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AN ASSESSMENT OF THE KNOWLEDGE, ATTITUDES, AND  
PRACTICES PRE- AND POST- 'SODOTO' MODEL OF  
INTERVENTION IN THE MOBILE TEACHING KITCHEN

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CLASS OF 2020  
SKIDMORE COLLEGE

## Introduction

Malnutrition “refers to the deficiencies, excesses, or imbalances to a person’s intake of energy and/or nutrients”<sup>1</sup>. The term covers two comprehensive conditions: undernutrition, which includes wasting, stunting, underweight, micronutrient deficiencies, and overnutrition, including overweight, obesity, and diet-related noncommunicable diseases<sup>1</sup>. One of the ways to characterize this condition, in all its forms, is to determine the nutritional status of an individual. The nutritional status of individuals depends on multiple factors such as complex interactions between the food they eat, the environment they occupy and their overall health state, hence its determination is often complex and problematic. It is usually determined using the ABCDE method which includes anthropometric, biochemical, clinical, demographic factors, and environmental and social factors method<sup>2</sup>. According to the Global Nutrition Report 2018, the different forms of malnutrition continue to compound one another. Three of the most common forms of malnutrition are stunting of growth, anemia in women of reproductive age and overweight among women. Globally, 124 out of 141 (~ 88%) countries experience high levels of at least two of these indicators, with 41 reporting high rates of all three<sup>3</sup>.

Malnutrition, including overnutrition and undernutrition, affects approximately 2.3 billion adults worldwide - 1.9 billion are overweight or obese, while 462 million are underweight. For children under the age of five years old, 52 million are wasted, 155 million are stunted, and 41 million are overweight or obese. Of the 52 million children under 5 years that are wasted, 17 million are severely wasted<sup>1</sup>. More than 33% of India’s child deaths are due to undernutrition, mostly from its most severe manifestations<sup>4</sup>. Malnutrition affects children’s chances at survival, increases their susceptibility to illness, impacts their cognitive ability, hence rendering them unproductive in their later life stages. Furthermore, malnutrition

disproportionately affects women in India. According to the National Family Health Survey (NFHS), as of 2016, 22.9% of women have a body mass index (BMI) below normal (BMI <18.5 kg/m<sup>2</sup>) compared to 20.2% of their male counterparts. Furthermore, 20.6% of women are affected by overweight or obesity compared to 18.9% of men<sup>5</sup>. In addition to gender, there are also, disparities in the nutritional status of individuals between urban and rural areas - 26.7% of women in rural areas are underweight (BMI < 18.5 kg/m<sup>2</sup>) compared to 15.5% of their urban counterparts. However, in the case of overweight or obesity, women living in urban areas are more likely to be affected and this condition is more acute in women of higher income and socioeconomic status than their poorer counterparts<sup>5</sup>. Mother's nutritional status, lactation behavior, women's education and sanitation are among the leading contributing factors to malnutrition in the country<sup>6</sup>.

Malnutrition, in all its forms, is complex and multifactorial. Common causes of malnutrition in India include food insecurity, poverty, low nutrition knowledge, inadequate healthcare infrastructure, and weak implementation of government policies or lack thereof<sup>7</sup>. Consequently, the populations most at risk include individuals with greater nutrient needs such as women and children, individuals residing in resource-deprived contexts such as rural areas and slums, and individuals with low nutrition knowledge. This condition presents serious health consequences for individuals that are affected by it. Most common health consequences include weight loss, high blood pressure, cardiovascular diseases, growth retardation and stunting in children, and death<sup>7</sup>. Individuals affected by malnutrition are also at risk of psychosocial health problems such as anxiety and depression as they are more likely to be stigmatized and/or bullied. Lastly, malnutrition, like other chronic conditions, presents an economic burden for the

individuals and communities that are affected by it directly through healthcare costs and indirectly through lost productivity.

