Empowering children to take charge of their nutrition: Impact evaluation of the Nourishing Schools Initiative

Brijesh Jani[1], Archana Sinha[2], Giovanna Adamo[3], Anant Jani[4, 5]*

1. *University of Chicago, Chicago, USA*
2. *Nourishing Schools, Ashoka India, Bangalore, India*
3. *Department of Public Health and Infectious Diseases, Sapienza University of Rome, Italy*
4. *Value Based Healthcare Programme, University of Oxford, Nuffield Department of Primary Care Health Sciences, University of Oxford Oxford, UK*
5. *Government Outcomes Lab, Blavatnik School of Government, University of Oxford, Oxford UK*

*Correspondences should be addressed to: anant.jani@phc.ox.ac.uk

Value in Healthcare Review
Working Paper 004

ABSTRACT

Malnutrition is the most important risk factor for illness and death globally and is associated with more than one third of all deaths in young children. According to UNICEF, more than one third of the world's children who are wasted live in India and despite several efforts by the Government of India, the problem still persists. Ashoka Nourishing Schools utilises a six component toolkit that engages school-going children aged between 9-14 through their academic curriculum and community activities to create lifelong nutrition-seeking habits to prevent the vicious cycle of undernutrition. Ashoka Nourishing Schools and Lend-A-Hand India worked with 1016 children aged 9-14 from 14 schools across three districts (Pune, Sangli and Satara) in Maharashtra, India. The midline results of Nourishing schools include: a statistically significant reduction in the number of severely thin and thin children (100 at baseline to 23 post-intervention; 179 at baseline to 89 post-intervention, respectively); a statistically significant reduction in the number of severely anaemic children (68 at baseline to 9 post-intervention); a statistically significant reduction in goitre (11 at baseline to 3 post-intervention); and a statistically significant reduction in malaria (12 at baseline to 2 post-intervention). The promising results of Nourishing Schools demonstrate that working with schools to educate and empower children with knowledge about nutrition can lead to behavior change and positive health outcomes. It is hoped that these results can be expanded to other locations in India and globally where childhood malnutrition is a serious issue.

INTRODUCTION

Malnutrition is the most important risk factor for illness and death globally and is associated with more than one third of all deaths in young children[1]. Low birth weight, inadequate feeding practices, poor health services and lack of safe water and sanitation are regarded as the major causes of malnutrition. Infectious diseases such as diarrhoea, pneumonia, measles and malaria also undermine a child's health status[2].

According to the United Nations Children's Fund (UNICEF), more than one third of the world's children who are wasted live in India[3]. Although great efforts have been made by the Government of India in the past few years to tackle the problem and burden of malnutrition, it is still present in the country and remains a major public health issue[4]. Malnourished children have increased risk of infection, death, and delayed cognitive development and chronic undernourishment is associated with an under-developed brain and with long-lasting consequences including diminished mental ability and learning capacity, poor school performance in childhood, reduced earnings and increased risks of nutrition-realted chronic diseases such as diabetes, hypertension and obesity. A lack of proper nutrition in childhood results in a profound impediment to the advancement of both individuals and societies and slows progress towards development goals[5].

The current situation in India, and other countries with a large proportion of undernourished children, exists because nutrition programmes primarily focus on providing services and awareness during the 1000-day window e.g. giving pregnant women supplements and educating them about the importance of breastfeeding or they focus on providing supplements and school meals to adolescents.

One way of addressing the challenge of malnutrition is empowering children, i.e. “Future Parents”, with basic knowledge of water, sanitation, hygiene, health and nutrition[6]. Primary school has the potential to serve as a strategic place to foster healthy habits during childhood - a formative phase of an individual’s life. Considering that India’s primary education system encompasses over 700,000 primary and upper primary schools, the promotion of healthy life styles within schools can have an enormous impact[7].

