). Finally, rural households' pension wealth³⁶ was still low or nonexistent during the study period³⁷. Due to the extent of borrowing and income insecurity it is likely that further increases in health insurance coverage would still not be enough to overcome non-health related risks and precautionary saving motives. However, it may

³⁵ Using a PPP conversion factor of 0.6 for 2012 (World Bank, 2014).

³⁶ Pension wealth is defined as the present discounted value of future pension benefits.

³⁷ The State Council had only just launched a pilot rural pension in scheme in 2009 expecting to cover 10 percent of the population.

improve health by providing protection from high out-of-pocket health expenditures and improving food consumption.

Chapter 6 - *The effect of price and quality on patient's choice of provider in rural Ningxia*

6.1 Introduction

In traditional economic study, consumer choice is analyzed in a utility maximizing framework in which an individual chooses between alternatives given his/her preferences for the attributes of each alternative and their budget constraint determined by income and the relative prices of goods and services on offer. But, in health care, research has mostly focused on how demand changes with respect to the price of health care, ignoring other aspects of consumer incentives such as quality (Zweifel and Manning, 2000, Folland et al., 2013). According to the economic theory on the demand for health care services, individuals maximize their utility of health care with decreasing out-of-pocket health expenditures and increasing quality – their choice a reflection of the price-quality tradeoff they have made. Knowledge of how these attributes influence choice of provider is essential if policy makers are to prescribe a balance of demand and supply side interventions that ensures individuals access the health care system in the most cost-effective manner. This is especially relevant as rapidly ageing populations and growing burdens of non-communicable diseases and co-morbidities worldwide highlight the need to focus on prevention and move disease management and long term care from hospital settings to more cost-effective delivery settings. Yet, the bypassing of nearby and often free or subsidized first level facilities for higher level secondary and tertiary care is a surprisingly common phenomenon in low and middle income countries.

In chapter four, the impact of a more generous benefit package and of a tiered reimbursement structure on financial risk protection was evaluated. The intention of the design was to encourage utilization of lower level primary health care facilities that

deliver services at lower cost ultimately decreasing health care expenditures overall. No interventions to improve quality at the various facilities were introduced. While utilization increased at village clinics and catastrophic and impoverishing health expenditures and household borrowing for medical reasons reduced significantly in intervention counties versus comparison counties, there was no substitution of use from township health centres and county hospitals to village clinics. If demand for health care is elastic with respect to quality, patients who have strong perceptions that the quality of care at tertiary hospitals is better will bypass primary care facilities despite their higher reimbursement rates.

In China, the perceived quality at primary care facilities is so low that patients are willing to travel further, wait longer, and pay more to seek better care (Liang and Langenbrunner, 2013). This perception is not entirely without basis. In 2010, among all doctors, nurses, technicians, and pharmacists working in township health centres, less than six percent had a bachelor's degree or higher, half had technical high school degrees, and the rest had either no degree or below a senior high school level (Liang and Langenbrunner, 2013). Recently, studies have begun documenting the quality of care provided at rural health facilities using undercover patients presenting with standardized symptoms for conditions that village and township doctors should be able to treat – adding objective data to previously anecdotal or self-reported patient accounts of the quality provided at primary health care facilities. Less than 26 percent of village doctors were able to correctly diagnose cases of angina and dysentery. Doctors in township health centres fared slightly better correctly diagnosing 52 percent of cases however appropriateness of treatment was similar in township health centres and in village clinics with clinicians providing harmful or unnecessary medications in 64 percent of interactions (Sylvia et al., 2015). The inappropriate use of antibiotics in

China has also been widely documented – making up nearly 50 percent of all prescriptions and frequently cited as the standard treatment for coughs, diarrhea, and the common cold in some parts of the country (Dong et al., 2008, Reynolds and McKee, 2009, Zhang et al., 2006, Yezli and Li, 2012).

This chapter addresses the price-quality tradeoff asking to what extent patient's perception of health care quality overrides the health insurance price effect in choice of health care facility. It uses the cross-county variation in price, proxied by the introduction of the tiered reimbursement structure, a tiered deductible, as well as other provider specific characteristics such as distance and quality to explore consumer incentives. While there was no specific quality intervention introduced I argue the measures of quality used suffer less from endogeneity than previous studies and are able to offer a persuasive account of the importance of perceived quality in redirecting patient flow and curtailing the bypassing of primary care facilities in favor of tertiary or specialist services for outpatient care. However, in an inpatient setting, I find that quality is less important. Descriptive evidence on inappropriate hospitalizations suggests that some individuals may be substituting outpatient for inpatient care because of higher NCMS coverage.

The chapter is organized as follows. Section two presents an overview of previous work in this area including their methodological shortcomings. Section three describes the study setting, data collected, and key variables. Section four highlights the estimation strategy. Section five discusses results and main findings. Section six reviews the studies' main limitations. Finally, section seven offers concluding remarks.

6.2 Literature review

This literature review consists of two parts. First, it summarizes the previous work on the effect of price and quality on choice of provider. Second, it highlights the methodological issues in measuring price and quality.

6.2.1 The demand for health care literature

Much of the early empirical work on the demand for health care services – and more specifically on the choice of provider – focused on the role of price (both the money and time price of consuming health care) in low and middle income countries, addressing quality mainly as an unobservable characteristic of the provider. Income of the potential health care seeker and coinsurance level affecting the price of health care in the event of illness also received considerable attention. In these pioneering studies, since quality was not explicitly measured (Heller, 1982, Sauerborn et al., 1994), or measured quite crudely³⁸ (Akin et al., 1986, Schwartz et al., 1988), they told us nothing about consumer preference with regards to provider quality. All tried to ascertain individuals' willingness to pay for health care fuelling the user fee debate with findings of low overall price elasticities of demand and negligible reductions in health care usage relative to increases in cash price³⁹ (Meessen et al., 2011). However, other studies showed that user fees decreased health care utilization especially amongst the poor (Sauerborn et al., 1994, Mwabu et al., 1993, Gertler et al., 1987, Hotchkiss, 1993, Hotchkiss, 1998, Bolduc et al., 1996, Ching, 1995). Acton (1975), Dor and Van der Gaag (1988), and Dor et al. (1987) look at the role of other private costs such as travel time and the opportunity cost of time finding that they act in much the same way as

³⁸ Quality was generally a dummy variable measuring a single aspect of quality such as the availability of drugs at a given facility.

³⁹ These studies were driven by the move in the late 1980s by international organizations to promote user fees as a means for increasing the revenues of struggling public health facilities in low and middle income countries in the wake of the economic crisis (Meessen et al 2011).

monetary cost with demand substantially more elastic as travel times increase, especially amongst lower income levels (Acton, 1975, Dor and Van der Gaag, 1988, Dor et al., 1987).

In China, Zhong (2011), Brown and Theoharides (2009), Qian et al. (2009), and Yip et al. (1998) all looked at determinants of health seeking behavior in choice of provider finding that price, health status, insurance, and distance had significant impacts in the direction predicted by economic theory on the demand for health care. However, none accounted for provider quality.

Starting in the early 1990s, the debate on user fees shifted to focus on whether part of the negative effects of increased costs could be compensated by patients' willingness to pay for better quality services, partly to justify their continued use. Evidence started to mount in support of quality improvements leading to increased demand (Lavy and Germain, 1994, Akin et al., 1995, Hotchkiss, 1993, Hotchkiss, 1998, Habtom and Ruys, 2007, Chawla and Ellis, 2000, Mariko, 2003), and the narrative became that reasonable price increases combined with improved quality could still lead to increased use of public facilities. A review and critique of this literature finds that most suffer from significant methodological problems in measuring price and quality (Creese, 1991, Gertler and Hammer, 1997, Alderman and Lavy, 1996).

6.2.2 Measurement of price and quality

Typically price is either taken from health expenditure data from household surveys or from service fees listed in a facility survey. In household surveys, expenditure is conditional on use of medical care within the recall period, therefore it is necessary to impute health expenditure data from the users to the nonusers (Lindelow, 2004). This could lead to potential selection bias if the price of healthcare discouraged use – leaving researchers with no way to distinguish between those who chose not to

consume and those who could not afford to (Heller, 1982). It follows, that expenditure is to a large extent determined by consumption choices and is therefore endogenous. Also, it is perceived rather than actual expenditure that is relevant for explaining provider choice. Yet, this is difficult to measure retrospectively, since perceptions might be altered following encounters with given providers (Heller, 1982). On the other hand, while the benefit of facility surveys is that price schedules are exogenous, a menu of alternative consultation fees for each type of service at different facilities is often unknown to a patient and, in any case, as already mentioned it is perceived rather than actual price that is relevant (Mwabu et al., 1993). This may be better captured by a single reimbursement rate for each facility.

Quality measures are most commonly derived from provider surveys. Here too, the benefit is that quality is exogenous to the choice of provider, however measures may not reflect what is important to the consumer. For instance, patients are less able to judge technical knowledge compared to providers and may give greater importance to other observable features such as waiting time. As with price, it is patients' perceived quality that is important in their decision making. Instead, it is quality measures collected in household surveys that reports patient's perception of quality. However, the downside is that they generally tend to follow questions on illness and use of a facility and so can be endogenous. This cueing effect is not only problematic as quality measures given reflect actual choices made and so give rise to a self-selection problem but also because imputation of quality scores for the providers that the respondent did not choose is needed. Additionally, household surveys may be capturing both supply and demand side quality concerns. For instance, demand for high quality providers might in the long run translate into a decrease in utilization if treatment was more effective in reducing morbidity. Finally, quality measures are often limited to one

specific aspect, generally a structural dimension such as availability of drugs or equipment. Yet, quality is a much broader concept.

Donabedian (2005) describes three approaches to assessing quality. He describes structural, process, and outcome quality measures. Structural quality is concerned with the adequacy of facilities, the availability of drugs and equipment, and the qualifications of doctors and nurses. Measures of process evaluate the appropriateness of care – that is, whether the right questions were asked by the physician for a given set of symptoms, whether the appropriate diagnostic tests were conducted, and whether best practice guidelines for given conditions were followed. Finally, outcome-based measures assess the success of treatment in reducing symptoms and/or restoring health (Donabedian, 2005).

Acknowledging the differences between actual and perceived quality, Hanson et al. (2004) also propose a multidimensional approach to quality that emphasizes the perceived aspects of health care quality. By careful thought and placement of the location of quality questions in their household survey they also overcome many of the issues associated with quality measurement. They propose technical quality measures which relate to the effectiveness of care, interpersonal quality measures that look at doctor-patient interactions, and amenities such as waiting time, environment cleanliness, and comfort (Hanson et al., 2004). This chapter follows their approach in measurement of quality arguing that both price and quality variables included in this investigation are less endogenous to the choice of health care facility compared to measures used in previous studies.

6.3 Intervention and outcomes of interest

6.3.1 Reimbursement design

We take advantage of the tiered reimbursement and deductible⁴⁰ structure operating in five counties in Ningxia province, where higher reimbursement rates and lower deductibles are found at lower level (e.g. primary care) facilities. A more detailed description of the tiered reimbursement and deductible structure for outpatient and inpatient services for 2011 and 2012 is presented in Tables 6.1 and 6.2. A two-year pooled cross section dataset for years 2011 and 2012 is used.

Table 6-1: Reimbursement structure for outpatient services

General Outpatient		County 1	County 2	County 3	County 4	County 5
Reimbursement rate (%)	Village Clinic	70	70	60	0	0
	Township Health Centre	55	55	50	40	0
	County hospital	30	30	0	0	0

Table 6-2: Reimbursement structure for inpatient services

Inpatient		County 1	County 2	County 3	County 4	County 5
Deductible (Yuan per visit)†	Township Health Centre	100	100	100	100	100
	County hospital	200	200	200	300	300
	Above county	350	350	300	500	500
Reimbursement rate (%)	Township Health Centre	85	80	80	80	¥75/80/85
	County hospital	80	70	75	75	¥70/75/80
	Above county	60	60	65	50	¥50/60/70

Notes: † 1 Yuan=.16 USD; ‡In 2011, County 5 introduced a choice of three health insurance plans. All have the same disease coverage but reimbursement rates are different – with a higher premium buying individuals increased protection. 98.75 percent of households choose plan 1.

⁴⁰ For outpatient services, the patient pays no deductible. However, for inpatient services, patients pay a per visit deductible.

6.3.2 Variable description

6.3.2.1 *Dependent variables*

Outcome variables are the facility level at which the initial contact with a physician took place if sick during a given period of time. This is presented for outpatient and inpatient care services separately. For outpatient treatment⁴¹, the recall period is two weeks and provider choices include did not seek treatment⁴², village clinic, township health centre, and county hospital. For inpatient treatment⁴³, the recall period is within the last 12 months and provider choices include did not seek treatment, township health centres, county hospitals, and above county hospital.

6.3.2.2 *Independent variables*

Both alternative/provider specific variables and individual/case-specific variables make up the list of independent variables.

6.3.2.2.1 Price

This study uses the tiered reimbursement structure at different facilities as a proxy for price⁴⁴ as it offers natural exogenous variation, minimizes selection bias, and requires no imputation. Distance is used as a non-monetary price measure and proxy for the opportunity cost of time as distance to nearest village clinic and township health centre were collected in the household survey. For distance to nearest county hospital the distance was determined by Google maps from the capital of Ningxia (Yinchuan) to each county as this was not collected by the survey. For inpatient care only, the tiered per admission deductible at various facilities was also included as there is no

⁴¹ Outpatient choices also include private clinics, above county hospital, and other. Private clinics were grouped with village clinics and above county hospitals and other were grouped with county hospitals.

⁴² In both outpatient and inpatient analyses, did not seek treatment refers to not seeking treatment at a health care facility. It includes both those who chose to do nothing and those who chose to self-treat.

⁴³ Inpatient choices also include an 'other' category which was grouped with above county hospitals.

⁴⁴ Actually, the reimbursement rate represents an underestimate of actual price.

deductible for outpatient services. In line with economic theory, it is hypothesized that as the deductible increases and the reimbursement rate decreases (i.e. the out-of-pocket cost for the individual increases) and as distance to a facility increases, the likelihood of that facility being chosen decreases.

6.3.2.2.2 Quality

Information on perceived quality was collected from each household at the beginning of the household survey (i.e. before questions on illness, injury, and health care utilization) to minimize the cueing and selection bias effects described earlier and avoid having to impute quality measures for the providers the respondent did not choose. In each household, the family member most familiar with the health care system in Ningxia was asked to rate 7 aspects of medical service quality⁴⁵ on a scale of 1 to 5 where 1 is very poor and 5 is very good. They were also asked to give an overall quality rating. Outpatient service quality was elicited for village clinics, township health centres, and county hospitals. Inpatient service quality was elicited for township health centres, county hospitals, and above county hospitals. We hypothesize that as the quality score at a facility increases, the more likely it is for that facility to be chosen.

Tables 6.3 and 6.4 show mean distance, reimbursement rate, deductible, and overall quality score – the provider specific characteristics – at each provider for outpatient and inpatient services respectively, with mean distance to a health care facility type increasing as we move up the three-tiered health care system, mean reimbursement rate decreasing, and mean overall quality increasing. It is important to note that mean reimbursement rates are much lower for outpatient services than for

⁴⁵ The seven aspects fall under amenities (waiting time, environment cleanliness and comfort), interpersonal quality (physician politeness and consideration of patients, physician description of illness, causes, and treatment plan), and technical quality (drug availability, equipment sophistication, physician ability to diagnose and treat illness).

inpatient services and quality scores are overall higher for inpatient services. Tables 6.5 and 6.6 present mean outpatient and inpatient ratings by facility for the seven disaggregated aspects of quality. All aspects of quality improve as we move up the three-tiered health care system, with the exception of waiting time which is rated best at village clinics. For outpatient services, physician politeness is also rated slightly better at village clinics than at township health centres⁴⁶.

Table 6-3: Outpatient provider specific characteristics

Provider type	Distance	Reimbursement	Overall quality
Village clinic	5.8	48.2	3.6
Township health centre	35.6	38.3	3.7
County hospital	171.7	16.7	4.1

Note: Distance in li where 1li=0.5kilometers

Table 6-4: Outpatient quality ratings by provider type

Quality aspect	Village clinic	Township health centre	County hospital
Waiting time	4.2	3.9	3.7
Environment	3.7	3.7	4.1
Physician politeness	3.9	3.8	4.0
Physician communication	3.7	3.7	4.0
Drug availability	3.0	3.4	4.0
Equipment sophistication	2.8	3.3	4.0
Physician knowledge	3.5	3.6	4.1

Table 6-5: Inpatient provider specific characteristics

Provider type	Distance	Reimbursement	Deductible	Overall quality
Township health centre	35.6	81.6	100.0	3.7
County hospital	171.7	75.7	229.0	4.1
Above county hospital	289.1	58.7	386.0	4.4

Notes: Distance in li where 1li=0.5kilometers; deductible in Yuan where 1 Yuan=.16 USD

⁴⁶ Quality ratings between facility levels are statistically different at the 0.01 level for both outpatient and inpatient care.

Table 6-6: Inpatient quality ratings by provider type

Quality aspect	Township health centre	County hospital	Above county hospital
Waiting time	3.9	3.8	3.5
Environment	3.7	4.0	4.3
Physician politeness	3.8	4.0	4.3
Physician communication	3.7	4.0	4.3
Drug availability	3.5	4.0	4.5
Equipment sophistication	3.4	4.0	4.5
Physician knowledge	3.7	4.1	4.4

6.3.2.2.3 Other variables

Age, sex, health status, severity of illness, education of household head, occupation of household head, ethnicity, female headed households, number of household members, and household consumption are additional control variables representing individual specific variables. Individual specific characteristics are summarized in chapter three in Table 3.15.

Health status is measured by including dummy variables for the top ten diseases at outpatient and inpatient facilities. These are summarized in Tables 6.7 and 6.8 representing approximately 75 and 42 percent of all outpatient and inpatient cases respectively. It is encouraging to note that the top ten reasons for visiting an outpatient facility are for conditions best treated in an outpatient setting. Influenza, the common cold, gastritis, laryngitis, and hypertension – the top five visit reasons in 2011 – are also all treated more frequently at village clinics than at higher level providers (Appendix C8). However, admissions for conditions such as hypertension, gastritis, rheumatoid arthritis, or the common cold suggest that individuals may be inappropriately substituting outpatient for inpatient care. Additionally, gastritis, hypertension, pneumonia, and arthritis are also seen more frequently at county hospitals than at township health centres that should be able to treat these conditions (Appendix C8).

Table 6-7: Top ten (primary) reasons for outpatient visits

2011				2012			
Disease	Cases	Percent	Disease	Cases	Percent		
1 Influenza	580	29.22	1 Acute nasopharyngitis (common cold)	569	29.82		
2 Acute nasopharyngitis (common cold)	281	14.16	2 Influenza	351	18.40		
3 Acute and chronic gastritis	114	5.74	3 Acute and chronic gastritis	106	5.56		
4 Acute pharyngitis, laryngitis, tonsillitis and tracheitis	90	4.53	4 Acute pharyngitis, laryngitis, tonsillitis and tracheitis	104	5.45		
5 Hypertension	80	4.03	5 Other disorders of the musculoskeletal system and connective tissue	60	3.14		
6 Other disorders of the musculoskeletal system and connective tissue	79	3.98	6 Hypertension	57	2.99		
7 Other disorders of female genital organs	61	3.07	7 Other disorders of female genital organs	53	2.78		
8 Intervertebral disc disorders	58	2.92	8 Rheumatoid arthritis	51	2.67		
9 Cholelithiasis and cholecystitis	51	2.57	9 Intervertebral disc disorders	43	2.25		
10 Rheumatoid arthritis	49	2.47	10 Cholelithiasis and cholecystitis	41	2.15		

Table 6-8: Top ten (primary) reasons for hospital admissions

2011				2012			
	Disease	Cases	Percent		Disease	Cases	Percent
1	Cholelithiasis and cholecystitis	114	5.56	1	Bone fracture	132	6.1
2	Bone fracture	110	5.36	2	Cholelithiasis and cholecystitis	111	5.13
3	Hypertension	104	5.07	3	Hypertension	104	4.81
4	Acute and chronic gastritis	96	4.68	4	Acute and chronic gastritis	90	4.16
5	Diseases of the appendix	90	4.39	5	Pneumonia	89	4.11
6	Other disorders of the musculoskeletal system and connective tissue	81	3.95	6	Other disorders of female genital organs	83	3.84
7	Other disorders of female genital organs	79	3.85	7	Intervertebral disc disorders	77	3.56
7	Pneumonia	79	3.85	8	Other disorders of the musculoskeletal system and connective tissue	72	3.33
9	Cerebrovascular diseases	62	3.02	9	Diseases of the appendix	71	3.28
10	Rheumatoid arthritis	54	2.63	10	Acute nasopharyngitis (common cold)	70	3.24

6.4 Estimation strategy

A discrete choice model derived under the assumptions of a utility maximizing framework is used. Having considered the characteristics of each available alternative, the choice of health care provider is usually assumed to maximize an individual's utility (U). That is, an individual, i , will choose alternative j if $U_{ij} > U_{ik}$ for all $j \neq k$. If utility is further decomposed to include a deterministic component V_{ij} and an unobservable stochastic component ε_{ij} we get:

$$V_{ij} + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik} \text{ or rearranging, } \varepsilon_{ij} - \varepsilon_{ik} > V_{ij} - V_{ik} \text{ for all } j \neq k$$

This is known as an additive random utility model (ARUM). The deterministic component is also allowed to include both individual-specific and alternative-specific characteristics. This is represented by $V_{ij} = V(S_i) + V(X_j) + V(S_i, X_j)$ where,

(S_i) is a vector of individual specific characteristics,

(X_j) is a vector of provider-specific attributes, and

(S_i, X_j) represents interactions between individual and provider specific characteristics.

Since the difference between utilities (Y_{ji}^*) is unobservable, what is observed instead is the choice made ($Y_i = j$). Formally, this can be given a latent variable interpretation where,

$$Y_{ij}^* = \alpha_j + \beta_j S_i + \gamma_j X_{ij} + \varepsilon_{ji}$$

$$\text{and } Y_i = \begin{cases} 1 & \text{if } Y_i^* > 0, \\ 0 & \text{if otherwise} \end{cases}$$

This is actually J different regressions – one for each provider alternative compared to a fixed reference point alternative. Here too, errors are clustered at the village level. The model is estimated by maximum likelihood which finds the parameters that maximize the likelihood of the observed choices conditional on the model. It does this

by first developing a joint probability density function of the observed sample – the likelihood function – and second estimating parameter values which maximize the likelihood function (Manski and McFadden, 1981b, Abbring and Heckman, 2007).

The distribution of the unobserved component can take on different functional forms each with their own underlying assumptions. The most widely used is the multinomial logit (MNL) model which assumes the error terms are identically and independently distributed across alternatives and across individuals and they are extreme-value (or Gumbel) distributed. The probability of choosing a given alternative is given by the expression

$$P_{ij} = \frac{\exp(S_i\beta_j + X_{ij}\gamma)}{\sum_k \exp(S_i\beta_k + X_{ik}\gamma)}$$

The model assumes the errors in the different equations are uncorrelated with one another implying the independence of irrelevant alternatives (IIA) property must be satisfied. This means that if a new alternative is introduced, all of the absolute probabilities will be reduced which is not necessarily true in practice, especially where close substitutes exist (McFadden, 1974, Manski and McFadden, 1981b, Manski and McFadden, 1981a). There are two ways of testing the validity of the IIA assumption. The first is choice set partitioning. A Hausman test compares estimated coefficients from the full model with all choice alternatives with estimates from a reduced model that has been re-estimated after having dropped an alternative. For the test to pass, the two sets of estimated coefficients should not change. The test yielded a $X^2(51) = 434.98; prob > X^2 = 0.000$ (omitting the ‘did not seek treatment’ alternative), rejecting the null hypothesis that the two coefficients are similar and that the MNL model is appropriate. However, Cheng and Long (2007) present evidence that IIA tests often reject the IIA assumption even when alternatives are distinct and do not reject it

when alternatives are close substitutes, concluding that choice set partitioning methods are not appropriate for applied work.

A second way to test the IIA assumption is model based testing – by estimating a nested multinomial logit (NMNL) model which relaxes the IIA property by allowing for correlated errors between the ‘nests’ or branch levels of a model that ranks the choice alternatives. A two level tree structure is modelled in which the choice of provider is nested within the decision of whether to seek care or not. The NMNL model collapses to the MNL if the dissimilarity parameters – which are a function of the underlying correlation between alternatives within a nest – are equal to one, implying no correlation among alternatives in a nest. Here, the results of the likelihood-ratio test for IIA comparing the NMNL and a constrained NMNL model leading to IIA yields a $\chi^2(2) = 0.02; prob > \chi^2 = 0.9884$, suggesting that the IIA assumption holds and that the MNL model is appropriate. Given these mixed results, the choice of alternatives is argued to be plausibly distinct and weighed independently by each decision maker. Therefore, results from the MNL model are presented in what follows (Cheng and Long, 2007). This is sometimes also referred to as a conditional logit model.

Multinomial probit models (MNP), like NMNL models, also allow relaxation of the IIA assumption. They have the advantage of allowing a much more flexible pattern of error correlation and do not require the specification of a nesting structure. All possible correlations among error terms are allowed so the IIA problem is avoided. However, MNPs effectively preclude the use of more than three or four categories of the dependent variable as it is much more computationally burdensome.

6.5 Results

The following section presents estimation results from the multinomial analysis of provider choice. Outpatient and inpatient health seeking behaviour are taken in turn.

In each analysis, four models are presented. The first two use different specifications for provider quality. The third and fourth include interaction terms of household consumption with the distance, reimbursement rate, and quality variables to account for the fact that responses to facility characteristics may differ by socioeconomic status. Finally, as it is difficult to interpret the magnitude of the effect from multinomial coefficients, various policy changes that may influence the utilization of health care and the choice of provider are also simulated.

6.5.1 **Outpatient analysis**

6.5.1.1 *Estimation results*

Tables 6.9 and 6.10 present the results from the same outpatient multinomial logit regression. However, for ease of discussion alternative and individual specific coefficients are separated into two tables as their respective coefficient interpretation differs. For alternative specific coefficients, a positive coefficient means that if the regressor increases for one provider, then that provider is chosen more and other providers are chosen less; and vice versa for a negative coefficient. Models 1 and 3 use the overall measure of perceived quality respondents gave for each available outpatient facility whereas models 2 and 4 use the seven disaggregated aspects of quality. Models 3 and 4 also add interaction terms between facility characteristics and household consumption. Measures of goodness of fit⁴⁷ are presented at the bottom of Table 6.9 indicating that the disaggregated aspects of quality and use of interaction terms between

⁴⁷Goodness of fit measures used include Akaike's information criterion (AIC) and Schwarz's Bayesian information criterion (BIC). AIC estimates the relative distance between the unknown true likelihood function and the fitted likelihood function plus a constant so that a lower AIC means a closer fitting model. Instead, BIC estimates the posterior probability of a model being true. This again means that a lower BIC is a closer fitting model. Models can be compared by looking at the difference between AIC and BIC values (Raftery, 1995, Burnham and Anderson, 2004).

facility characteristics and household consumption provide a better-fitted model⁴⁸(Raftery, 1995, Burnham and Anderson, 2004).

Here, as distance to a given provider increases, individuals' demand for that specific provider decreases while it increases for all other alternatives and as overall quality increases for a specific provider, demand for that given provider increases and it decreases for all other providers. Surprisingly, reimbursement rate does not seem to influence choice of provider overall. However, the significant and negative coefficients on the reimbursement interaction term in models 3 and 4 confirm previous studies' findings in that poorer households are more responsive to price than richer households and are less likely to frequent facilities with lower reimbursement rates. Similarly, the positive coefficient on the distance interaction term indicates that richer households are less deterred with increasing distance to a facility. Distance confounds both the opportunity cost of time and the cost of transportation, explaining why poorer households are more sensitive to what could also be interpreted as an additional financial barrier.

Overall, quality seems to be equally important among poorer and richer households. Looking at specific aspects of quality, only waiting time at a facility, physician communication, and physician knowledge seem to matter. Here quality is rated on a scale of 1 to 5 with 5 being good and 1 being worst so an improvement in waiting time and physician communication at a given facility means demand for that facility increases relative to other facilities.

These findings are consistent with the ex-post household survey question that asked patients following a visit to a health care provider the primary reason for having

⁴⁸ Removing quality completely from the models presented yielded a Log Likelihood of -7806, an AIC of 15766 and a BIC of 16399 indicating that adding measures of quality does help explain choice of outpatient provider.

selected that particular outpatient health facility. Nearly 65 percent of patients responded that it was because the facility was nearby or convenient. The second most common response (approximately 20 percent) was that it had high technical capacity. Only 3 percent said that they chose their provider because prices were reasonable (Appendix C9). Of interest, referrals play a limited role in individuals' choice of outpatient provider as less than 3 percent of patients were referred on to higher level facilities and less than 2 percent of visits occurred as a result of a previous referral (Appendix C10).

Table 6-9: Outpatient choice of provider estimation results, alternative specific coefficients

	Model 1	Model 2	Model 3	Model 4
Distance	-0.002*** <i>0.000</i>	-0.002*** <i>0.000</i>	-0.026*** <i>0.005</i>	-0.025*** <i>0.005</i>
Reimbursement rate	0.001 <i>0.001</i>	0.001 <i>0.001</i>	0.057*** <i>0.013</i>	0.061*** <i>0.013</i>
Overall quality	0.173*** <i>0.027</i>		0.771* <i>0.363</i>	
Waiting time		0.078** <i>0.026</i>		-0.385 <i>0.347</i>
Environment		-0.034 <i>0.034</i>		0.285 <i>0.496</i>
Physician politeness		0.019 <i>0.038</i>		0.363 <i>0.553</i>
Physician communication		0.124** <i>0.04</i>		-1.244* <i>0.574</i>
Drug availability		0.023 <i>0.037</i>		1.094* <i>0.530</i>
Equipment sophistication		-0.046 <i>0.034</i>		-0.438 <i>0.498</i>
Physician knowledge		0.077* <i>0.036</i>		0.703 <i>0.512</i>
Household consumption*Overall quality			-0.057 <i>0.035</i>	
Household consumption*Distance			0.002*** <i>0.000</i>	0.002*** <i>0.000</i>
Household consumption*Reimbursement rate			-0.006*** <i>0.001</i>	-0.006*** <i>0.001</i>
Household consumption*Waiting time				0.044 <i>0.033</i>
Household consumption*Environment				-0.031 <i>0.048</i>
Household consumption*Physician politeness				-0.033 <i>0.053</i>
Household consumption*Physician communication				0.132* <i>0.055</i>
Household consumption*Drug availability				-0.103* <i>0.051</i>
Household consumption*Equipment sophistication				0.038 <i>0.048</i>
Household consumption*Physician knowledge				-0.060 <i>0.049</i>
Number of observations	25320	25192	25320	25192
Number of cases	6330	6298	6330	6298
Log likelihood	-7202	-7145	-7181	-7119
AIC	14559	14458	14523	14425
BIC	15194	15141	15182	15181

Notes: Each model is a different regression. Results are from conditional logit models (the STATA estimation command is 'asclogit'). Alternative specific coefficients are presented and interpreted as follows: a positive coefficient means that if the regressor increases for one provider, then that provider is chosen more and other providers are chosen less; and vice versa for a negative coefficient. Individual specific coefficients from model 1 are presented in Table 6.10. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

For individual specific regressors, coefficients are interpreted as parameters of a binary logit model against the base category ‘did not seek treatment’. As coefficients are similar across all four models only those for model 1 are presented in Table 6.10 and discussed here (Appendix C11 for individual specific regressors from all models). Significant variables include household consumption, age, severity of illness, and several of the disease dummies. Relative to the probability of not seeking care, an increase in household consumption leads to a significant increase in the probability of seeking care at township health centres and county hospitals. This is not surprising as richer households are more able to cope with the lower reimbursement rates at higher level facilities. Individuals who have a cold, the flu, or laryngitis are much more likely to seek care at village clinics and much less likely to go to higher level facilities relative to the reference category of not seeking care. This is encouraging as these are conditions that should be easily treatable by village doctors. Hypertension patients are also more likely to be treated at township health centres and less likely to be treated at county hospitals. As these patients might require longer term care and that quality is perceived to be better at township health centres than at village clinics, this could be a reflection of knowledgeable patients accessing and/or returning to facilities with better quality services. These findings are also consistent with previous studies in China finding that chronic conditions lead to higher-level use of services (Qian et al., 2009, Yip et al., 1998). The longer an individual stays in bed because of illness, the more likely they are to seek care at all facilities relative to not seeking care. Finally, younger individuals are more likely to seek care than older people. This is not an uncommon finding in the literature. It could be that older people have more experience with self-treatment or are giving priority to younger working individuals.

Table 6-10: Outpatient choice of provider estimation results, individual specific coefficients (Model 1)

	Village clinic	Township health centre	County hospital
Household size	0.016 <i>0.021</i>	-0.039 <i>0.025</i>	-0.178*** <i>0.028</i>
Ethnicity	-0.021 <i>0.069</i>	-0.054 <i>0.084</i>	0.069 <i>0.09</i>
Age	-0.007** <i>0.002</i>	-0.005* <i>0.003</i>	-0.010*** <i>0.003</i>
Married	0.177 <i>0.092</i>	0.046 <i>0.11</i>	0.032 <i>0.118</i>
<i>Education of household head</i>			
Elementary school	0.157 <i>0.083</i>	-0.156 <i>0.099</i>	0.054 <i>0.108</i>
Middle school	0.115 <i>0.095</i>	-0.064 <i>0.112</i>	0.066 <i>0.121</i>
High school and above	0.287 <i>0.149</i>	-0.005 <i>0.183</i>	0.156 <i>0.191</i>
<i>Occupation of household head</i>			
Farmer	0.480* <i>0.195</i>	0.355 <i>0.224</i>	-0.171 <i>0.218</i>
Laborer	0.507* <i>0.206</i>	0.512* <i>0.238</i>	0.001 <i>0.235</i>
Other	0.118 <i>0.251</i>	0.199 <i>0.291</i>	-0.341 <i>0.299</i>
Female headed household	0.161 <i>0.146</i>	-0.407 <i>0.208</i>	0.12 <i>0.191</i>
Female	-0.041 <i>0.065</i>	0.129 <i>0.081</i>	-0.009 <i>0.087</i>
Days in bed	0.064*** <i>0.009</i>	0.078*** <i>0.009</i>	0.096*** <i>0.009</i>
Log of household consumption	0.065 <i>0.047</i>	0.224*** <i>0.056</i>	1.104*** <i>0.057</i>
<i>Reason for visit</i>			
Influenza	0.589*** <i>0.098</i>	-0.415*** <i>0.119</i>	-1.981*** <i>0.142</i>
Common cold	0.361*** <i>0.1</i>	-0.159 <i>0.114</i>	-2.082*** <i>0.145</i>
Acute and chronic gastritis	0.27 <i>0.155</i>	0.101 <i>0.169</i>	-0.129 <i>0.156</i>
Disorder of musculoskeletal system and connective tissue	-0.214 <i>0.187</i>	-0.295 <i>0.2</i>	-0.684*** <i>0.186</i>
Acute pharyngitis, laryngitis, tonsillitis and tracheitis	0.326* <i>0.148</i>	-0.358 <i>0.186</i>	-1.631*** <i>0.217</i>
Hypertension	-0.104 <i>0.193</i>	0.390* <i>0.177</i>	-0.610** <i>0.198</i>
Rheumatoid arthritis	-0.435* <i>0.213</i>	-0.639** <i>0.238</i>	-0.643** <i>0.2</i>
Intervertebral disc disorders	-0.125 <i>0.233</i>	-0.615* <i>0.293</i>	0.112 <i>0.194</i>
Disorders of female genital organs	0.274 <i>0.247</i>	0.525* <i>0.238</i>	0.29 <i>0.223</i>
Cholelithiasis and cholecystitis	-0.259 <i>0.241</i>	0.623** <i>0.197</i>	-0.171 <i>0.216</i>

Notes: Results are from a conditional logit model. Individual specific coefficients are from model 1 which uses the overall quality measure and no interaction terms. Coefficients are interpreted as parameters of a binary logit model against the base category 'did not seek treatment'. Alternative specific coefficients from this regression were presented in Table 6.9. *** p<0.01, ** p<0.05, * <0.1.