The Need for Nutrition Education/Innovation Program (NNedPro) adopts a rights-based approach to addressing malnutrition in India. The target population is women, particularly pregnant women and mothers. NNedPro is an international think tank working globally to address nutrition related issues around the world. Through the Teaching Kitchen Program, launched in 2018, in Kolkata, India, NNedPro aims to create a sustainable solution that will enable the rural-urban slum-dwellers and various marginalized communities across regions of the world to challenge food insecurity and malnutrition. This program was envisioned in line with the United Nations (UN) Sustainable Development Goals and the UN Decade of Action on Nutrition. The current model constitutes a Mobile Teaching Kitchen Project - involves a fully adapted van, with fully functioning kitchen, travelling to two slums in Kolkata, India and providing nutrition education to slum-dwelling mothers. Trained volunteers were used to deliver nutrition teaching to mothers from these communities, with the aim of empowering them with skills and knowledge on cooking a healthy nourishing meal, whilst being able to pass this knowledge on to others. The knowledge is focused around a template menu, comprised of locally available ingredients which are nutritionally complete, affordable, and can be made into a tasty meal. This is taught through a “See One, Do One, Teach One” (SODOTO) model providing education in a more traditional, story-telling or practical method. The SODOTO model, often used in surgical training, is a traditional teaching method where participants, after a single observation, are expected to be capable of performing a skill/procedure followed by teaching another participant how to perform the skill/procedures.

An important element of this method of intervention is mentalization, a developmental construct which refers to “a form of (mostly preconscious) imaginative mental activity that enables us to perceive and interpret human behavior in terms of intentional mental states”<sup>9</sup>. Mentalization as an aspect of mobile teaching kitchen is a novel approach. It refers to a mother's or caregiver's ability to predict, understand, and cater to their child's nutritional preferences and psychological needs. In order to assess the mentalizing skills of the participants in the pilot intervention program of the mobile teaching clinics, the NNedPro team administered the *Wisconsin card sorting test* (WCST) and the *unexpected transfer task*. WCST is used primarily to assess abstract reasoning in adults and children - more specifically, it allows one to assess an individual's problem-solving ability and direct behavior toward achieving a goal<sup>10</sup>. Furthermore, the unexpected transfer task is used to assess a person's false belief understanding, in which “a character leaves an object in one location and while he or she is outside the room, the object is transferred to a new location”<sup>11</sup>. This task is indicative of an individual's competency in metacognition and narrative skills. In the case of the mobile teaching clinics, both WCST and the unexpected transfer task are used as indicators to assess whether the SODOTO model of intervention would improve participants' intellectual flexibility.

### **Goal of the Project**

For my final project, I aim to investigate the relationship between demographic characteristics, namely the education of the participants from the two slums - RG Kar and Chetla, their occupation and income status, with their knowledge, attitude and practices (KAP), and Teach one response. Additionally, I seek to investigate the relationship between the level of malnutrition and the observed mentalization of participants. Through studying this project to

combat malnutrition, I hope to improve my understanding of how to address nutrition-related issues while honing my social science research skills in preparation for further graduate education in public health.

## **Justification**

An understanding of the factors underlying malnutrition, in all its forms, and its impact in the lives of individuals that are affected by it, particularly with regards to cognitive functioning, is critical to ameliorating its effects, particularly in impoverished areas. Program interventions, such as the NNedPro teaching clinics, show promise in the fight against hunger, particularly for developing economies in the global south.

This past summer, I interned at the New York State Department of Health, where I gained first-hand experience in managing large data sets and using data analysis and visualization tools such as Tableau and GIS. Coupled with campus resources such as library reference help, GIS lab, advisement and supervision from readers, and coursework taken both at Skidmore and abroad, I believe I am well equipped to complete my final project as proposed.

## **Methodology**

I will be using survey data collected for the pilot phase of the SODOTO model of intervention in February 2018 by the NNedPro team. This study includes 12 participants. Demographics data collected include: level of education, occupation and annual income. For the level of education, respondents were categorized as having either primary education or none. In addition, participants were categorized as either 'housewife' or 'domestic worker' for their occupation, and for income, they were categorized as earning <2000/-, 2000/- to 4999/- or 5000/-

annually. The knowledge, attitude and practices of the participants with regards to nutrition were surveyed pre- and post-intervention using the survey questionnaire shown in Appendix A. At the end of the 'Teach One' step, participants were assessed using the questionnaire shown in Appendix B. Furthermore, mentalization was assessed using WCST and the unexpected transfer task, shown in Appendices C and D respectively. Mentalization was assessed after each step of the SODOTO model in all participants. The unexpected transfer task was assessed as either 'correct' or 'incorrect', whereas the WCST was assessed in terms of 'perseverance' and 'non-perseverance' error' and sum of errors recorded.