To begin to tackle the problem of childhood malnutrition, Nourishing Schools was established to partner with organisations that have a network of schools, organisations working in agriculture as well as the government to target the most powerful changemakers – children. By transforming children from passive participants to changemakers and active advocates in their and their families’ nutrition, Nourishing Schools aims to prevent the vicious cycle of undernutrition from reinforcing itself, generation after generation. The programme is delivered through a five component toolkit (Data for Nutrition, Curriculum for Nutrition; Design for Nutrition; Content for Nutrition; Mid Day Meals for Nutrition; Community for Nutrition) that engages school-going children aged between 9 and 14 through their academic curriculum and community activities, in order to create lifelong nutrition-seeking habits. This is done in the following ways[8]:

1) Children are taught about nutrients, how to cook food optimally, and a range of topics that can help them make more informed choices.
2) To show rather than tell, a range of activities are conducted, which include tending to a school garden, association games, and storytelling, to name a few.
3) Partnerships are fostered with mid day meal programmes to improve the nutritional

value, hygiene and food safety norms of food served in schools.

4) Community participation is encouraged through farmer groups, by communicating to change negative food habits, and collaborating to restore positive ones.

METHODS

The study sample consisted of 1016 children aged 9-14 years from 14 schools across three districts (Pune, Sangli and Satara) in Maharashtra. Data was collected at baseline and midline, one year after the introduction of the Nourishing Schools Toolkit, using the same methodology at both times. Data analysed include quantitative measurements on health outcomes (Body Mass Index (BMI), haemoglobin levels, visual inspection for goitre, diagnosis of malaria) and qualitative measurements indicating behaviour change in children.

The statistical software program R was used to conduct statistical analysis to quantify the potential impact certain factors has on health and behavioural changes. Through logistic regressions signs in front of the resulting beta coefficients were used to determine the direction of the relationship between the different factors and an alpha level of 5% was used to determine the statistical significance of the resulting p-values.

RESULTS

An essential outcome from the Nourishing Schools programme is to change the behaviour of children and communities so they pursue activities that will improve their nutrition. The toolkit includes activities designed to convey knowledge to children, parents and community

members on proper nutrition so that they make better choices to improve their nutrition.

Behaviours specifically targeted for change are indicated in Table 1 below.

Positive Behaviour	Percent of children
Increased Consumption of Vegetables	77%
Increased Consumption of Fruits	73%
Increased Consumption of Local Herbs & Greens	39%
Increased Consumption of Milk	50%
Growing Vegetables in his/her garden	81%

Table 1: Behaviour change in children post-Nourishing Schools Programme. The table indicates the percentage of children undertaking the behaviours indicated in the left column after being introduced to the Nourishing schools programme.

Our results indicate some impressive outcomes but also imply that there is clear room for improvement in several areas.

While it is essential to change behaviour, the ultimate outcome is improved nutritional status and health of the children in these communities. The four health indicators analysed included BMI (figure 1A), haemoglobin measurement as a proxy for anemia (figure 1B), presence of goitre (figure 1C) and presence of malaria in children (figure 1D).