6.5.1.2 *Simulation results*

The estimation results indicate that distance and quality significantly affect outpatient health seeking behaviour and that for poorer households, price also matters. However, in order to get a better sense of just how much these characteristics matter, a number of different policy scenarios are simulated. First, the predicted probabilities for choosing each alternative were calculated using the actual value of all independent variables for each individual, averaged over the entire sample. These are the baseline probabilities presented in the second row of Table 6.11. Second, the value of a single variable of policy interest (e.g. quality, reimbursement rate, and distance) was changed while holding all other variables constant and new probabilities were predicted for each individual, again averaged over the sample. These are referred to as the simulated probabilities. Table 6.11 shows the observed values, the predicted baseline probabilities, and the simulated probabilities following the policy change using the first model's specifications.

Table 6-11: Effect of policy changes on patterns of outpatient utilization (percentage change in probabilities)

Provider type	Did not seek treatment	Village clinic	Township health centre	County hospital
<i>Observed values</i>	<i>0.452</i>	<i>0.249</i>	<i>0.141</i>	<i>0.159</i>
<i>Baseline probabilities</i>	<i>0.458</i>	<i>0.243</i>	<i>0.141</i>	<i>0.158</i>
<i>Simulated probabilities</i>				
20% increase in overall quality	-3.01%	1.38%	0.80%	0.84%
50% increase in overall quality	-7.43%	3.38%	1.97%	2.08%
50% increase in reimbursement	-0.42%	0.32%	0.12%	-0.02%
50% decrease in distance	-1.34%	-0.53%	0.03%	1.84%
20% increase in VC quality	-1.48%	2.28%	-0.45%	-0.35%
50% increase in VC quality	-3.83%	5.91%	-1.16%	-0.93%
50% increase in reimbursement at VC	-0.26%	0.40%	-0.08%	-0.06%
50% decrease in distance to VC	-0.07%	0.11%	-0.02%	-0.02%
50% increase in reimbursement at THC	-0.11%	-0.06%	0.21%	-0.04%
50% decrease in distance to THC	-0.25%	-0.14%	0.48%	-0.09%
50% increase in reimbursement at CTY	-0.04%	-0.02%	-0.02%	0.08%
50% decrease in distance to CTY	-1.03%	-0.51%	-0.41%	1.95%

Notes: VC=village clinic; THC=township health centre; CTY=county hospital

While a majority of individuals choose not to seek outpatient treatment when ill, those that do predominantly frequent primary health care facilities. If the desired objective of each policy change is to decrease the percentage of individuals not seeking formal care and increase the demand at village clinics as a first point of contact then improvements in perceived quality would yield the greatest results. A 50 percent improvement in quality at all facilities would increase utilization by 3.38, 1.97, and 2.08 percentage points at village clinics, township health centres, and county hospitals respectively. Focusing quality improvements specifically at the village clinic level results in an even larger 5.91 percentage point gain in village clinic utilization. In contrast, increasing the reimbursement rate at or decreasing the distance to village clinics results in less than a percentage point gain in utilization. This is not surprising given the average distance to a village clinic is only 5.8li (or 2.8km) as seen in Table 6.3. Also, the median out-of-pocket per visit cost at village clinics was 30 Yuan (approximately USD4.8) in 2012. Fifty percent increases in reimbursement rates at township health centres and county hospitals also result in less than a percentage point increase in their utilization. Given the average per visit cost at these facilities, these changes would still not make them cheaper than village clinics (Table 3.7).

6.5.2 Inpatient analysis

6.5.2.1 *Estimation results*

Tables 6.12 and 6.13 present the results from the same inpatient multinomial logit regression, here too splitting alternative and individual specific characteristics into two tables for ease of discussion. The same four model specifications were conducted for inpatient analysis. However, as none of the interaction terms between household consumption and the various alternative specific characteristics were statistically

significant we do not present those results⁴⁹. The lack of significance means that distance, reimbursement rates, deductibles, and quality all influence utilization patterns in the same way across consumption groups and that this measure of living standards does not help explain heterogeneity in choice of provider. This is confirmed by the goodness of fit measures presented at the bottom of Appendix C12.

First, distance acts in the same way as for outpatient services, with increasing distance to a facility leading to less use of that facility. However, for inpatient services, the coefficients for the two price proxies present contradictory results. The higher the deductible at a facility the less likely are patients to frequent that facility. This is in line with what we would expect and in accordance with a previous study looking at variations in NCMS design across counties in Anhui and Jiangsu provinces albeit no quality or distance effects were accounted for (Brown and Theoharides, 2009). Supporting survey data also highlights the importance of financial barriers to access. Economic difficulties are still cited as the number one reason for not being hospitalized despite need (Appendix C14). Also, nearly a quarter of hospitalized patients checked out against doctor's orders and when asked why they had done so more than half cited economic difficulties while the rest claimed not to have been cured after a long time (Appendix C15).

However, the higher the reimbursement rate the less likely individuals are to use that facility. One explanation could be that because deductibles are known fixed amounts that do not change depending on services received there is less uncertainty involved in making provider choice decisions. Whereas with reimbursement rates, the amount of out-of-pocket expenditure a patient is responsible for will vary depending on the severity of disease and the amount of services provided – an amount which is

⁴⁹ See Appendix C12-C13.

difficult for patients to determine beforehand. And because reimbursement rates are much higher for inpatient services than outpatient care, patients may be less wary of final out-of-pocket costs at different facilities. Therefore, it may be that deductible not reimbursement rate is what patients respond to when making health care decisions (Aron-Dine et al., 2013). The variation in reimbursement rates across facilities is also not very spread out and it is likely that a 5-10 percent difference (in most cases) is simply not enough to influence choice of provider. For these reasons, we consider the deductible to be a better proxy for the price of medical care.

However, lack of familiarity with NCMS benefits may also lend a possible explanation. It is somewhat indicative that nearly 45 percent of households were unaware which facility level offered the highest reimbursement rate and the lowest deductible for inpatient care and almost 75 percent were unaware that their reimbursement rate would increase with a referral in 2012. Only 22 and 15 percent of households answered these two questions correctly. Lastly, another explanation that could explain the negative sign on the reimbursement coefficient is that price may be acting as a proxy for unobservable quality. This has for a long time been the standard proxy for quality in the trade and quality literature (Sutton, 2012, Khandelwal, 2010) and increasingly in the health field (Sinaiko and Rosenthal, 2011).

Curiously, for inpatient services, quality seems not to influence choice of provider as none of the coefficients are significant except for environment. This is in conflict with the ex-post household survey question that asked patients the reason they chose to be hospitalized outside of their own county. Approximately a quarter of hospitalized patients sought treatment out-of-county in 2011 and 2012. And, in 2012, while twenty percent of patients who were hospitalized outside their county said they had a referral, when asked the reason for seeking treatment out-of-county only 4 percent

said it was because of a physician recommendation. Instead, half cited high technical capacity while a fifth answered geographical convenience. It could be that our measures of quality are simply not picking up what is relevant to consumers in their choice of inpatient providers. Removing quality measures from the models presented and repeating the analysis yielded a Log Likelihood of -4272, an AIC of 8694 and a BIC of 9269. Comparing these values with the measures of goodness of fit listed in Table 6.12 indicate that adding quality does improve the model fit but the difference between the quality and the non-quality models is much smaller than it was for the outpatient analysis. This lends some support to the argument that these measures may be less adept at influencing choice of inpatient provider than they were at influencing choice of outpatient provider.

It is also possible that township health centres and county hospitals are not true substitutes and that for certain conditions patients may have no choice but to seek treatment at county or above county facilities as they may not be treatable at township health centres. This would also help explain the negative sign on the reimbursement coefficients. Nearly a quarter of respondents reported having undergone surgery while being hospitalized. Township health centres provide only very basic inpatient care and may not be able to treat these cases.

Table 6-12: Inpatient choice of provider estimation results, alternative specific coefficients

	Model 1	Model 2
Distance	-0.003*** <i>0.000</i>	-0.003*** <i>0.000</i>
Deductible	-0.006*** <i>0.001</i>	-0.006*** <i>0.001</i>
Reimbursement rate	-0.110*** <i>0.010</i>	-0.111*** <i>0.010</i>
Overall quality	0.007 <i>0.042</i>	
Waiting time		0.044 <i>0.029</i>
Environment		-0.096* <i>0.048</i>
Physician politeness		0.068 <i>0.051</i>
Physician communication		-0.033 <i>0.056</i>
Drug availability		0.038 <i>0.061</i>
Equipment sophistication		-0.009 <i>0.059</i>
Physician knowledge		0.070 <i>0.058</i>
Number of observations	14520	14488
Number of cases	3630	3622
Log likelihood	-3900	-3889
AIC	7952	7941
BIC	8528	8563

Notes: Each model is a different regression. Results are from conditional logit models (the STATA estimation command is 'asclogit'). Alternative specific coefficients are presented and interpreted as follows: a positive coefficient means that if the regressor increases for one provider, then that provider is chosen more and other providers are chosen less; and vice versa for a negative coefficient. Individual specific coefficients from model 1 are presented in Table 6.13. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

For inpatient care, the only individual characteristics that are significant are household consumption, ethnicity, age, gender, and a dummy for diseases of the musculoskeletal system. Here too, household consumption leads to a significant increase in the probability of seeking care at higher level facilities as they are more able to cope with the lower reimbursement rates and the longer distances to facilities. Individuals of Hui ethnicity are less likely than Han to seek care at township health centres and out-of-county hospitals. Older individuals and women are less likely to

seek care out-of-county. Reason for visit does not seem to influence choice of inpatient provider with the exception of individuals who have diseases of the musculoskeletal system who are less likely to visit higher level services than they are to not seek treatment.

Table 6-13: Inpatient choice of provider estimation results, individual specific coefficients (Model 1)

	Township health centre	County hospital	Above county
Household size	-0.009 0.056	0.046 0.053	-0.038 0.057
Ethnicity	0.472* 0.189	0.079 0.182	0.409* 0.191
Age	-0.002 0.005	-0.003 0.005	-0.013* 0.005
Married	-0.332 0.238	-0.368 0.228	-0.235 0.240
<i>Education of household head</i>			
Elementary school	0.250 0.216	0.178 0.204	0.271 0.218
Middle school	0.255 0.266	0.128 0.253	0.277 0.266
High school and above	-0.267 0.353	-0.588 0.337	-0.630 0.364
<i>Occupation of household head</i>			
Farmer	-0.483 0.439	-0.499 0.421	-0.683 0.446
Laborer	-0.393 0.491	-0.335 0.471	-0.494 0.496
Other	-0.379 0.562	-0.529 0.540	-0.757 0.572
Female headed household	-0.414 0.372	-0.258 0.348	0.075 0.365
Female	0.283 0.180	-0.006 0.171	-0.372* 0.180
Log of household consumption	-0.009 0.119	0.236* 0.113	0.644*** 0.119
<i>Reason for visit</i>			
Cholelithiasis and cholecystitis	-0.613 0.479	-0.734 0.442	-0.660 0.499
Bone fracture	12.913 1484.395	13.938 1484.395	14.499 1484.395
Hypertension	-0.198 0.477	-0.440 0.457	-1.033 0.536
Acute and chronic gastritis	-0.117 0.484	-0.435 0.462	-1.037 0.552
Diseases of the appendix	14.668 1715.764	14.097 1715.764	13.676 1715.764
Disorders of musculoskeletal system and connective tissue	-0.890 0.458	-1.655*** 0.439	-1.645** 0.516
Disorders of female genital organs	14.456 962.85	14.361 962.849	13.920 962.85
Pneumonia	-0.413 0.818	-0.374 0.753	-1.268 0.858
Cerebrovascular diseases	13.922 706.797	13.839 706.797	13.523 706.797
Rheumatoid arthritis	-0.509 0.591	-0.532 0.556	-0.537 0.610

Notes: Results are from a conditional logit model (STATA estimation command is 'asclogit'). Individual specific coefficients from model 1 which uses the overall quality measure and no interaction terms are presented here although coefficients are similar for all four models. Coefficients are interpreted as parameters of a binary logit model against the base category 'did not seek treatment'. Alternative specific coefficients from this regression were presented in Table 6.12. *** p<0.01, ** p<0.05, * <0.1.

6.5.2.2 *Simulation results*

Because quality was not significant in our estimations and reimbursement rates were already high, only scenarios involving changes in distance and deductibles were attempted in order to assess the magnitude of their effect on choice of provider. The same method was used as in the outpatient simulations. Results are presented in Table 6.14. Here the desired result is an increase in utilization at township health centres and county hospitals and a decrease in use of out-of-county facilities.

In contrast to outpatient services, only 4.38 percent chose not to seek hospitalization following doctor's advisement – a reflection of both the much higher reimbursement rates offered for inpatient services and the likelihood of more significant need. County hospitals and out-of-county hospitals provide nearly three-quarters of all inpatient services. Decreasing the deductible by 50 percent or removing it completely results in a shift to higher level facilities leading to large increases in above county hospital use of 12.03 and 25.15 percentage points. By far the policy change bringing about the greatest increases in utilization of township health centres and county hospitals involve reducing the deductible at those specific facilities and/or increasing the deductible at above county hospitals. Decreasing the distance to facilities results in utilization changes of much smaller magnitude.

Table 6-14: Effect of policy changes on patterns of inpatient utilization (percentage change in probabilities)

Provider type	Did not seek treatment	Township health centre	County hospital	Above county hospital
<i>Observed values</i>	4.38%	21.57%	51.57%	22.48%
<i>Baseline probabilities</i>	3.84%	20.70%	50.87%	24.59%
<i>Simulated probabilities</i>				
50% decrease in deductible	-2.01%	-7.45%	-2.57%	12.03%
50% increase in deductible	3.41%	8.15%	-2.11%	-9.45%
No deductible	-3.04%	-12.99%	-9.12%	25.15%
50% decrease in distance	-0.84%	-3.67%	0.53%	3.98%
50% decrease in deductible at THC	-0.30%	5.36%	-3.47%	-1.59%
No deductible at THC	-0.63%	11.49%	-7.43%	-3.43%
50% decrease in distance to THC	-0.04%	0.81%	-0.52%	-0.24%
50% increase in deductible at CTY	1.26%	7.11%	-16.33%	7.96%
50% decrease in deductible at CTY	-1.26%	-7.14%	16.31%	-7.91%
50% increase in deductible at OOC hospital	0.76%	3.94%	10.15%	-14.85%

Notes: THC=township health centre; CTY=county hospital; OOC CTY=above county hospital

6.5.2.3 *Further inpatient analysis*

Using available data, this section further explores a number of the explanations proposed for why quality does not seem to influence patients in their choice of provider for inpatient services and why higher reimbursement rates discourages utilization.

First, in case complex or more serious conditions requiring hospitalization are not treatable at township health centres, they are grouped with county hospitals into a single choice category. In this analysis, an individual now has three choices – not to seek treatment, to seek treatment at a township health centre or county hospital, or to seek treatment out-of-county. The findings remained unchanged for models 1 and 2 – that is, longer distances and higher reimbursement rates still discourage use and quality measures remain insignificant. However, for models 3 and 4 that interacted provider characteristics with household consumption, there was no significance on any of our covariates (Appendix C16).

Second, the analysis was repeated keeping the original inpatient provider choice set but this time removing all patients who had undergone a surgery during their hospitalization. This was another way to account for severity of condition, in case it is influencing provider choice. Again, inpatient results were unchanged for models 1 and 2 and the significance on all variables in models 3 and 4 dropped except for drug availability which became significant and positive (Appendix C17).

Finally, all analysis in this chapter used STATA's 'asclogit' command for estimating conditional logit models. While more cumbersome to use, an alternative command, 'clogit', allows for the coefficients on alternative specific characteristics to vary by provider level. This is done by interacting distance, deductible, reimbursement rate, and quality measures with facility level dummy variables. Individual characteristics are also interacted by facility level dummy variables. Results are

presented in Appendix C18. They show that the greater the distance the less likely individuals are to use township health centres and county hospitals compared to a base category of not seeking care. But for out-of-county hospitals distance is not significant. Quality remains insignificant at all facility levels. Deductible and reimbursement rates are trickier to interpret. The higher the deductible the more likely individuals are to choose township health centres but less likely to choose county hospitals over a reference of no treatment. It may be that health need is considerable enough to override smaller deductibles. Here too the higher the reimbursement rates the less likely individuals are to choose that facility against a base of no treatment. Again, the same explanation as in the main results section is offered, that the final out-of-pocket cost is too unknown to patients a priori and that the variation in reimbursement rates across facilities too narrow to influence choice of inpatient provider.

6.6 Limitations

The results presented in this chapter are subject to a number of limitations with regards to the exogeneity and appropriateness of quality measures. It may be argued that the *ex-ante* quality measures used are still likely to be based on prior utilization and therefore considered endogenous. One way the literature has addressed this is by comparing *ex-ante* quality measures with the more common *ex-post* quality measures found in surveys following questions on health care utilization. The *ex-ante* measures are found to be better in demand estimation (Hanson et al., 2004). I am not able to perform this analysis as I do not have similar ex-post quality rating questions in my survey. Still, even if our quality measures were contaminated by past experience with the health care system this is but one source of information that a patient uses in making a decision on the choice of provider.

Another concern is that our measures of quality, especially inpatient quality, are not capturing what is important to consumers. Our measures mostly relate to doctor-patient relationships, amenities, and structural aspects of quality with our question rating overall quality coming at the end. This may prompt respondents to view overall quality in light of the aforementioned aspects of quality. While this approach may be valid for capturing important determinants of perceived quality in an outpatient setting where survival or disability does not pose a serious threat, in an inpatient setting final health outcome may trump all other considerations.

Finally, we are not able from our data to know whether a sick individual, in choosing to seek treatment, made the choice between outpatient and inpatient care. In Ningxia, the reimbursement rates are still much higher for inpatient care than they are for outpatient services and it is possible that patients may choose to be admitted in order to receive a more generous reimbursement. For the last few years, China has seen a positive trend in access and the use of services as it has expanded NCMS coverage. However, the strongest increases have occurred in hospital admissions, growing at an annual rate of 11.8 percent between 2003 and 2011. In contrast, use of outpatient care grew much more modestly at 1.2 percent over the same eight year period (Meng et al., 2012). It is estimated that between 30 to 50 percent of all hospital admissions are unnecessary (Liang and Langenbrunner, 2013). Therefore, it is important to keep in mind that utilization decisions reflect both the choice of level of provider but also the type of care. To the extent that this is the case, for example, for conditions that should not normally require hospitalization such as (hypertension, gastritis, arthritis, or the common cold) this represents approximately 12 percent of hospitalizations in our sample.

6.7 Concluding remarks

While chapter four assessed the overall impact of a more generous health insurance plan on financial risk protection, this chapter looked at the role of both provider quality and out-of-pocket cost of health care in choice of health care facility. It used the cross-county variation in reimbursement rates and deductibles set by the NCMS as well as measures of distance and quality to set up a conditional logit model that makes use of both alternative and individual specific characteristics to determine patient choice. In short, it looked at whether the price effect of our health insurance intervention outweighed the quality preferences of individual health seekers.

For outpatient services, we find that overall quality and distance both override the price incentive in choice of provider. However, price still plays an important role amongst the poorest households and distance is a greater deterrent to poorer individuals than it is for richer ones. This confirms utilization findings from the analysis of heterogeneous treatment effects by quintile in chapter four. This suggests that while at lower levels of household consumption, demand for health care is elastic with respect to price, as income rises past subsistence, individuals begin to value other attributes of health care providers. This is consistent both with economic theory and with previous studies in China that find that people with higher income choose higher levels of care (Yip et al., 1998, Qian et al., 2009, Wagstaff and Lindelow, 2008). From a policy perspective, this could mean two things. First, short of building closer facilities which changes utilization patterns only modestly, improving quality at lower level facilities is more likely to increase their utilization compared to further increases in reimbursement rates. In particular, waiting time and physician communication are the observable quality aspects that influence patient's choice of provider most. Second, in order to see changes in health seeking behavior, it is necessary to teach patients what is appropriate

care. In a companion study using this project's setup, Fe et al. (forthcoming) linked perceived quality data from our household surveys to a village clinic facility survey which included a 35 item knowledge test assessing village doctor's clinical competence for cases they should be able to treat. They found no evidence of correlation between utilization of village clinics and doctor competence. They also found no correlation between doctor competence and households' perception of quality. While quality perception was an important determinant of choice of provider, patients seemed unable to recognize more competent doctors. The authors offered that perhaps perception of quality was driven by factors less important to health outcomes (Fe et al., forthcoming). It is important for policymakers to recognize that without changing individuals' perceived quality, improving actual quality as judged by providers would fail to shift patterns of health care utilization and overcome the bypassing of primary care facilities.

For inpatient care, our results indicate that quality does not seem to influence patients in their choice of health care provider. Hospitalizations for hypertension, gastritis, rheumatoid arthritis, and the common cold suggest to some extent that patients may be pursuing higher inpatient reimbursement rates relative to outpatient reimbursement rates however the data does not allow us to confirm this substitution effect. Chandra, Gruber, and Mcknight (2010), Hsu et al (2006), and Trivedi et al (2010) compare different cost-sharing arrangements among Medicare patients in the US finding that increases in cost-sharing for ambulatory and outpatient/preventative care led to increased spending on inpatient care – offsetting the reductions of spending in one type of care with more pronounced spending in another (Chandra et al., 2010, Hsu et al., 2006, Trivedi et al., 2010). The fact that there was an unexpected sign on the inpatient reimbursement rate could have a number of explanations. The lack of familiarity with NCMS benefits being one and the narrow variation in reimbursement

rates between facility levels being the other. Furthermore, Baicker and Goldman (2011) and Aron-Dine et al (2013) highlight the complexity of multiple cost sharing arrangements and the difficulty of using cost-sharing as a tool for distinguishing between low value and high value care further obfuscating which design feature (deductible or reimbursement rate) it is individuals consider when deciding to seek health care (Aron-Dine et al., 2013, Baicker and Goldman, 2011). The important thing to remember for China is that inpatient reimbursement at the highest provider level is often greater than the rate provided at the lowest outpatient facility. If considering distance and deductible, then financial barriers to access become more evident. As the simulations showed, removing the deductible at township health centres and/or increasing it at above county hospitals resulted in the greatest increase in township health centres and county hospitals.

These findings have important implications as China tries to shift utilization patterns from higher level tertiary facilities to lower level primary health care facilities as a first point of contact. As seen in chapter three, median cost outpatient visit at county hospitals is 13.3 times costlier than at village clinics and median inpatient admission at out-of-county hospitals can be up to 14.7 times more expensive than the median cost of a township health centre admission. As household incomes rise and disease patterns shift towards non-communicable diseases and chronic conditions – two factors associated with increased use of higher-level care – health care expenditures are likely to rise. A successful strategy to control health expenditures will likely require restructuring the benefit design scheme so that it incentivizes outpatient use over inpatient care, improving quality at primary care facilities, establishing a functional referral system, informing patients of their NCMS benefits, and educating them on appropriate care.

Chapter 7 - *Discussion*

This thesis assessed the role of health insurance design features on financial risk protection within the context of rural Ningxia by evaluating the impact of a scheme that increased reimbursement rates for outpatient services and drugs and established a tiered reimbursement structure in which higher reimbursement rates were given at lower level primary care facilities. The intervention was implemented in two counties and compared to three comparison counties that continued to operate under the government NCMS scheme. The novelty of this experiment is that unlike the majority of studies that evaluate the impact of health insurance versus no health insurance on health care expenditures, it allowed us to differentiate the impact of specific health insurance characteristics. With the push towards universal health coverage, the need for health insurance or other risk pooling mechanisms is a non-issue. Of greater contribution to the field is how to design and implement health insurance schemes that ensure individuals access the health care system in the most cost-effective manner. In this final chapter findings for the three main research questions are synthesized, main strengths and limitations discussed, and key policy implications extracted. The chapter ends with areas of future research and overall concluding remarks.

7.1 Main findings

7.1.1 To what extent do health insurance design features matter in reducing catastrophic and impoverishing health expenditures?

In chapter four, I evaluated the impact of a modified health insurance scheme on various measures of financial risk protection. At baseline, despite high NCMS coverage rates and a benefit package that focused predominantly on inpatient care, utilization of health care services when ill was still low and households continued to

face significant financial barriers in access to health care suggesting that either the coverage provided was not enough or that it was poorly targeted. As out-of-pocket costs for outpatient services became relatively lower in intervention counties versus comparison counties I hypothesized a decrease in out-of-pocket spending, catastrophic and impoverishing health expenditures and the percentage of households having to take out a loan for medical reasons. I further expected that this would be driven by decreases in outpatient and self-treated drug spending. I found that while outpatient, drug, and total out-of-pocket spending did decrease by 23, 52, and 24 percent respectively in intervention counties relative to comparison counties, results were only significant for self-treated drug spending. But while the intervention had limited impact on health expenditures, catastrophic expenditure at the 10 percent threshold decreased from 32 to 23 percent, the percentage of households falling into poverty due to medical expenditures defined at the 2.00\$/day poverty line fell by 3 percentage points to 6.8 percent, and the percentage of households reporting having taken out a medical loan shrunk to 15.3 percent (from 20.4 percent) after two years of implementation for households in intervention counties relative to comparison households.

Figure 7-1: Decreases in out-of-pocket health expenditure significant only among self-treated drug expenditures

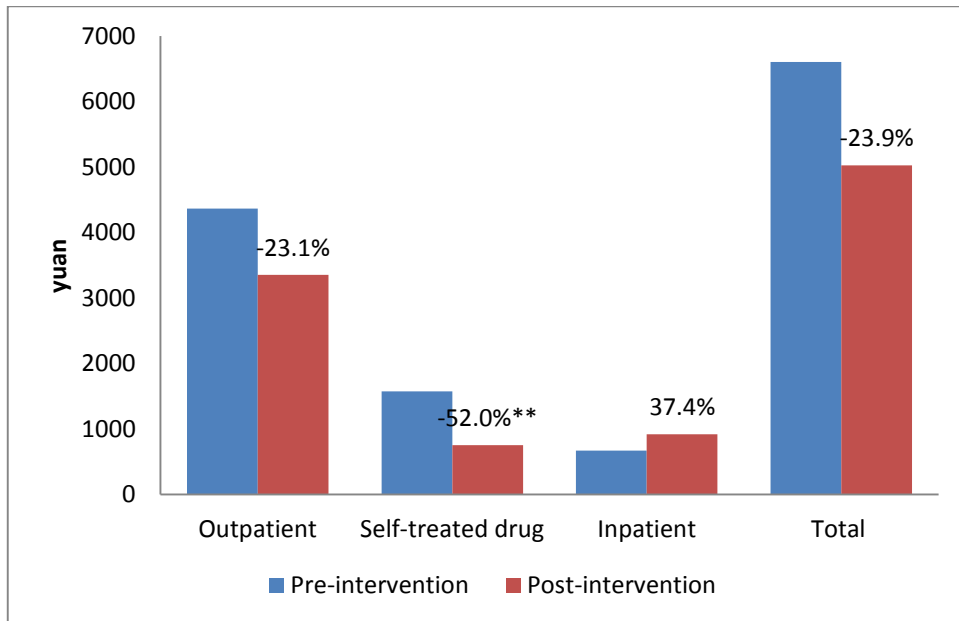
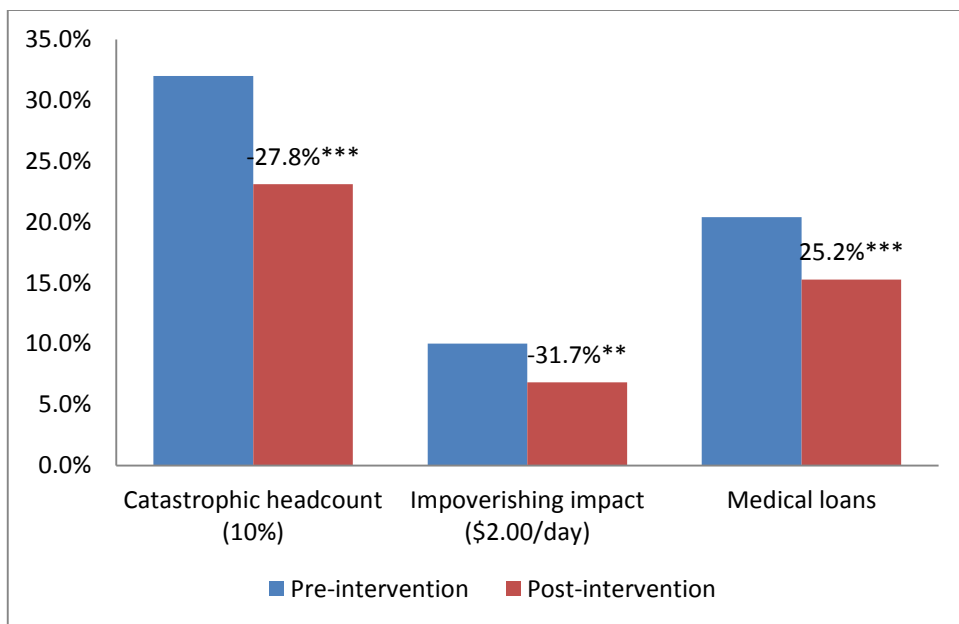


Figure 7-2: Increased financial risk protection

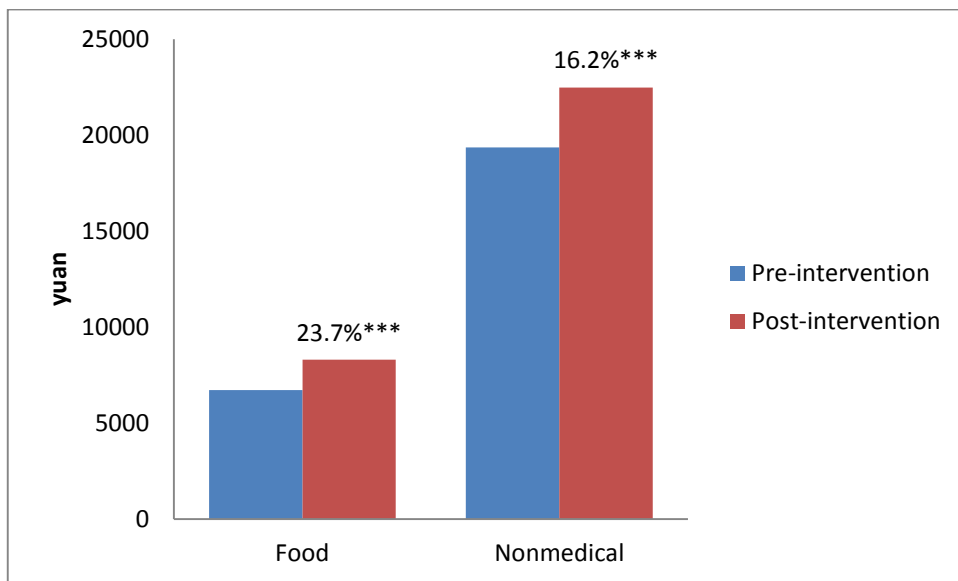


I further found that financial risk protection was most evident amongst middle income households, and surprisingly not among households who had members with chronic conditions. Instead, poorer households and households with chronic disease members benefitted most in terms of access, increasing their utilization at primary care facilities as they were likely previously forgoing care.

7.1.2 Does health insurance reduce the precautionary savings motivation of households and stimulate their consumption?

In chapter five, I used the modified health insurance intervention as an observable, exogenous, and variable measure of risk to examine the impact of a decrease in health-related financial risk on household saving and consumption behavior. I hypothesized that households in intervention counties would increase their precautionary savings if below target wealth and decrease their savings if above, relative to comparison households. I also expected an increase in consumption of nonmedical goods and services. I found that households in intervention counties increased food and nonmedical consumption by 1,590 and 3,135 Yuan respectively relative to comparison counties suggesting that the added coverage provided by the modified health insurance design is helping intervention households meet a more desired food consumption level. That these benefits are driven by chronic disease households and those in the bottom four quintiles highlight the important welfare enhancing outcomes of health insurance that are often not considered when discussing the costs and benefits of health insurance schemes. However, the intervention had no effect on potential household savings despite increasing the likelihood of positive savings in intervention households after two years of implementation indicating that rural households in Ningxia are likely living near their budget constraint.

Figure 7-3: Increased food and nonmedical consumption



7.1.3 Do patient perceptions of health care quality override the health insurance price effect in choice of health care provider?

Chapter six looked at other dimensions of access beyond affordability. Using cross-county variation in deductibles, reimbursement rate, quality, and distance, as well as various individual demographic characteristics I examined what drives consumers' choice of health care provider. I hypothesized that as the out-of-pocket cost and distance to a facility decreases and the quality of a facility increases then the likelihood of that facility being chosen increases. I found that for outpatient services, distance and quality effects outweighed the price effect as proxied by reimbursement rates which was significant only for poorer households suggesting that while at lower levels of household consumption, demand for health care is elastic with respect price, as income rises past subsistence, individuals begin to value other attributes of health care providers – a finding that confirms chapter four's utilization analysis by household consumption. For inpatient services, the distance and price effects (as measured by deductibles) outweighed quality perhaps suggesting that for more serious conditions, quality measures that focus on the interpersonal relationships with medical staff and amenities

are not as important as they are for outpatient care and that other aspects of quality may be more valid when survival and threat of disability are at stake. Descriptive statistics also revealed inappropriate hospitalizations for conditions such as hypertension, the common cold, gastritis, and rheumatoid arthritis suggesting that individuals may be pursuing the higher reimbursement rates provided for inpatient care.

7.2 Strengths and limitations

Before considering the policy implications of these findings it is important to situate them within the strengths and limitations of the thesis. The strengths of this thesis include region specific findings, significant contributions to the literature, and robust evaluation methods.

7.2.1 External validity

Being able to evaluate the impact of a large scale reform such as health insurance using robust experimental designs is challenging. Changes are often implemented suddenly and across an entire population preventing the use of pre-post treatment control experiments. Since launching the NCMS in 2003, the government of China has encouraged regional innovation in its design in order to maximize local impact. Ningxia is in a region where there has been comparatively little academic research as the bulk of health systems work has been concentrated on richer eastern and central provinces. Given the dearth of information for this relatively understudied region, findings have potentially significant scope for guiding policy in other similarly developed western regions and local provincial government has already begun to expand elements of our project to other counties within Ningxia. An added strength of this intervention is that it was managed and implemented by local government meaning that scale-up efforts are likely to be administered under similar conditions. Although

these findings may only be representative of regions with similar socioeconomic and institutional development, there is a theoretical basis for the wider adaptation and dissemination of results.

7.2.2 Contributions to the literature

While there is considerable variety in health insurance design characteristics across China, few studies have examined the impact of health plan generosity on financial risk protection and health seeking behavior. Chapters four and six make use of more generous outpatient and drug coverage and a tiered reimbursement structure to address these gaps in the literature. Additionally, most of the health care demand literature in low and middle income countries has focused on the role of price ignoring other aspects of consumer incentives. But price is just one dimension of access and where price and quality were both considered, problems of endogeneity, selection bias, and imputation have marred findings. Chapter six is one of a few studies to address these shortcomings. Finally, despite much interest in expanding social safety nets as instruments to reduce high national household saving rates and encourage consumption, no study has looked at the role of health insurance in reducing the precautionary savings motivation in mainland China and few have looked at its impact on nonmedical consumption globally. Chapter five takes on this challenge. It also provides additional evidence to an often overlooked pathway in which health insurance can improve health outcomes – preserving or increasing household food consumption during health shocks. Together the three main research chapters provide significant contributions to the literature and highlight the importance of health insurance design characteristics on reducing catastrophic and impoverishing expenditures, influencing health seeking behavior, and household consumption decisions.