I will be investigating the relationship, if any, between the level of education, occupation, and annual income of the participants and their 'Teach One' and KAP survey responses. The 'Teach One' self-assessment and KAP survey responses were scored using a simple rating scale. For the 'Teach One' responses, scoring was as follows: 'not confident' (0), 'average' (1), 'good' (2), and 'excellent' (3). In the case of the KAP survey responses, I scored each of the three components of the survey separately, as seen in Appendix E. Appendix F shows the simple rating scale for the demographics data.

Using Excel-based tools, measures of central tendency and variability will be used to assess the impact of the SODOTO model of intervention in both slums as well as identify patterns between income, level of education, and occupation of the participants and their 'Teach One' assessment. My independent variables include level of education, occupation and income, whereas my dependent variable is the 'Teach One' responses. Furthermore, the knowledge, attitudes, and practices will be assessed for statistically significant improvements, if any, pre- and post-intervention. For the second portion of my analysis, I intend to investigate the relationship between the level of malnutrition and the observed mentalization, using a similar

technique. My independent variable for this portion of the analysis will be mentalization and my dependent variable, level of malnutrition.

### **Timeline**

**2nd & 3rd Week of October:** Completed introduction section and started on literature review.

Outlined the structure of written portion of the project.

**3rd & 4th Week of November:** Clean data set and start data analysis. Liaise with readers to get feedback.

**December:** Final decision to be made on project proposal by SDM Advisory board.

**December & January:** Start literature review and complete data analysis.

**1st and 2nd Week of February:** Start first draft and get feedback from readers.

**3rd and 4th Week of February:** Revise first draft of thesis.

**1st and 3rd Week of March:** Present a finished draft of the thesis to readers and present a first draft of the presentation poster to readers.

**Last week of March and 1st Week of April:** Final review of thesis and poster presentation.

**April 15th:** Final draft of the Thesis is due.

## References

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9. Fonagy P, Allison E. What is mentalization? the concept and its foundations in developmental research and social-cognitive neuroscience; In Midgley N, Vrouva I, eds. *Minding the child: Mentalization-based interventions with children, young people and their families*. New York, NY: Routledge; 2012: 11-34. Accessed October 15, 2019.
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## Appendix A – KAP Survey Questionnaire

### KNOWLEDGE

*Please circle the box that most closely matches your level of knowledge*

1. WHAT DO YOU UNDERSTAND ABOUT YOUR CHILD'S HEALTHY NUTRITION/HEALTHY FOOD PRACTICE?

|              |                |                    |                |                     |
|--------------|----------------|--------------------|----------------|---------------------|
| No Knowledge | Some Knowledge | Moderate Knowledge | Good Knowledge | Very Good Knowledge |
|--------------|----------------|--------------------|----------------|---------------------|

2. DO YOU HAVE ANY KNOWLEDGE REGARDING THE NUTRITION VALUE OF DIFFERENT TYPE OF OILS SUCH AS MUSTARD OIL, SOYA OIL, BANASPATI/DALDA, GHEE ETC?

|              |                |                    |                |                     |
|--------------|----------------|--------------------|----------------|---------------------|
| No Knowledge | Some Knowledge | Moderate Knowledge | Good Knowledge | Very Good Knowledge |
|--------------|----------------|--------------------|----------------|---------------------|

3. DO YOU HAVE ANY KNOWLEDGE ABOUT PROTEIN RICH FOOD?

|              |                |                    |                |                     |
|--------------|----------------|--------------------|----------------|---------------------|
| No Knowledge | Some Knowledge | Moderate Knowledge | Good Knowledge | Very Good Knowledge |
|--------------|----------------|--------------------|----------------|---------------------|

4. DO YOU HAVE ANY KNOWLEDGE ABOUT THE USEFULNESS OF GREEN LEAFY VEGETABLES FOR YOUR CHILD?

|              |                |                    |                |                     |
|--------------|----------------|--------------------|----------------|---------------------|
| No Knowledge | Some Knowledge | Moderate Knowledge | Good Knowledge | Very Good Knowledge |
|--------------|----------------|--------------------|----------------|---------------------|

5. DO YOU HAVE ANY KNOWLEDGE ABOUT LOW COST NUTRITIOUS FOOD?

|              |                |                    |                |                     |
|--------------|----------------|--------------------|----------------|---------------------|
| No Knowledge | Some Knowledge | Moderate Knowledge | Good Knowledge | Very Good Knowledge |
|--------------|----------------|--------------------|----------------|---------------------|