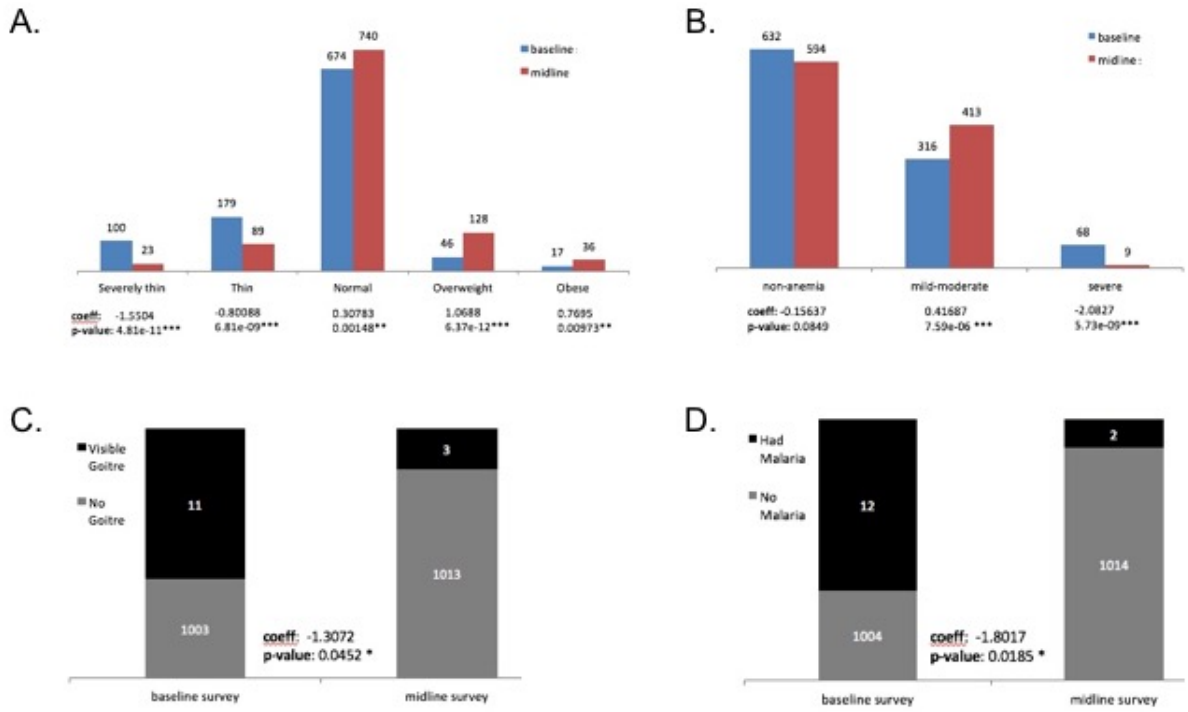

Figure 1: Health Outcomes in children post-Nourishing Schools intervention. Baseline survey indicates measurements taken at the baseline and before exposure to the Nourishing Schools intervention. Midline survey indicates measurements taken after exposure to the Nourishing Schools intervention. Measurements for each metric were taken in the same way at baseline and midline. Numbers above the graphs (A and B) or in the bars (C and D) indicate the absolute number of children in each condition. Beta coefficients and p-values (using an alpha level of 5%) are indicated in the graphs, with the extent of statistical significance indicated by the number of *'s; with no *'s indicating no statistical significance and *** indicating very high statistical significance. A) Body Mass Index (BMI) of children was measured at baseline (blue bars) and midline (red bars). BMI measurements were then categorised into different categories (e.g. 'Severely thin', 'Thin', 'Normal', etc.) based on standard WHO guidelines for BMI measurement in children. B) Haemoglobin was measured at baseline (blue bars) and midline (red bars) using Hemochek. Haemoglobin levels were categorised based on the standards recommended by WHO for measurement of anaemia. C) Number of children who had visible goitres (black portion of bars) at baseline and midline (*NB: bars not to scale*). D) Number of children who had malaria (black portion of bars) at baseline and midline (*NB: bars not to scale*).

BMI

Figure 1A shows the change in BMI status in five different categories (severely thin, thin, normal, overweight and obese adjusted for age and gender) based on established WHO standards[9, 10]. There was a substantial reduction in the number of children who were severely thin and thin between baseline (blue bars) and midline (red bars) – 100 severely thin at baseline versus 23 at midline and 179 thin at baseline versus 89 at midline. There

was also, worryingly, an increase the in number of children who were overweight and obese in midline versus baseline. This reflects a trend also seen in the 2015-16 National Family Health Survey where the percentage of men and women aged 15-49 years who were overweigh/obese has nearly doubled[11]. Further study is needed to determine why this is the case in the children we are working with.

Haemoglobin

Anemia status was determined by measuring haemoglobin levels and categorised according to WHO standards (non-anemia; mild-moderate anemia, severe anemia adjusted for age and gender)[12]. Figure 1B shows a significant reduction in the number of children who were severely anemic in the baseline versus midline measurements – 68 at baseline versus 9 post-intervention. There was an increase in the number of children who had mild-moderate anemia, which is likely due to the severely anemic children now becoming mildly anemic. Future measurements will help to determine whether we are able to transition the children with mild-moderate anemia to having normal haemoglobin levels.