7.2.3 Robust evaluation methods

The availability of three rounds of panel household survey data pre- and post-intervention allowed the calculation of unbiased estimates of treatment effects in chapters four and five under the assumption that time varying unobservables in treatment and comparison counties follow a parallel trend. Time-invariant unobservables were removed by the difference-in-difference fixed effects specification. These methods are much more robust than before and after time-series studies and/or retrospective case-control cross sectional studies. The availability of exogenous price proxies and the careful placement of quality questions within the household survey separate from questions on illness and use of provider allowed chapter six to address much of the methodological issues plaguing the determinants of health seeking behavior literature.

Nevertheless, there are a number of weaknesses with regards to the limitations of the evaluation methods and the inadequacies of measures of financial risk protection, savings, and quality.

7.2.4 Internal validity

First, our results are based on a limited number of counties. This has partly to do with the fact that the experiment was originally designed to disentangle the effect of increased outpatient coverage alone from the effect of increased outpatient coverage combined with a change to provider payment arrangements compared to a third study arm which implemented neither of the two policy interventions. The changes to payment method were meant to occur at the town level, introducing variation among 28 townships. However, as there were significant delays in the introduction of the provider payment method, this thesis focused on studying the impact of increased outpatient coverage alone, which was introduced at the county level. Still, there are

only three studies that use more than five counties and panel data methods to examine the impact of NCMS on financial risk protection making this work an important contribution (Wagstaff et al., 2009a, Lei and Lin, 2009, Liu and Tsegai, 2011). The methods described also do not allow for differences in time-varying unobservables to be accounted for. If these are correlated with any of our regressors then estimates of average treatment effects in chapters four and five will be biased. Accounting for these differences would have required additional pre-intervention trend data or the use of instrumental variables which were not available. Finally, unexpected changes or variations in implementation may introduce bias to the findings highlighting the difficulty of maintaining a controlled experimental setting when implementing complicated system-wide interventions. In 2011, the benefit package for comparator county C began providing more generous coverage of outpatient care – similar to that of our intervention counties. These issues all concern the internal validity of the study and interpretation of findings must be viewed in light of these limitations.

7.2.5 Measurement of outcomes

As highlighted in section 4.6, catastrophic and impoverishing expenditures, although the most commonly used measures of financial risk protection, are subject to a number of limitations. Most importantly, they cannot distinguish between households that draw upon alternative mechanisms to finance often unexpected medical care and those that have no such reserves and, they do not capture those that forgo treatment at the expense of their health because they either do not have access to health care facilities or they cannot afford it (Wagstaff, 2008a, Giedion et al., 2013). While I am unable to directly identify the source of health care financing, I am able to look at the impact of our intervention on household savings, medical loans and nonmedical consumption which allow for a more comprehensive understanding of the impact of increased health

coverage on financial risk protection. This combined analysis revealed that while household savings was an unlikely source of alternative financing for health care in rural Ningxia, households did borrow for medical reasons. However, difficulty in measuring household income and savings in agricultural settings where most transactions are in-kind and cash income reflects only a small part of total household income mean that our household savings measures are likely underestimated. With regards to the loss of information from the omission of those that forgo treatment, this can be checked to some extent by looking at health care utilization. The analysis revealed that poorer and chronic disease households were likely forgoing care in intervention counties prior to the intervention.

As discussed in section 6.6, although quality measures used are placed at the beginning of the survey before any prompting questions on health care utilization, there may still be a chance that response is driven by prior experience with the health care system and findings from chapter six must be interpreted with caution. However, use of *ex-ante* quality measures have been found to be superior to *ex-post* quality measures in demand estimation studies (Hanson et al., 2004). Finally, because of the questionnaire design I am unable to tell whether individuals choose between inpatient or outpatient care when seeking treatment and so results in chapter six reflect both the choice of level of provider and the type of care. This point will be discussed further in the policy implications section.

7.3 Policy implications

As countries complete their epidemiological transition, experience growth in income, and expand insurance coverage, international evidence suggests that patients will seek care higher up on the service provider ladder (Wagstaff and Lindelow, 2008, Yip et al., 1998, Manning et al., 1987). Therefore, increasing cost-efficiency strategies

that promote disease prevention, gatekeeping, coordinated care, and a shift from hospital-based to ambulatory care will help health insurance coverage go a lot further towards protecting households from unpredictable and ruinous medical expenditures and ensuring the sustainability of the scheme. These strategies can be incorporated into health insurance designs and have the potential to raise the performance of health systems in terms of financial risk protection.

Common practice for health insurance schemes in low and middle income countries – and China is no exception – has been to focus on low probability, high cost inpatient care over high probability, low cost outpatient care reasoning that catastrophic and impoverishing health expenditures are more likely to occur from expensive hospital services. Drugs essential for the maintenance of common non-communicable diseases, including chronic conditions, are either not covered or have considerable out-of-pocket cost sharing arrangements. However, in Ningxia, it is outpatient and drug spending that is causing households catastrophic expenditures. The findings of this thesis add to the growing body of evidence that health insurance benefit packages that provide coverage for outpatient services for chronic conditions and drugs provides better protection from catastrophic out-of-pocket health expenditures (Lagomarsino et al., 2012). Additionally, increased coverage for outpatient services encourages patients to seek preventive care and ensures ongoing disease management preventing the development of more serious conditions. While it was middle income households that benefitted the most from the intervention's increased outpatient coverage in terms of financial risk protection, it was poorer and chronic disease households that not only increased their access and utilization of primary care facilities but also increased their food consumption – two pathways often cited by which health insurance is meant to improve health outcomes. This suggests that as coverage of outpatient services improves those

most vulnerable and in need will increase their access to health care where there was previous underutilization but not necessarily see an improvement in financial risk protection. On the other hand, the increased cover would offer greater protection for those already using but not necessarily change their utilization patterns. Our findings highlight the importance of tailoring health insurance benefits to local need and suggest that China revisit its strategy of focusing health coverage on catastrophic inpatient care in order to maximize the impact of health insurance on financial risk protection.

Furthermore, while consumption of medical care increased at the village clinic level reflecting the intervention's ability to improve affordability and access, the tiered reimbursement and deductible structure on its own was not enough to redirect established patterns of health care utilization. Other dimensions of access also influence health seeking behavior. In both developed and developing countries alike, hospitals are responsible for the largest share of health expenditures, therefore it is critical to understand why individuals are bypassing cheaper primary care facilities. In Ningxia, findings from the analysis of outpatient provider choice suggest that while at lower levels of household consumption, demand for health care is elastic with respect to price, as income rises past subsistence, individuals begin to value other attributes of health care providers. Overall distance and quality trumped the price incentive of a higher reimbursement rate for lower level primary care facilities suggesting that further possible gains to financial risk protection may be had by either improving quality at village clinics and township health centres or changing people's perception of what good quality care looks like. Without these changes, poor quality or the perception of poor quality would only encourage the continued use of hospitals over primary care facilities by those who can afford to use them promoting a two-tiered system in which richer households have access to better quality services. Only then can complementary

information campaigns that educate consumers of the financial benefits of seeking care at primary care facilities and obtaining referrals for secondary and tertiary services be more effective at shifting utilization towards primary care settings. For inpatient choice of provider, quality does not seem to influence behavior. Instead, descriptive statistics of inappropriate admissions hints that people are substituting inpatient for outpatient care. The fact that chapter four findings revealed that there was no change in inpatient health expenditures in intervention counties relative to comparison counties suggests that there was no substitution from inpatient to outpatient spending following the increase in outpatient coverage. Higher reimbursement rates for inpatient services relative to outpatient care presents an obvious disincentive for patients to be treated in outpatient settings. In Ningxia, even after the intervention, inpatient reimbursement rates at the highest level of provider were still higher than outpatient reimbursement rates at the lowest level of primary care. This presents a key challenge for policymakers in China, as unless they modify these strong financial incentives, patients are unlikely to shift their utilization from hospital to outpatient settings.

Finally, while China has promoted health insurance as a tool for decreasing its high household savings rate and increasing domestic consumption, I find that the NCMS only helps achieve half of these objectives – namely, it increases nonmedical consumption. Increased health insurance on its own is unlikely to decrease household savings as considerable non-health related risk to household income remains. According to analysts, in order to decrease households' precautionary savings motivation, non-health sector interventions will likely have a greater impact than interventions that merely expand the social safety net. Woetzel et al (2009) assess the impact of policies on household savings and consumption under a number of different scenarios compared with status quo trendline projections. These policies are aimed at

enabling consumer spending (i.e. expanding and improving the quality of products and increasing the availability and uptake of credit), improving social safety nets (i.e. increasing health insurance coverage and pension benefits), and rebalancing investment and income – all of which are areas the government of China has itself identified as key in reducing the household savings rate. They find that improving social safety nets contributes the least to increased consumption – between a 0.2 to 1.1 percentage point increase in China’s consumption share by 2025 while enabling consumer spending and carrying out structural reforms affecting the financial system contributes between 2.8-4.7 and 3.5-6.0 percentage points respectively. They also find that the predicted trendline reduction in household savings rate of 8 percent of household disposable income on its own will only result in a 2 to 5 percent increase in China’s consumption share. Their findings suggest that perhaps other interventions might contribute more to decreasing household savings and increasing consumption than would expanding health insurance benefits. Carmichael and Dissou (2000) also suggest that improving investment-related income via a greater array of financial products with higher returns could drastically increase household purchasing power. They show that while health insurance may decrease the total level of savings it will change the composition of savings from cash savings to more productive higher return investments resulting in an overall increase in growth (Carmichael and Dissou, 2000).

However, these findings do not take into account the important equity considerations of our own findings. Not only did food and nonmedical consumption increase substantially amongst intervention households exposed to the decreased health related financial risk provided by more generous health insurance, but the effect on food consumption was driven by poorer and sicker households. The implication that added insurance provides substantial welfare gains amongst households living near their

budget constraint may mean that China considers increased health insurance targeted towards the poor. More globally, these findings also mean that low income economies have much higher potential welfare gains as measured by increased food consumption by decreasing health risk compared to higher income economies.

7.4 Areas of further research

7.4.1 Further evaluation of design characteristics on frequency of use, type of care, and location of visit

The above discussion reveals a number of priority areas for future research. First, reaching universal health coverage will require the expansion of health insurance schemes that not only protects individuals from out-of-pocket medical expenditures but that incorporate design features that promote the cost-effective use of care. This will require research into the effectiveness of various cost sharing and delivery arrangements aimed at redirecting care from hospital-based settings towards primary care facilities, fostering greater coordination between levels of care, and encouraging the use of preventive and health improving activities. Reimbursement rates, deductibles, and ceilings can take on a number of different forms. For instance, instead of a per visit deductible it could be a yearly amount deductible. This would present households with one price before the deductible has been met and a zero-cost price after the deductible has been met potentially changing health seeking behavior depending on time of year a health event occurs (Folland et al., 2013, Aron-Dine et al., 2013). Studies that decompose medical expenditures to account for frequency of use and type and location of visit will make it easier to assess whether health care benefit packages are appropriately designed.

7.4.2 Implementation research

Second, research into the political, organizational, and service delivery environment in which our intervention was implemented will not only help identify areas for improvement but will aid efforts to scale-up or introduce similar interventions in a diversity of settings. As evidence that health insurance improves financial risk protection mounts, the more interesting question is under what circumstances are the benefits of insurance maximized. Careful design is a crucial first step. But research into the conditions of implementation, an often neglected area, addresses in what context, why, and by how much an intervention will succeed.

7.4.3 Demand versus supply-side trade-offs

Third, given the role of health care providers in influencing health care expenditures, it is vital to evaluate the impact of supply-side interventions on out-of-pocket expenditures and patterns of utilization as they may have an even bigger impact than health insurance. Existing evidence indicates that prospective or mixed payment arrangements that shift some of the risk of payment onto the providers reduces unnecessary care, improves efficiency, and controls health care expenditure. And increasingly results-based financing arrangements that tie payment to measures of improved performance has been shown to enhance quality (McClellan, 2011, Ellis and McGuire, 1986, McGuire, 2000).

In China, Yip and Eggleston (2001, 2004) evaluate the change from a fee-for-service payment system to a prospective global budget type system in hospitals in Hainan province. They found that this led to a reduction in cost per admission in intervention hospitals, especially for drugs and high technology procedures, and was also associated with a reduction in patients' copayments. Similar to our intervention, Wang et al. (2009) compare a community-based health insurance scheme with

increased coverage for outpatient services and contracted village doctors paid on a salary plus performance bonus basis with a scheme that only provided inpatient services and paid doctors by fee-for-service. However, treatment effects were limited to outcomes of health status (Wang et al., 2009).

Wagstaff and Yu (2007) evaluate the impact of supply-side interventions other than provider payment reform aimed at improving quality and efficiency in Gansu province. Efforts to upgrade equipment and treatment protocols, train and supervise health care workers, and enforce penalties for not adhering to an essential medicines list at primary care facilities or to the referral system put in place linking village clinics, township health centres, and county hospitals resulted in decreased out-of-pocket spending and a lower incidence in catastrophic and impoverishing expenditures. While the study was not designed to disentangle the impact from various components, the authors attributed most of the impact to a decrease in drug spending (Wagstaff and Yu, 2007).

The more information available on the costs and benefits of various demand and supply-side interventions the better policy makers can prioritize health interventions. In this respect, evaluations that combine both and allow the identification of separate treatment impacts are even more valuable.

7.5 A unifying framework

Of central importance to the role of health insurance in financial risk protection is how to account for the economic consequences of illness which includes both direct and indirect costs. Direct costs are those related to the financial cost of services and drugs. Some researchers also include related costs such as transportation to medical facilities and informal payments in the form of gifts to providers. In contrast, indirect costs are those related to loss of income while sick (McIntyre et al., 2006). The extent

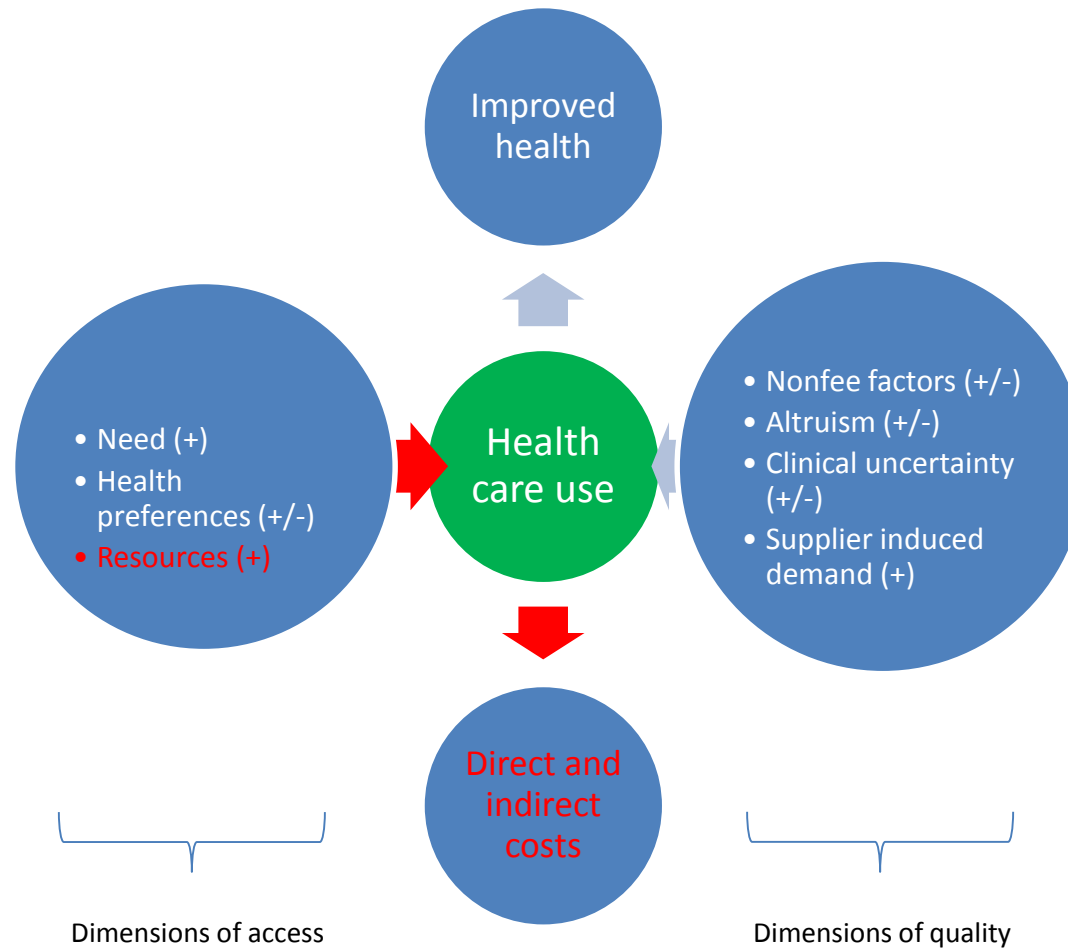
of these costs is determined by the quantity of health care used by and provided to the patient. Figure 6.1 provides a visual representation of how health care costs are linked not only to health insurance but with the broader forces acting within the health system.

On the left hand side, health seeking behavior is driven by perceived need for health care, predisposing health preferences, and enabling factors such as family and community resources. Family resources might include current income, savings, access to credit, ability to sell assets, and/or health insurance. Community resources might be the availability of providers or public infrastructure to reach providers. These are referred to as dimensions of access. On the right hand side, the quantity and quality of services provided is driven by a different set of considerations. Non-fee factors such as defensive medicine, practice guidelines, or provider experience may influence the type and quantity of care delivered. Altruistic providers that weigh the benefits to patients relatively more than profit may be more willing to take into account patient preferences for treatment. Heterogeneity of benefits and clinical uncertainty surrounding the effectiveness of treatments also influence care. Finally, provider payment incentives may induce physicians to provide more services – this is known as supplier induced demand. We refer to these factors as dimensions of quality – all of which play a part in the variation of treatment costs (McClellan, 2011, Chandra et al., 2011).

Therefore, while health insurance may enhance household resources and increase the affordability of health care, it will not necessarily improve utilization of health care services if other dimensions of access are not addressed. And similarly, access to health care services will not necessarily determine the quantity, quality, and ultimate cost of services received. Health insurance is but one link in the chain that is expected to increase utilization of health care services by lowering the out-of-pocket

price of otherwise unaffordable services. How that translates into health care expenditures is ambiguous given all of the other determinants of health care costs that are at play. What we expect is that, as a share of total household consumption, health care costs should decrease with increased health insurance coverage.

Figure 7-4: Framework for linking the determinants of health care costs and the protection provided by health insurance



Note: The signs in parentheses indicate the expected direction of effect on health care use. For example, an increase in health insurance coverage (i.e. resources) is expected to increase health care use.

7.6 Concluding remarks

Given the financial resources China has committed to health care reform, success will be defined not by additional funding but by more efficient use of those funds in the financing and provision of health care. On one level, China has reached universal health coverage in that 96 percent of its population is covered by one of three health insurance schemes. Still, households continue to face some of the highest catastrophic and impoverishing health expenditures in the world. Health insurance schemes are more than just about breadth of coverage. Benefit packages and coverage rates need to be in tune with regional health burden and need in order to provide greater financial protection from illness. And the right financial cost-sharing incentives need to be in place to not only incentive use of facilities lower on the provider chain but encourage outpatient care. The poor quality at primary care facilities or the perception of poor quality must be addressed as it is a significant obstacle to establishing a functional referral system without which further increases in demand side health insurance reimbursement rates will only result in increased utilization of higher level facilities and an unsustainable escalation of health care expenditures. However, while expanding social safety nets such as health insurance coverage has the potential to provide substantial welfare enhancing outcomes in addition to protection from ruinous health care expenditures and access to care these benefits are unlikely to translate into decreased household savings. To truly decrease household savings and encourage consumption, interventions that improve the purchasing power of households will likely have more impact.

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Appendix A: Questionnaires

Appendix A1: 2009 questionnaire

1. Name of head of household: _____

ID Numbers: County: □
Township:□□ Village:□□ Household:□□
NCMS Number: □□□□□□□□□□□□□□
Telephone: _____

2. Number of registered people in the household:

In the past six months, the number of people regularly living in the household (including registered residents):

3. Family address: _____ County, _____ Township, _____ Village

4. Interviewer's name: _____ Interviewer's ID #: _____ 4. Supervisor's name: _____ Supervisor's ID #: _____

5. Time household was entered. Date (yyyy/mm/dd): ____/____/____ Time: ____

Time questionnaire was filled out. Date (yyyy/mm/dd): ____/____/____ Time: ____ Interviewer signature:

Time form was double-checked. Date (yyyy/mm/dd): ____/____/____ Time: ____ Checker signature:

Interviewer's introductory speech upon entering household:

Hello! We are conducting a survey for the project "Enhancing TB Control through Alignment of Health System Incentives". The purpose of this survey is to understand people's health and health service utilization habits, which will provide information for the design of this area's health insurance system. We hope we can obtain your cooperation. The contents of this survey will only be used for research analysis. You and your family's answers will be kept confidential according to the requirements of the People's Republic of China's confidentiality laws for data collection. We hope you will answer the following questions honestly. Thank you very much for your cooperation!

Respondent's number (01 for the head of household, others according to the order in which they were interviewed)		01	02	03	04	05	06	07
A. Individual's basic information (A1-A10 answered only by the head of household or knowledgeable person)								
A1	Household member's name (Household member includes both registered members and individuals who have lived there over the past six months. Fill in the name of the head of household for 01.)							
A2	Relationship to head of household: (1) Head of household (2) Spouse (3) Son or daughter (4) Grandchild (5) Parent (6) Grandparent (7) Sibling (8) Other							
A3	Gender: (1) Male (2) Female							
A4	Ethnicity: (1) Han (2) Meng (3) Hui (4) Zang (5) Wei (6) Miao (7) Other							
A5	Age (based on full years of life) (Note: Interviewer should use birth date to verify. If using the hukou booklet, first fill in the complete year and month of birth.)							
A6	Marital status (1) Unmarried (2) Married (3) Divorced (4) Widow/er (5) Remarried (6) Other							
A7	Level of education: (1) Never attended school (2) Elementary school (3) Middle school (4) High school/technical school (5) Vocational college (6) Community college (7) College and above							
A8	Occupation(s) (can choose up to three): (1) Farmer (2) Laborer (unskilled) (3) Village cadre (4) Village doctor (5) Tradesperson (6) Teacher (7) Student (8) Business owner (9) Unemployed (10) Other (list)							
A9	In the past year since this survey, have you left town to work as a migrant? (1) Yes (2) No (Skip to A10)							
A9.1	In the past year approximately how many months total did you spend working out of town as a migrant? (unit: months)							
A10	What type of health insurance do you currently have? (can select more than one) (1) NCMS (2) Urban residents health insurance schemes (3) Urban workers basic health insurance (4) Private insurance (5) Other (6) None (if yes to (1), answer A10.2-A10.3.3; otherwise skip to A11)							

A11	Who will be answering the following survey questions (section B,C,D)? (Interviewer fill in) (1) The individual him or herself (2) Someone else							
A11.1	Reasons for proxy: (1)working as a migrant (2)Too young (3)Mentally impaired (4)Unwilling (5)Temporary absence (6)Other							
A12	How would you assess your health compares with that of others your age? (1) Very good (2) Good (3) Average (4) Poor (5) Very poor (6) Refuse to answer (7) Don't know							
A13								
A13.1	Height (cm)							
A13.2	Weight (cm)							
A13.3	Waistline (cm)							
A13.4	Hipline (cm)							
B. Illness, injury, and outpatient visits over the past 14 days								
B1	In the past 14 days, have you been ill? (1)Yes (2)No (Skip to part C)							
B2	How would you rate the severity of your illness or injury? (1) Minor (2) Average (3) Severe							
B3.1	What illness or injury did you suffer? (fill in the name of the illness—if multiple, please list all)							
B3.2	(fill in disease code—use National Health Services Survey Code)							
B4	In the 14 days before this survey, how many days were you bedridden because you were ill? (unit: days)? (if no, write 0)							
B5	If you are a worker or employee, how many days did you take off of work because you were ill? (unit: days) (if no, write 0)							
B6	If you are a student, how many days did you take off from your studies because you were ill? (unit: days)? (if no, write 0)							
B7	After you got sick, did you undergo treatment? (including self-treatment)? (1) Yes (Skip to B8) (2) No							
B7.1	What is your primary reason for not undergoing treatment? (After answering, skip to Part C.) (1)Felt it was not serious (2) Economic difficulties (3) No time (4) Transportation is inconvenient (5) No effective measures (6) Other							

B8	How did you treat the illness? (1) Within two weeks went to see a doctor <i>and also</i> self-treated (2) Within two weeks went to see a doctor (Skip to B11) (3) Only self-treated							
B9	Why did you choose self-treatment? (1) Followed doctor's prescription to self-treat (2) Felt the ailment was minor/No need to see a doctor (3) Self-treatment is cheaper (4) No time (5) Transportation is inconvenient (6) Poor service (7) Other							
B10	If you self-treated, the source of your medicine was: (can select a maximum of three) (1) Already in the home (Skip to B11) (2) Purchased at pharmacy (3) Purchased at health facility but did not visit doctor (4) Someone gave it to me (Skip to B11) (5) Other (Skip to B11)							
B10.1	If the medicine was purchased at the pharmacy or at a health facility, how much did you spend on pharmaceutical products in the past fourteen days? (unit: RMB)							
The following questions ask about visits to the doctor in the past two weeks. If you did not see a doctor in the past two weeks (B8=(3)), then part B is finished—Skip to section C.								
B11	In the past 14 days, how many times did you go to see a doctor? (unit: times)							
The following questions are about your first visit to the doctor (according to the individual or a knowledgeable representative)								
B12	Where did you go for your first visit to the doctor? (Please write the full, detailed name of the facility, even for private clinics)							
B12.1	The primary reason for selecting the above facility was: (1) It is nearby/convenient (2) The price is reasonable (3) The technical capacity is high. (4) Its facilities and equipment are good. (5) It has a variety of drugs. (6) The service attitude is good. (7) It is a designated reimbursable hospital (8) Someone I know works there. (9) It has a dependable doctor. (10) I was referred (11) Other							

B12.2	If this visit to the doctor was not to the village clinic, the reason for not selecting the village clinic was: (can select a maximum of 3) (1) The illness was pretty severe. (2) The technical capacity of the village clinic is low. (3) The village clinic offers a limited selection of drugs. (4) They use expired and spoiled drugs there. (5) The facilities are poor. (6)The service attitude is poor. (7) The price is unreasonable. (8) My insurance doesn't cover it. (9) They offer unnecessary services (including drugs and exams) (10) Other							
B13	At this visit, did you have any of the following treatments?							
B13.1	Injection (1)Yes (2)No							
B13.2	Intravenous drip (1)Yes (2)No							
B13.3	Oral medicine (1)Yes (2)No (Skip to B13.4)							
B13.3.1	The medicine you took was: (1) Traditional Chinese medicine (2) Western medicine (3) A combination of Chinese and Western medicine (4) Don't know							
B13.3.2	Where did the medicine you took primarily come from: (can select up to 3) (1)Purchased at the health facility (2)Already had it at home (3)Purchased at the pharmacy (4)Given by someone else (5)Other							
B14	On this visit to the doctor how much was the total cost?							
B14.1	How much of that was paid in cash by you?							
B14.2	How much was paid from the family account (not including reimbursements)?							
B14.3	How much was covered by NCMS reimbursements or reductions?							
B15	In this visit to the doctor, did the doctor prescribe drugs not included on the NCMS reimbursement list? (1) Yes (2) No (3) Don't know (If (2) or (3) is selected skip to B16)							
B15.1	If yes, how much did you pay for these drugs?							
B16	How would you evaluate this visit to the doctor (1)Very satisfied (2)Satisfied (3)Neither satisfied nor unsatisfied (4)Unsatisfied (5)Very unsatisfied (If you chose, 1, 2, or 3—skip to B17)							

B16.1	<p>What were you most unsatisfied with during this visit? (May choose up to 3)</p> <p>(1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Other</p>							
The following questions are about your second visit to the doctor (according to the individual or a knowledgeable representative)								
B17	<p>Where did you go for your second visit to the doctor? (Please write the full, detailed name of the facility, even for private clinics)</p>							
B17.1	<p>The primary reason for selecting the above facility was:</p> <p>(1) It is nearby/convenient (2) The price is reasonable (3) The technical capacity is high. (4) Its facilities and equipment are good. (5) It has a variety of drugs. (6) The service attitude is good. (7) It is a designated reimbursable hospital. (8) Someone I know works there. (9) It has a dependable doctor. (10) I was referred (11) Other</p>							
B17.2	<p>If this visit to the doctor was not to the village clinic, the reason for not selecting the village clinic was: (can select a maximum of 3)</p> <p>(1) The illness was pretty severe. (2) The technical capacity of the village clinic is low. (3) The village clinic offers a limited selection of drugs. (4) They use expired and spoiled drugs there. (5) The facilities are poor. (6)The service attitude is poor. (7) The price is unreasonable. (8) My insurance doesn't cover it. (9) They offer unnecessary services (including drugs and exams) (10) Other</p>							
B18	At this visit, did you have any of the following treatments?							
B18.1	Injection (1)Yes (2)No							
B18.2	Intravenous drip (1)Yes (2)No							
B18.3	Oral medicine (1)Yes (2)No (Skip to B18.4)							

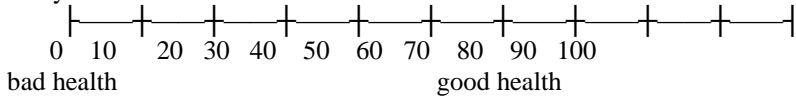
B18.3.1	The medicine you took was: (1) Traditional Chinese medicine (2) Western medicine (3) A combination of Chinese and Western medicine (4) Don't know							
B18.3.2	Where did the medicine you took primarily come from: (can select up to 3) (1) Purchased at the health facility (2) Already had it at home (3) Purchased at the pharmacy (4) Given by someone else (5) Other							
B20	On this visit to the doctor how much was the total cost?							
B20.1	How much of that was paid in cash by you?							
B20.2	How much was paid from the family account (not including reimbursements)?							
B20.3	How much was covered by NCMS reimbursements or reductions?							
B21	In this visit to the doctor, did the doctor prescribe drugs not included on the NCMS reimbursement list? (1) Yes (2) No (3) Don't know (If (2) or (3) is selected skip to B22)							
B21.1	If yes, how much did you pay for these drugs?							
B22	How would you evaluate this visit to the doctor: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to section C)							
B22.1	What were you most unsatisfied with during this visit? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Other							
C. Hospitalizations within the past year								
C1	In the past year, has a doctor advised you that you need to be hospitalized? (1)Yes (2)No (Skip to Part D)							
C1.1	How many times in the past year?							
C2	In the past year, how many times did a doctor advise you that you need to be hospitalized but you did not go to the hospital? (Fill in the exact number of times. If never, write "0" and skip to C3)							

C2.1	Your primary reason for not being hospitalized was: (1)Unnecessary (2)No time (3)Economic troubles (4)Poor service (5)Price too high (6)No beds (7)Other								
C3	In the past year, how many times were you hospitalized? (Fill in the exact number. If none, write "0" and skip to Part D.)								
Most recent hospitalization in the past year									
C4	What is the name of the illness (injury, poison, etc.) for which you were hospitalized? (During the survey write the name of the ailment, during the cross-check fill in the code for the ailment)								
C4.1	When did you enter the hospital?: (year)								
C4.1.1	(month)								
C4.2	What is the name of the institution where you were hospitalized? (Please write full, complete name)								
C4.3	Were you referred to the hospital this time? (1)Yes (2)No (Skip to C4.4)								
C4.3.1	If you were referred, from where were you referred? (1) Township health center (2) County (district) hospital (3) Municipal hospital (4) Provincial hospital (5) Military hospital (6) County-level Chinese Medicine Hospital (7) Municipal-level or above Chinese Medicine Hospital (8) Private hospital (9) Other								
C4.4	For how many days were you hospitalized this time? (days)								
C4.5	During this hospitalization, did you undergo surgery? (1) Yes (2) No								
C4.6	If you work, how many days did you take off due to your hospitalization this time? (including days in the hospital, if none write "0".)								
C4.6.1	If you are a student, how many how many days did you take off due to your hospitalization this time? (including days in the hospital, if none write "0".)								
C4.6.2	For how many days before or after your hospitalization were you bedridden? (Does not include days in the hospital. If none write "0".)								
C4.7	Why did you check out of the hospital this time? (1) Fully recovered, doctor advised that you check out (2) Not fully recovered, but doctor still advised that you check out (3) Against doctor's orders (4) Other (If you selected 3 continue on to C4.7.1, all other selections skip to C4.8)								

C4.7.1	If you checked out of the hospital against doctor's orders, the reason was: (1) Illness hadn't been cured after a long time (2) Economic difficulties (3) Limited hospital resources (4) Poor service attitude (5) Other							
C4.8	In the past year, were you enrolled in the New Cooperative Medical System? (1) Yes (2) No (Skip to C4.10)							
C4.8.1	If you were enrolled in NCMS, how were you reimbursed for this hospitalization? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Hospital directly lowered the hospitalization fee. (Skip to C4.10)							
C4.9	During this hospitalization, how much did you spend up front? (Does not include transportation costs, personal nurse, bribes)							
C4.9.1	How much did the NCMS Office reimburse you for this hospitalization? (RMB) (Skip to C4.11)							
C4.10	During this hospitalization, how much did you spend out of pocket? (Does not include transportation costs, personal nurse, bribes)							
C4.11	During this hospitalization, how much did you spend on transportation, vitamins, food, and/or a personal nurse? (RMB) (If none write "0")							
C4.12	While you were hospitalized, did you or your family members give gifts or money to hospital employees? (1) Gave money (2) Gave gifts (3) Both gifts and money (4) Neither gifts nor money (5) Other (eg. taking them out to dinner, etc.)							
C4.12.1	If yes, how much did you spend?							
C4.13	How would you evaluate this hospitalization: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to C5)							

C4.13.1	<p>What were you most unsatisfied with during this hospitalization? (May choose up to 3)</p> <p>(1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Treatment environment is poor (12) Inadequate treatment or effect not noticeable (13) Other</p>							
Your second most recent visit to the hospital in the past year (If you had two or more hospitalizations in the past year. Otherwise, skip to part D)								
C5	<p>What is the name of the illness (injury, poison, etc.) for which you were hospitalized? (During the survey write the name of the ailment, during the cross-check fill in the code for the ailment)</p>							
C5.1	When did you enter the hospital? (year)							
C5.1.1	(month)							
C5.2	<p>What is the name of the institution where you were hospitalized? (Please write full, complete name)</p>							
D. Chronic disease patients								
D1	<p>In the past six months, have you suffered from a chronic disease that was formally diagnosed by a doctor? (1) Yes (2) No (Skip to part E)</p>							
D1.1	<p>If yes, which disease(s)? (If more than three, please fill in the names of the three most severe.) (According to the National Health Services Survey Code)</p>							
D2	<p>In the past three months, how many times have you seen a doctor about these diseases? (If never, write "0" and skip to Part E.)</p>							
D3.1	<p>In the past three months, the main type of facility at which you've seen a doctor for this disease has been: (1) Village clinic (2) Township health center (3) County hospital (4) Private clinic (5) Other</p>							
D3.2	<p>Have you already obtained an NCMS Chronic Disease card? (1) Yes (2) No (Skip to D3.4)</p>							