### ATTITUDE

*Share your opinion on the statements below: how strongly do you agree or disagree?*

6. FRUITS AND VEGETABLES ARE HEALTHY/ESSENTIAL FOR YOUR CHILD.

|                   |          |                            |  |       |                |
|-------------------|----------|----------------------------|--|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree |  | Agree | Strongly agree |
|-------------------|----------|----------------------------|--|-------|----------------|

7. MILK IS VERY HEALTHY FOR STRONG BONES AND TEETH.

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

8. PULSES, NUTS, SEEDS, EGG, POULTRY AND FLESH FOODS ARE VERY ESSENTIAL FOR YOUR CHILD GROWTH AND DEVELOPMENT.

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

9. MIXED AND A VARIETY OF NATURALLY COLOURFUL FOODS ARE AN ATTRACTIVE AND NATURAL IMMUNE ENHANCER FOR YOUR CHILD

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

10. FRUITS AND VEGETABLES PROVIDES VITAMINES AND MINERALS

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

11. SMALL AMOUNT OF FREQUENT FEEDING IS GOOD FOR THE HEALTH OF YOUR CHILD

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

12. BREAKFAST PLAYS AN IMPORTANT ROLE FOR YOUR CHILD'S GROWTH AND DEVELOPMENT

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

13. IF YOUR CHILD IS ILL, SKIPPING MEALS IS GOOD

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

14. WHOLE FRUIT IS BETTER THAN FRUIT JUICE

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

15. IT IS BETTER TO WASH VEGETABLES BEFORE CUTTING.

|                   |          |                            |       |                |
|-------------------|----------|----------------------------|-------|----------------|
| Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|-------------------|----------|----------------------------|-------|----------------|

**PRACTICE**

16. How often do you have Milk & milk products?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

17. How often do you have Roots and tuber?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

18. How often do you have Pulses?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

19. How often do you have Green leafy Vegetable?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

20. How often do you have Nuts & seeds?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

21. How often do you have Fish/ Meat/ Egg?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

22. How often do you have fruits?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

23. How often you offer your child homemade food during the day?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

24. How often does your child take outside food during the day?

|       |            |             |             |                       |
|-------|------------|-------------|-------------|-----------------------|
| Never | Once a day | 2 x per day | 3 x per day | More than 3 x per day |
|-------|------------|-------------|-------------|-----------------------|

25. Do you provide school Tiffin to your child?

|       |                    |                     |                      |                  |
|-------|--------------------|---------------------|----------------------|------------------|
| Never | 1-6 days per month | 7-12 days per month | 13-18 days per month | Almost regularly |
|-------|--------------------|---------------------|----------------------|------------------|

| Demographic Data                                                  |        |                            |                            |                  |  |
|-------------------------------------------------------------------|--------|----------------------------|----------------------------|------------------|--|
| NAME OF PARTICIPANT                                               |        |                            |                            |                  |  |
| Address                                                           |        |                            |                            |                  |  |
| Age (Years)                                                       |        | Date of Birth (DD/MM/YYYY) |                            |                  |  |
| Gender                                                            |        | Male                       |                            | Female           |  |
| Please circle where this form was KAP questionnaire was completed |        |                            |                            |                  |  |
| See One                                                           | Do One | Teach One                  | Children Focus Group       | Male Focus Group |  |
| Date:                                                             |        |                            | Signature of investigator: |                  |  |

## Appendix B – ‘Teach One’ survey questionnaire



### Knowledge, Attitude, Practices Self-Assessment: ‘Teach One’ Teaching Kitchen, Kolkata

|                  |  |                |  |
|------------------|--|----------------|--|
| Unique code      |  | Date           |  |
| Participant Name |  |                |  |
| Inner Wheel rep  |  | Trained mother |  |

*This should be completed by the participating mothers with the assistance of a team member.*

Key



Not confident



Average



Good



Excellent

In the table below, circle how confident you feel in relation to your skills in the following areas:

|                                                 |  |  |  |  |
|-------------------------------------------------|--|--|--|--|
| Food handling and overall hygiene               |  |  |  |  |
| Cooking skills                                  |  |  |  |  |
| Understanding the importance of a balanced diet |  |  |  |  |
| Retention of knowledge and skills gained        |  |  |  |  |
| Ability to explain and teach others             |  |  |  |  |