Goitre

Presence of goitre is indicative of iodine deficiency. Figure 1C shows that there was a significant reduction in the number of children with visible goitre between the baseline (11 children) to midline (3 children) measurements.

Malaria

Malnutrition makes children more susceptible to infectious diseases like malaria. Figure 1D indicates a significant reduction in the number of children with malaria in the midline (2 children) versus baseline (12 children) measurements. This is a very encouraging result.

DISCUSSION

Give a man a fish and you feed him for a day; teach a man to fish and you feed him for a lifetime.

The goal of the Nourishing Schools Programme is to develop changemakers by building the capability and capacity of children and communities to take care of their own health and nutrition. This is the only way to create sustainable solutions that can build resilient communities that are empowered to use and/or create local solutions to maintain and improve their health.

The initial results of the Nourishing Schools Programme are very encouraging. We have shown that empowering children and communities with knowledge can lead to behaviour change and improved health outcomes. There are still some issues to resolve to ensure we are able to deepen the reach of these ideas within and across communities and to also address some of the negative outcomes – namely the increase in the number of overweight and obese children post-Nourishing Schools. The Nourishing Schools Programme is designed to engage with all stakeholders who can influence childhood nutrition and we hope to engage with our stakeholders to make them aware of these issues and to co-design solutions to these problems. Based on the success of our initial pilots, the programme has

expanded and currently covers over 150 schools in India, spanning the states of Maharashtra, Haryana, Rajasthan and Assam. It has also been invited by the Government of Rajasthan to cover 1400 schools in the state.

REFERENCES

1. Tette EMA, Sifah EK, Nartey ET. Factors affecting malnutrition in children and the uptake of interventions to prevent the condition. BMC Pediatrics. 2015;15:189.
2. World Health Organization. Malnutrition [Internet]. Geneva: World Health Organization; 2017 [cited 2017 Oct 5]. Available from: http://www.who.int/maternal_child_adolescent/topics/child/malnutrition/en/
3. United Nations Children's Fund. Nutrition [internet]. New York: United Nations Children's Fund [cited 2017 Oct 5]. Available from: http://unicef.in/Story/1124/Nutrition
4. Mishra C P. Malnutrition-free India: Dream or reality. Indian J Public Health 2017;61:155-62.
5. Food and Agriculture Organization of the United Nations. The spectrum of malnutrition. Roma: Food and Agriculture Organization of the United Nations; 2012. [cited 2017 Oct 5]. Available from: http://www.fao.org/worldfoodsummit/english/fsheets/malnutrition.pdf
6. Snel M, Ganguly S, Shordt K. School Sanitation and Hygiene Education – India- Resource book and hand book for teachers. Technical Paper Series 39 Delft, the Netherlands: IRC International Water and Sanitation Centre; 2002.
7. Snel M, Ganguly S. School sanitation and hygiene education – 'SWASTHH'. In: Water, sanitation and hygiene: challenges of the millennium. 26th WEDC Conference. Dhaka, Bangladesh: Water, Engineering and Development Centre; 2000. Available from: http://wedc.lboro.ac.uk/resources/conference/26/Snel.pdf'.
8. Nourishing schools. About Us [Internet]. Bangalore: Nourishing Schools Initiative; 2017 [cited 2017 Oct 7]. Available from: https://www.nourishingschools.org/
9. World Health Organization. BMI-for-age boys; 2007. [cited 2017 Oct 7]. Available from: www.who.int/growthref/bmifa_boys_z_5_19_labels.pdf?ua=1
10. World Health Organization. BMI-for-age girls; 2007. [cited 2017 Oct 7]. Available from: www.who.int/growthref/bmifa_girls_z_5_19_labels.pdf?ua=1
11. Key Findings from NFHS-4 [Internet]. Maharashtra: National Family Health Survey, India; 2016 [cited 2017 Oct 7]. Available from: http://rchiips.org/NFHS/factsheet_NFHS-4.shtml.
12. World Health Organization. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity; 2011. [cited 2017 Oct 7]. Available from: http://www.who.int/vmnis/indicators/haemoglobin.pdf?ua=1