D3.2.1	If you were enrolled in NCMS, how were you reimbursed for treatment? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Facility directly lowered the hospitalization fee. (If selected (2), skip to D3.4)							
D3.3	In the past three months, how much did you spend on these diseases up front? (Does not include transportation costs, personal nurse, bribes)							
D3.3.2	In the past three months, how much did the NCMS Office reimburse you for these diseases? (If none, skip to D3.5)							
D3.4	In the past 3 months, how much did you spend out of pocket? (Does not include transportation costs, personal nurse, bribes)							
D3.5	In the past three months, how much did you spend at the pharmacy because of this disease? (RMB) (if none, write "0")							
E. Health and behavior of adults aged 15 and over								
E1	Today, in terms of your mobility: (1)Can move in four directions without any difficulty (2)Movement is a little difficult (3)Bedridden							
E2	Today, in terms of your ability to take care of yourself (wash hands and face, get dressed): (1)No problems at all (2)Some problems (3)Unable to wash or dress oneself							
E3	Today, in terms of your ability to carry out regular daily activities (work, read, or household chores): (1)Can carry out daily activities without any problem (2)Some problems (3)Unable to carry out daily activities							
E4	Today, in terms of pain or discomfort: (1)No pain or discomfort (2)Moderate pain or discomfort (3)Extreme pain or discomfort							
E5	Today, in terms of your level of worry or depression: (1)No worry or depression (2)Moderate worry or depression (3)Extreme worry or depression							

E6	On this ruler, please indicate the point that best represents your health today. 							
E7	Generally speaking, your health is: (1)Extremely good (2)Good (3)Fine (4)Average (5)Poor							
E8	Compared with one year ago, how would you describe your health? (1)Much better than 1 year ago (2)A little better than 1 year ago (3)About the same as 1 year ago (4)A little worse than 1 year ago (5)Much worse than 1 year ago							
F. Survey of already married 15-49 year old women (including married, divorced, and widowed women)								
F1	In the past year, have you had a gynecological exam? (breast exam, pap smear, etc.) (1) Yes (2) No							
F2	Have you given birth since January 1, 2003 ? (1) Yes (2) No (Skip to G1)							
F3	For your most recent birth, how many pre-natal exams did you have? (unit: exams)? (If none, write "0" and skip to F4.)							
F3.1	At how many weeks of pregnancy did you have your first pre-natal exam? (unit: weeks)							
F3.2	Where did you have your pre-natal exam(s)? (Can select up to three) (1) County/district-level hospital or above (2) County/district-level or above TCM hospital (3) Maternal and child health facility (4) Township health center (5) Community health center (6) Family planning center (7) Village Clinic (8) Other							
F3.3	During your pre-natal exam, did the doctor perform any of the following exams?							
F3.3.1	Weigh you: (1) Yes (2) No							
F3.3.2	Draw blood for blood test: (1) Yes (2) No							
F3.3.3	Measure blood pressure: (1) Yes (2) No							
F3.3.4	Routine urine exam: (1) Yes (2) No							
F3.3.5	Ultrasound: (1) Yes (2) No							

F4	Location of birth: (1) County/district-level hospital or above (2) County/district-level or above TCM hospital (3) Maternal and child health facility (4) Township health center (5) Community health center (6) Family planning center (7) Village Clinic (8) Other							
F4.1	If you gave birth at home, your primary reason for not going to the hospital was: (1) No need to go to hospital (2) Didn't make it on time (fast birth) (3) Economic difficulties (4) Transportation inconvenient (5) Other							
F4.2	If you gave birth at home, who delivered the baby? (1) Doctor from the township-level or above (2) Village doctor (3) Licensed midwife (4) Unlicensed midwife (5) Family member (6) Other							
F4.3	This birth was: (1)Natural (2)C-section (3)Other							
F5	If you are enrolled in the New Cooperative Medical Scheme, how were you reimbursed for this time giving birth? (1) Paid the entirety up front, then went to the NCMS Office for reimbursement. (2) Facility directly lowered the fee. (3) All from out-of-pocket							
F5.1	How much of the costs incurred by this birth did you pay up front? (not including transportation costs, personal nurse, or bribes)							
F5.2	How much of the costs incurred by this birth were reimbursed? (If none write "0". If don't know write "9999999".)							
F5.3	How much of the costs incurred by this birth did you pay out-of-pocket? (not including transportation costs, personal nurse, or bribes)							
F6	In the 42 days after the birth, how many home visits did you accept from doctors or health staff? (visits) (None, write 0; don't know, write 9999999)							
G. Survey of children 5 years and younger								
G1	Survey ID number of child's mother (If the mother was not surveyed, write "0")							
G2	In the past 12 months, how many times did the child have a routine check-up? (times) (not including an exam to treat an illness)							
G3	Does the child have a planned immunization/inoculation care or booklet? (1) Yes (2) No (3) Don't know							
G4	Has s/he received the BCG vaccine? (1) Yes (2) No							

G4.1	How many times did s/he have DPT shots? (times)								
G4.2	How many doses of the polio vaccine? (times)								
G4.3	Did s/he have the measles vaccine? (1) Yes (2) No								
G4.4	How many times did s/he have the Hepatitis B vaccine? (times)								
G4.4.1	When was his/her first time having the Hepatitis B vaccine? (1) Within 24 hours of birth (2) Within a week of birth (3) Within a month of birth (4) More than a month after birth (5) Not sure								
G5	Where do you typically go for immunizations? (1)CDC center (2)Township hospital (3)Community health center (4)Village clinic (5)Other								
G6	In the past 2 weeks has this child had diarrhea? (1) Yes (2) No (Skip to H1)								
G7	While suffering from diarrhea, did he/she take any of the following? (1) ORS powder (powder-like objects in water to drink) (2) oral rehydration salt solution (open direct consumption) (3) homemade oral rehydration salt solution (salt or sugar in the liquid food)								
H. Survey of elderly individuals aged 55 and above									
H1	Is walking 2 <i>li</i> (1 km) difficult for you? (1) No difficulty (skip to H4) (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know								
H2	Is walking 1 <i>li</i> (500 meters) difficult for you? (1) No difficulty (skip to H4) (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know								
H3	Is walking around a room difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know								
H4	Is sitting continuously for 2 hours difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know								
H5	Is standing up after sitting for a long time difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know								
H6	Is climbing a flight of stairs difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know								

H7	Is lifting a 5 kg object such as a bag of rice or flour difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H8	Is squatting difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H9	Is dressing yourself difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H10	Is going to the bathroom by yourself difficult for you? (1) No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
I. Health behavior and knowledge								
I1	Smoking							
I1.1	Do you smoke? (1) I've never smoked (skip to I2) (2) Occasionally (3) Often (4) I've already quit (skip to I1.5)							
I1.2	How old were you when you started to smoke? (age)							
I1.3	On average, how many cigarettes a day do you smoke? (fill in the exact number)							
I1.4	Approximately how much do you spend each month on smoking? (skip to I2)							
I1.5	For how long have you quit smoking?							
I1.5.1	What was your main reason(s) for quitting smoking? (can make multiple selections) (1) Already sick (2) To prevent disease (3) Economic difficulties (4) Family opposed it (5) Environmental restrictions (6) Set an example (7) Educational campaign (8) Doctor's advice (9) Other (10) Don't know							
I2	Tuberculosis							
I2.1	Do you think TB is a serious disease? (select one) (1) Very serious (2) Somewhat serious (3) Not very serious (4) Don't know							

I2.2	How did you first learn about TB? (can make multiple selections) (1) Newspaper or periodical (2) Radio (3) TV (4) Public service announcement (5) Educational pamphlet, poster, or other printed material (6) Health worker (7) Family, friend, neighbor, or coworker (8) Religious leader (9) Teacher (10) Other (please specify) (11) Don't know							
I2.3	What are the symptoms of TB? (can make multiple selections) (1) Rash (2) Cough (3) Cough lasting 3 weeks or longer (4) Coughing up blood (5) Severe headache (6) Nausea (7) Emaciation (8) Fever (9) Unexplained fever lasting 7 days or more (10) Chest pain (11) Shortness of breath (12) Continued weakening (13) Other (14) Don't know							
I2.4	How can you get TB? (can make multiple selections) (1) Shaking hands (2) From the spray of a TB patient's cough or sneeze (3) Sharing food (4) Sharing kitchen utensils (5) Touching public objects (doors, public buses, etc.) (6) Other (please explain) (7) Don't know							
I2.5	How can TB be prevented? (can make multiple selections) (1) Don't shake hands (2) Cover your nose and mouth when you sneeze or cough (3) Avoid eating with others (4) Wash hands after touching public surfaces (5) Close the windows at home (6) Good nutrition (7) Prayer (8) Don't know (9) Other (Please explain)							
I2.6	Who do you think is susceptible to TB? (can make multiple selections) (1) Anyone (2) Only poor people (3) Only homeless people (4) Only drunkards (5) Only drug addicts (6) Only HIV/AIDS patients (7) Only prisoners (8) Other (Please explain)							
I2.7	Can TB be treated? (1) Yes (2) No (3) Do not know							
I2.8	How should TB patients be treated? (can make multiple selections) (1) Herbal Chinese medicine (2) Rest at home, no need for treatment (3) Pray (4) The specific medication given by health facilities (5) DOTS strategy (6) Don't know (7) Other							

I2.9	If you thought you had TB, would you seek treatment? (1) Yes (2) No (skip to I2.9.2)							
I2.9.1	If yes, where would you choose to go to seek treatment? (can make multiple selections) (1) Go to the village clinic (2) Go to the township health center (3) Go to the county or above level hospital (4) Go to the TB control center (5) Go to the pharmacy to buy drugs (6) Traditional treatment (such as visit a practitioner of Chinese medicine) (7) Self treat (such as herbal medicine, etc.) (8) Other							
I2.9.2	What would be your reason for not going to a health facility? (can make multiple selections) (1) Don't know where to go (2) Too expensive (3) Transportation is inconvenient/Too far away (4) Don't trust health workers (5) Poor attitude of health workers (6) Can't leave work (Time conflict between work and health facility hours) (7) Don't want to hear bad news (8) Other (Please explain)							
I2.10	What do you think of China's TB diagnosis and treatment costs? (select one) (1) Should be free (2) Price is reasonable (3) Price is a little high (4) Price is very high (5) Don't know							
I2.11	How do you hope to obtain information and news about TB prevention and treatment? (Select the three most effective sources) (1) Newspaper or periodical (2) Radio (3) TV (4) Public service announcement (5) Educational pamphlet, poster, or other printed material (6) Health worker (7) Family, friend, neighbor, or coworker (8) Religious leader (9) Teacher (10) Other (please specify)							
I3	Hypertension							
I3.1	Is hypertension related to eating and drinking? (1) Yes (2) No (3) Don't know							
I3.1.1	Does salt intake affect hypertension? (1) Yes (2) No (3) Don't know							
I3.2	Is hypertension related to smoking? (1) Yes (2) No (3) Don't know							

13.3	Is hypertension related to being overweight? (1) Yes (2) No (3) Don't know							
13.4	Is hypertension related to drinking alcohol? (1) Yes (2) No (3) Don't know							
13.5	If a hypertensive patient is unable to control his or her blood pressure, which of the following diseases could result? (can select more than one) (1) Paralysis (stroke) (2) Coronary heart disease (angina) (3) Tumor (4) None (99) Don't know							
13.6	How should a hypertensive patient control his or her blood pressure? (can select more than one) (1) Take medicine recommended by doctor (2) Make doctor-recommended diet changes to control salt intake (3) Limit consumption of meat, eggs, etc. with high fat and cholesterol content (4) Maintain a stable mood (5) Do appropriate activities (6) Control body weight (7) Don't need to control blood pressure (99) Don't know							

J. Family revenues and expenditure	
Please record the ID of respondent	
Basic household situation	
J1 Does your family own any of the following possessions? (1)Yes (please indicate quantity) (2)No (write 0)	
J1.1 Watch/Alarm clock	
J1.2 Bicycle	
J1.3 Radio	
J1.4 Black & white TV	
J1.5 Color TV	
J1.6 Sewing machine	
J1.7 Motorbike	
J1.8 Car	
J1.9 Electric refrigerator	
J1.10 Washing machine	
J1.11 Telephone (including cell phone)	
J1.12 Farming machine	

J1.13 VCD、 DVD、 sound system、 TV receiver, etc.	
J1.14 Camera, video camera, etc. _____	
J1.15 Air conditioning	
J1.16 Cow	
J1.17 Sheep	
J1.18 Horse, donkey, mule	
J1.19 Pig	
J1.20 Irrigated land	
J1.21 Fields on a mountain	
J2 What type of house does your family live in? (1)Brick, earth, and mud (2)Wooden blocks (3)Earth and wood (4)All brick (5) Cave dwelling (6) Other	
J2.1 What material is the floor of your house made of? (1) Dirt (2) Brick (3) Ceramic tile (4) Wooden planks (5) Laminate (6) Other	
J2.2 In which year was your house built?	
J2.3 What is the area of your house? (unit: square meters)	
J3 The primary source of your family's drinking water is: (1)Tap water (2)Spring water (3)Hand-drawn well water (4)Cellar water (5)Well water (6)River or lake water (7)Ditch water (8)Other	
J4 What type of toilet does your family have (1) Flush toilet (2-6) have toilet but not flush toilet (7) No toilet (8) Other <i>[note: (2)(3)(4)(5)(6) were not translated as they do not have an English equivalent]</i>	
J5 What type of fuel does your family typically use for cooking? (can select up to two): (1)Coal (2)Electric (3)Kerosene (4)Natural gas (5)Wood/hay/etc. (6)Charcoal (7)Other	
J6. Are your living space and kitchen separated? (1) Yes (2) No	
J7. Do people and animals live in the same room? (1) Yes (2) No	
J8. Distance between your home and the nearest health facility.	
J8.1 Distance to the nearest village clinic	
J8.1.1 distance (unit: <i>li</i> , 1 <i>li</i> =0.5 kilometer)	
J8.1.2 Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.1.3 Time needed to get there using typical means of transportation: (minutes)	
J8.2 Distance to the nearest township health center	
J8.2.1 distance (unit: <i>li</i> , 1 <i>li</i> =0.5 kilometer)	
J8.2.2 Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.2.3 Time needed to get there using typical means of transportation: (minutes)	
J8.3 Distance to the nearest county hospital	
J8.3.1 distance (unit: <i>li</i> , 1 <i>li</i> =0.5 kilometer)	

J8.3.2 Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.3.3 Time needed to get there using typical means of transportation: (minutes)	
J9 Was your family identified as a local or national impoverished or subsistence household? (1) No (skip to J10) (2) Yes	
J9.1 When you enrolled in the New Cooperative Medical Scheme, did your family receive any financial assistance? (1)Yes (2)No (3)Not sure	
Household Loans	
J10 Does your family have any outstanding loans? (1)Yes (2)No (skip to J11) (3)Not sure	
J10.1 If your family has loans, what was the main reason for taking out the loan? (1)Purchase food (2)Build or fix a house (3)See the doctor (4)Send the children to school (5)Pay taxes (6)Wedding or funeral expenses (7)Agricultural production (8) Other (list)	
J10.1.1 What is the total amount of the loan?	
J11.3.2 What is the interest on the loan? (unit: RMB)	
J11 Does your family currently have any money lent out to others? (1)Yes (2)No (skip to J12) (3)Not sure	
J11.1 What is the total amount of money lent out?	
Production expenditure	
J12 What were your family's necessary production expenses last year? (eg. Raising cattle, fertilizer, seeds, farming machinery, etc.)	
Consumption expenditure	
J13 Average monthly expenditure on the following products	
J13.1 Grains, meat, fruit, vegetables, etc.	
J13.2 Oil, salt, soy sauce, vinegar, tea, seasoning, etc.	
J13.3 Daily commodities, such as soap, paper, pens, newspaper, etc.	
J13.4 Utilities, such as electric, water, heating, cooking fuel, etc.	
J13.5 Rent	
J13.6 Cigarettes, alcohol, etc.	
J13.7 Transportation, phone, postage, etc.	
J13.8 Cultural and entertainment activities	
J14 Expenditure on the following commodities over the past year (12 months)	
J14.1 Clothing	
J14.2 Education: tuition, books, school supplies (including living expenses for students not living at home)	
J14.3 New Cooperative Medical Scheme premium	
J14.4 Medicine, medical expenses, etc. (only includes what you personally paid for health services and medicine)	
J14.5 Gifts, such as a dowry, wedding gifts, New Year's gifts, funeral expenses, gifts to friends and family	
J14.6 Entertainment, gambling, etc.	
J14.7 Taxes, etc.	
J14.8 Insurance expenditure (not including NCMS)	
J14.9 Non-durable goods, such as TV, radio, fan, bicycle, motorbike, car, etc.	

J14.10 Building and/or repairing buildings	
J14.11 Other (expenditure not included in the above monthly and yearly expenditure categories)	
Savings	
J15 Over the past year was your family's income sufficient? How much were you able to save? (RMB) (If none write "0".)	

J16 Home-produced goods					
The value of total household consumption of home-produced items over the past year.					
<i>Note1: If the respondent can answer questions about the quantity, then the total value will be calculated by interviewers afterwards using the market price; whereas if the respondent cannot answer questions about the quantity, ask instead for financial value of the goods.</i>					
<i>Note 2: The unit of three quantity variables -total, sold and consumed- is jin (1 jin=0.5 kilo).</i>					
Home produced good	Total quantity produced	Quantity sold	Quantity consumed	Market price	Total value
J16.1 Wheat					
J16.2 Corn					
J16.3 Vegetables					
J16.4 Meat					
J16.5 Eggs					
J16.6 Fruit					
J16.7 Buckwheat					
J16.8 Flax					
J16.9 Potatoes					
J16.10 Other (not included in the above categories)					
Household income					
J17 In the past year, total household income (RMB) (including money sent home by family members working out of town as migrants)					
J17.1 Total amount of remittances sent home by family members working out of town as migrants (RMB)					

Appendix A2: 2011 questionnaire

1. Head of household name: _____ ID _____
Numbers: County:□ Township:□□ Village:□□□ Household:□□
NCMS Number: □□□□□□□□□□□□□□□□
Telephone: _____

2. Number of registered people in the household: _____ In the past six months, the number of people regularly living in the household (including registered residents): _____

3. Family address: _____ County, _____ Township, _____ Village

4. Interviewer's name: _____ Interviewer's ID #: _____ 4. Supervisor's name: _____ Supervisor's ID #: _____

5. Time household was entered. Date (yyyy/mm/dd): ____/____/____ Time: ____

Time questionnaire was filled out. Date (yyyy/mm/dd): ____/____/____ Time: ____ Interviewer signature: _____
Time form was double-checked. Date (yyyy/mm/dd): ____/____/____ Time: ____ Checker signature: _____

Interviewer's introductory speech upon entering household:

Hello! We are conducting a survey for the project "Enhancing TB Control through Alignment of Health System Incentives". The purpose of this survey is to understand people's health and health service utilization habits, which will provide information for the design of this area's health insurance system. We hope we can obtain your cooperation. The contents of this survey will only be used for research analysis. You and your family's answers will be kept confidential according to the requirements of the People's Republic of China's confidentiality laws for data collection. We hope you will answer the following questions honestly. Thank you very much for your cooperation!

Respondent's number (01 for the head of household, others according to the order in which they were interviewed)		01	02	03	04	05	06	07
A. Individual's basic information (A1-A10 answered only by the head of household or knowledgeable person)								
A1	Household member's name (Household member includes both registered members and individuals who have lived there over the past six months. Fill in the name of the head of household for 01.)							
A2	Relationship to head of household: (1) Head of household (2) Spouse (3) Son or daughter (4) Grandchild (5) Parent (6) Grandparent (7) Sibling (8) Other							
A3	Gender: (1) Male (2) Female							
A4	Ethnicity: (1) Han (2) Meng (3) Hui (4) Zang (5) Wei (6) Miao (7) Other							
A5	Age (based on full years of life) (Note: Interviewer should use birth date to verify. If using the hukou booklet, first fill in the complete year and month of birth.)							
A6	Marital status (1) unmarried (2) married (3) divorced (4) widow/widower (5) other							
A7	Level of education: (1) Never attended school (2) Elementary school (3) Middle school (4) High school or more							
A8	Main occupation: (1) Farmer (2) Laborer (unskilled) (3) Village cadre (4) Village doctor (5) Tradesperson (6) Teacher (7) Student (8) Business owner (9) Unemployed (10) Other (list)							
A9	In the past year since this survey, have you left town to work as a migrant? (1) Yes (2) No (Skip to A10)							
A9.1	In the past year approximately how many months total did you spend working out of town as a migrant? (unit: months)							
A10	What type of health insurance do you currently have? (can select more than one) (1) NCMS (2) Urban residents health insurance (3) Urban workers basic health insurance (4) Private insurance (5) Other (6) None							
A11	Who will be answering the following survey questions? (Interviewer fill in) (1) The individual him or herself (2) Someone else							
A11.1	Reasons for proxy: (1) working as a migrant (2) Too young (3) Mentally impaired (4) Unwilling (5) Temporary absence (6) Other							
A12	How would you assess your health compares with that of others your age? (1) Very good (2) Good (3) Average (4) Poor (5) Very poor (6) Refuse to answer (7) Don't know							

A14	Which member of your household is most familiar with the medical information of the family? (can choose 1-2 people, age 18 or above) This person needs to answer a few related questions about medical service quality . Please record the person's ID number.							
	The following questions (A15-16) only require the individual most familiar with medical information to respond (selected based on A14).							
A15	Outpatient service quality							
A15.1	We would like to ask for your rating of the village clinic outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A15.1.1	Waiting time (If you feel the waiting time was too long, score 1 ; a little long but acceptable, score 2 ; Neither long nor short, 3 ; Short, 4 ; Very short, 5)							
A15.1.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level(If you feel the environment was very poor and uncomfortable, score 1; somewhat poor and uncomfortable, score 2 ; average, 3 ; somewhat good and comfortable, 4 ; very good and comfortable, 5)							
A15.1.3	Physician politeness and consideration of patients (Impolite and inconsiderate, 1; somewhat impolite and inconsiderate, 2 ; average levels of politeness and consideration, 3 ; somewhat polite and considerate, 4 ; very polite and considerate, 5)							
A15.1.4	Physician description of illness, causes, and treatment plan (No explanation, 1; simple explanations, 2; average level of detail, 3; good level of detail in explanation, 4; very good level of detail, 5)							
A15.1.5	Drug availability (Incomplete drug availability, 1 ; somewhat incomplete, 2; average availability, 3 ; quite complete availability, 4 ; complete availability, 5)							
A15.1.6	Equipment sophistication (Very unsophisticated, 1 ; somewhat unsophisticated, 2 ; average sophistication, 3 ; somewhat sophisticated, 4 ; very sophisticated, 5)							
A15.1.7	Physician ability to diagnose and treat illness (If you have no confidence in physician ability to correctly identify and treat your illness, score 1 ; little confidence, 2 ; some confidence, 3 ; fairly confident, 4 ; very confident, 5)							
A15.1.8	Overall (Very poor, 1 ; somewhat poor, 2 ; average, 3 ; somewhat good, 4 ; very good, 5)							

A15.2	We would like to ask for your rating of the township health center outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A15.2.1	Waiting time (If you feel the waiting time was too long, score 1 ; a little long but acceptable, score 2 ; Neither long nor short, 3 ; Short, 4 ; Very short, 5)							
A15.2.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level(If you feel the environment was very poor and uncomfortable, score 1; somewhat poor and uncomfortable, score 2 ; average, 3 ; somewhat good and comfortable, 4 ; very good and comfortable, 5)							
A15.2.3	Physician politeness and consideration of patients							
A15.2.4	Physician description of illness, causes, and treatment plan							
A15.2.5	Drug availability							
A15.2.6	Equipment sophistication							
A15.2.7	Physician ability to diagnose and treat illness							
A15.2.8	Overall							
A15.3	We would like to ask for your rating of the county hospital outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A15.3.1	Waiting time (If you feel the waiting time was too long, score 1 ; a little long but acceptable, score 2 ; Neither long nor short, 3 ; Short, 4 ; Very short 5)							
A15.3.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level(If you feel the environment was very poor and uncomfortable, score 1; somewhat poor and uncomfortable, score 2 ; average, 3 ; somewhat good and comfortable, 4 ; very good and comfortable, 5)							
A15.3.3	Physician politeness and consideration of patients							
A15.3.4	Physician description of illness, causes, and treatment plan							
A15.3.5	Drug availability							
A15.3.6	Equipment sophistication							
A15.3.7	Physician ability to diagnose and treat illness							

A15.3.8	Overall							
A16	Inpatient service quality							
A16.1	We would like to ask for your rating of the township health center outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A16.1.1	Waiting time (If you feel the waiting time was too long, score 1 ; a little long but acceptable, score 2 ;Neither long nor short, 3 ;Short, 4 ;Very short, 5)							
A16.1.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level(If you feel the environment was very poor and uncomfortable, score 1; somewhat poor and uncomfortable, score 2 ; average, 3 ; somewhat good and comfortable, 4 ; very good and comfortable, 5)							
A16.1.3	Physician politeness and consideration of patients							
A16.1.4	Physician description of illness, causes, and treatment plan							
A16.1.5	Drug availability							
A16.1.6	Equipment sophistication							
A16.1.7	Physician ability to diagnose and treat illness							
A16.1.8	Overall							
A16.2	We would like to ask for your rating of the county hospital inpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A16.2.1	Waiting time (If you feel the waiting time was too long, score 1 ; a little long but acceptable, score 2 ;Neither long nor short, 3 ;Short, 4 ;Very short, 5)							
A16.2.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level(If you feel the environment was very poor and uncomfortable, score 1; somewhat poor and uncomfortable, score 2 ; average, 3 ; somewhat good and comfortable, 4 ; very good and comfortable, 5)							
A16.2.3	Physician politeness and consideration of patients							
A16.2.3	Physician description of illness, causes, and treatment plan							
A16.2.3	Drug availability							

A16.2.3	Equipment sophistication								
A16.2.7	Physician ability to diagnose and treat illness								
A16.2.8	Overall								
A16.3	We would like to ask for your rating of the above county hospital inpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.								
A16.3.1	Waiting time (If you feel the waiting time was too long, score 1 ; a little long but acceptable, score 2 ;Neither long nor short, 3 ;Short, 4 ;Very short, 5)								
A16.3.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level(If you feel the environment was very poor and uncomfortable, score 1; somewhat poor and uncomfortable, score 2 ; average, 3 ; somewhat good and comfortable, 4 ; very good and comfortable, 5)								
A16.3.3	Physician politeness and consideration of patients								
A16.3.4	Physician description of illness, causes, and treatment plan								
A16.3.5	Drug availability								
A16.3.6	Equipment sophistication								
A16.3.7	Physician ability to diagnose and treat illness								
A16.3.8	Overall								
B. Illness, injury, and outpatient visits over the past 14 days									
B1	In the past 14 days, have you been ill? (1) Yes (2) No (Skip to part C)								
B3.1	What illness or injury did you suffer? (fill in the name of the illness—if multiple, please list all)								
B3.2	(fill in disease code—use National Health Services National Health Survey’s codes)								
B3.3	In the 14 days before this survey, have you had any coughing symptoms? (1) yes (2) no (Skip to B4)								
B3.4	Has the cough continued for 2 weeks or more? (1) yes (2) no								

B3.5	Is the cough accompanied by any of the following symptoms (choose many) : (1) Continuous coughing, phlegm (2) Coughing up blood (3) Fever, sweating (4) Backache (5) Weakness (6) Other							
B3.6	Do any of the members of your household, family, friends or neighbors have similar symptoms? (1) Yes (Specify the number of people _____) (2) No (Write 0)							
B4	In the 14 days before this survey, how many days were you bedridden because you were ill? (unit: days) ? (if not bedridden, write 0)							
B5	If you are a worker or employee, how many days did you take off of work because you were ill ? (unit: days) (if didn't take days off, write 0)							
B6	If you are a student, how many days did you take off from your studies because you were ill? (unit: days) ? (if didn't take days off, write 0)							
B7	After you got sick, did you undergo treatment? (including self-treatment) ? (1) Yes (Skip to B8) (2) No							
B7.1	What is your primary reason for not undergoing treatment? (After answering, skip to Part C.) (1)Felt it was not serious (2) Economic difficulties (3) No time (4) Transportation is inconvenient (5) No effective measures (6) Other							
B8	How did you treat the illness? (1) Within two weeks went to see a doctor <i>and also</i> self-treated (2) Within two weeks went to see a doctor (Skip to B11) (3) Only self-treated							
B10.	If you self-treated, the source of your medicine was: (can select a maximum of three) (1) Already in the home (Skip to B11) (2) Purchased at pharmacy (Ask B10.11-14) (3) Purchased at a health facility (without seeing a doctor) (Skip to B10.21 -26) (4) Someone gave it to me (Skip to B11) (5) Other							

B10.11	Why did you choose to buy drugs from the pharmacy rather than going to see a physician? (1) More complete selection at the pharmacy (2) I felt the disease was not serious/did not require a doctor (3) Cheaper at the pharmacy (4) Didn't have time to visit the doctor (5) Transportation to the doctor is inconvenient (6) Services provided by the doctor are poor (7) Other							
B10.12	If the medicine was purchased at the pharmacy, how much did you spend on pharmaceutical products in the past fourteen days? (unit: yuan)							
B10.13	(In the past 14 days) How many types of medicine did you buy at the pharmacy?							
B10.14	Of those, how many types were treating cough? (types) If none, write 0							
B10.21	Why did you choose to buy drugs at the health facility rather than seeing a doctor? (1) I am clear about my condition and know which drugs would be most effective (2) Self-medication according to physician's instructions (3) I felt the disease was not serious/did not require a doctor (4) Other							
B10.22	If the medicine was purchased at the health facility, how much did you spend on pharmaceutical products in the past fourteen days? (unit: yuan)							
B10.23	Did you receive reimbursement from NCMS? (1) Received (2) Did not receive (Skip to B10.25)							
B10.24	After reimbursement, how much did you actually pay out of pocket? (Yuan)							
B10.25	(In the past 14 days) How many types of medicine did you buy at the health facility?							
B10.26	Of those, how many types were treating cough? (types) If none, write 0							
The following questions ask about visits to the doctor in the past two weeks. If you did not see a doctor in the past two weeks (B8=(3)), then part B is finished—Skip to section C.								
B11	In the past 14 days, how many times did you go to see a doctor? (unit: times)							
The following questions are about your first visit to the doctor (according to the individual or a knowledgeable representative)								
B12	Where did you go for your first visit to the doctor?(Please write the full, detailed name of the facility, even for private clinics)							

B12.1	The primary reason for selecting the above facility was: (1) It is nearby/convenient (2) The price is reasonable (3) The technical capacity is high. (4) Its facilities and equipment are good. (5) It has a variety of drugs. (6) The service attitude is good. (7) It is a designated reimbursable hospital (8) Someone I know works there. (9) It has a dependable doctor. (10) I was referred (11) Other							
B12.3	Was this visit for the purpose of treating cough or cough-related symptoms? (1) Yes (2) No (Skip to B13)							
B12.4	Had you been coughing 2 weeks or more? (1) Yes (2) No							
B13	At this visit, did you have any of the following treatments?							
B13.1	(1) Injection (1) Yes (2) No							
B13.2	(2) Intravenous drip (1) Yes (2) No							
B13.3	(3) Oral medicine (1) Yes (2) No (Skip to B13.4)							
B13.3.1	The medicine you took was: (1) Traditional Chinese medicine (2) Western medicine (3) A combination of Chinese and Western medicine (4) Don't know							
B13.3.2	Where did the medicine you took primarily come from: (can select up to 3) (1) Purchased at the health facility (2) Already had it at home (3) Purchased at the pharmacy (4) Given by someone else (5) Other							
B.13.4	On this visit to the doctor, did you accept any diagnostic investigations? (1) Yes (2) No (Skip to B13.5)							
B13.4.1	What type of inspections did you have? (1) X-ray (2) Sputum smear (3) Ultrasound (4) CT (5) Basic blood test (6) Other blood test (7) Urine test (8) Clinical examination (9) Other (Please fill in precise name)							
B13.5	Were you referred from this visit to a higher level facility? (1) Yes (2) No (Skip to B13.6)							
B13.5.1	What level facility were you referred to? (1) Township (2) County (3) County-above general hospital (4) CDC Center (Preventive Care) TB outpatient care (5) Other							
B13.6	Was this visit the result of a referral from another facility? (1) Yes (2) No (Skip to B14)							

B13.6.1	Before you were transferred, what level facility had you visited? (1)Village (2) Township (3) County (4) CDC Center (5) Outside of county facility (6) Other								
B14	On this visit to the doctor how much was the total cost?								
B14.1	How much of that was paid in cash by you?								
B14.1.1	Did you receive NCMS reimbursement (recorded on your NCMS record book)? (1)Received (Skip to B16) (2) Did not receive								
B14.1.2	Why didn't you receive reimbursement? (1) I forgot to bring my record book to the visit (2) Reimbursement process requires too much time (3) Reimbursement process is very complicated (4) I was told that the services/drugs I needed were not covered (5)The cost of drugs was so low, it wasn't worth it (6) Other								
B16	How would you evaluate this visit to the doctor: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to B17)								
B16.1	What were you most unsatisfied with during this visit? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Other								
The following questions are about your second visit to the doctor (according to the individual or a knowledgeable representative)									
B17	Where did you go for your second visit to the doctor?(Please write the full, detailed name of the facility, even for private clinics)								
B17.1	The primary reason for selecting the above facility was: (1) It is nearby/convenient (2) The price is reasonable (3) The technical capacity is high. (4) Its facilities and equipment are good. (5) It has a variety of drugs. (6) The service attitude is good. (7) It is a designated reimbursable hospital. (8) Someone I know works there. (9) It has a dependable doctor. (10) I was referred (11) Other								
B17.3	Was this visit for the purpose of treating cough or cough-related symptoms? (1) Yes (2) No (Skip to B13)								

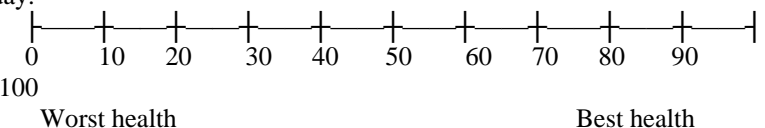
B17.4	Had you been coughing 2 weeks or more? (1) Yes (2) No								
B18	At this visit, did you have any of the following treatments?								
B18.1	(1) Injection (1) Yes (2) No								
B18.2	(2) Intravenous drip (1) Yes (2) No								
B18.3	(3) Oral medicine (1) Yes (2) No (Skip to B18.4)								
B18.3.1	The medicine you took was: (1) Traditional Chinese medicine (2) Western medicine (3) A combination of Chinese and Western medicine (4) Don't know								
B18.3.2	Where did the medicine you took primarily come from: (can select up to 3) (1) Purchased at the health facility (2) Already had it at home (3) Purchased at the pharmacy (4) Given by someone else (5) Other								
B.18.4	On this visit to the doctor, did you accept any diagnostic investigations? (1) Yes (2) No (Skip to B18.5)								
B18.4.1	What type of inspections did you have?接受了那种检查: (1) X-ray (2) Sputum smear (3)Ultrasound (4) CT (5) Basic blood test (6) Other blood test (7) Urine test (8)Clinical test (9) Other (Please fill in precise name)								
B18.5	Were you referred from this visit to a higher level facility? (1) Yes (2) No (Skip to B18.6)								
B18.5.1	What level facility were you referred to? (1) Township (2) County (3) County-above general hospital (4) CDC Center (Preventive Care) TB outpatient care (5) Other								
B18.6	Was this visit the result of a referral from another facility? (1) Yes (2)No (Skip to B20)								
B18.6.1	Before you were transferred, what level facility had you visited? (1)Village (2) Township (3) County (4) CDC Center (5) Outside of county facility (6) Other								
B20	On this visit to the doctor how much was the total cost?								
B20.1	How much of that was paid in cash by you?								
B20.1.1	Did you receive NCMS reimbursement (recorded on your NCMS record book)? (1)Received (Skip to B22) (2) Did not receive								