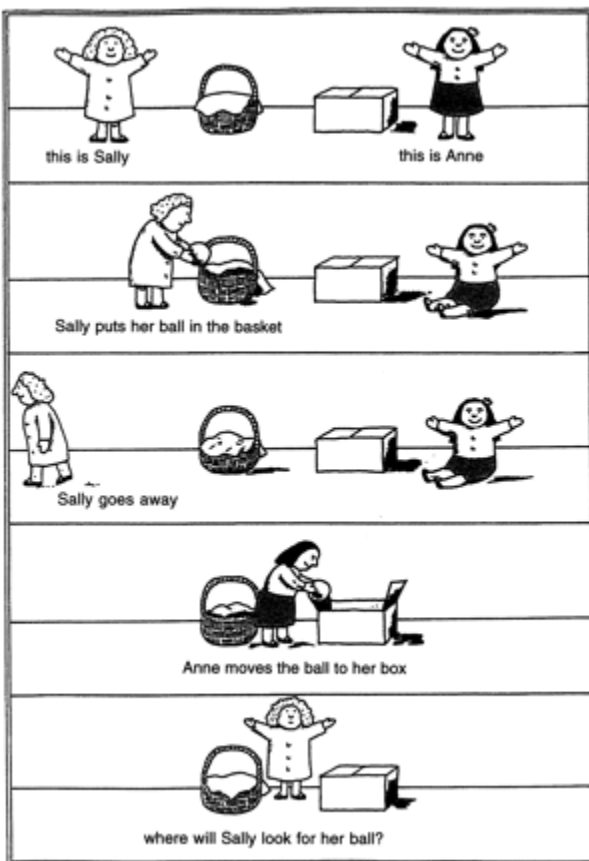
## Appendix C – Cognitive flexibility and mentalizing skills

This project intends to assess the effects of a current intervention of nutrition education (Teaching Kitchen) on slum women and their children, through a multidisciplinary approach focusing on wellbeing and cognition.

We aim to assess mothers' / caregivers' knowledge and awareness of diet and lifestyle, but also their mentalizing skills in relation to their child's nutritional preferences, attitudes and needs. 'Mentalizing' refers to the mothers' or caregivers' ability to predict, understand and cater for their children's psychological needs. Investigating mothers' mentalizing skills towards children's nutritional needs is a novel aspect of the proposed work. Mentalizing is a form of imaginative mental activity about others or oneself. It includes perceiving and interpreting human behavior in terms of intentional mental states (e.g. needs, desires, feelings, beliefs, goals, purposes, and reasons). A lot of mentalizing is not conscious, deliberate, and reflective but rather automatic, intuitive, and implicit. Mentalizing can be assessed through standard Theory of Mind tasks examples of which are presented below:

### Cognitive ToM tasks

#### 1) Unexpected Transfer Task: (Wimmer & Perner, 1983):



Adapted from 'Sally-Anne Test' - Baron-Cohen, Alan Leslie & UtaFrith (1985)

Control questions:

- Where did Mary put her ball? .....
- Where is the ball now? .....

Belief question:

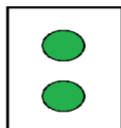
- Where does Mary think the ball is?
- Why does Mary believe the ball is in the basket? (justification question)  
.....

Target/ action question:

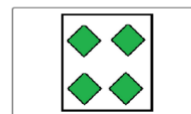
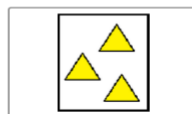
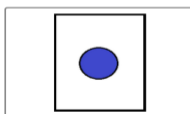
- When Mary goes back, where will she look for her ball first? .....
- Why will she look there? (justification question) .....
- Will she find the ball when she looks in there? .....
- Why/ Why not? .....

2) Wisconsin Card Sorting Task (WCST) - Grant & Berg, 1948

The task involves a set of cards which are comprised of all the different combinations of 4 colors (red, blue, yellow, green), 4 shapes (crosses, stars, circles, squares) and 4 numbers (1, 2, 3, 4). This makes 64 cards e.g. 3 red circles, 2 yellow stars. The participant is shown 4 of these cards which display all the features. An example of this may be 1 red circle, 2 green stars, 3 blue squares and 4 yellow crosses. The participant is then shown one of the other cards and must match it to one of these 4 based on one of these features. The participant is then told if they sorted that card correctly. Based on this feedback, the participant must work out the rule as to which feature, they are sorting the cards by. However, over the course of the experiment the rule changes. How quickly the participant can adjust their responses to the new rule set according to feedback is indicative of their level of cognitive flexibility. The rules normally change every 10 cards.



Pick one of the decks below to shuffle the card into



Here the participant can either sort the card into the first pile (shape), second pile (number) or fourth pile (color). The participant will receive feedback to tell them if their match was correct or not.

## Appendix E – Simple rating scale for KAP survey responses

### Knowledge

| Multiple choice option | Score |
|------------------------|-------|
| No Knowledge           | 0     |
| Some Knowledge         | 1     |
| Moderate Knowledge     | 2     |
| Good Knowledge         | 3     |
| Very Good Knowledge    | 4     |

### Attitudes

| Multiple choice option     | Score |
|----------------------------|-------|
| Strongly disagree/Disagree | 0     |
| Neither agree nor disagree | 1     |
| Agree/Strongly agree       | 2     |

### Practices

| Multiple choice option | Score |
|------------------------|-------|
| Never                  | 0     |
| Once a day             | 1     |
| 2x per day             | 2     |
| 3x per day             | 3     |
| More than 3x per day   | 4     |

**Appendix F – Simple rating scale for demographics data**

**Income**

| <b>Level of income</b> | <b>Score</b> |
|------------------------|--------------|
| <2000                  | 0            |
| 2000 - 4999            | 1            |
| >5000                  | 2            |

**Education**

| <b>Level of education</b>          | <b>Score</b> |
|------------------------------------|--------------|
| No primary education               | 0            |
| Primary education (up to IV)       | 1            |
| Primary education (higher than IV) | 2            |

**Occupation**

|                 |   |
|-----------------|---|
| Housewife       | 0 |
| Domestic worker | 1 |
|                 |   |

## **Annotated Bibliography**

Aijaz R. Preventing hunger and malnutrition in India. Observer Research Foundation.

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The Observer Research Foundation, established in 1990, constitutes India's leading economists and policymakers, and aims to encourage a plurality of thought and voice that aids public policy and economic reforms. This report was published in the ORF 2017 annual report and author, Rumi Aijaz, a senior fellow at the foundation, offers an overview of the state of malnutrition in India and reports current efforts to tackle malnutrition in the region. Using data from the National Family Health Survey-4 (NFHS) and the International Food Policy Research Institute (IFPRI) global nutrition report, Aijaz describes the effects of malnutrition among different age groups -newborns, adolescents, and adults. He explains the risk factors associated with the prevalence of malnutrition in the region, such as unemployment and income poverty, nutrition knowledge, inadequate investment in healthcare infrastructure and services, lifestyle, and weak implementation of nutrition schemes. Lastly, Aijaz examines past and current policies and food-based program interventions in India, highlighting improvements that have been made so far and the challenges that remain. This report provides a snapshot of the state of malnutrition in India and its underlying causes. In addition, it provides a profound analysis of current interventions from which I can compare my intervention.

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India. *Int J Med Sci Public Health*. 2015; 4(2): 162-167.

doi:10.5455/ijmsph.2015.2609201429. Accessed September 17, 2019.

In this article, a cross-sectional descriptive-observational study method was used to evaluate the multi-strategy approach of the Integrated Child Development Services (ICDS) in India over the past forty years. The study was conducted in a rural ICDS block in Delhi for a duration of 6 months and it included 80 mothers of both healthy and undernourished children. Through semi structured interviews and focus group discussions, the study investigated the mothers' child feeding practices and beliefs surrounding child nutrition. Using x2-test analysis, the study found that a lack of nutritional knowledge and inadequate treatment-seeking behavior and poverty were among the leading causes of the high prevalence of malnutrition in children in rural India. This article provides an in-depth evaluation and analysis of a current major food-based intervention in India. In addition, it establishes the link between nutritional knowledge of the mother and child malnutrition in rural India, providing further justification of the importance of educating women, particularly mothers in the rural parts of India.

Fonagy P, Allison E. What is mentalization? The concept and its foundation in developmental research and social cognitive neuroscience. In: Midgley N, Vrouva I, ed. *Minding the Child: Mentalization-Based Interventions with Children, Young People, And Their Families*. New York, NY: Routledge; 2012: 11-35. Accessed October 15, 2019.