B20.1.2	Why didn't you receive reimbursement? (1) I forgot to bring my record book to the visit (2) Reimbursement process requires too much time (3) Reimbursement process is very complicated (4) I was told that the services/drugs I needed were not covered (5)The cost of drugs was so low, it wasn't worth it (6) Other							
B22	How would you evaluate this visit to the doctor: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to section C)							
B22.1	What were you most unsatisfied with during this visit? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Other							
C. Hospitalizations within the past year								
C1	In the past year, has a doctor advised you that you need to be hospitalized? (1) Yes (2) No (Skip to Part D)							
C1.1	How many times in the past year?							
C2	In the past year, how many times did a doctor advise you that you need to be hospitalized but you did not go to the hospital? (Fill in the exact number of times. If never, write "0" and skip to C3.)							
C2.1	Your primary reason for not being hospitalized was: (1) Unnecessary (2) No time (3) Economic troubles (4) Poor service (5) Price too high (5) No beds (6) Other							
C3	In the past year, how many times were you hospitalized? (Fill in the exact number. If none, write "0" and skip to Part D.)							
Most recent hospitalization in the past year								
C4	What is the name of the illness (injury, poison, etc.) for which you were hospitalized? (During the survey write the name of the ailment, during the cross-check fill in the code for the ailment)							
C4.1	When did you enter the hospital?: (year)							
C4.1.1	(month)							
C4.2	What is the name of the institution where you were hospitalized? (Please write full, complete name)							

C4.2.1	What level of hospital is it? (1) County or less (Skip to C4.3) (2) Outside county							
C4.2.2	Why did you choose to go to an above-county level hospital for this hospitalization? (1) Environment is good (2) High technical capacity (3) Serious illness (4) Equipment is good (5) Better selection of drugs (6) Physician recommendation (7)Close to home (8)Other							
C4.3	Were you referred to the hospital this time? (1) Yes (2) No (Skip to C4.4)							
C4.3.1	If you were referred, from where were you referred? (1) Township health center (2) County (district) hospital (3) Municipal hospital (4) Provincial hospital (5) Military hospital (6) County-level Chinese Medicine Hospital (7) Municipal-level or above Chinese Medicine Hospital (8) Private hospital (9) Other							
C4.4	For how many days were you hospitalized this time? (days)							
C4.5	During this hospitalization, did you undergo surgery? (1) Yes (2) No							
C4.6	If you work, how many days did you take off due to your hospitalization this time? (including days in the hospital, if none write "0".)							
C4.6.1	If you are a student, how many how many days did you take off due to your hospitalization this time? (including days in the hospital, if none write "0".)							
C4.6.2	For how many days before or after your hospitalization were you bedridden? (Does not include days in the hospital. If none write "0".)							
C4.7	Why did you check out of the hospital this time? (1) Fully recovered, doctor advised that you check out (2) Not fully recovered, but doctor still advised that you check out (3) Against doctor's orders (4) Other (If you selected 3 continue on to C4.7.1, all other selections skip to C4.8)							
C4.7.1	If you checked out of the hospital against doctor's orders, the reason was: (1) Illness hadn't been cured after a long time (2) Economic difficulties (3) Limited hospital resources (4) Poor service attitude (5) Other							
C4.8	In the past year, were you enrolled in the New Cooperative Medical System? (1) Yes (2) No (Skip to C4.10)							

C4.8.1	If you were enrolled in NCMS, how were you reimbursed for this hospitalization? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Hospital directly lowered the hospitalization fee. (Skip to C4.10)							
C4.9	During this hospitalization, how much did you spend up front? (Does not include transportation costs, personal nurse, bribes)							
C4.9.1	How much did the NCMS Office reimburse you for this hospitalization? (RMB) (Skip to C4.11)							
C4.10	During this hospitalization, how much did you spend out of pocket? (Does not include transportation costs, personal nurse, bribes)							
C4.11	During this hospitalization, how much did you spend on transportation, vitamins, food, and/or a personal nurse? (yuan) (If none write "0".)							
C4.12	While you were hospitalized, did you or your family members give gifts or money to hospital employees? (1) Gave money (2) Gave gifts (3) Both gifts and money (4) Neither gifts nor money (5) Other (eg. taking them out to dinner, etc.)							
C4.12.1	If yes, how much did you spend?							
C4.13	How would you evaluate this hospitalization: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to C5)							
C4.13.1	What were you most unsatisfied with during this hospitalization? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Treatment environment is poor (12) Inadequate treatment or effect not noticeable (13) Other							
Your second most recent visit to the hospital in the past year (If you had two or more hospitalizations in the past year. Otherwise, skip to part D.)								
C5	What is the name of the illness (injury, poison, etc.) for which you were hospitalized? (During the survey write the name of the ailment, during the cross-check fill in the code for the ailment)							
C5.1	When did you enter the hospital?: (year)							
C5.1.1	(month)							

C5.2	What is the name of the institution where you were hospitalized? (Please write full, complete name)								
D. Chronic disease patients									
D1	In the past 6 months have you suffered from a chronic disease that was formally diagnosed by a doctor? (1) Yes (2) No (Skip to part E.)								
D1.1	If yes, which disease(s)? (If more than three, please fill in the names of the three most severe.) (According to the National Health Services National Health Survey numbers.)								
D2	In the past three months, how many times have you seen a doctor about these diseases? (If never, write "0" and skip to Part E.)								
D3.1	In the past three months, the main type of facility at which you've seen a doctor for this disease has been: (1) Village clinic (2) Township health center (3) County hospital (4) Private clinic (5) Other								
D3.2	Have you already obtained an NCMS Chronic Disease card? (1) Yes (2) No (Skip to D3.4)								
D3.2.1	If you were enrolled in NCMS, how were you reimbursed for treatment? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Facility directly lowered the hospitalization fee. (If selected (2), skip to D3.4)								
D3.3	In the past three months, how much did you spend on these diseases up front? (Does not include transportation costs, personal nurse, bribes)								
D3.3.2	In the past three months, how much did the NCMS Office reimburse you for these diseases? (If none, skip to D3.5)								
D3.4	In the past 3 months, how much did you spend out of pocket? (Does not include transportation costs, personal nurse, bribes)								
D3.5	In the past three months, how much did you spend at the pharmacy because of this disease? (yuan) (if none, write "0")								
E. Health and behavior of adults aged 15 and over (Only survey the adult population aged 15 and over)									
E1	Today, in terms of your mobility: (1) Can move in four directions without any difficulty (2) Movement is a little difficult (3) Bedridden								

E2	Today, in terms of your ability to take care of yourself (wash hands and face, get dressed): (1) No problems at all (2) Some problems (3) Unable to wash or dress oneself								
E3	Today, in terms of your ability to carry out regular daily activities (work, read, or household chores): (1) Can carry out daily activities without any problem (2) Some problems (3) Unable to carry out daily activities								
E4	Today, in terms of pain or discomfort: (1) No pain or discomfort (2) Moderate pain or discomfort (3) Extreme pain or discomfort								
E5	Today, in terms of your level of worry or depression: (1) No worry or depression (2) Moderate worry or depression (3) Extreme worry or depression								
E6	On this ruler, please indicate the point that best represents your health today. 								
E7	Generally speaking, your health is: ① Extremely good ② Good ③ Fine ④ Average ⑤ Poor								
E8	Compared with one year ago, how would you describe your health? ① Much better than 1 year ago ② A little better than 1 year ago ③ About the same as 1 year ago ④ A little worse than 1 year ago ⑤ Much worse than 1 year ago								
F. Survey of already married 15-49 year old women (including married, divorced, and widowed women)									
F1	In the past year, have you had a gynecological exam? (breast exam, pap smear, etc.) (1) Yes (2) No								
F2	Have you given birth since February 1, 2009? (1) Yes (2) No (Skip to G1)								
F3	For your most recent birth, how many pre-natal exams did you have? (unit: exams)? (If none, write "0" and skip to F4.)								

F3.1	At how many weeks of pregnancy did you have your first pre-natal exam? (unit: weeks)								
F3.2	Where did you have your pre-natal exam(s)? (Can select up to three.) (1) County/district-level hospital or above (2) County/district-level or above TCM hospital (3) Maternal and child health facility (4) Township health center (5) Community health center (6) Family planning center (7) Village Clinic (8) Other								
F3.3	During your pre-natal exam, did the doctor perform any of the following exams?								
F3.3.1	(1) Weigh you: (1) Yes (2) No								
F3.3.2	(2) Draw blood for blood test: (1) Yes (2) No								
F3.3.3	(3) Measure blood pressure: (1) Yes (2) No								
F3.3.4	(4) Routine urine exam: (1) Yes (2) No								
F3.3.5	(5) Ultrasound: (1) Yes (2) No								
F4	Location of birth: (1) County/district-level hospital or above (2) County/district-level or above TCM hospital (3) Maternal and child health facility (4) Township health center (5) Community health center (6) Family planning center (7) Village Clinic (8) Other								
F4.1	If you gave birth at home, your primary reason for not going to the hospital was: (1) No need to go to hospital (2) Didn't make it on time (fast birth) (3) Economic difficulties (4) Transportation inconvenient (5) Other								
F4.2	If you gave birth at home, who delivered the baby? (1) Doctor from the township-level or above (2) Village doctor (3) Licensed midwife (4) Unlicensed midwife (5) Family member (6) Other								
F4.3	This birth was: (1) Natural (2) C-section (3) Other								
F5	If you are enrolled in the New Cooperative Medical Scheme, how were you reimbursed for this time giving birth? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Facility directly lowered the fee. (3) Self-pay								
F5.4	How much did this birth-related hospitalization cost in total? (not including transportation, personal nurse, bribes)								
	How much reimbursement was provided through the rural pregnancy policy (yuan)? (None, write 0; don't know, write 99999)								
F5.5	How much was reimbursed by NCMS? (yuan) (None, write 0; don't know, write 99999)								

F5.6	How much of the costs incurred by this birth did you pay? (not including transportation costs, personal nurse, or bribes) (None, write 0; don't know, write 99999)							
F6	In the 42 days after the birth, how many home visits did you accept from doctors or health staff? (visits) ? (If none write "0".)							
G. Survey of children 5 years and younger								
G1	Survey ID number of child's mother (If the mother was not surveyed, write "0".)							
G2	In the past 12 months, how many times did the child have a routine check-up? (times) ? (not including an exam to treat an illness)							
G3	Does the child have a planned immunization/inoculation care or booklet? (1) Yes (2) No (3) Don't know							
G4	Has s/he received the BCG vaccine? (1) Yes (2) No							
G4.1	How many times did s/he have DPT shots? (times)							
G4.2	How many doses of the polio vaccine? (times)							
G4.3	Did s/he have the measles vaccine? (1) Yes (2) No							
G4.4	How many times did s/he have the Hepatitis B vaccine? (times)							
G4.4.1	When was his/her first time having the Hepatitis B vaccine? (1) Within 24 hours of birth (2) Within a week of birth (3) Within a month of birth (4) More than a month after birth (5) Not sure							
G4.5	Has s/he received the meningitis vaccine? (1) Yes (2) No							
G4.6	Has s/he received the Japanese encephalitis vaccine? (1) Yes (2) No							
G4.7	Has s/he received the Hepatitis A vaccine? (1) Yes (2) No							
G4.8	Has s/he received the MMR vaccine? (1) Yes (2) No							
G5	Where do you typically go for immunizations? (1) CDC center (2) Township hospital (3) Community health center (4) Village clinic (5) Other							
G6	In the past 2 weeks has this child had diarrhea? (1) Yes (2) No (Skip to H1)							
G7	While suffering from diarrhea, did he/she take any of the following ? (1) ORS powder (powder-like objects in water to drink) (2) oral rehydration salt solution (open direct consumption) (3) homemade oral rehydration salt solution (salt or sugar in the liquid food)							

G7.1	Other than these, did s/he take any medicines? (1) Yes (2) No (Skip to H)								
G7.2	Did s/he take any anti-inflammatory drugs? (1) Yes (2) No (3) Don't know								
H. Survey of elderly individuals aged 55 and above									
H1	Is walking 2 li (1 km) difficult for you? 1 No difficulty (<i>skip to H4</i>) 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H2	Is walking 1 li (500 meters) difficult for you? 1 No difficulty (<i>skip to H4</i>) 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H3	Is walking around a room difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H4	Is sitting continuously for 2 hours difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H5	Is standing up after sitting for a long time difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H6	Is climbing a flight of stairs difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H7	Is lifting a 5 kg object such as a bag of rice or flour difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H8	Is squatting difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H9	Is dressing yourself difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
H10	Is going to the bathroom by yourself difficult for you? 1 No difficulty 2 A little difficult, but can still do it 3 Need help 4 Can't do it 5 Refuse to answer 6 Don't know								
I. Health behavior and knowledge									
I1	Smoking								

I1.1	Do you smoke? (1) I've never smoked (skip to I2) (2) Occasionally (3) Often (4) I've already quit (skip to I1.5)							
I1.2	How old were you when you started to smoke? (age)							
I1.3	On average, how many cigarettes a day do you smoke? (fill in the exact number)							
I1.4	Approximately how much do you spend each month on smoking? (skip to I2)							
I1.5	For how long have you quit smoking?							
I1.5.1	What was your main reason(s) for quitting smoking? (can make multiple selections) (1) Already sick (2) To prevent disease (3) Economic difficulties (4) Family opposed it (5) Environmental restrictions (6) Set an example (7) Educational campaign (8) Doctor's advice (9) Other (10) Don't know							

Code of the person being interviewed (Either head of household or knowledgeable individual)	
I2 Tuberculosis	
I2.1 Do you think TB is a serious disease? (select one) (1) Very serious (2) Somewhat serious (3) Not very serious (4) Don't know	
I2.2 How did you first learn about TB? (can make multiple selections) (1) Newspaper or periodical (2) Radio (3) TV (4) Public service announcement (5) Educational pamphlet, poster, or other printed material (6) Health worker (7) Family, friend, neighbor, or coworker (8) Religious leader (9) Teacher (10) Other (please specify) (11) Don't know	
I2.3 What are the symptoms of TB? (can make multiple selections) (1) Rash (2) Cough (3) Cough lasting 3 weeks or longer (4) Coughing up blood (5) Severe headache (6) Nausea (7) Emaciation (8) Fever (9) Unexplained fever lasting 7 days or more (10) Chest pain (11) Shortness of breath (12) Continued weakening (13) Other (14) Don't know	
I2.4 How can you get TB? (can make multiple selections) (1) Shaking hands (2) From the spray of a TB patient's cough or sneeze (3) Sharing food (4) Sharing kitchen utensils (5) Touching public objects (doors, public buses, etc.) (6) Other (please explain) (7) Don't know	

Code of the person being interviewed (Either head of household or knowledgeable individual)	
I2.5	How can TB be prevented? (can make multiple selections) (1) Don't shake hands (2) Cover your nose and mouth when you sneeze or cough (3) Avoid eating with others (4) Wash hands after touching public surfaces (5) Close the windows at home (6) Good nutrition (7) Prayer (8) Don't know (9) Other (Please explain:)
I2.6	Who do you think is susceptible to TB? (can make multiple selections) (1) Anyone (2) Only poor people (3) Only homeless people (4) Only drunkards (5) Only drug addicts (6) Only HIV/AIDS patients (7) Only prisoners (8) Other (Please explain:)
I2.7	Can TB be treated? (1)Yes (2)No
I2.8	How should TB patients be treated? (can make multiple selections) (1) Herbal Chinese medicine (2) Rest at home, no need for treatment (3) Pray (4) The specific medication given by health facilities (5) DOTS strategy (6) Don't know (7) Other:
I2.9	If you thought you had TB, would you seek treatment? (1) Yes (2) No (skip to I2.9.2)
I2.9.1	If yes, where would you choose to go to seek treatment? (can make multiple selections) (1) Go to the village clinic (2) Go to the township health center (3) Go to the county or above level hospital (4) Go to the TB control center (5) Go to the pharmacy to buy drugs (6) Traditional treatment (such as visit a practitioner of Chinese medicine) (7) Self treat (such as herbal medicine, etc.) (8) Other
I2.9.2	What would be your reason for not going to a health facility? (can make multiple selections) (1) Don't know where to go (2) Too expensive (3) Transportation is inconvenient/Too far away (4) Don't trust health workers (5) Poor attitude of health workers (6) Can't leave work (Time conflict between work and health facility hours) (7) Don't want to hear bad news (8) Other (Please explain)
I2.10	What do you think of China's TB diagnosis and treatment costs?(select one) (1) Should be free (2) Price is reasonable (3) Price is a little high (4) Price is very high (5) Don't know
I2.11	How do you hope to obtain information and news about TB prevention and treatment? (Select the three most effective sources.) (1) Newspaper or periodical (2) Radio (3) TV (4) Public service announcement (5) Educational pamphlet, poster, or other printed material (6) Health worker (7) Family, friend, neighbor, or coworker (8) Religious leader (9) Teacher (10) Other (please specify)
I3 High blood pressure	
I3.1	Is hypertension related to eating and drinking? (1) Yes (2) No (3) Don't know
I3.1.1	Does salt intake affect hypertension? (1) Yes (2) No (3) Don't know
I3.2	Is hypertension related to smoking? (1) Yes (2) No (3) Don't know
I3.3	Is hypertension related to being overweight? (1) Yes (2) No (3) Don't know
I3.4	Is hypertension related to drinking alcohol? (1) Yes (2) No (3) Don't know
I3.5	If a hypertensive patient is unable to control his or her blood pressure, which of the following diseases could result? (can select more than one) (1) Paralysis (stroke) (2) Coronary heart disease (angina) (3) Tumor (4) None (99) Don't know

Code of the person being interviewed (Either head of household or knowledgeable individual)	
I3.6 How should a hypertensive patient control his or her blood pressure? (can select more than one) (1) Take medicine recommended by doctor (2) Make doctor-recommended diet changes to control salt intake (3) Limit consumption of meat, eggs, etc. with high fat and cholesterol content (4) Maintain a stable mood (5) Do appropriate activities (6) Control body weight (7) Don't need to control blood pressure (99) Don't know	
J. Family revenues and expenditure	
Basic household situation	
J1 Does your family own any of the following possessions? (1) Yes (please indicate quantity) (2) No (write 0)	
J1.1 Watch/Alarm clock	
J1.2 Bicycle	
J1.3 Radio	
J1.4 Black & white TV	
J1.5 Color TV	
J1.6 Sewing machine	
J1.7 Motorbike	
J1.8 Car	
J1.9 Electric refrigerator	
J1.10 Washing machine	
J1.11 Telephone (including cell phone)	
J1.12 Farming machine	
J1.13 VCD、 DVD、 sound system、 TV receiver, etc.	
J1.14 Camera, video camera, etc. _____	
J1.15 Air conditioning	
J1.16 Cow	
J1.17 Sheep	
J1.18 Horse, donkey, mule	
J1.19 Pig	
J1.20 Irrigated land	
J1.21 Fields on a mountain	
J2 What type of house does your family live in? (1) Brick, earth, and mud (2) Wooden blocks (3) Earth and wood (4) All brick (5) Cave dwelling (6) Other	
J2.1 What material is the floor of your house made of? (1) Dirt (2) Brick (3) Ceramic tile (4) Wooden planks (5) Laminate (6) Other	
J2.2 In which year was your house built?	
J2.3 What is the area of your house? (unit: square meters)	

Code of the person being interviewed (Either head of household or knowledgeable individual)	
J3 The primary source of your family's drinking water is: (1) Tap water (2) Spring water (3) Hand-drawn well water (4)Cellar (5) Well water (6)River or lake water (7)Ditch water (8)Other	
J4 What type of toilet does your family have: (1) Flush toilet (2) Pit or waterless toilet (3) Commode (4) Pail (5) No toilet (8) Other	
J5 What type of fuel does your family typically use for cooking? (can select up to two) : (1) Coal (2) Electric (3) Kerosene (4) Natural gas (5) Wood/hay/etc. (6) Charcoal (7)Other	
J6. Are your living space and kitchen separated? (1) Yes (2) No	
J7. Do people and animals live in the same room? (1) Yes (2) No	
J8. Distance between your home and the nearest health facility.	
J8.1 Distance to the nearest village clinic	
J8.1.1 <i>miles</i>	
J8.1.2 Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.1.3 Time needed to get there using typical means of transportation: (minutes)	
J8.2 Distance to the nearest township health center	
J8.2.1 <i>li</i>	
J8.2.2 Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.2.3 Time needed to get there using typical means of transportation: (minutes)	
J8.3 Distance to the nearest county hospital	
J8.3.1 <i>li</i>	
J8.3.2 Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.3.3 Time needed to get there using typical means of transportation: (minutes)	
J9 Was your family identified as a local or national impoverished or subsistence household? (1) No (skip to J10) (2) Yes	
J9.1 When you enrolled in the New Cooperative Medical Scheme, did your family receive any financial assistance? (1) Yes (2) No (3) Not sure	
Household Loans	
J10 Does your family have any outstanding loans? (1) Yes (2) No (skip to J11) (3) Not sure	
J10.1 If your family has loans, what was the main reason for taking out the loan? (1) Purchase food (2) Build or fix a house (3) See the doctor (4) Send the children to school (5) Pay taxes (6) Wedding or funeral expenses (7)Agricultural production (8) Other (Explain)	
J10.1.1 What is the total amount of the loan?	
J11.3.2 What is the interest on the loan? (unit: RMB)	
J11 Does your family currently have any money lent out to others? (1) Yes (2) No (skip to J12) (3) Not sure	
J11.1 What is the total amount of money lent out?	

Code of the person being interviewed (Either head of household or knowledgeable individual)	
Production expenditure	
J12 What were your family's necessary production expenses last year? (eg. Raising cattle, fertilizer, seeds, farming machinery, etc.)	
Consumption expenditure	
J13 Average monthly expenditure on the following products	
J13.1 Grains, meat, fruit, vegetables, etc.	
J13.2 Oil, salt, soy sauce, vinegar, tea, seasoning, etc.	
J13.3 Daily commodities, such as soap, paper, pens, newspaper, etc.	
J13.4 Utilities, such as electric, water, heating, cooking fuel, etc.	
J13.5 Rent	
J13.6 Cigarettes, alcohol, etc.	
J13.7 Transportation, phone, postage, etc.	
J13.8 Cultural and entertainment activities	
J15 Expenditure on the following commodities over the past year (12 months)	
J14.1 Clothing	
J14.2 Education: tuition, books, school supplies (including living expenses for students not living at home)	
J14.3 New Cooperative Medical Scheme premium	
J14.4 Medicine, medical expenses, etc. (only includes what you personally paid for health services and medicine)	
J14.5 Gifts, such as a dowry, wedding gifts, New Year's gifts, funeral expenses, gifts to friends and family	
J14.6 Entertainment, gambling, etc.	
J14.7 Taxes, etc.	
J14.8 Insurance expenditure (not including NCMS)	
J14.9 Non-durable goods, such as TV, radio, fan, bicycle, motorbike, car, etc.	
J14.10 Building and/or repairing buildings	
J14.11 Other (expenditure not included in the above monthly and yearly expenditure categories)	
Savings	
J15 Over the past year was your family's income sufficient? How much were you able to save? (RMB) (If none write "0".)	

J16 Home-produced goods					
The value of total household consumption of home-produced items over the past year. (If the respondent can answer questions about the quantity, then you can use the market price to obtain the total value. But if the respondent cannot answer questions about the quantity, ask instead for financial value of the goods)					
Home produced good	Total quantity produced (<i>jin</i>)	Quantity sold (<i>jin</i>)	Quantity consumed (<i>jin</i>)	Market price (obtained from the market; don't need to ask)	Total value (calculated by interviewer)
J16.1 Wheat					

J16.2 Corn					
J16.3 Vegetables					
J16.4 Meat					
J16.5 Eggs					
J16.6 Fruit					
J16.7 Buckwheat					
J16.8 Flax					
J16.9 Potatoes					
J16.10 Other (not included in the above categories)					
Household income					
J17 In the past year, total household income (yuan) (including money sent home by family members working out of town as migrants)					
J17.1 Total amount of remittances sent home by family members working out of town as migrants (yuan)					

Appendix A3: 2012 questionnaire

1. Name of head of household: _____

ID Numbers: County: □

Township:□□ Village:□□ Household:□□

NCMS Number: □□□□□□□□□□□□□□

Telephone: _____

2. Number of registered people in the household:

In the past six months, the number of people regularly living in the household (including registered residents):

3. Family address: _____ County, _____ Township, _____ Village

4. Interviewer's name: _____ Interviewer's ID #: _____ 4. Supervisor's name: _____ Supervisor's ID #: _____

5. Time household was entered. Date (yyyy/mm/dd): ____/____/____ Time: ____

6. Has the household been split since last interview in 2011? (1) Yes (2) No

If yes, how many households it split into? This questionnaire interviews the ____ split household.

Time questionnaire was filled out. Date (yyyy/mm/dd): ____/____/____ Time: ____ Interviewer signature:

Time form was double-checked. Date (yyyy/mm/dd): ____/____/____ Time: ____ Checker signature:

Interviewer's introductory speech upon entering household:

Hello! We are conducting a survey for the project "Enhancing TB Control through Alignment of Health System Incentives". The purpose of this survey is to understand people's health and health service utilization habits, which will provide information for the design of this area's health insurance system. We hope we can obtain your cooperation. The contents of this survey will only be used for research analysis. You and your family's answers will be kept confidential according to the requirements of the People's Republic of China's confidentiality laws for data collection. We hope you will answer the following questions honestly. Thank you very much for your cooperation!

Respondent's number (01 for the head of household, others according to the order in which they were interviewed)		01	02	03	04	05	06	07
A. Individual's basic information (A1-A10 answered only by the head of household or knowledgeable person)								
A1	Household member's name (Household member includes both registered members and individuals who have lived there over the past six months. Fill in the name of the head of household for 01.)							
A2	Relationship to head of household: (1) Head of household (2) Spouse (3) Son or daughter (4) Grandchild (5) Parent (6) Grandparent (7) Sibling (8) Other							
A3	Gender: (1) Male (2) Female							
A4	Ethnicity: (1) Han (2) Meng (3) Hui (4) Zang (5) Wei (6) Miao (7) Other							
A5	Age (based on full years of life): (Note: Interviewer should use birth date to verify. If using the hukou booklet, first fill in the complete year and month of birth.)							
A6	Marital status: (1) unmarried (2) married (3) divorced (4) widow/widower (5) other							
A7	Level of education: (1) Never attended school (2) Elementary school (3) Middle school (4) High school or more							
A8	Main occupation: (1) Farmer (2) Laborer (unskilled) (3) Village cadre (4) Village doctor (5) Tradesperson (6) Teacher (7) Student (8) Business owner (9) Unemployed (10) Other (list)							
A9	In the past year since this survey, have you left town to work as a migrant? (1) Yes (2) No (Skip to A10)							
A9.1	In the past year approximately how many months total did you spend working out of town as a migrant? (unit: months)							
A10	What type of health insurance do you currently have? (can select more than one) (1) Integrated health insurance for urban and rural areas (combined NCMS and Urban residents health insurance schemes) (if yes, answer A10.2-A10.3.3; otherwise skip to A11) (3) Urban workers basic health insurance (4) Private insurance (5) Other (6) None							

A10.1	What type of insurance did you have last year? (all need to answer) (1) NCMS (2) Urban residents health insurance (3) Urban workers basic health insurance (4) Private insurance (5) Other (6) None							
<i>If A10=(1), please answer A10.2-A10.3.3</i>								
A10.2	Which package did you choose? (1) Package 1 (2) Package 2 (3) Package 3							
A10.3	Why did you choose this plan? (1) Higher reimbursement (2) Lower premium (3) I was advised by family/relatives/friends to choose this plan (4) Enrollment officer told me I was assigned this plan (5) Don't know							
A10.3.1	If receiving outpatient care, what facility level offers you the highest reimbursement rate? (1) Village clinic (2) Township health center (3) County hospital (4) Above county hospital (5) All the same (6)Don't know							
A10.3.2	If receiving inpatient care, what facility level offers you the highest reimbursement rate and the lowest deductible? (1) Township health center (2) County hospital (3) Above county hospital (4) All the same (5)Don't know							
A10.3.3	If receiving inpatient care above the county hospital level, does your reimbursement rate increase if you are referred? (1) Yes (2) No (3) Don't know							
A14	Which member of your household is most familiar with the medical information of the family? (can choose 1-2 people, age 18 or above) This person needs to answer a few related questions about medical service quality . Please record the person's ID number.							
	The following questions (A15-16) only require the individual most familiar with medical information to respond (selected based on A14).							
A15	Outpatient service quality							
A15.1	We would like to ask for your rating of the village clinic outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A15.1.1	Waiting time (If you feel the waiting time was too long, score 1; Very short, 5)							

A15.1.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level (If you feel the environment was very poor and uncomfortable, score 1; very good and comfortable, 5)							
A15.1.3	Physician politeness and consideration of patients (Impolite and inconsiderate, 1; very polite and considerate, 5)							
A15.1.4	Physician description of illness, causes, and treatment plan (No explanation, 1; very good level of detail, 5)							
A15.1.5	Drug availability (Incomplete drug availability, 1; complete availability, 5)							
A15.1.6	Equipment sophistication (Very unsophisticated, 1; very sophisticated, 5)							
A15.1.7	Physician ability to diagnose and treat illness (If you have no confidence in physician ability to correctly identify and treat your illness, score 1; very confident, 5)							
A15.1.8	Overall (Very poor, 1; very good, 5)							
A15.2	We would like to ask for your rating of the township health center outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A15.2.1	Waiting time (If you feel the waiting time was too long, score 1; Very short, 5)							
A15.2.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level (If you feel the environment was very poor and uncomfortable, score 1; very good and comfortable, 5)							
A15.2.3	Physician politeness and consideration of patients							
A15.2.4	Physician description of illness, causes, and treatment plan							
A15.2.5	Drug availability							
A15.2.6	Equipment sophistication							
A15.2.7	Physician ability to diagnose and treat illness							
A15.2.8	Overall							
A15.3	We would like to ask for your rating of the county hospital outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A15.3.1	Waiting time (If you feel the waiting time was too long, score 1; Very short 5)							

A15.3.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level (If you feel the environment was very poor and uncomfortable, score 1; very good and comfortable, 5)							
A15.3.3	Physician politeness and consideration of patients							
A15.3.4	Physician description of illness, causes, and treatment plan							
A15.3.5	Drug availability							
A15.3.6	Equipment sophistication							
A15.3.7	Physician ability to diagnose and treat illness							
A15.3.8	Overall							
A16	Inpatient service quality							
A16.1	We would like to ask for your rating of the township health center outpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A16.1.1	Waiting time (If you feel the waiting time was too long, score 1; Very short, 5)							
A16.1.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level (If you feel the environment was very poor and uncomfortable, score 1; very good and comfortable, 5)							
A16.1.3	Physician politeness and consideration of patients							
A16.1.4	Physician description of illness, causes, and treatment plan							
A16.1.5	Drug availability							
A16.1.6	Equipment sophistication							
A16.1.7	Physician ability to diagnose and treat illness							
A16.1.8	Overall							
A16.2	We would like to ask for your rating of the county hospital inpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.							
A16.2.1	Waiting time (If you feel the waiting time was too long, score 1; Very short, 5)							
A16.2.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level (If you feel the environment was very poor and uncomfortable, score 1; very good and comfortable, 5)							
A16.2.3	Physician politeness and consideration of patients							
A16.2.3	Physician description of illness, causes, and treatment plan							

A16.2.3	Drug availability								
A16.2.3	Equipment sophistication								
A16.2.7	Physician ability to diagnose and treat illness								
A16.2.8	Overall								
A16.3	We would like to ask for your rating of the above county hospital inpatient service quality. Your answer can be based on your subjective impressions, what friends/relatives have told you, or media reports. 5 represents very good, 1 represents very poor.								
A16.3.1	Waiting time (If you feel the waiting time was too long, score 1; Very short, 5)								
A16.3.2	Environment (Waiting room, treatment room, bathroom) cleanliness and comfort level (If you feel the environment was very poor and uncomfortable, score 1; very good and comfortable, 5)								
A16.3.3	Physician politeness and consideration of patients								
A16.3.4	Physician description of illness, causes, and treatment plan								
A16.3.5	Drug availability								
A16.3.6	Equipment sophistication								
A16.3.7	Physician ability to diagnose and treat illness								
A16.3.8	Overall								
A11	Who will be answering the following survey questions (section B,C,D)? (Interviewer fill in) (1) The individual him or herself (2) Someone else								
A11a	Please record the ID of respondent if A11=(2)								
A11.1	Reasons for proxy: (1)working as a migrant (2)Too young (3)Mentally impaired (4)Unwilling (5)Temporary absence (6)Other								
A12	How would you assess your health compares with that of others your age? (1) Very good (2) Good (3) Average (4) Poor (5) Very poor (6) Refuse to answer (7) Don't know								
B. Illness, injury, and outpatient visits over the past 14 days									
B1	In the past 14 days, have you been ill? (1)Yes (2)No (Skip to part C)								
B3.1	What illness or injury did you suffer? (fill in the name of the illness—if multiple, please list all)								
B3.2	(fill in disease code—use National Health Services National Health Survey's codes)								

B3.3	In the 14 days before this survey, have you had any coughing symptoms? (1)Yes (2) No (Skip to B4)								
B3.4	Has the cough continued for 2 weeks or more? (1)Yes (2)No								
B3.5	Is the cough accompanied by any of the following symptoms (choose many): (1) Continuous coughing, phlegm (2) Coughing up blood (3) Fever, sweating (4) Chest pain (5) Weakness (6) Other								
B3.6	Do any of the members of your household, family, friends or neighbors have similar symptoms? (1)Yes (Specify the number of people _____) (2) No (Write 0)								
B4	In the 14 days before this survey, how many days were you bedridden because you were ill? (unit: days)? (if not bedridden, write 0)								
B5	If you are a worker or employee, how many days did you take off of work because you were ill? (unit: days) (if didn't take days off, write 0)								
B6	If you are a student, how many days did you take off from your studies because you were ill? (unit: days)? (if didn't take days off, write 0)								
B7	After you got sick, did you undergo treatment? (including self-treatment)? (1) Yes (Skip to B8) (2) No								
B7.1	What is your primary reason for not undergoing treatment? (After answering skip to Part C) (1)Felt it was not serious (2) Economic difficulties (3) No time (4) Transportation is inconvenient (5) No effective measures (6) Other								
B8	How did you treat the illness? (1)Within two weeks went to see a doctor <i>and also</i> self-treated (2) Within two weeks went to see a doctor (Skip to B11) (3) Only self-treated								
B10	If you self-treated, the source of your medicine was: (can select a maximum of three) (1)Already in the home (Skip to B11) (2)Purchased at pharmacy (Ask B10.11-14) (4)Someone gave it to me (Skip to B11) (5)Other (Skip to B11)								

B10.11	Why did you choose to buy drugs from the pharmacy rather than going to see a physician? (1) More complete selection at the pharmacy (2) I felt the disease was not serious/did not require a doctor (3) Cheaper at the pharmacy (4) Didn't have time to visit the doctor (5) Transportation to the doctor is inconvenient (6) Services provided by the doctor are poor (7) Other							
B10.12	If the medicine was purchased at the pharmacy, how much did you spend on pharmaceutical products in the past fourteen days? (unit: yuan)							
B10.13	(In the past 14 days) How many types of medicine did you buy at the pharmacy?							
B10.14	Of those, how many types were treating cough? (types) If none, write 0							
The following questions ask about visits to the doctor in the past two weeks. If you did not see a doctor in the past two weeks (B8=(3)), then part B is finished—Skip to section C.								
B11	In the past 14 days, how many times did you go to see a doctor? (unit: times)							
The following questions are about your first visit to the doctor (according to the individual or a knowledgeable representative)								
B12	Where did you go for your first visit to the doctor? (Please write the full, detailed name of the facility, even for private clinics)							
B12.1	The primary reason for selecting the above facility was: (1) It is nearby/convenient (2) The price is reasonable (3) The technical capacity is high. (4) Its facilities and equipment are good. (5) It has a variety of drugs. (6) The service attitude is good. (7) It is a designated reimbursable hospital (8) Someone I know works there. (9) It has a dependable doctor. (10) I was referred (11) Other							
B12.3	Was this visit for the purpose of treating cough or cough-related symptoms? (1) Yes (2) No (Skip to B13)							
B12.4	Had you been coughing 2 weeks or more? (1) Yes (2) No							
B13	At this visit, did you have any of the following treatments?							