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Psychiatry and Behavioral Sciences at Baylor College of Medicine; and holds visiting professorships at Yale and Harvard Medical Schools. In this chapter, authors, Fonagy and Allison, define the concept of mentalization, origins, foundation in developmental research, and the challenges of mentalizing in family interactions. In addition, they summarize the relationship between attachment and mentalizing, and its importance in child development. Lastly, they suggest that focusing on the mentalizing process could enhance clinical practice and therapeutic interventions. This chapter provides an entryway to understanding the mentalizing skills aspect of the data collection method of the NNedPro team, thus providing the foundations of the evaluation and data analysis process.

Global Nutrition Report 2018. Global Nutrition Report. <https://globalnutritionreport.org/>.

Accessed September 17, 2019.

The Global Nutrition Report (GNP) is formulated yearly by the International Food Policy Research Institute (IFPRI). IFPRI, established in 1975, is an agricultural research center that operates internationally with a mission to provide research-based policy solutions that sustainably reduce poverty and end hunger and malnutrition in developing countries. This report is data-driven and tracks the state of global nutrition with the aim of inspiring key stakeholders to act and end malnutrition. The GNP provides data that highlight the progress that has been made with malnutrition and other nutrition-related conditions worldwide, as well as the challenges that remain. This report provides a basis for comparing the trends of nutrition-related conditions between India and the rest of the world, in order to help answer the question of what is being done in other parts of the world that isn't being done in India.

India Rural Third Repeat Survey of Diet and Nutritional Status 2011-2012 | GHDx.

Ghdx.healthdata.org. <http://ghdx.healthdata.org/record/india-rural-third-repeat-survey-diet-and-nutritional-status-2011-2012>. Accessed September 17, 2019.

The National Nutrition Monitoring Bureau (NNMB) is a collaborative effort between the Indian Council of Medical Research and the State governments of India. The NNMB is a nation-wide monitoring system that assesses the diet, nutritional status, and prevalence of obesity, overweight, hypertension, and type 2 diabetes across rural and urban populations of India through cross sectional surveys at individual and household levels. Sociodemographic and anthropometric measures are collected, and clinical assessments performed on approximately 86,898 individuals from 23,889 households in 1,195 villages. Nearly 4,600 mothers of children less than 3 years of age were also interviewed on antenatal care, infant and child feeding practices, and other aspects of infant and child-care. The bureau reports malnutrition data and estimates based on Gomez classification for children and body mass index (BMI) for adults. This report presents overall trends and changes in the nutritional status of India's population over time, with particular focus to rural areas, depicting improvements that have been made over the years as well as challenges that remain.

Jose S, Navaneetham K. A factsheet on women's malnutrition in India. *Econ Polit Wkly*. 2008; 43(33): 61-67. <https://www.jstor.org/stable/40277858>. Accessed September 8, 2019.

This article analyses women's malnutrition in India over a seven-year period between 1998 and 2006. Using data from the NFHS-3, 2005-2006, and through comparative analysis between NFHS-3 and NFHS-2 data, 1998-1999, the authors propose a precursory factsheet on the levels

on women's malnutrition including the spatial and socioeconomic disparities. Authors, Navaneetham and Ravi used the following indicators of nutrition: BMI (weight to squared height) below 18.5 indicates undernutrition, referred to as chronic energy deficiency (CED) and a BMI above 25.0 and 30.0 indicate overweight and obesity respectively. To conclude, they make an argument for the significance and relevance of women's nutrition in India due to its implications for human development, thereby providing a justification for my choice of target population.

National Family Health Survey. Rchiips.org. <http://rchiips.org/nfhs/>. Accessed September 17, 2019.

The National Family Health Survey (NFHS) is coordinated and run by the International Institute for Population Sciences in collaboration with the Ministry of Health and Family Welfare and the Government of India. This survey was first conducted in 1992 - 93 and four additional surveys have been conducted since then. This report provides cumulative state and national data for India on fertility, nutritional status of children and adults, infant and child mortality, family planning, maternity and delivery care, child immunizations, HIV/AIDS, hypertension, anemia, blood glucose level, gender-based violence, tobacco use, and alcohol consumption. The NFHS provides data on key health indicators that are used for analysis of the determinants of malnutrition and other food-related issues in India.

Puttaraju, Uma H. Women malnutrition: Rural-urban disparities still persist in India. *Int J Res Soc Sci*. 2018; 8(7): 187-198.

[https://www.ijmra.us/project%20doc/2018/IJRSS\\_JULY2018/IJMRA-14021.pdf](https://www.ijmra.us/project%20doc/2018/IJRSS_JULY2018/IJMRA-14021.pdf).

Accessed September 30, 2019.

Authors, Puttaraju, Professor of Economics at Maharani's College for Women, and Dr. Uma, Professor of Economics at the University of Mysore, examine that state of malnutrition among women across all 29 states and 7 union territories in India at the macro level. Using data from the NFHS-4, India Health Report on Nutrition 2015, Global Nutrition Reports, and statistical tools such independent  $t$  tests, the authors analyze the difference in the prevalence of malnutrition among women in urban and rural areas. This study found significant differences in prevalence of malnutrition across states and between urban and rural areas, and between affluent and impoverished areas within urban areas. With the focus on women, this study was able to provide an in-depth analysis of the risk factors underlying prevalence of malnutrition among this group and the unique challenges that they may face, especially during pregnancy. Understanding how this group, women in rural areas, differs from the rest of the population will help me design an intervention that will be tailored for and cater to them.

Radhakrishna R. Food and nutrition of the poor: Emerging perspectives and policy issues. *Econ Polit Wkly*. 2005; 40(18): 1817-1821. <http://www.jstor.org/stable/4416562>. Accessed September 9, 2019.

In this article, Radhakrishna, one of India's most influential applied economists and author reviews the trends in food energy intake and malnutrition in India using a wide range of input and outcome measures, including the per capita consumption of food, calorie intake and nutritional status based on anthropometric measures. The author is critical of inferences between

food energy intake and nutritional status, and the impact of dietary diversification on the nutritional status of an individual. In addition, he explores the relationship between income poverty and malnutrition in children and adults across both urban and rural areas of the country. Lastly, he assesses the efficacy of current major food-based interventions in India, highlighting areas for improvement. This article establishes a framework for understanding malnutrition in all its forms in a resource deprived context, in this case, rural India.

Radhakrishna R, Ravi C. Malnutrition in India: Trends and determinants. *Econ Polit Wkly*. 2004; 39(7): 671-676. <http://www.jstor.org/stable/4414642>. Accessed September 8, 2019.

This article reviews the trends in nutritional status - malnutrition among children and chronic energy deficiency (CED) among adults - in rural areas of India using data from the National Nutrition Monitoring Bureau and analyses the determinants of malnutrition using data from the National Family Health Survey-2. In addition, the authors explore the association between poverty reduction and undernutrition, concluding that the nutritional status of individuals in India, particularly women and children had not kept up with reduction in poverty levels. With a sample size of 10,438 and estimating logit regression model using the maximum likelihood method, the authors identified mother's education, age and employment status to have significant impact on malnutrition. Likewise, household level variables were statistically significant, complying with the notion that malnutrition decreases with increase in the standard of living of the household and increases with household size. The authors establish the root causes of malnutrition in India providing a basis for analysis, intervention design and mitigation efforts.

Rajaram Y, Kalosona P, Shrestha S. Progress in demographic and other factors and its influence on nutritional status of mothers and children in India. *J Multidiscip Res Healthcare*. 2016; 2(2):133-148. doi:10.15415/jmrh.2016.22009. Accessed September 18, 2019.

Primarily, this article explores the ways in which advancements in demographic and socioeconomic factors influence the nutritional status of mothers and children in India. Using data from the first and second round of the NFHS (1992 -93; 2005-06), the authors calculated the rank correlation between mother's underweight and children's underweight by different socioeconomic and demographic backgrounds and characteristics. Furthermore, using the Oaxaca Decomposition Model, the authors quantified the contribution of mother's education and timing to initiate breastfeeding to the reduction of underweight among children between 1992 and 2006. This study shows that improvement in maternal education, hence maternal literacy, is the leading contributing factor toward improving their nutritional status and the nutritional status of children in India.

Raykar, N, Majumder, M, Laxminarayan, R, Menon, P. India health report: Nutrition 2015: IFPRI Publications. <http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/130085>. Published 2015. Accessed October 5, 2019.

This report is published by the Public Health Foundation of India and the International Food Policy Research Institute (IFPRI). It provides a state-level overview of the trends of maternal and child undernutrition in India. More specifically, it provides trends and disparities in the nutritional status of mothers and children under five years across geographical regions, socioeconomic status, and demographic groups, its multiple determinants and the status of the

country's key nutrition-based interventions.