B13.1	Injection (1)Yes (2)No								
B13.2	Intravenous drip (1)Yes (2)No								
B13.3	Oral medicine (1)Yes (2)No (Skip to B13.4)								
B13.3.1	The medicine you took was: (1) Traditional Chinese medicine (2) Western medicine (3) A combination of Chinese and Western medicine (4) Don't know								
B13.3.2	Where did the medicine you took primarily come from: (can select up to 3) (1)Purchased at the health facility (2)Already had it at home (3)Purchased at the pharmacy (4)Given by someone else (5)Other								
B.13.4	On this visit to the doctor, did you accept any diagnostic investigations? (1)Yes (2)No (Skip to B13.5)								
B13.4.1	What type of inspections did you have? (1) X-ray (2) Sputum smear (3)Ultrasound (4) CT (5) Routine blood test (6)Other blood test (7) Urine test (8)Clinical examination (9)Other (Please fill in precise name)								
B13.5	Were you referred from this visit to a higher level facility? (1)Yes (2)No (Skip to B13.6)								
B13.5.1	What level facility were you referred to? (1)Township (2)County (3)Above-county general hospital (4)CDC Center (Preventive Care) TB outpatient care (5)Other								
B13.6	Was this visit the result of a referral from another facility? (1)Yes (2)No (Skip to B14)								
B13.6.1	Before you were transferred, what level facility had you visited? (1)Village (2)Township (3) County (4) CDC Center (5) Above-county facility (6) Other								
B14	On this visit to the doctor how much was the total cost?								
B14.1	How much of that was paid in cash by you?								
B14.1.1	Did you receive NCMS reimbursement (recorded on your NCMS record book)? (1)Received (Skip to B16) (2) Did not receive								

B14.1.2	Why didn't you receive reimbursement? (1) I forgot to bring my record book to the visit (2) Reimbursement process requires too much time (3) Reimbursement process is very complicated (4) I was told that the services/drugs I needed were not covered (5) The cost of drugs was so low, it wasn't worth it (6) Other							
B16	How would you evaluate this visit to the doctor: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to B17)							
B16.1	What were you most unsatisfied with during this visit? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Other							
The following questions are about your second visit to the doctor (according to the individual or a knowledgeable representative)								
B17	Where did you go for your second visit to the doctor? (Please write the full, detailed name of the facility, even for private clinics)							
B17.1	The primary reason for selecting the above facility was: (1) It is nearby/convenient (2) The price is reasonable (3) The technical capacity is high. (4) Its facilities and equipment are good. (5) It has a variety of drugs. (6) The service attitude is good. (7) It is a designated reimbursable hospital. (8) Someone I know works there. (9) It has a dependable doctor. (10) I was referred (11) Other							
B17.3	Was this visit for the purpose of treating cough or cough-related symptoms? (1) Yes (2) No (Skip to B13)							
B17.4	Had you been coughing 2 weeks or more? (1) Yes (2) No							
B18	At this visit, did you have any of the following treatments?							
B18.1	Injection (1) Yes (2) No							

B18.2	Intravenous drip (1)Yes (2)No								
B18.3	Oral medicine (1)Yes (2)No (Skip to B18.4)								
B18.3.1	The medicine you took was: (1) Traditional Chinese medicine (2) Western medicine (3) A combination of Chinese and Western medicine (4) Don't know								
B18.3.2	Where did the medicine you took primarily come from: (can select up to 3) (1) Purchased at the health facility (2) Already had it at home (3) Purchased at the pharmacy (4) Given by someone else (5) Other								
B.18.4	On this visit to the doctor, did you accept any diagnostic investigations? (1)Yes (2)No (Skip to B18.5)								
B18.4.1	What type of inspections did you have? (1) X-ray (2) Sputum smear (3)Ultrasound (4) CT (5) Routine blood test (6)Other blood test (7) Urine test (8)Clinical examination (9)Other (Please fill in precise name)								
B18.5	Were you referred from this visit to a higher level facility? (1)Yes (2)No (Skip to B18.6)								
B18.5.1	What level facility were you referred to? (1)Township (2)County (3)County-above general hospital (4)CDC Center (Preventive Care) TB outpatient care (5)Other								
B18.6	Was this visit the result of a referral from another facility? (1)Yes (2)No (Skip to B20)								
B18.6.1	Before you were transferred, what level facility had you visited? (1)Village (2)Township (3) County (4) CDC Center (5) Above-county facility (6) Other								
B20	On this visit to the doctor how much was the total cost?								
B20.1	How much of that was paid in cash by you?								
B20.1.1	Did you receive NCMS reimbursement (recorded on your NCMS record book)? (1)Received (Skip to B22) (2) Did not receive								

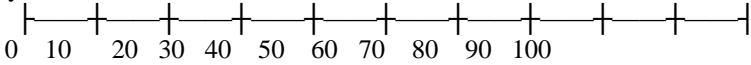
B20.1.2	Why didn't you receive reimbursement? (1) I forgot to bring my record book to the visit (2) Reimbursement process requires too much time (3) Reimbursement process is very complicated (4) I was told that the services/drugs I needed were not covered (5)The cost of drugs was so low, it wasn't worth it (6)Other							
B22	How would you evaluate this visit to the doctor: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to section C)							
B22.1	What were you most unsatisfied with during this visit? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Other							
C. Hospitalizations within the past year								
C1	In the past year, has a doctor advised you that you need to be hospitalized? (1)Yes (2)No (Skip to Part D)							
C1.1	How many times in the past year?							
C2	In the past year, how many times did a doctor advise you that you need to be hospitalized but you did not go to the hospital? (Fill in the exact number of times. If never, write "0" and skip to C3)							
C2.1	Your primary reason for not being hospitalized was: (1)Unnecessary (2)No time (3)Economic troubles (4)Poor service (5)Price too high (5)No beds (6)Other							
C3	In the past year, how many times were you hospitalized? (Fill in the exact number. If none, write "0" and skip to Part D.)							
Most recent hospitalization in the past year								
C4	What is the name of the illness (injury, poison, etc.) for which you were hospitalized? (During the survey write the name of the ailment, during the cross-check fill in the code for the ailment)							
C4.1	When did you enter the hospital?: (year)							
C4.1.1	(month)							

C4.2	What is the name of the institution where you were hospitalized? (Please write full, complete name)							
C4.2.1	Where did you hospitalized? (1)within-county health facility (answer C4.3-C4.3.7) (2) above-county level health facility (answer C4.2.2-C4.2.4)							
C4.2.2	Why did you choose to go to an above-county level hospital for this hospitalization? (1)Environment is good (2)High technical capacity (3)Serious illness (4)Equipment is good (5)Better selection of drugs (6)Physician recommendation (7)Close to home (8)Other							
C4.2.3	Were you referred to above-county health facility from within-county health facility? (1)yes (2)no (skip to C4.4)							
C4.2.4	If referred, which level of health facility were you referred from? (1) township health centre (2) county hospital (3)county Chinese hospital (4)others							
C4.3	Were you referred to the hospital this time? (1)Yes (2)No (Skip to C4.4)							
C4.3.1	If you were referred, from where were you referred? (1) Township health center (2) County (district) hospital (3) Municipal hospital (4) Provincial hospital (5) Military hospital (6) County-level Chinese Medicine Hospital (7) Municipal-level or above Chinese Medicine Hospital (8) Private hospital (9) Other							
C4.3.2	During your hospitalization in some within-county health facility, did you engage any doctors from other health facilities to treat your disease? (1) yes (2) no (skip to C4.4)							
C4.3.3	Where did the doctor come from? (1) Hospital affiliated to Ningxia Medical University (2) Ningxia Provincial hospital (3) Yinchuan hospital (4) others (5) don't know							
C4.3.4	Who wanted to engage a doctor from other health facility? (1)patient himself took the initiative in engaging a doctor from other health facility (2)the health facility where patient was hospitalized requested to engage a doctor from other health facility							

C4.3.5	Who got in touch with the engaged doctor? (1) the patient and relatives themselves (2) the patient specified the doctor and the health facility where patient was hospitalized helped to get in touch (3) the health facility where patient was hospitalized got in touch with the doctor directly (4)others							
C4.3.6	What was the engaged doctor responsible for? (1) make a diagnosis (2) work out a treatment plan (3) perform a surgery (4)others (5)don't know							
C4.3.7	How much did you spend for engaging this doctor? (fill in exact number)							
C4.4	For how many days were you hospitalized this time? (days)							
C4.5	During this hospitalization, did you undergo surgery? (1) Yes (2) No							
C4.6	If you work, how many days did you take off due to your hospitalization this time? (including days in the hospital, if none write "0".)							
C4.6.1	If you are a student, how many days did you take off due to your hospitalization this time? (including days in the hospital, if none write "0")							
C4.6.2	For how many days before or after your hospitalization were you bedridden? (Does not include days in the hospital. If none write "0".)							
C4.7	Why did you check out of the hospital this time? (1) Fully recovered, doctor advised that you check out (2) Not fully recovered, but doctor still advised that you check out (3) Against doctor's orders (4) Other (If you selected 3 continue on to C4.7.1, all other selections skip to C4.8)							
C4.7.1	If you checked out of the hospital against doctor's orders, the reason was: (1) Illness hadn't been cured after a long time (2) Economic difficulties (3) Limited hospital resources (4) Poor service attitude (5) Other							
C4.8	In the past year, were you enrolled in the New Cooperative Medical System? (1) Yes (2) No (Skip to C4.10)							
C4.8.1	If you were enrolled in NCMS, how were you reimbursed for this hospitalization? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Hospital directly lowered the hospitalization fee. (Skip to C4.10)							

C4.9	During this hospitalization, how much did you spend up front? (Does not include transportation costs, personal nurse, bribes)							
C4.9.1	How much did the NCMS Office reimburse you for this hospitalization? (yuan) (Skip to C4.11)							
C4.10	During this hospitalization, how much did you spend out of pocket? (Does not include transportation costs, personal nurse, bribes)							
C4.11	During this hospitalization, how much did you spend on transportation, vitamins, food, and/or a personal nurse? (yuan) (If none write "0")							
C4.12	While you were hospitalized, did you or your family members give gifts or money to hospital employees? (1) Gave money (2) Gave gifts (3) Both gifts and money (4) Neither gifts nor money (5) Other (eg. taking them out to dinner, etc.)							
C4.12.1	If yes, how much did you spend?							
C4.13	How would you evaluate this hospitalization: (1) Very satisfied (2) Satisfied (3) Neither satisfied nor unsatisfied (4) Unsatisfied (5) Very unsatisfied (If you chose, 1, 2, or 3—skip to C5)							
C4.13.1	What were you most unsatisfied with during this hospitalization? (May choose up to 3) (1) Nothing (2) Low technical capacity (3) Poor facilities (4) Limited selection of drugs (5) Poor service (6) They offered unnecessary services (including drugs and exams) (7) Price was unreasonable (8) Fee was too high (9) Tedious administrative procedures (10) Long waiting time (11) Treatment environment is poor (12) Inadequate treatment or effect not noticeable (13) Other							
Your second most recent visit to the hospital in the past year (If you had two or more hospitalizations in the past year. Otherwise, skip to part D)								
C5	What is the name of the illness (injury, poison, etc.) for which you were hospitalized? (During the survey write the name of the ailment, during the cross-check fill in the code for the ailment)							
C5.1	When did you enter the hospital?: (year)							
C5.1.1	(month)							
C5.2	What is the name of the institution where you were hospitalized? (Please write full, complete name)							
D. Chronic disease patients								

D1	Have you suffered from a chronic disease that was formally diagnosed by a doctor? (1) Yes (2) No (Skip to part E)							
D1.1	If yes, which disease(s)? (If more than three, please fill in the names of the three most severe.) (According to the National Health Services National Health Survey numbers.)							
D2	In the past three months, how many times have you seen a doctor about these diseases? (If never, write "0" and skip to Part E.)							
D3.1	In the past three months, the main type of facility at which you've seen a doctor for this disease has been: (1) Village clinic (2) Township health center (3) County hospital (4) Private clinic (5) Other							
D3.2	Have you already obtained an NCMS Chronic Disease card? (1) Yes (2) No (Skip to D3.4)							
D3.2.1	If you were enrolled in NCMS, how were you reimbursed for treatment? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Facility directly lowered the hospitalization fee. (If selected (2), skip to D3.4)							
D3.3	In the past three months, how much did you spend on these diseases up front? (Does not include transportation costs, personal nurse, bribes)							
D3.3.2	In the past three months, how much did the NCMS Office reimburse you for these diseases? (If none, skip to D3.5)							
D3.4	In the past 3 months, how much did you spend out of pocket? (Does not include transportation costs, personal nurse, bribes)							
D3.5	In the past three months, how much did you spend at the pharmacy because of this disease? (yuan) (if none, write "0")							
E. Health and behavior of adults aged 15 and over (Only survey the adults aged 15 and over)								
E1	Today, in terms of your mobility: (1)Can move in four directions without any difficulty (2)Movement is a little difficult (3)Bedridden							

E2	Today, in terms of your ability to take care of yourself (wash hands and face, get dressed): (1)No problems at all (2)Some problems (3)Unable to wash or dress oneself							
E3	Today, in terms of your ability to carry out regular daily activities (work, read, or household chores): (1)Can carry out daily activities without any problem (2)Some problems (3)Unable to carry out daily activities							
E4	Today, in terms of pain or discomfort: (1)No pain or discomfort (2)Moderate pain or discomfort (3)Extreme pain or discomfort							
E5	Today, in terms of your level of worry or depression: (1)No worry or depression (2)Moderate worry or depression (3)Extreme worry or depression							
E6	On this ruler, please indicate the point that best represents your health today. 							
E7	Generally speaking, your health is: (1)Extremely good (2)Good (3)Fine (4)Average (5)Poor							
E8	Compared with one year ago, how would you describe your health? (1)Much better than 1 year ago (2)A little better than 1 year ago (3)About the same as 1 year ago (4)A little worse than 1 year ago (5)Much worse than 1 year ago							
F. Survey of already married 15-49 year old women (including married, divorced, and widowed women)								
F1	In the past year, have you had a gynecological exam?(breast exam, pap smear, etc.) (1) Yes (2) No							
F2	Have you given birth since February 1, 2009? (1) Yes (2) No (Skip to G1)							
F3	For your most recent birth, how many pre-natal exams did you have? (unit: exams)? (If none, write "0" and skip to F4.)							
F3.1	At how many weeks of pregnancy did you have your first pre-natal exam? (unit: weeks)							

F3.2	Where did you have your pre-natal exam(s)? (Can select up to three) (1) County/district-level hospital or above (2) County/district-level or above TCM hospital (3) Maternal and child health facility (4) Township health center (5) Community health center (6) Family planning center (7) Village Clinic (8) Other							
F3.3	During your pre-natal exam, did the doctor perform any of the following exams?							
F3.3.1	Weigh you: (1) Yes (2) No							
F3.3.2	Draw blood for blood test: (1) Yes (2) No							
F3.3.3	Measure blood pressure: (1) Yes (2) No							
F3.3.4	Routine urine exam: (1) Yes (2) No							
F3.3.5	Ultrasound: (1) Yes (2) No							
F4	Location of birth: (1) County/district-level hospital or above (2) County/district-level or above TCM hospital (3) Maternal and child health facility (4) Township health center (5) Community health center (6) Family planning center (7) Village Clinic (8) Other							
F4.1	If you gave birth at home, your primary reason for not going to the hospital was: (1) No need to go to hospital (2) Didn't make it on time (fast birth) (3) Economic difficulties (4) Transportation inconvenient (5) Other							
F4.2	If you gave birth at home, who delivered the baby? (1) Doctor from the township-level or above (2) Village doctor (3) Licensed midwife (4) Unlicensed midwife (5) Family member (6) Other							
F4.3	This birth was: (1) Natural (2) C-section (3) Other							

F5	If you are enrolled in the New Cooperative Medical Scheme, how were you reimbursed for this time giving birth? (1) Paid the entirety up front, then went to the NCMS Office to apply for reimbursement. (2) Facility directly lowered the fee. (3)Self-pay							
F5.4	How much did this birth-related hospitalization cost in total? (not including transportation, personal nurse, bribes)							
F5.4.1	How much reimbursement was provided through the rural pregnancy policy? (None, write 0; don't know, write 99999)							
F5.5	How much was reimbursed by NCMS? (yuan) (None, write 0; don't know, write 99999)							
F5.6	How much of the costs incurred by this birth did you pay? (not including transportation costs, personal nurse, or bribes) (None, write 0; don't know, write 99999)							
F6	In the 42 days after the birth, how many home visits did you accept from doctors or health staff? (visits) (If none write "0".)							
G. Survey of children 5 years and younger								
G1	Survey ID number of child's mother (If the mother was not surveyed, write "0".)							
G2	In the past 12 months, how many times did the child have a routine check-up?(times) (not including an exam to treat an illness)							
G3	Does the child have a planned immunization/inoculation care or booklet? (1) Yes (2) No (3) Don't know							
G4	Has s/he received the BCG vaccine? (1) Yes (2) No							
G4.1	How many times did s/he have DPT shots? (times)							
G4.2	How many doses of the polio vaccine? (times)							
G4.3	Did s/he have the measles vaccine? (1) Yes (2) No							
G4.4	How many times did s/he have the Hepatitis B vaccine? (times)							
G4.4.1	When was his/her first time having the Hepatitis B vaccine? (1) Within 24 hours of birth (2) Within a week of birth (3) Within a month of birth (4) More than a month after birth (5) Not sure							
G4.5	Has s/he received the meningitis vaccine? (1) Yes (2) No							

G4.6	Has s/he received the Japanese encephalitis vaccine? (1) Yes (2) No							
G4.7	Has s/he received the Hepatitis A vaccine? (1) Yes (2) No							
G4.8	Has s/he received the MMR vaccine? (1) Yes (2) No							
G5	Where do you typically go for immunizations? (1)CDC center (2)Township hospital (3)Community health center (4)Village clinic (5)Other							
G6	In the past 2 weeks has this child had diarrhea? (1) Yes (2) No (Skip to H1)							
G7	While suffering from diarrhea, did he/she take any of the following? (1) ORS powder (powder-like objects in water to drink) (2) oral rehydration salt solution (open direct consumption) (3) homemade oral rehydration salt solution (salt or sugar in the liquid food)							
G7.1	Other than these, did s/he take any medicines? (1) Yes (2) No (Skip to H)							
G7.2	Did s/he take any anti-inflammatory drugs? (1) Yes (2) No (3)Don't know							
H. Survey of elderly individuals aged 55 and above								
H1	Is walking 2 li (1 km) difficult for you? (1) No difficulty (skip to H4) (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H2	Is walking 1 li (500 meters) difficult for you? (1) No difficulty (skip to H4) (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H3	Is walking around a room difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H4	Is sitting continuously for 2 hours difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							

H5	Is standing up after sitting for a long time difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H6	Is climbing a flight of stairs difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H7	Is lifting a 5 kg object such as a bag of rice or flour difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H8	Is squatting difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H9	Is dressing yourself difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							
H10	Is going to the bathroom by yourself difficult for you? (1)No difficulty (2) A little difficult, but can still do it (3) Need help (4) Can't do it (5) Refuse to answer (6) Don't know							

I. Health behavior and knowledge (not surveyed in 2012)		
J. Family revenues and expenditure		
Please record the ID of respondent		
Basic household situation		
J1	Does your family own any of the following possessions? (1)Yes (please indicate quantity) (2)No (write 0)	
J1.1	Watch/Alarm clock	
J1.2	Bicycle	
J1.3	Radio	
J1.4	Black & white TV	
J1.5	Color TV	
J1.6	Sewing machine	
J1.7	Motorbike	
J1.8	Car	
J1.9	Electric refrigerator	
J1.10	Washing machine	
J1.11	Telephone (including cell phone)	

J1.12	Farming machine	
J1.13	VCD、 DVD、 sound system、 TV receiver, etc.	
J1.14	Camera, video camera, etc. _____	
J1.15	Air conditioning	
J1.16	Cow	
J1.17	Sheep	
J1.18	Horse, donkey, mule	
J1.19	Pig	
J1.20	Irrigated land	
J1.21	Fields on a mountain	
J2	What type of house does your family live in? (1)Brick, earth, and mud (2)Wooden blocks (3)Earth and wood (4)All brick (5) Cave dwelling (6) Other	
J2.1	What material is the floor of your house made of? (1) Dirt (2) Brick (3) Ceramic tile (4) Wooden planks (5) Laminate (6) Other	
J2.2	In which year was your house built?	
J2.3	What is the area of your house? (unit: square meters)	
J3	The primary source of your family's drinking water is: (1)Tap water (2)Spring water (3)Hand-drawn well water (4)Cellar (5)Well water (6)River or lake water (7)Ditch water (8)Other	
J4	What type of toilet does your family have: (1) Flush toilet (2) Pit (3) Pail (4) Waterless toilet (5) Commode (6) Dry latrine (7) No toilet (8) Other	
J5	What type of fuel does your family typically use for cooking? (can select up to two): (1)Coal (2)Electric (3)Kerosene (4)Natural gas (5)Wood/hay/etc. (6)Charcoal (7)Other	
J6	Are your living space and kitchen separated? (1) Yes (2) No	
J7	Do people and animals live in the same room? (1) Yes (2) No	
J8	Distance between your home and the nearest health facility	
J8.1	Distance to the nearest to village clinic	
J8.1.1	Distance (<i>li</i>)	
J8.1.2	Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.1.3	Time needed to get there using typical means of transportation: (minutes)	
J8.2	Distance to the nearest township health center	
J8.2.1	Distance (<i>li</i>)	

J8.2.2	Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.2.3	Time needed to get there using typical means of transportation: (minutes)	
J8.3	Distance to the nearest county hospital	
J8.3.1	Distance (<i>li</i>)	
J8.3.2	Usual method of transportation: (1) Walk (2) Public bus (3) Bicycle (4) Motorbike (5) Other	
J8.3.3	Time needed to get there using typical means of transportation: (minutes)	
J9	Was your family identified as a local or national impoverished or subsistence household? (1) No (skip to J10) (2) Yes	
J9.1	When you enrolled in the New Cooperative Medical Scheme, did your family receive any financial assistance? (1)Yes (2)No (3)Not sure	
Household Loans		
J10.2	Does your household borrow money due to medical care in the past 6 months? (1) Yes (2) No	
J10	Does your family have any outstanding loans? (1)Yes (2)No (skip to J11) (3)Not sure	
J10.1	If your family has loans, what was the main reason for taking out the loan? (1)Purchase food (2)Build or fix a house (3)See the doctor (4)Send the children to school (5)Pay taxes (6)Wedding or funeral expenses (7)Agricultural production (8) Other (Explain)	
J10.1.1	What is the total amount of the loan?	
J11.3.2	What is the interest on the loan? (unit: RMB)	
J11	Does your family currently have any money lent out to others? (1)Yes (2)No (skip to J12) (3)Not sure	
J11.1	What is the total amount of money lent out?	
Production expenditure		
J12	What were your family's necessary production expenses last year? (eg. Raising cattle, fertilizer, seeds, farming machinery, etc.)	
Consumption expenditure		
J13	Average monthly expenditure on the following products	
J13.1	Grains, meat, fruit, vegetables, etc.	
J13.2	Oil, salt, soy sauce, vinegar, tea, seasoning, etc.	
J13.3	Daily commodities, such as soap, paper, pens, newspaper, etc.	
J13.4	Utilities, such as electric, water, heating, cooking fuel, etc.	
J13.5	Rent	
J13.6	Cigarettes, alcohol, etc.	

J13.7	Transportation, phone, postage, etc.	
J13.8	Cultural and entertainment activities	
J14	Expenditure on the following commodities over the past year (12 months)	
J14.1	Clothing	
J14.2	Education: tuition, books, school supplies (including living expenses for students not living at home)	
J14.3	New Cooperative Medical Scheme premium	
J14.4	Medicine, medical expenses, etc. (only includes what you personally paid for health services and medicine)	
J14.5	Gifts, such as a dowry, wedding gifts, New Year's gifts, funeral expenses, gifts to friends and family	
J14.6	Entertainment, gambling, etc.	
J14.7	Taxes, etc.	
J14.8	Insurance expenditure (not including NCMS)	
J14.9	Non-durable goods, such as TV, radio, fan, bicycle, motorbike, car, etc.	
J14.10	Building and/or repairing buildings	
J14.11	Other (expenditure not included in the above monthly and yearly expenditure categories)	
Savings		
J15	Over the past year was your family's income sufficient? How much were you able to save? (yuan) (If none write "0")	

J16 Home-produced goods					
The value of total household consumption of home-produced items over the past year. (If the respondent can answer questions about the quantity, then you can use the market price to obtain the total value. But if the respondent cannot answer questions about the quantity, ask instead for financial value of the goods)					
Home produced good	Total quantity produced (<i>jin</i>)	Quantity sold (<i>jin</i>)	Quantity consumed (<i>jin</i>)	Market price (obtained from the market; don't need to ask)	Total value (calculated by interviewer)
J16.1 Wheat					
J16.2 Corn					
J16.3 Vegetables					
J16.4 Meat					
J16.5 Eggs					
J16.6 Fruit					
J16.7 Buckwheat					
J16.8 Flax					
J16.9 Potatoes					
J16.10 Other (not included in the above categories)					

K4.2	Do you agree “increased alcohol consumption (defined as more than 4 drinks in one sitting; or as more than 10 drinks a week for women and 14 drinks a week for men) has many negative health consequences”? (1) Strongly agree (2) Agree (3) I don’t know (4) Disagree (5) Strongly disagree	
K5	<i>Risk aversion</i> Given your present circumstances, which would you choose between the following two options? (To interviewer: Please ask the questions one by one until the answer is switched to (2))	
K5.1	(1) RMB300 for certain (2) a 50/50 chance (coin toss) of RMB500 if heads, 0 if tails	
K5.2	(1) RMB300 for certain (2) a 50/50 chance (coin toss) of RMB600 if heads, 0 if tails	
K5.3	(1) RMB300 for certain (2) a 50/50 chance (coin toss) of RMB700 if heads, 0 if tails	
K5.4	(1) RMB300 for certain (2) a 50/50 chance (coin toss) of RMB800 if heads, 0 if tails	
K5.5	(1) RMB300 for certain (2) a 50/50 chance (coin toss) of RMB900 if heads, 0 if tails	
K5.6	(1) RMB300 for certain (2) a 50/50 chance (coin toss) of RMB1000 or more if heads, 0 if tails	
K6	<i>Time preference</i> Given your present circumstances, which would you choose between the following two options? (To interviewer: Please ask the questions one by one until the answer is switched to (2))	
K6.1.1	(1) RMB600 now (2) RMB750 in 1 month	
K6.1.2	(1) RMB600 now (2) RMB900 in 1 month	
K6.1.3	(1) RMB600 now (2) RMB1050 in 1 month	
K6.1.4	(1) RMB600 now (2) RMB1200 in 1 month	
K6.2.1	(1) RMB600 now (2) RMB750 in 1 year	
K6.2.2	(1) RMB600 now (2) RMB900 in 1 year	
K6.2.3	(1) RMB600 now (2) RMB1050 in 1 year	
K6.2.4	(1) RMB600 now (2) RMB1200 in 1 year	
K6.2.5	(1) RMB600 now (2) RMB1500 in 1 year	

Appendix A4: Classification of disease

A.	Infectious Diseases
001	Typhoid and paratyphoid fevers
002	Bacterial foodborne intoxications
003	Amoebic dysentery
004	Hepatitis A
005	Other intestinal infectious diseases
006	Tuberculosis
007	Tetanus
008	Sepsis
009	Measles
010	Japanese encephalitis
011	Epidemic haemorrhagic fever
012	Hepatitis B
013	Leptospirosis
014	Atypical pneumonia
015	Other parenteral infectious diseases
B.	Parasitic Diseases
016	Malaria
017	Schistosomiasis
018	Other parasitic diseases
C.	Malignant neoplasms
019	Malignant neoplasm of nasopharynx
020	Malignant neoplasm of oesophagus
021	Malignant neoplasm of stomach
022	Malignant neoplasm of colon
023	Malignant neoplasm of rectum and anus
024	Malignant neoplasm of liver
025	Malignant neoplasm of pancreas
026	Malignant neoplasm of trachea, bronchus and lung
027	Malignant neoplasm of breast
028	Malignant neoplasm of cervix uteri
029	Leukaemia
030	Other malignant neoplasms
D.	In situ neoplasms, benign neoplasms and neoplasms of uncertain or unknown behaviour
031	Benign neoplasms of uterus
032	Benign neoplasm of brain
033	Other benign neoplasms
034	In situ neoplasms
035	Neoplasms of uncertain or unknown behaviour
E.	Endocrine, nutritional, metabolic and immune diseases

036	Hyperthyroidism
037	Diabetes mellitus
038	Malnutrition and nutritional deficiencies
039	Rickets
040	Obesity and other hyperalimentation
041	Other endocrine, nutritional, metabolic and immune diseases
F.	Diseases of the blood and blood-forming organs
042	Anaemia
043	Other diseases of the blood and blood-forming organs
G	Mental and behavioural disorders
044	Senile psychosis and pre-senile period organic psychosis
045	Schizophrenia
046	Depression
047	Other mental disorders
H.	Diseases of the nervous system
048	Meningitis
049	Epilepsy
050	Acute infectious polyneuritis
051	Parkinson disease
052	Other disorders of the nervous system
I.	Diseases of the eye and adnexa
053	Glaucoma
054	Cataract
055	Disorders of cornea
056	Other disorders of eye and adnexa
J.	Diseases of the ear and mastoid process
057	Otitis media and mastoiditis
058	Other disorders of ear and mastoid
K.	Diseases of the circulatory system
059	Acute rheumatic fever
060	Chronic rheumatic heart diseases
061	Angina pectoris
062	Acute myocardial infarction
063	Other ischaemic heart diseases
064	Pulmonary heart diseases
065	Other forms of heart disease
066	Hypertension
067	Cerebrovascular diseases
068	Varicose veins of lower extremities

069	Other disorders of the circulatory system
L.	Diseases of the respiratory system
070	Acute nasopharyngitis(common cold)
071	Acute pharyngitis, laryngitis, tonsillitis and tracheitis
072	Influenza
073	Pneumonia
074	Chronic pharyngitis and laryngitis
075	Emphysema
076	Other chronic obstructive pulmonary diseases (COPD, chronic bronchitis)
077	Asthma
078	Other diseases of the respiratory system (Acute lower respiratory infections)
M.	Diseases of the digestive system
079	Diseases of oral cavity, salivary glands and jaws
080	Acute and chronic gastritis
081	Peptic ulcer
082	Diseases of appendix
083	Abdominal hernia
084	Intestinal obstruction
085	Chronic hepatitis and cirrhosis
086	Cholelithiasis and cholecystitis
087	Other diseases of the digestive system
N.	Diseases of the genitourinary system
088	Nephritis and nephrosis
089	Pyelitis
090	Urolithiasis
091	Other disorders of the genitourinary system
092	Hyperplasia or inflammatory diseases of prostate
093	Other disorders of male genital organs
094	Disorders of breast
095	Salpingitis and oophoritis
096	Uterovaginal prolapse
097	Other disorders of female genital organs

O.	Pregnancy, childbirth and the puerperium
098	Spontaneous abortion
099	*Medical abortion
100	Haemorrhage in pregnancy and labour
101	Gestational hypertension
102	*Normal labour
103	Obstructed labour
104	Complications of the puerperium
105	Other diseases of pregnancy, childbirth and the puerperium
P.	Diseases of the skin and subcutaneous tissue
106	Carbuncle and furuncle
107	Dermatitis
108	Other disorders of the skin and subcutaneous tissue
Q.	Diseases of the musculoskeletal system and connective tissue
109	Rheumatoid arthritis
110	Intervertebral disc disorders
111	Osteomyelitis
112	Other disorders of the musculoskeletal system and connective tissue
R.	Congenital malformations
113	Congenital heart diseases
114	Other congenital malformations
S.	Certain conditions originating in the perinatal period
115	Preterm infants
116	Birth trauma
117	Fetal and birth asphyxia
118	Neonatal tetanus
119	Other disorders originating in the perinatal period
T.	Injury, poisoning and certain other consequences of external causes
120	Bone fracture
121	Dislocation, sprain and strain
122	Intracranial and internal injuries (including cranial nerves)
123	Open wound and vascular injury
124	Burns
125	Poisoning and toxic effects

126	Other sequelae of injury, poisoning
V.	*Factors influencing health status and contact with health services
127	Supervision of pregnancy
128	Sterilization
129	Persons encountering health services for specific procedures and health care
130	Persons encountering health services for examination and investigation
131	Other factors influencing health status and contact with health services
999	Uncertain signs, symptoms and factors

Items with the * marks are not diseases

Note: (1) When filling in the code of the diseases, only Arabic numbers should be written; don't fill in the English capital letters (e.g. A, B, etc. The capital letters only presents the categories of the diseases)

(2) It is often not possible to list all the diseases under the classification. If a certain kind of disease is not listed, please fill in the disease code with 'Other Diseases of X system' according to the underlying category of the disease. For example, if it is a malignant tumor of ovary, the disease code should be 027, which is 'Other malignant neoplasms' under the Malignant neoplasms category. In terms of uncertain signs and symptoms that cannot be diagnosed, please code the disease by 999.

Appendix B: Methods

Appendix B1: Measurement of living standards

As most of our analyses require a measure of living standards, the following guideline lists the various options often available in household surveys, explains the rationale for our choice of measure, and describes variable construction.

In choosing a measure of living standards, four measures are often cited:

- i) income, defined as the value of goods and services produced by the household – this includes wages, rental income, and transfers;
- ii) expenditure, defined as the value of goods and services purchased by the household;
- iii) consumption, defined as the value of goods and services consumed by the household; and
- iv) wealth indices, defined as the value of possessions and living conditions of the household (EQUITAP, 2002, O'Donnell et al., 2008).

In low- and middle-income countries, it is generally perceived that household consumption better captures the distribution of living standards where seasonal variability associated with rural and agricultural societies cause wide income variation in the short term. Consumption is more stable than income (and expenditure for that matter) as it accounts for income previously earned and saved and goods purchased but not immediately consumed, smoothing out short term fluctuations. Hence consumption over a week or a month will likely be a better approximation of annual living standards than income.

Consumption also captures self-employment and home production of goods, important contributors to living standards in non-formal economies. In the case of the former, accurate information on income is hard to gather, whereas in the case of the latter expenditure data would result in an underestimation of household living standards. For these reasons, consumption is often viewed as the best measure of the economic component

of living standards and is the measure chosen for our catastrophic and impoverishment analyses (Deaton and Zaidi, 2002).

However, where surveys fail to collect direct measures of living standards (i.e. income, expenditure, and consumption), it is still possible to construct a wealth index – a proxy measure of living standard⁵⁰ – based on available variables describing household assets and characteristics. Typically these include household ownership of various durable goods (e.g. television, car, refrigerator, etc.), specific dwelling characteristics (such as source of water, cooking fuel, etc.), and land ownership. These variables are weighted to create the wealth index (Filmer and Pritchett, 2001). Three weighting schemes are generally adopted. The first is to assign equal weights to all assets, often referred to as the arbitrary approach. The second, if asset prices are available, is to assign these as weights. Finally, the third scheme is to assign weights determined by principal components analysis (PCA) or factor analysis – statistical procedures which summarize the variability among a set of variables (Filmer and Pritchett, 2001, O'Donnell et al., 2008).

As our household survey collects data that enables estimations of direct measures of living standards, we begin with a more detailed exposition of the consumption measure used in our analysis before describing the construction of the asset index.

1. Constructing the consumption measure

Total household consumption is generally an aggregate of food, non-food, durable goods, and housing.

1.2 Food aggregate

The food aggregate was constructed by adding the value of food consumed and the value of food that was home-produced by each household. Food consumed was obtained

⁵⁰ Asset or wealth indices are often used as a proxy for long-run or permanent economic status rather than transitory income, expenditure, or even consumption measures.

by multiplying the value of items J13.1 (grains, meat, fruit, vegetables, etc.) and J13.2 (oil, salt, soy sauce, vinegar, tea, seasoning, etc.) consumed in the last month by 12. Home-produced items included were wheat, corn, vegetables, meat, eggs, fruit, buckwheat, flax, and potatoes. Quantities of food actually consumed, rather than the total amount produced or sold over the past year were then multiplied by the average market price in each county thus accounting for regional differences (Table B1).

Table B1: Regional average market price in Yuan/jin

Variable	County A			County B			County C			County D			County E		
	2009	2011	2012	2009	2011	2012	2009	2011	2012	2009	2011	2012	2009	2011	2012
Wheat	1.0	1.2	1.8	1.0	1.2	1.5	0.9	1.5	1.5	1.0	1.0	1.0	0.9	0.9	1.2
Corn	0.7	1.0	1.5	1.0	1.0	1.0	0.8	1.0	1.2	0.8	0.9	0.8	0.7	0.8	1.0
Veg	1.0	5.3	2.0	2.4	0.6	0.4	1.0	0.8	1.5	1.0	1.0	1.0	1.5	1.0	1.5
Meat	16.0	15.0	26.0	24.0	20.0	22.0	16.0	16.5	25.0	12.0	10.0	12.0	16.0	16.0	25.0
Eggs	3.5	3.8	5.5	7.6	8.0	12.0	3.5	4.2	4.9	3.4	4.0	3.4	3.5	3.5	8.0
Fruit	1.5	4.0	2.5	1.0	2.0	2.0	1.5	2.5	2.5	0.9	1.0	0.9	1.5	1.5	3.0
Buckwheat	0.8	2.2	2.0	1.8	3.0	1.4	0.8	1.0	1.0	1.1	5.0	1.1	0.8	0.8	1.0
Flax	2.8	2.0	3.5	3.3	2.0	2.0	2.8	8.5	2.0	2.8	4.0	2.8	3.0	2.8	2.4
Potatoes	0.5	1.0	1.1	1.6	0.8	0.4	0.5	0.8	1.5	0.6	0.5	0.6	0.4	0.5	0.7

Notes: 1 Yuan=.16 USD; 1jin=500grams

1.3 Non-food aggregate

The various non-food categories were then harmonized to the same reference period of twelve months and added to create the non-food aggregate. This included commodities (J13.3), utilities (J13.4), given rent (J13.5), cigarettes (J13.6), transportation (J13.7), cultural activities (J13.8), clothing (J14.1), education (J14.2), the NCMS premium (J14.3), health expenditure (derived from the detailed health module and substituted for J14.4), wedding and funeral expenses (J14.5), gambling (J14.6), taxes (J14.7), insurance expenditure other than NCMS (14.8), non-durable goods (J14.9), building and repairs (J14.10) and other expenditures not otherwise included (J14.11).

While the case is often made for excluding taxes and insurance in measures of consumption as they are deductions from income (Deaton and Zaidi, 2002), these items were included in our calculation as less than 1.5% of households reported having any tax expenditure representing approximately 0.1 percent of annual household consumption in each survey year, and only 8, 20, and 34 percent of households reported having insurance expenditure representing 0.1, 0.3 and 0.4 percent of annual household consumption in 2009, 2011, and 2012 respectively.

An argument has equally been put forward for excluding large and infrequent expenditures as they tend to overestimate the consumption of households reporting such events during the survey period (Deaton and Zaidi, 2002). In our case, a decision was made to include lifecycle events such as wedding and funeral expenses as it was reasoned that households may have accordingly adjusted consumption throughout the year. Building and repairing of buildings (J14.10) was also included following extensive reading on the housing situation in China in which these expenses were revealed to be often predictable and therefore likely to be accountable in household budgeting.

The final item to be included in the non-food aggregate is the household's production expenses (J12).

1.4 Durable goods

The separate section on consumer goods (J1.1-J1.21) was not included as original and/or even current item value and information necessary to calculate rates of depreciation was not available to accurately impute consumption flow (Deaton and Grosh, 2000). Typically, such imputation would consist of two components: i) the value that the good could fetch on the market – or its opportunity cost and, ii) its depreciation. If the date of purchase and the cost of purchase are known, an assumption can be made about the lifetime of the good to impute its value. If these are not known, then imputation can be given by

$$(1) \quad S_t P_t (r_t - \pi_t + \delta)$$

where, $S_t P_t$ is the good's current value, $r_t - \pi_t$ the real rate of interest, and δ the good's rate of depreciation (Deaton and Zaidi, 2002). Using this formula, Deaton and Zaidi (2002) describe the imputation of durable goods for a number of different scenarios based on the information that is available in sample household surveys. It should be mentioned that when the information necessary required to impute the value of durable goods cannot be collected reliably, the guidelines for constructing measures of living standards in Living Standards and Measurement surveys have been known to recommend excluding durable goods from their measure of consumption, especially if the reporting of such items are rare.

1.5 Housing

The housing aggregate is usually just annualized reported rent or if the property is owned, estimated rent. However, in rural China, the rental market is virtually non-existent. As a result, very few households reported rent in our survey (less than 3 percent in 2009 and less than 4 percent

in 2011 and 2012) and information on estimated rent was not collected. Imputation by hedonic regression with the rent value for households as the dependent variable and characteristics of the dwelling (such as construction material of the house, number of rooms, etc.) as independent variables was also considered unreliable (O'Donnell et al., 2008). While the area of each house was reported in square meters (J2.3), and average rental price per square meter for each county provided, it was deemed too risky to adopt these imputations based on no other complementary information as it had a significant impact on total household consumption (Deaton and Grosh, 2000). In short, the housing aggregate was taken simply as reported rent.

1.6 Total household consumption

The top 0.5 percent of outliers were removed for food, non-food, and housing categories. Finally, the three aggregates were added to give total household annual consumption (O'Donnell et al., 2008).

1.7 Further possible adjustments

As the data was collected over one week during the same period each year in repeated survey rounds, adjusting for temporal price differences may not be warranted. While regional price differences were accounted for at the county level, village level price surveys were not available.

Three other measures of household consumption were also created. The first measure adjusts for household size and composition. As larger households are likely to benefit from economies of scale and the needs of adults differ from those of children, the number of adult equivalents (AE) in the household was calculated as

$$(2) \quad (AE = (A + \alpha K)^\theta$$

where A is the number of adults, K is the number of children, α is the cost of children relative to that of an adult, and θ is the degree of economies of scale. Conventional values of 0.5 and 0.75 were used respectively for α and θ as suggested by the literature (Deaton and Zaidi, 2002, EQUITAP, 2002). This adjusted consumption measure was used in the catastrophic analyses to generate household rank. The second measure of household consumption was adjusted on a per capita basis since poverty lines are defined in per capita terms. This measure was used in the impoverishment analyses. Finally, the third measure deducts total household health expenditures from overall consumption. This measure of non-medical household consumption was used in chapter five in relation to the analysis on households saving behavior.

2. Constructing the wealth index

2.1 Selecting variables

While there is no specific set of asset indicators that must be included in the construction of a wealth index, the literature consistently describes wealth indices that are generally derived from i) ownership of specific durable goods captured as dummy variables (i.e. owns a radio or not), ii) characteristics of the home itself, and iii) access to sanitation facilities and sources of water⁵¹ (Montgomery et al., 2000). Variables that work best in PCA are those that have high standard deviations (i.e. variation between households). For this reason it is recommended to first look at means, frequencies, and standard deviations of each asset under consideration⁵² (Hanson et al., 2005).

⁵¹ Variables included were number of cows, sheep, horses, and pigs owned, hectares of irrigated land, hectares of fields on a mountain, area of house in square meters, ownership of clock, bicycle, radio, tv, sewing machine, motorbike, car, refrigerator, washing machine, VCR/DVD, camera, and air conditioning. Variables that reported the type of house, floor material, toilet, source of drinking water, cooking fuel, whether the kitchen was separated from living spaces and whether animals and people lived in the same room were also included.

⁵² Another method for selecting asset variables is limiting the choice of assets to those that are highly correlated with household expenditure (Hanson et al., 2005). This method was not adopted in our construction.

2.2 Preparing data for principal component analysis

Most of the categorical asset indicators (in our case type of house, type of floor material, source of drinking water, type of toilet, and source of cooking fuel) should be converted into dummy variables, however non-binary variables such as the number of livestock owned could also be included. Similar and low frequency variables may be combined together into one category⁵³(Vyas and Kumaranayake, 2006). For households that had missing values the following strategy was adopted: i) for durable goods and specific house characteristics, missing values were coded as not owning the item or not having that house characteristic as less than 0.1 percent of households had missing values; ii) for house area, missing values were replaced with the mean (in 0.9 percent of households).

2.3 Principal component analysis

Once the asset variables have been selected, weights are then assigned using PCA. The wealth index A_i is then given by

$$A_i = \sum_k \left[f_k \frac{(a_{ik} - \bar{a}_k)}{s_k} \right]$$

where, a_{ik} is the value of asset variable k for individual i , \bar{a}_k its mean value, s_k its standard deviation, and f_k the weights of the first principal component (O'Donnell et al., 2008).

2.1 Interpreting results

Interpretation of factor scores is straightforward. Higher socioeconomic status is predicted by positive factor scores while the opposite is true of negative factor scores. The resulting wealth index is used for our purposes not as an alternative to consumption, as consumption remains the

⁵³ For the categorical variable on the primary source of drinking water, 'hand-drawn well' and 'well water' were combined into a single category.

better measure of living standards, rather as a controlling variable in our catastrophic and poverty analysis to account for wealth effects.

A simple check of how closely related our wealth index is to our consumption measure yields a weak correlation of 0.2. In general, correlation coefficients between 0.2-0.4 tend to be common from wealth indices generated using principal components analysis (O'Donnell et al., 2008). Correlation between quintiles assigned via the wealth asset proxy and the adjusted household consumption measure yield a slightly better correlation of 0.3152. Rank correlation between the two measures was 0.3384.

Appendix C: Additional results and analyses

Appendix C1: Health expenditure treatment effects

	Outpatient	Drug	Inpatient	THE
2011	84.19 (811.4)	-516.6*** (186.6)	569.5*** (183.5)	137.1 (822.5)
2012	3,367 (2,094)	138.6 (298.2)	461.9*** (136.4)	3,967* (2,107)
Treatment effect 2011	115.3 (1,104)	-519.0** (243.9)	-74.71 (210.3)	-478.5 (1,162)
Treatment effect 2012	-1,009 (2,947)	-818.2** (352.5)	249.7 (177.3)	-1,577 (2,985)
County C 2011 effect	-773.2 (1,486)	-1,925*** (546.7)	-10.40 (199.8)	-2,708* (1,586)
County C 2012 effect	-4,765** (2,220)	-1,301* (668.9)	563.1** (283.2)	-5,503** (2,404)
Household size	-122.6 (1,353)	279.1** (129.0)	269.0*** (70.27)	425.5 (1,383)
Ethnicity	-2,608 (3,329)	-663.3 (1,206)	2,517 (2,538)	-754.2 (4,401)
Dependency ratio	430.2 (1,276)	-111.0 (186.0)	-170.9 (126.6)	148.3 (1,309)
Age of household head	-844.4 (695.4)	-38.72 (151.7)	-143.2* (74.46)	-1,026 (717.1)
Age of household head squared	8.956 (7.151)	0.679 (1.570)	1.110* (0.622)	10.75 (7.352)
Chronic disease status	4,846*** (1,111)	1,320*** (200.9)	694.3*** (122.2)	6,860*** (1,167)
Education of household head				
Elementary school	-1,487* (895.8)	-617.9* (374.0)	-63.11 (118.4)	-2,168* (1,111)
Middle school	-2,540* (1,313)	-800.2 (570.1)	49.68 (217.4)	-3,291** (1,616)
High school	-2,361 (1,652)	-503.6 (562.9)	62.74 (249.1)	-2,801 (1,903)
Occupation of household head				
Farmer	5,302 (5,628)	-271.8 (267.5)	-78.74 (132.1)	4,951 (5,648)
Laborer	5,404 (5,446)	-328.7 (326.5)	-68.17 (163.6)	5,007 (5,498)
Other	4,876 (5,157)	-828.7** (400.2)	-227.0 (238.6)	3,821 (5,228)
Comparison group mean at baseline	4089	1732	598	6419
Intervention group mean at baseline	4364	1572	668	6604
Observations	19,511	19,511	19,511	19,511
Number of households	8,464	8,464	8,464	8,464

Notes: Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. Health expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

Appendix C2: Catastrophic treatment effects at the 10 percent threshold (holding household consumption constant at baseline)

		Catastrophic headcount 10%
2011		0.00486 (0.0172)
2012		0.0424** (0.0195)
Treatment effect 2011		-0.0603*** (0.0213)
Treatment effect 2012		-0.101*** (0.0235)
County C 2011 effect		-0.116*** (0.0309)
County C 2012 effect		-0.126*** (0.0301)
Household size		0.0229*** (0.00517)
Ethnicity		0.0695 (0.110)
Dependency ratio		0.00530 (0.0138)
Age of household head		0.00531 (0.00798)
Age of household head squared		-2.71e-05 (8.20e-05)
Chronic disease status		0.223*** (0.00999)
Education of household head		
	Elementary school	0.00589 (0.0152)
	Middle school	0.0318* (0.0189)
	High school	0.00365 (0.0316)
Occupation of household head		
	Farmer	0.0116 (0.0228)
	Laborer	0.00361 (0.0266)
	Other	-0.0300 (0.0306)
Comparison group mean at baseline		0.3227
Intervention group mean at baseline		0.3200
Observations		19,511
Number of households		8,464

Notes: Regression is estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The unit of observation is the household. *** p<0.01, ** p<0.05, * <0.1.

Appendix C3: Catastrophic, impoverishing, and medical loan treatment effects

	Catastrophic headcount 10%	Impoverishing impact \$2.00/day	Medical loans
2011	-0.0102 (0.0171)	-0.0312*** (0.0111)	-0.0320** (0.0154)
2012	0.00861 (0.0184)	-0.0174 (0.0124)	0.0823*** (0.0159)
Treatment effect 2011	-0.0617*** (0.0204)	-0.00763 (0.0134)	-0.0245 (0.0177)
Treatment effect 2012	-0.0889*** (0.0223)	-0.0316** (0.0137)	-0.0512*** (0.0183)
County C 2011 effect	-0.133*** (0.0289)	-0.0639*** (0.0187)	-0.0740*** (0.0256)
County C 2012 effect	-0.141*** (0.0272)	-0.0849*** (0.0177)	-0.0359 (0.0272)
Household size	0.0138*** (0.00509)	0.0149*** (0.00330)	0.0103** (0.00456)
Ethnicity	0.0788 (0.111)	-0.00257 (0.0593)	-0.0516 (0.103)
Dependency ratio	0.00874 (0.0130)	0.00806 (0.00981)	0.0199* (0.0118)
Age of household head	0.00297 (0.00753)	0.00829* (0.00501)	0.00671 (0.00639)
Age of household head squared	3.11e-06 (7.73e-05)	-6.98e-05 (5.12e-05)	-6.30e-05 (6.47e-05)
Chronic disease status	0.206*** (0.00950)	0.0648*** (0.00666)	
Education of household head			
Elementary school	0.000472 (0.0145)	-0.00767 (0.00842)	-0.00391 (0.0123)
Middle school	0.0148 (0.0188)	0.0159 (0.0110)	-0.00921 (0.0168)
High school	-0.00897 (0.0302)	0.00687 (0.0181)	-0.0375 (0.0274)
Occupation of household head			
Farmer	0.0119 (0.0219)	-0.00820 (0.0170)	0.0210 (0.0202)
Laborer	0.00417 (0.0254)	-0.0118 (0.0186)	0.00299 (0.0223)
Other	-0.0402 (0.0300)	-0.0279 (0.0189)	-0.00917 (0.0239)
Comparison group mean at baseline	0.3227	0.1225	0.2207
Intervention group mean at baseline	0.3200	0.0998	0.2035
Observations	19,511	19,511	19,511
Number of households	8,464	8,464	8,464

Notes: Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). *** p<0.01, ** p<0.05, * <0.1.

Appendix C4: Food and nonmedical treatment effects

	Food	(ln)Food	Nonmedical	(ln)Nonmedical
2011	490.4** (244.9)	-0.0166 (0.0494)	5,121*** (552.5)	0.256*** (0.0292)
2012	1,245*** (223.1)	0.189*** (0.0396)	8,458*** (578.0)	0.411*** (0.0272)
Treatment effect 2011	1,565*** (312.9)	0.310*** (0.0574)	2,325*** (745.2)	0.0504 (0.0344)
Treatment effect 2012	1,590*** (301.1)	0.202*** (0.0464)	3,135*** (1,052)	0.00879 (0.0330)
County C 2011 effect	2,848*** (349.6)	0.552*** (0.0654)	7,803*** (1,634)	0.241*** (0.0472)
County C 2012 effect	1,755*** (329.1)	0.362*** (0.0554)	7,826*** (1,439)	0.204*** (0.0490)
Household size	533.1*** (60.36)	0.0835*** (0.00820)	1,390*** (244.0)	0.0834*** (0.00753)
Ethnicity	-258.4 (1,245)	0.00434 (0.137)	4,028 (5,002)	0.130 (0.103)
Dependency ratio	-338.0** (138.2)	-0.0551** (0.0218)	-1,805*** (560.2)	-0.0799*** (0.0181)
Age of household head	80.95 (87.96)	-0.00157 (0.0142)	565.9** (254.6)	0.0180* (0.00996)
Age of household head squared	-0.865 (0.912)	-2.36e-05 (0.000142)	-6.640** (2.608)	-0.000208** (0.000102)
Chronic disease status	53.80 (123.2)	0.00812 (0.0170)	-512.0 (420.2)	0.00831 (0.0133)
Education of household head				
Elementary school	-17.58 (165.2)	0.00705 (0.0244)	-474.7 (500.3)	0.00417 (0.0183)
Middle school	229.2 (223.2)	0.0360 (0.0284)	1,586** (797.5)	0.0598*** (0.0219)
High school	518.8 (359.5)	0.0413 (0.0501)	2,309* (1,349)	0.0775* (0.0423)
Occupation of household head				
Farmer	-298.4 (257.1)	-0.0320 (0.0404)	-32.60 (1,045)	-0.00772 (0.0385)
Laborer	-514.4* (290.9)	-0.0567 (0.0432)	-13.06 (1,137)	-0.00962 (0.0397)
Other	-0.769 (330.7)	0.0312 (0.0485)	1,768 (1,579)	0.0846* (0.0472)
Comparison group mean at baseline	5327	-	15385	-
Intervention group mean at baseline	6707	-	19351	-
Observations	19,511	19,487	19,511	19,508
Number of households	8,464	8,460	8,464	8,464

Notes: Each column is a different regression. Regressions are estimated by OLS, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. The unit of observation is the household. Expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

Appendix C5: Part 1, the participation effect – whether households save

	Self-reported savers	Calculated savers
2011	0.0504*** (0.0131)	0.0990*** (0.0147)
2012	0.0227 (0.0132)	0.0572*** (0.0129)
Treatment effect 2011	0.0296* (0.0139)	0.00963 (0.0149)
Treatment effect 2012	0.0342* (0.0153)	0.0276* (0.0141)
County C 2011 effect	0.0129 (0.0203)	-0.0274 (0.0185)
County C 2012 effect	-0.00657 (0.0188)	0.0473 (0.0245)
Household size	-0.00224 (0.00203)	-0.000580 (0.00247)
Age of household head	-0.00536*** (0.00133)	-0.00794*** (0.00202)
Age of household head squared	0.0000509*** (0.0000138)	0.0000862*** (0.0000206)
Chronic disease status	-0.0367*** (0.00407)	-0.0680*** (0.00632)
Dependency ratio	-0.00956* (0.00404)	-0.0100 (0.00547)
Ethnicity	0.0734*** (0.00963)	0.0665*** (0.00920)
Education of household head		
Elementary school	0.0199** (0.00663)	0.00470 (0.00841)
Middle school	0.0335*** (0.00737)	0.0216* (0.00940)
High school	0.0209 (0.0114)	0.0261 (0.0148)
Occupation of household head		
Farmer	-0.0216 (0.0128)	-0.0219 (0.0181)
Laborer	-0.00812 (0.0122)	0.0847*** (0.0207)
Other	0.0414* (0.0179)	0.132*** (0.0255)
Comparison group mean at baseline	0.038	0.126
Intervention group mean at baseline	0.090	0.147
Observations	19,511	19,511

Notes: Each column is a different regression. Regressions are estimated by probit (marginal effects presented), using three waves of household survey and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. The unit of observation is the household. *** p<0.01, ** p<0.05, * <0.1.

Appendix C6: Part 2, conditional on positive savings effect –how much households save

	Self-reported savers	Calculated savers
2011	0.411 (0.326)	0.474** (0.178)
2012	0.203 (0.444)	0.641*** (0.180)
Treatment effect 2011	0.0255 (0.329)	0.132 (0.212)
Treatment effect 2012	0.338 (0.449)	0.0188 (0.217)
County C 2011 effect	0.329 (0.809)	0.273 (0.305)
County C 2012 effect	1.446 (0.789)	-0.0604 (0.309)
Household size	0.104 (0.0661)	0.0188 (0.0520)
Age of household head	0.152 (0.135)	0.0514 (0.0710)
Age of household head squared	-0.000431 (0.00163)	-0.000489 (0.000678)
Chronic disease status	0.0879 (0.141)	-0.0862 (0.126)
Dependency ratio	0.272 (0.211)	-0.146 (0.159)
Ethnicity		1.681*** (0.310)
Education of household head		
Elementary school	-0.0644 (0.140)	0.189 (0.160)
Middle school	-0.362 (0.208)	0.106 (0.175)
High school	-0.135 (0.398)	0.230 (0.269)
Occupation of household head		
Farmer	-0.383 (0.289)	-0.180 (0.225)
Laborer	-0.217 (0.290)	-0.175 (0.242)
Other	-0.367 (0.312)	-0.222 (0.254)
Comparison group mean at baseline	3309	6192
Intervention group mean at baseline	5534	9477
Observations	2015	3827
Number of households	1692	2998

Notes: Each column is a different regression. The dependent variable is logged savings. Regressions are estimated by OLS conditional on positive savings, using three waves of household survey, household fixed effects, and robust standard errors clustered at the village level (in parentheses). The model uses dummies to separate out the treatment effect in 2011 versus 2012. It also uses a dummy for county C so that the treatment effect presented represents the effect between intervention counties and counties D and E. This was done because the implemented benefit package for county C was very similar to our own intervention county benefit package. Results robust to collapsing the time series information into pre and post intervention periods. The unit of observation is the household. Expenditures in yuan. *** p<0.01, ** p<0.05, * <0.1.

Appendix C7: Validation of income, savings, and consumption measures

Per capita 2012	Mean from China statistical Yearbook 2013	Mean	Median	Standard deviation	Skewness
Income	6180	4324	3000	5490	6.6506
Self-reported savings	-	343	0	1812	14.6928
Calculated savings	-	-4605	-2552	21117	-40.1510
Calculated savings (censored)	829	706	0	3208	14.4560
Loans	-	4194	1200	11325	17.4432
Total household consumption	5351	8928	5861	21084	40.6595
Total household non-medical consumption	4859	6876	5000	6672	4.0125

Source: National Bureau of Statistics (2013).

Appendix C8: Choice of provider for common conditions (# of cases)

Outpatient	2011				2012			
	VC	THC	CTY	OOC	VC	THC	CTY	OOC
Acute and chronic gastritis	39	34	24	9	34	24	41	7
Hypertension	27	20	17	6	8	27	19	2
Pneumonia	0	1	3	0	0	1	7	0
Rheumatoid arthritis	12	11	17	3	18	8	20	5
Acute nasopharyngitis (common cold)	139	92	16	4	353	157	48	10
Influenza	390	100	53	7	148	90	26	3
Acute pharyngitis, laryngitis, tonsillitis and tracheitis	35	28	15	1	66	24	8	6
Bone fracture	0	0	0	0	0	0	0	0

Note: VC=village clinic; THC=township health centre; CTY=county hospital; OOC=out-of-county hospital

Inpatient	2011			2012		
	THC	CTY	OOC	THC	CTY	OOC
Acute and chronic gastritis	39	47	10	30	44	16
Hypertension	39	52	13	29	56	19
Pneumonia	25	46	8	20	57	12
Rheumatoid arthritis	18	23	13	20	34	8
Acute nasopharyngitis (common cold)	24	20	1	33	28	9
Influenza	26	14	5	17	23	7
Bone fracture	14	73	23	6	78	47

Note: THC=township health centre; CTY=county hospital; OOC=out-of-county hospital

***Appendix C9: Primary reason for selecting a particular outpatient health facility (percent)
(first visit)***

	2009	2011	2012
Nearby or convenient	49.26	64.90	64.34
Reasonable price	4.53	3.85	2.94
High technical capacity	28.50	18.53	20.29
Good facilities and equipment	4.99	2.93	3.78
Variety of drugs	1.68	1.57	1.47
Good service attitude	0.66	0.54	0.05
Designated reimbursable hospital	1.78	0.54	1.73
Someone I know works there	3.51	1.79	1.47
Has a dependable doctor	2.34	2.76	1.52
Referred to	2.75	-	0.16
Other	-	2.60	2.25

Appendix C10: Prevalence of referrals in outpatient visits (first visit)

	2011	2012
Percent referred from this visit to a higher level facility	2.67	2.41
Percent who's most recent visit was the result of a referral	1.61	1.36
Note: Questions only available for 2011 and 2012		

Appendix C11: Outpatient choice of provider estimation results, individual specific coefficients – all models

Village clinic	Model 1	Model 2	Model 3	Model 4
Household size	0.016 <i>0.021</i>	0.018 <i>0.021</i>	0.019 <i>0.021</i>	0.022 <i>0.021</i>
Ethnicity	-0.021 <i>0.069</i>	-0.046 <i>0.069</i>	0.005 <i>0.069</i>	-0.022 <i>0.069</i>
Age	-0.007** <i>0.002</i>	-0.007** <i>0.002</i>	-0.007*** <i>0.002</i>	-0.007** <i>0.002</i>
Married	0.177 <i>0.092</i>	0.191* <i>0.092</i>	0.182* <i>0.092</i>	0.196* <i>0.092</i>
<i>Education of household head</i>				
Elementary school	0.157 <i>0.083</i>	0.155 <i>0.084</i>	0.177* <i>0.084</i>	0.171* <i>0.084</i>
Middle school	0.115 <i>0.095</i>	0.122 <i>0.095</i>	0.147 <i>0.095</i>	0.150 <i>0.096</i>
High school and above	0.287 <i>0.149</i>	0.243 <i>0.151</i>	0.305* <i>0.149</i>	0.254 <i>0.151</i>
<i>Occupation of household head</i>				
Farmer	0.480* <i>0.195</i>	0.469* <i>0.196</i>	0.539** <i>0.196</i>	0.531** <i>0.197</i>
Laborer	0.507* <i>0.206</i>	0.503* <i>0.207</i>	0.546** <i>0.207</i>	0.539** <i>0.208</i>
Other	0.118 <i>0.251</i>	0.130 <i>0.252</i>	0.167 <i>0.252</i>	0.178 <i>0.253</i>
Female headed household	0.161 <i>0.146</i>	0.169 <i>0.146</i>	0.171 <i>0.146</i>	0.181 <i>0.147</i>
Female	-0.041 <i>0.065</i>	-0.031 <i>0.065</i>	-0.042 <i>0.065</i>	-0.033 <i>0.066</i>
Days in bed	0.064*** <i>0.009</i>	0.064*** <i>0.009</i>	0.065*** <i>0.009</i>	0.065*** <i>0.009</i>
Log of household consumption	0.065 <i>0.047</i>	0.059 <i>0.048</i>	0.524*** <i>0.149</i>	0.306 <i>0.176</i>
<i>Reason for visit</i>				
Influenza	0.589*** <i>0.098</i>	0.570*** <i>0.099</i>	0.588*** <i>0.098</i>	0.567*** <i>0.099</i>
Common cold	0.361*** <i>0.100</i>	0.368*** <i>0.101</i>	0.375*** <i>0.101</i>	0.384*** <i>0.101</i>
Acute and chronic gastritis	0.270 <i>0.155</i>	0.242 <i>0.156</i>	0.280 <i>0.156</i>	0.259 <i>0.157</i>
Disorder of musculoskeletal system and connective tissue	-0.214 <i>0.187</i>	-0.241 <i>0.188</i>	-0.216 <i>0.188</i>	-0.237 <i>0.188</i>
Acute pharyngitis, laryngitis, tonsillitis and tracheitis	0.326* <i>0.148</i>	0.299* <i>0.149</i>	0.338* <i>0.148</i>	0.309* <i>0.149</i>
Hypertension	-0.104 <i>0.193</i>	-0.109 <i>0.194</i>	-0.095 <i>0.194</i>	-0.095 <i>0.194</i>
Rheumatoid arthritis	-0.435* <i>0.213</i>	-0.443* <i>0.214</i>	-0.446* <i>0.213</i>	-0.445* <i>0.214</i>

Intervertebral disc disorders	-0.125 0.233	-0.157 0.234	-0.120 0.233	-0.153 0.234
Disorders of female genital organs	0.274 0.247	0.274 0.248	0.271 0.248	0.274 0.248
Cholelithiasis and cholecystitis	-0.259 0.241	-0.255 0.242	-0.255 0.242	-0.261 0.242
Township health centre				
Household size	-0.039 0.025	-0.033 0.026	-0.036 0.025	-0.030 0.026
Ethnicity	-0.054 0.084	-0.073 0.084	-0.039 0.084	-0.062 0.085
Age	-0.005* 0.003	-0.006* 0.003	-0.005* 0.003	-0.006* 0.003
Married	0.046 0.110	0.060 0.111	0.050 0.110	0.062 0.111
<i>Education of household head</i>				
Elementary school	-0.156 0.099	-0.15 0.099	-0.145 0.099	-0.148 0.100
Middle school	-0.064 0.112	-0.046 0.112	-0.042 0.112	-0.029 0.112
High school and above	-0.005 0.183	-0.005 0.183	0.006 0.183	0.008 0.184
<i>Occupation of household head</i>				
Farmer	0.355 0.224	0.337 0.224	0.402 0.225	0.381 0.225
Laborer	0.512* 0.238	0.506* 0.238	0.547* 0.238	0.536* 0.239
Other	0.199 0.291	0.189 0.291	0.232 0.292	0.222 0.292
Female headed household	-0.407 0.208	-0.428* 0.209	-0.396 0.209	-0.416* 0.209
Female	0.129 0.081	0.135 0.081	0.127 0.081	0.134 0.081
Days in bed	0.078*** 0.009	0.077*** 0.009	0.078*** 0.009	0.078*** 0.009
Log of household consumption	0.224*** 0.056	0.227*** 0.056	0.573*** 0.151	0.398* 0.173
<i>Reason for visit</i>				
Influenza	-0.415*** 0.119	-0.425*** 0.119	-0.418*** 0.119	-0.426*** 0.119
Common cold	-0.159 0.114	-0.162 0.115	-0.146 0.114	-0.147 0.115
Acute and chronic gastritis	0.101 0.169	0.086 0.169	0.107 0.169	0.093 0.169
Disorder of musculoskeletal system and connective tissue	-0.295 0.200	-0.307 0.200	-0.296 0.200	-0.300 0.200
Acute pharyngitis, laryngitis, tonsillitis and tracheitis	-0.358 0.186	-0.359 0.187	-0.346 0.187	-0.357 0.187
Hypertension	0.390* 0.390*	0.380* 0.380*	0.401* 0.401*	0.394* 0.394*

	0.177	0.178	0.178	0.178
Rheumatoid arthritis	-0.639**	-0.641**	-0.647**	-0.649**
	0.238	0.238	0.238	0.239
Intervertebral disc disorders	-0.615*	-0.623*	-0.616*	-0.627*
	0.293	0.293	0.293	0.294
Disorders of female genital organs	0.525*	0.514*	0.517*	0.502*
	0.238	0.239	0.238	0.239
Cholelithiasis and cholecystitis	0.623**	0.614**	0.621**	0.616**
	0.197	0.197	0.197	0.198
County hospital				
Household size	-0.178***	-0.177***	-0.172***	-0.170***
	0.028	0.028	0.028	0.028
Ethnicity	0.069	0.053	0.092	0.082
	0.090	0.090	0.090	0.091
Age	-0.010***	-0.009***	-0.009***	-0.009***
	0.003	0.003	0.003	0.003
Married	0.032	0.014	0.035	0.018
	0.118	0.119	0.118	0.119
<i>Education of household head</i>				
Elementary school	0.054	0.064	0.057	0.065
	0.108	0.108	0.108	0.109
Middle school	0.066	0.084	0.069	0.088
	0.121	0.122	0.122	0.122
High school and above	0.156	0.167	0.146	0.156
	0.191	0.192	0.191	0.192
<i>Occupation of household head</i>				
Farmer	-0.171	-0.165	-0.107	-0.107
	0.218	0.218	0.220	0.220
Laborer	0.001	0.019	0.057	0.066
	0.235	0.236	0.237	0.238
Other	-0.341	-0.333	-0.238	-0.228
	0.299	0.300	0.301	0.302
Female headed household	0.120	0.082	0.132	0.094
	0.191	0.192	0.191	0.192
Female	-0.009	-0.004	-0.005	0.000
	0.087	0.087	0.087	0.088
Days in bed	0.096***	0.097***	0.096***	0.097***
	0.009	0.009	0.009	0.009
Log of household consumption	1.104***	1.116***	1.101***	0.961***
	0.057	0.057	0.172	0.194
<i>Reason for visit</i>				
Influenza	-1.981***	-1.995***	-1.991***	-2.002***
	0.142	0.142	0.142	0.142
Common cold	-2.082***	-2.106***	-2.081***	-2.111***
	0.145	0.145	0.144	0.145
Acute and chronic gastritis	-0.129	-0.149	-0.137	-0.162
	0.156	0.157	0.156	0.157
Disorder of musculoskeletal system and connective tissue	-0.684***	-0.697***	-0.710***	-0.725***
	0.186	0.186	0.187	0.187

Acute pharyngitis, laryngitis, tonsillitis and tracheitis	-1.631***	-1.643***	-1.619***	-1.633***
	<i>0.217</i>	<i>0.218</i>	<i>0.217</i>	<i>0.217</i>
Hypertension	-0.610**	-0.629**	-0.597**	-0.627**
	<i>0.198</i>	<i>0.198</i>	<i>0.198</i>	<i>0.199</i>
Rheumatoid arthritis	-0.643**	-0.633**	-0.645**	-0.636**
	<i>0.200</i>	<i>0.201</i>	<i>0.200</i>	<i>0.201</i>
Intervertebral disc disorders	0.112	0.082	0.11	0.08
	<i>0.194</i>	<i>0.196</i>	<i>0.195</i>	<i>0.196</i>
Disorders of female genital organs	0.290	0.273	0.265	0.244
	<i>0.223</i>	<i>0.223</i>	<i>0.223</i>	<i>0.224</i>
Cholelithiasis and cholecystitis	-0.171	-0.218	-0.17	-0.227
	<i>0.216</i>	<i>0.218</i>	<i>0.216</i>	<i>0.219</i>

Notes: Each column is a different regression. Results are from a conditional logit model. Individual specific coefficients are interpreted as parameters of a binary logit model against the base category 'did not seek treatment'. Alternative specific coefficients from these regressions were presented in Table 6.9. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

**Appendix C12: Inpatient choice of provider estimation results, alternative specific coefficients
– all models**

	Model 1	Model 2	Model 3	Model 4
Distance	-0.003*** <i>0.000</i>	-0.003*** <i>0.000</i>	-0.004 <i>0.003</i>	-0.004 <i>0.004</i>
Deductible	-0.006*** <i>0.001</i>	-0.006*** <i>0.001</i>	-0.013 <i>0.009</i>	-0.013 <i>0.010</i>
Reimbursement rate	-0.110*** <i>0.010</i>	-0.111*** <i>0.010</i>	-0.005 <i>0.112</i>	-0.012 <i>0.113</i>
Overall quality	0.007 <i>0.042</i>		0.416 <i>0.513</i>	
Waiting time		0.044 <i>0.029</i>		0.134 <i>0.373</i>
Environment		-0.096* <i>0.048</i>		-0.736 <i>0.62</i>
Physician politeness		0.068 <i>0.051</i>		1.201 <i>0.656</i>
Physician communication		-0.033 <i>0.056</i>		-0.531 <i>0.745</i>
Drug availability		0.038 <i>0.061</i>		1.277 <i>0.768</i>
Equipment sophistication		-0.009 <i>0.059</i>		0.591 <i>0.754</i>
Physician knowledge		0.070 <i>0.058</i>		-1.034 <i>0.736</i>
Household consumption*Distance			0.000 <i>0.000</i>	0.000 <i>0.000</i>
Household consumption*Deductible			0.001 <i>0.001</i>	0.001 <i>0.001</i>
Household consumption*Reimbursement rate			-0.010 <i>0.011</i>	-0.009 <i>0.011</i>
Household consumption*Overall quality			-0.040 <i>0.050</i>	
Household consumption*Waiting time				-0.009 <i>0.036</i>
Household consumption*Environment				0.062 <i>0.060</i>
Household consumption*Physician politeness				-0.110 <i>0.064</i>
Household consumption*Physician communication				0.049 <i>0.073</i>
Household consumption*Drug availability				-0.121 <i>0.075</i>
Household consumption*Equipment sophistication				-0.058 <i>0.073</i>
Household consumption*Physician knowledge				0.107 <i>0.072</i>
Number of observations	14520	14488	14520	14488

Number of cases	3630	3622	3630	3622
Log likelihood	-3900	-3889	-3898	-3882
AIC	7952	7941	7956	7947
BIC	8528	8563	8563	8645

Notes: Each model is a different regression. Results are from conditional logit models (the STATA estimation command is 'asclogit'). Alternative specific coefficients are presented and interpreted as follows: a positive coefficient means that if the regressor increases for one provider, then that provider is chosen more and other providers are chosen less; and vice versa for a negative coefficient. Individual specific coefficients presented in Appendix C13. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

Appendix C13: Inpatient choice of provider estimation results, individual specific coefficients
– all models

	Model 1	Model 2	Model 3	Model 4
Township health centre				
Household size	-0.009 <i>0.056</i>	-0.009 <i>0.056</i>	-0.008 <i>0.056</i>	-0.009 <i>0.056</i>
Ethnicity	0.472* <i>0.189</i>	0.458* <i>0.189</i>	0.478* <i>0.189</i>	0.469* <i>0.189</i>
Age	-0.002 <i>0.005</i>	-0.002 <i>0.005</i>	-0.002 <i>0.005</i>	-0.002 <i>0.005</i>
Married	-0.332 <i>0.238</i>	-0.326 <i>0.238</i>	-0.328 <i>0.238</i>	-0.316 <i>0.238</i>
<i>Education of household head</i>				
Elementary school	0.250 <i>0.216</i>	0.248 <i>0.216</i>	0.253 <i>0.216</i>	0.255 <i>0.216</i>
Middle school	0.255 <i>0.266</i>	0.250 <i>0.266</i>	0.258 <i>0.266</i>	0.250 <i>0.266</i>
High school and above	-0.267 <i>0.353</i>	-0.268 <i>0.353</i>	-0.263 <i>0.352</i>	-0.271 <i>0.353</i>
<i>Occupation of household head</i>				
Farmer	-0.483 <i>0.439</i>	-0.479 <i>0.439</i>	-0.475 <i>0.439</i>	-0.468 <i>0.439</i>
Laborer	-0.393 <i>0.491</i>	-0.394 <i>0.491</i>	-0.385 <i>0.491</i>	-0.378 <i>0.491</i>
Other	-0.379 <i>0.562</i>	-0.361 <i>0.562</i>	-0.373 <i>0.562</i>	-0.349 <i>0.562</i>
Female headed household	-0.414 <i>0.372</i>	-0.409 <i>0.372</i>	-0.409 <i>0.372</i>	-0.398 <i>0.372</i>
Female	0.283 <i>0.180</i>	0.282 <i>0.180</i>	0.283 <i>0.180</i>	0.283 <i>0.180</i>
Log of household consumption	-0.009 <i>0.119</i>	-0.008 <i>0.119</i>	0.912 <i>0.948</i>	0.974 <i>0.959</i>
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.613 <i>0.479</i>	-0.593 <i>0.480</i>	-0.619 <i>0.479</i>	-0.582 <i>0.481</i>
Bone fracture	12.913 <i>1484.395</i>	12.925 <i>1477.530</i>	12.933 <i>1488.535</i>	12.944 <i>1488.409</i>
Hypertension	-0.198 <i>0.477</i>	-0.190 <i>0.477</i>	-0.195 <i>0.476</i>	-0.191 <i>0.477</i>
Acute and chronic gastritis	-0.117 <i>0.484</i>	-0.110 <i>0.484</i>	-0.116 <i>0.484</i>	-0.092 <i>0.484</i>
Diseases of the appendix	14.668 <i>1715.764</i>	14.679 <i>1717.829</i>	14.666 <i>1710.35</i>	14.74 <i>1704.885</i>
Disorders of musculoskeletal system and connective tissue	-0.890 <i>0.458</i>	-0.892 <i>0.458</i>	-0.905* <i>0.458</i>	-0.905* <i>0.458</i>
Disorders of female genital organs	14.456 <i>962.85</i>	14.362 <i>931.784</i>	14.458 <i>964.039</i>	14.48 <i>959.34</i>
Pneumonia	-0.413 <i>0.818</i>	-0.392 <i>0.819</i>	-0.416 <i>0.818</i>	-0.410 <i>0.819</i>

Cerebrovascular diseases	13.922 706.797	13.953 710.919	13.924 708.489	13.973 712.782
Rheumatoid arthritis	-0.509 0.591	-0.529 0.591	-0.491 0.591	-0.532 0.592
County hospital				
Household size	0.046 0.053	0.046 0.053	0.048 0.053	0.049 0.053
Ethnicity	0.079 0.182	0.068 0.183	0.089 0.183	0.076 0.183
Age	-0.003 0.005	-0.003 0.005	-0.003 0.005	-0.003 0.005
Married	-0.368 0.228	-0.360 0.228	-0.362 0.228	-0.350 0.228
<i>Education of household head</i>				
Elementary school	0.178 0.204	0.177 0.204	0.181 0.204	0.184 0.204
Middle school	0.128 0.253	0.127 0.253	0.132 0.253	0.138 0.253
High school and above	-0.588 0.337	-0.604 0.337	-0.586 0.336	-0.597 0.337
<i>Occupation of household head</i>				
Farmer	-0.499 0.421	-0.501 0.421	-0.488 0.421	-0.482 0.421
Laborer	-0.335 0.471	-0.34 0.471	-0.323 0.470	-0.321 0.470
Other	-0.529 0.540	-0.522 0.541	-0.523 0.540	-0.513 0.540
Female headed household	-0.258 0.348	-0.243 0.348	-0.254 0.348	-0.240 0.349
Female	-0.006 0.171	-0.002 0.171	-0.008 0.171	0.000 0.171
Log of household consumption	0.236* 0.113	0.240* 0.114	1.014 0.962	1.113 0.971
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.734 0.442	-0.726 0.443	-0.744 0.442	-0.731 0.442
Bone fracture	13.938 1484.395	13.956 1477.530	13.97 1488.535	13.98 1488.408
Hypertension	-0.440 0.457	-0.436 0.457	-0.437 0.457	-0.405 0.458
Acute and chronic gastritis	-0.435 0.462	-0.431 0.463	-0.431 0.463	-0.425 0.463
Diseases of the appendix	14.097 1715.764	14.075 1717.829	14.105 1710.350	14.101 1704.885
Disorders of musculoskeletal system and connective tissue	-1.655*** 0.439	-1.664*** 0.441	-1.665*** 0.439	-1.670*** 0.440
Disorders of female genital organs	14.361 962.849	14.285 931.784	14.386 964.039	14.395 959.340
Pneumonia	-0.374 0.753	-0.378 0.753	-0.374 0.753	-0.350 0.753

Cerebrovascular diseases	13.839 706.797	13.858 710.919	13.84 708.489	13.856 712.782
Rheumatoid arthritis	-0.532 0.556	-0.547 0.556	-0.509 0.557	-0.523 0.557
Out-of-county hospital				
Household size	-0.038 0.057	-0.035 0.057	-0.036 0.057	-0.033 0.056
Ethnicity	0.409* 0.191	0.407* 0.191	0.420* 0.191	0.416* 0.191
Age	-0.013* 0.005	-0.013* 0.005	-0.013* 0.005	-0.013* 0.005
Married	-0.235 0.240	-0.238 0.240	-0.233 0.240	-0.233 0.241
<i>Education of household head</i>				
Elementary school	0.271 0.218	0.286 0.218	0.275 0.217	0.292 0.217
Middle school	0.277 0.266	0.294 0.266	0.286 0.266	0.298 0.266
High school and above	-0.630 0.364	-0.606 0.365	-0.627 0.364	-0.616 0.365
<i>Occupation of household head</i>				
Farmer	-0.683 0.446	-0.673 0.446	-0.664 0.446	-0.642 0.446
Laborer	-0.494 0.496	-0.503 0.497	-0.474 0.496	-0.471 0.497
Other	-0.757 0.572	-0.749 0.572	-0.746 0.572	-0.736 0.572
Female headed household	0.075 0.365	0.081 0.365	0.075 0.365	0.084 0.365
Female	-0.372* 0.180	-0.362* 0.180	-0.376* 0.180	-0.360* 0.180
Log of household consumption	0.644*** 0.119	0.647*** 0.119	1.166 0.897	1.292 0.905
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.660 0.499	-0.661 0.500	-0.676 0.499	-0.677 0.500
Bone fracture	14.499 1484.395	14.487 1477.530	14.472 1488.535	14.467 1488.408
Hypertension	-1.033 0.536	-1.035 0.536	-1.032 0.535	-1.019 0.536
Acute and chronic gastritis	-1.037 0.552	-1.029 0.552	-1.021 0.552	-1.003 0.552
Diseases of the appendix	13.676 1715.764	13.674 1717.829	13.66 1710.350	13.678 1704.885
Disorders of musculoskeletal system and connective tissue	-1.645** 0.516	-1.654** 0.517	-1.633** 0.514	-1.659** 0.516
Disorders of female genital organs	13.920 962.850	13.823 931.784	13.996 964.039	14.018 959.340
Pneumonia	-1.268 0.858	-1.249 0.858	-1.259 0.858	-1.231 0.858

Cerebrovascular diseases	13.523 <i>706.797</i>	13.541 <i>710.919</i>	13.518 <i>708.489</i>	13.54 <i>712.782</i>
Rheumatoid arthritis	-0.537 <i>0.610</i>	-0.551 <i>0.610</i>	-0.519 <i>0.611</i>	-0.539 <i>0.611</i>

Notes: Each column is a different regression. Results are from a conditional logit model. Individual specific coefficients are interpreted as parameters of a binary logit model against the base category 'did not seek treatment'. Alternative specific coefficients from these regressions were presented in Appendix C12. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

Appendix C14: Primary reason for not being hospitalized despite need (percent)

	2009	2011	2012
Unnecessary	6.88	9.33	10.5
No time	7.74	11.4	10.5
Economic difficulties	77.42	65.8	68.95
Poor service	0.43	0.52	-
High price	2.8	4.15	4.11
No beds	4.09	8.81	1.37
Other	0.65	-	4.57

Appendix C15: Primary reason for checking out of the hospital against doctor's orders (percent)

	2009	2011	2012
Not cured after a long time	7.7	14.0	23.1
Economic difficulties	74.5	64.4	56.5
Limited hospital resources	3.5	4.7	4.9
Poor service attitude	0.4	0.4	0.4
Other	13.9	16.5	15.2

Appendix C16: Inpatient choice of provider estimation results, alternative and individual specific coefficients – combining township health centres and county hospitals as a single choice

	Model 1	Model 2	Model 3	Model 4
Distance	-0.002*** <i>0.000</i>	-0.002*** <i>0.000</i>	0.006 <i>0.004</i>	0.005 <i>0.004</i>
Deductible	-0.008*** <i>0.002</i>	-0.007*** <i>0.002</i>	0.001 <i>0.017</i>	-0.001 <i>0.017</i>
Reimbursement rate	-0.099*** <i>0.012</i>	-0.099*** <i>0.012</i>	0.241 <i>0.135</i>	0.18 <i>0.133</i>
Overall quality	-0.024 <i>0.057</i>		0.581 <i>0.710</i>	
Waiting time		0.051 <i>0.041</i>		-0.438 <i>0.545</i>
Environment		0.004 <i>0.058</i>		-0.164 <i>0.769</i>
Physician politeness		-0.025 <i>0.064</i>		-0.187 <i>0.841</i>
Physician communication		0.013 <i>0.069</i>		-0.744 <i>0.906</i>
Drug availability		-0.098 <i>0.069</i>		0.976 <i>0.869</i>
Equipment sophistication		0.074 <i>0.066</i>		0.911 <i>0.848</i>
Physician knowledge		-0.013 <i>0.067</i>		-0.388 <i>0.871</i>
Household consumption*Distance			-0.001* <i>0.000</i>	-0.001 <i>0.000</i>
Household consumption*deductible			-0.001 <i>0.002</i>	-0.001 <i>0.002</i>
Household consumption*Reimbursement rate			-0.033* <i>0.013</i>	-0.027* <i>0.013</i>
Household consumption*Overall quality			-0.059 <i>0.068</i>	
Household consumption*Waiting time				0.048 <i>0.053</i>
Household consumption*Environment				0.016 <i>0.074</i>
Household consumption*Physician politeness				0.016 <i>0.081</i>
Household consumption*Physician communication				0.073 <i>0.087</i>
Household consumption*Drug availability				-0.104 <i>0.084</i>
Household consumption*Equipment sophistication				-0.081 <i>0.082</i>
Household consumption*Physician knowledge				0.035 <i>0.084</i>
Township health centre + County hospital				
Household size	0.037	0.035	0.041	0.038

	0.053	0.052	0.052	0.052
Ethnicity	0.211	0.153	0.212	0.165
	0.178	0.175	0.178	0.176
Age	-0.003	-0.003	-0.003	-0.003
	0.005	0.005	0.005	0.005
Married	-0.370	-0.418	-0.354	-0.398
	0.223	0.223	0.223	0.224
<i>Education of household head</i>				
Elementary school	0.200	0.171	0.201	0.171
	0.199	0.196	0.199	0.196
Middle school	0.200	0.158	0.203	0.153
	0.248	0.245	0.248	0.245
High school and above	-0.404	-0.421	-0.396	-0.422
	0.328	0.327	0.327	0.327
<i>Occupation of household head</i>				
Farmer	-0.474	-0.219	-0.463	-0.180
	0.414	0.362	0.414	0.360
Laborer	-0.317	-0.059	-0.307	-0.018
	0.463	0.416	0.462	0.415
Other	-0.444	-0.177	-0.451	-0.156
	0.531	0.492	0.530	0.489
Female headed household	-0.386	-0.259	-0.408	-0.276
	0.328	0.339	0.328	0.340
Female	0.069	0.089	0.067	0.081
	0.167	0.165	0.167	0.165
Log of household consumption	0.133	0.172	3.156*	2.388
	0.111	0.110	1.315	1.279
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.690	-0.792	-0.714	-0.809*
	0.429	0.410	0.429	0.409
Bone fracture	13.885	13.444	13.437	13.478
	1536.59	1080.808	1189.25	1073.31
Hypertension	-0.366	-0.347	-0.361	-0.339
	0.447	0.446	0.447	0.447
Acute and chronic gastritis	-0.262	-0.227	-0.252	-0.196
	0.452	0.450	0.452	0.451
Diseases of the appendix	15.559	15.542	15.103	15.627
	3405.13	3462.441	2643.96	3486.51
Disorders of musculoskeletal system and connective tissue	-1.426***	-1.479***	-1.444***	-1.517***
	0.413	0.398	0.412	0.395
Disorders of female genital organs	14.797	15.444	14.367	15.567
	1177.17	1511.6	936.515	1526.68
Pneumonia	-0.366	-0.363	-0.370	-0.372
	0.744	0.745	0.745	0.746
Cerebrovascular diseases	14.694	14.644	14.195	14.655
	1045.79	1027.835	814.936	1017.59
Rheumatoid arthritis	-0.489	-0.444	-0.448	-0.455
	0.543	0.542	0.544	0.543

Above county hospital

Household size	-0.039 0.056	-0.049 0.056	-0.037 0.056	-0.045 0.056
Ethnicity	0.504** 0.192	0.467* 0.189	0.514** 0.192	0.489** 0.189
Age	-0.012* 0.005	-0.013* 0.005	-0.012* 0.005	-0.013** 0.005
Married	-0.249 0.237	-0.286 0.238	-0.238 0.237	-0.265 0.239
<i>Education of household head</i>				
Elementary school	0.275 0.215	0.267 0.213	0.274 0.215	0.263 0.213
Middle school	0.289 0.264	0.295 0.261	0.297 0.264	0.292 0.262
High school and above	-0.589 0.362	-0.521 0.36	-0.587 0.362	-0.518 0.361
<i>Occupation of household head</i>				
Farmer	-0.643 0.444	-0.377 0.397	-0.627 0.444	-0.344 0.396
Laborer	-0.429 0.494	-0.163 0.452	-0.411 0.494	-0.135 0.451
Other	-0.727 0.571	-0.423 0.535	-0.723 0.571	-0.411 0.533
Female headed household	-0.082 0.352	0.068 0.363	-0.094 0.352	0.06 0.364
Female	-0.349 0.178	-0.353* 0.177	-0.350* 0.178	-0.364* 0.177
Log of household consumption	0.640*** 0.117	0.682*** 0.116	3.331* 1.335	2.670* 1.295
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.665 0.500	-0.716 0.484	-0.686 0.499	-0.740 0.482
Bone fracture	14.54 1536.59	14.034 1080.808	13.986 1189.25	14.019 1073.31
Hypertension	-1.055* 0.535	-1.001 0.534	-1.063* 0.535	-0.995 0.535
Acute and chronic gastritis	-1.019 0.553	-1.010 0.553	-1.004 0.553	-0.996 0.553
Diseases of the appendix	14.968 3405.13	14.947 3462.441	14.459 2643.96	14.931 3486.51
Disorders of musculoskeletal system and connective tissue	-1.569** 0.504	-1.707*** 0.504	-1.581** 0.503	-1.735*** 0.502
Disorders of female genital organs	14.214 1177.17	15.110 1511.600	13.809 936.515	15.189 1526.68
Pneumonia	-1.256 0.857	-1.231 0.858	-1.265 0.858	-1.224 0.859
Cerebrovascular diseases	14.360 1045.79	14.323 1027.835	13.878 814.936	14.322 1017.59

Rheumatoid arthritis	-0.507 <i>0.611</i>	-0.453 <i>0.610</i>	-0.485 <i>0.612</i>	-0.416 <i>0.610</i>
Number of observations	11067	11280	11067	11280
Log likelihood	-2440	-2465	-2435	-2458
AIC	4983	5046	4982	5053
BIC	5364	5471	5392	5551

Notes: Each model is a different regression. Results are from conditional logit models. The STATA estimation command is 'asclogit'. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

Appendix C17: Inpatient choice of provider estimation results, alternative and individual specific coefficients – removing all those who had surgery while hospitalized

	Model 1	Model 2	Model 3	Model 4
Distance	-0.003*** <i>0.000</i>	-0.003*** <i>0.000</i>	-0.004 <i>0.004</i>	-0.005 <i>0.004</i>
Deductible	-0.006*** <i>0.001</i>	-0.006*** <i>0.001</i>	-0.012 <i>0.010</i>	-0.012 <i>0.010</i>
Reimbursement rate	-0.103*** <i>0.011</i>	-0.104*** <i>0.011</i>	-0.114 <i>0.126</i>	-0.129 <i>0.127</i>
Overall quality	-0.013 <i>0.048</i>		0.937 <i>0.558</i>	
Waiting time		0.036 <i>0.033</i>		0.300 <i>0.418</i>
Environment		-0.103 <i>0.055</i>		-0.619 <i>0.680</i>
Physician politeness		0.064 <i>0.057</i>		1.141 <i>0.727</i>
Physician communication		-0.028 <i>0.064</i>		-0.749 <i>0.819</i>
Drug availability		0.013 <i>0.069</i>		1.898* <i>0.849</i>
Equipment sophistication		0.021 <i>0.066</i>		0.515 <i>0.813</i>
Physician knowledge		0.059 <i>0.064</i>		-0.685 <i>0.805</i>
Household consumption*Distance			0.000 <i>0.000</i>	0.000 <i>0.000</i>
Household consumption*deductible			0.001 <i>0.001</i>	0.001 <i>0.001</i>
Household consumption*Reimbursement rate			0.001 <i>0.012</i>	0.003 <i>0.012</i>
Household consumption*Overall quality			-0.093 <i>0.055</i>	
Household consumption*Waiting time				-0.026 <i>0.041</i>
Household consumption*Environment				0.051 <i>0.066</i>
Household consumption*Physician politeness				-0.105 <i>0.071</i>
Household consumption*Physician communication				0.070 <i>0.080</i>
Household consumption*Drug availability				-0.185* <i>0.083</i>
Household consumption*Equipment sophistication				-0.048 <i>0.079</i>
Household consumption*Physician knowledge				0.072 <i>0.079</i>
Township health centre				
Household size	-0.014 <i>0.056</i>	-0.015 <i>0.056</i>	-0.014 <i>0.056</i>	-0.016 <i>0.055</i>

Ethnicity	0.525**	0.512**	0.526**	0.524**
	0.191	0.191	0.191	0.191
Age	-0.001	-0.002	-0.001	-0.002
	0.005	0.005	0.005	0.005
Married	-0.305	-0.296	-0.299	-0.280
	0.243	0.243	0.243	0.243
<i>Education of household head</i>				
Elementary school	0.216	0.212	0.217	0.220
	0.217	0.217	0.217	0.217
Middle school	0.221	0.212	0.226	0.210
	0.268	0.268	0.268	0.267
High school and above	-0.266	-0.265	-0.264	-0.269
	0.356	0.356	0.356	0.356
<i>Occupation of household head</i>				
Farmer	-0.173	-0.167	-0.169	-0.151
	0.381	0.381	0.381	0.381
Laborer	-0.149	-0.146	-0.146	-0.121
	0.439	0.439	0.439	0.439
Other	-0.142	-0.125	-0.140	-0.108
	0.519	0.520	0.519	0.520
Female headed household	-0.412	-0.416	-0.398	-0.374
	0.375	0.375	0.375	0.375
Female	0.311	0.308	0.314	0.313
	0.182	0.182	0.182	0.182
Log of household consumption	-0.006	-0.004	0.199	0.334
	0.118	0.118	1.059	1.073
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.662	-0.629	-0.658	-0.624
	0.490	0.491	0.491	0.491
Bone fracture	14.457	14.447	14.462	14.425
	3238.590	3237.233	3226.308	3210.689
Hypertension	-0.130	-0.120	-0.126	-0.114
	0.475	0.476	0.475	0.476
Acute and chronic gastritis	-0.127	-0.123	-0.133	-0.110
	0.494	0.495	0.494	0.495
Diseases of the appendix	21.388	21.031	21.602	22.160
	77363.510	67786.505	81310.179	103000.000
Disorders of musculoskeletal system and connective tissue	-0.871	-0.869	-0.882	-0.859
	0.458	0.459	0.459	0.460
Disorders of female genital organs	15.063	15.036	14.967	15.114
	1161.025	1151.135	1140.685	1164.547
Pneumonia	-0.263	-0.234	-0.263	-0.256
	0.817	0.818	0.817	0.818
Cerebrovascular diseases	14.635	14.658	14.631	14.680
	989.804	989.925	991.260	989.834
Rheumatoid arthritis	-0.509	-0.539	-0.498	-0.561
	0.597	0.597	0.597	0.599
County hospital				

Household size	0.052 0.053	0.053 0.053	0.053 0.053	0.055 0.053
Ethnicity	0.006 0.187	0.000 0.188	0.004 0.187	0.001 0.188
Age	0.002 0.005	0.002 0.005	0.002 0.005	0.002 0.005
Married	-0.514* 0.234	-0.506* 0.234	-0.512* 0.234	-0.495* 0.234
<i>Education of household head</i>				
Elementary school	0.162 0.208	0.163 0.208	0.164 0.208	0.170 0.208
Middle school	0.199 0.257	0.202 0.257	0.206 0.257	0.217 0.257
High school and above	-0.555 0.347	-0.558 0.347	-0.556 0.347	-0.554 0.347
<i>Occupation of household head</i>				
Farmer	-0.264 0.365	-0.267 0.365	-0.267 0.365	-0.256 0.365
Laborer	-0.087 0.420	-0.096 0.421	-0.089 0.420	-0.089 0.421
Other	-0.310 0.501	-0.307 0.502	-0.322 0.501	-0.312 0.502
Female headed household	-0.310 0.357	-0.297 0.357	-0.292 0.358	-0.277 0.358
Female	0.064 0.174	0.066 0.174	0.064 0.174	0.072 0.174
Log of household consumption	0.191 0.113	0.195 0.113	0.346 1.067	0.531 1.079
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-0.839 0.465	-0.816 0.465	-0.845 0.465	-0.828 0.465
Bone fracture	15.286 3238.590	15.291 3237.233	15.281 3226.308	15.311 3210.688
Hypertension	-0.302 0.462	-0.293 0.462	-0.297 0.462	-0.252 0.463
Acute and chronic gastritis	-0.293 0.475	-0.293 0.476	-0.289 0.475	-0.285 0.475
Diseases of the appendix	0.521 79991.880	0.487 70061.517	0.537 84280.180	0.518 107000.000
Disorders of musculoskeletal system and connective tissue	-1.604*** 0.455	-1.617*** 0.457	-1.599*** 0.456	-1.609*** 0.458
Disorders of female genital organs	14.534 1161.025	14.518 1151.135	14.472 1140.685	14.598 1164.547
Pneumonia	-0.069 0.755	-0.067 0.755	-0.072 0.755	-0.036 0.755
Cerebrovascular diseases	14.656 989.804	14.658 989.925	14.659 991.260	14.649 989.834
Rheumatoid arthritis	-0.320	-0.341	-0.317	-0.333

	0.563	0.563	0.563	0.564
Above county hospital				
Household size	-0.043	-0.042	-0.042	-0.041
	0.059	0.058	0.059	0.058
Ethnicity	0.246	0.248	0.238	0.243
	0.200	0.200	0.201	0.201
Age	-0.010	-0.009	-0.010	-0.010
	0.005	0.005	0.005	0.005
Married	-0.342	-0.344	-0.341	-0.337
	0.253	0.253	0.253	0.254
<i>Education of household head</i>				
Elementary school	0.368	0.379	0.373	0.384
	0.228	0.228	0.228	0.228
Middle school	0.283	0.291	0.291	0.289
	0.279	0.279	0.279	0.279
High school and above	-0.489	-0.477	-0.488	-0.494
	0.390	0.390	0.390	0.390
<i>Occupation of household head</i>				
Farmer	-0.252	-0.245	-0.249	-0.237
	0.402	0.403	0.402	0.402
Laborer	-0.178	-0.168	-0.171	-0.154
	0.460	0.460	0.460	0.460
Other	-0.531	-0.519	-0.537	-0.537
	0.556	0.556	0.555	0.557
Female headed household	-0.137	-0.140	-0.134	-0.118
	0.389	0.389	0.389	0.389
Female	-0.248	-0.243	-0.248	-0.234
	0.188	0.188	0.188	0.189
Log of household consumption	0.508***	0.510***	0.614	0.839
	0.121	0.121	0.985	0.996
<i>Reason for visit</i>				
Cholelithiasis and cholecystitis	-1.115	-1.111	-1.127	-1.127
	0.614	0.615	0.614	0.614
Bone fracture	14.326	14.282	14.284	14.248
	3238.590	3237.233	3226.308	3210.689
Hypertension	-0.912	-0.913	-0.914	-0.895
	0.565	0.566	0.565	0.566
Acute and chronic gastritis	-0.755	-0.751	-0.740	-0.711
	0.586	0.586	0.586	0.586
Diseases of the appendix	-0.118	-0.135	-0.105	-0.087
	85498.864	74501.685	90142.327	114000.000
Disorders of musculoskeletal system and connective tissue	-1.735**	-1.755**	-1.727**	-1.736**
	0.592	0.593	0.590	0.591
Disorders of female genital organs	14.820	14.768	14.765	14.904
	1161.025	1151.135	1140.686	1164.547
Pneumonia	-1.049	-1.029	-1.051	-1.023
	0.887	0.888	0.887	0.888
Cerebrovascular diseases	14.449	14.459	14.452	14.469

	<i>989.804</i>	<i>989.925</i>	<i>991.260</i>	<i>989.834</i>
Rheumatoid arthritis	-0.402	-0.426	-0.411	-0.441
	<i>0.638</i>	<i>0.638</i>	<i>0.639</i>	<i>0.640</i>
Number of observations	10876	10856	10876	10856
Log likelihood	-3023	-3016	-3021	-3008
AIC	6197	6197	6202	6200
BIC	6752	6795	6785	6871

Notes: Each model is a different regression. Results are from conditional logit models. The STATA estimation command is 'asclogit'. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.

Appendix C18: Inpatient choice of provider estimation results from conditional logit model – allowing coefficients to vary by facility level

	Township health centre	Model 1 County hospital	Out-of-county	Township health centre	Model 2 County hospital	Out-of-county
Distance	-0.007*** <i>0.002</i>	-0.004*** <i>0.000</i>	0.000 <i>0.001</i>	-0.007*** <i>0.002</i>	-0.004*** <i>0.000</i>	0.000 <i>0.001</i>
Deductible	0.053** <i>0.020</i>	-0.011*** <i>0.001</i>	-0.009 <i>0.007</i>	0.047* <i>0.020</i>	-0.011*** <i>0.001</i>	-0.009 <i>0.007</i>
Reimbursement rate	-0.041* <i>0.019</i>	-0.063*** <i>0.014</i>	-0.096 <i>0.087</i>	-0.039* <i>0.019</i>	-0.062*** <i>0.014</i>	-0.103 <i>0.088</i>
Overall quality	0.010 <i>0.055</i>	0.011 <i>0.056</i>	0.006 <i>0.070</i>			
Waiting time				0.117* <i>0.059</i>	0.036 <i>0.045</i>	0.016 <i>0.038</i>
Environment				-0.068 <i>0.078</i>	-0.101 <i>0.074</i>	-0.120 <i>0.082</i>
Physician politeness				0.140 <i>0.092</i>	-0.007 <i>0.078</i>	0.076 <i>0.086</i>
Physician communication				-0.163 <i>0.101</i>	0.104 <i>0.085</i>	-0.084 <i>0.104</i>
Drug availability				-0.040 <i>0.094</i>	0.103 <i>0.092</i>	0.042 <i>0.134</i>
Equipment sophistication				0.064 <i>0.088</i>	-0.126 <i>0.090</i>	0.113 <i>0.134</i>
Physician knowledge				0.065 <i>0.089</i>	0.087 <i>0.089</i>	0.059 <i>0.115</i>
Household size	-0.020 <i>0.056</i>	0.045 <i>0.053</i>	-0.055 <i>0.057</i>	-0.020 <i>0.056</i>	0.044 <i>0.053</i>	-0.051 <i>0.057</i>
Ethnicity	0.571** <i>0.189</i>	0.265 <i>0.186</i>	0.545** <i>0.194</i>	0.544** <i>0.190</i>	0.255 <i>0.186</i>	0.537** <i>0.194</i>
Age	-0.002 <i>0.005</i>	-0.004 <i>0.005</i>	-0.013* <i>0.005</i>	-0.002 <i>0.005</i>	-0.004 <i>0.005</i>	-0.013* <i>0.005</i>
Married	-0.326 <i>0.237</i>	-0.365 <i>0.228</i>	-0.230 <i>0.240</i>	-0.313 <i>0.238</i>	-0.357 <i>0.228</i>	-0.234 <i>0.240</i>
Education of household head						

Elementary school	0.254 0.215	0.172 0.204	0.267 0.218	0.245 0.215	0.162 0.204	0.279 0.218
Middle school	0.256 0.266	0.111 0.253	0.299 0.266	0.242 0.266	0.102 0.254	0.315 0.266
High school and above	-0.275 0.352	-0.589 0.337	-0.641 0.364	-0.279 0.353	-0.607 0.338	-0.610 0.365
Occupation of household head						
Farmer	-0.441 0.439	-0.443 0.422	-0.707 0.446	-0.441 0.439	-0.433 0.423	-0.691 0.447
Laborer	-0.383 0.491	-0.325 0.471	-0.523 0.497	-0.387 0.491	-0.319 0.472	-0.532 0.497
Other	-0.365 0.562	-0.469 0.541	-0.794 0.573	-0.342 0.563	-0.453 0.542	-0.785 0.573
Female headed household	-0.446 0.371	-0.303 0.348	0.049 0.365	-0.439 0.372	-0.296 0.348	0.050 0.365
Female	0.292 0.179	-0.001 0.171	-0.361* 0.180	0.294 0.180	0.005 0.171	-0.347 0.180
<i>Reason for visit</i>						
Cholelithiasis and cholecystitis	-0.625 0.479	-0.743 0.443	-0.667 0.500	-0.580 0.479	-0.738 0.444	-0.655 0.501
Bone fracture	12.934 1522.196	14.023 1522.196	14.479 1522.196	12.986 1518.925	14.046 1518.924	14.460 1518.924
Hypertension	-0.225 0.476	-0.441 0.457	-1.060* 0.535	-0.201 0.477	-0.437 0.459	-1.050 0.536
Acute and chronic gastritis	-0.088 0.483	-0.383 0.465	-1.049 0.553	-0.081 0.484	-0.383 0.466	-1.030 0.553
Diseases of the appendix	14.617 1789.512	13.990 1789.512	13.640 1789.512	14.652 1803.169	13.978 1803.169	13.633 1803.169
Disorders of musculoskeletal system and connective tissue	-0.883 0.457	-1.696*** 0.440	-1.685** 0.516	-0.872 0.458	-1.692*** 0.442	-1.717*** 0.517
Disorders of female genital organs	14.260 907.328	14.182 907.328	13.666 907.328	14.109 852.537	13.977 852.537	13.476 852.537
Pneumonia	-0.394 0.817	-0.326 0.754	-1.237 0.857	-0.338 0.817	-0.345 0.754	-1.225 0.858

Cerebrovascular diseases	13.913 <i>685.313</i>	13.827 <i>685.313</i>	13.508 <i>685.314</i>	13.926 <i>687.972</i>	13.848 <i>687.972</i>	13.484 <i>687.972</i>
Rheumatoid arthritis	-0.452 <i>0.591</i>	-0.480 <i>0.559</i>	-0.497 <i>0.612</i>	-0.464 <i>0.591</i>	-0.483 <i>0.559</i>	-0.523 <i>0.613</i>
Log of household consumption	0.024 <i>0.118</i>	0.245* <i>0.113</i>	0.671*** <i>0.118</i>	0.025 <i>0.118</i>	0.247* <i>0.113</i>	0.673*** <i>0.118</i>
Number of observations		14520			14488	
Log likelihood		-3867			-3850	
AIC		7901			7902	
BIC		8530			8668	

Notes: Each model is a different regression. Model 1 uses the overall quality measure while Model 2 uses the seven disaggregated measures of quality. Results are from conditional logit models allowing coefficients to vary by facility level. The STATA estimation command is 'clogit'. Standard errors in italics. *** p<0.01, ** p<0.05, * <0.1.
