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Maternal Nutrition Practices and Perceptions in Bihar, India

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2007

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in the Hubert Department of Global Health
2013

Abstract

Maternal Nutrition Practices and Perceptions in Bihar, India
By Alexandra Marie Piasecki

Background
Malnourishment is a serious public health issue in India with more than half of India's children suffering from undernutrition. Improving maternal nutrition is one means of addressing this issue. Bihar, India is the poorest and least developed state and according to the United Nations Children's Fund (UNICEF). More than half the children are underweight in Bihar, a proportion which is higher than the overall Indian average.[1] And approximately one in two women aged 15-49 years in underweight with a body mass index (BMI) less than 18.5 kg/m^2, where a BMI between 18.6 and 24.9 is considered normal. [2]

Objective
This study aims to describe the perceptions of mothers, mothers-in-law and frontline workers surrounding maternal malnutrition in Bihar, India and make recommendations for improvements.

Methods
A qualitative study was conducted between June-August 2012. Data collection included twenty-two focus group discussions with mothers, mothers-in-law, and frontline workers in Bihar, India. A systematic analysis of verbatim transcripts identified major themes, comparing and contrasting patterns within the three population groups of the focus group discussion.

Results
The data revealed strong cultural practices and food taboos associated with maternal nutrition. All study groups mentioned specific foods with beneficial and/or adverse effects on either the mother or her child. Strong cultural practices preventing pregnant women from eating adequately were described, especially among women living in large multi-generational homes. All women mentioned a form of restrictive diet following delivery in order for the woman's body to recover and prevent post-delivery complications.

Discussion
Maternal nutrition needs to be prioritized at the community level among all family members and frontline workers. Cultural traditions prioritizing pregnant women need to be encouraged in order to improve their access to adequate food intake. Educational interventions to address specific food taboos and the harmful effects of a restrictive diet could improve nutritional knowledge. However further research surrounding the origins of these taboos is necessary in order to rebuff them and change behaviors and beliefs. With this information future programs can target the identified barriers and capitalize on the opportunities for improving mother's nutritional status and reducing maternal and infant mortality.

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Acknowledgements

I would like to thank Usha Ramakrishnan for her help in the process of writing this thesis. She gave me the freedom and flexibility necessary to learn and to grow throughout this process, while providing me with all of the support and advice that I needed. I would also like to thank Melissa Young Fox and Amy Webb Girard for the time that they put into helping me with this project. I greatly appreciate their feedback and wisdom.

I am thankful to the Emory University, CAREIndia, the Gates Foundation and Rey Martorell for making the trip to Bihar, India possible. I am also grateful to everyone who helped me with the data collection process in Bihar, especially Amanda Wendt, Priya Kekre, Pankaj Verma and Sridhar Srikantiah. I would also like to thank my research assistants, Anita Kumar, who helped facilitate the interviews, and Amit Kumar, who transcribed the interviews.

I would like to thank my family and friends for supporting me and encouraging me for the past year as I discussed this project at length.

Finally, I would like to thank all of the women and frontline workers who participated in this study. I very much appreciate their openness and willingness to share their stories.

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Chapter 1: Introduction

Introduction and rationale

The United Nations Children's Fund (UNICEF) has called malnutrition "the silent emergency" because of its persistent attack on humankind, the millions of lives it has taken and the little attention it has garnered from the public.[3] In India, child malnutrition underlies an estimated 50 percent of all deaths. Furthermore, approximately one in three women aged 15-19 years has a body mass index (BMI) below 18.5 kg/m^2, indicating severe nutritional deficiency and undernutrition. [2, 3] In Bihar, India, one of the regions poorest states, these numbers are even further exasperated where 28 percent of babies are low birth weight and one in two women have a BMI below 18.5 kg/m^2.[2] In recent decades, maternal mortality rates have seen no decline, and infant mortality rates have seen little improvement, indicating a new strategy for improving child and maternal nutrition is needed. [4] Improving maternal nutrition while a woman is pregnancy and nursing may improve pregnancy outcomes and reduce infant and maternal mortality rates. Understanding current maternal nutrition practices and perceptions is key to improving maternal nutrition and thereby reducing infant and maternal mortality rates.

Malnutrition in India

In India child malnutrition rates are even more staggering considering that nearly one-third of the country's population is under five. Consequently, India has one of the highest rates of child malnutrition in the world. [5] While India has made huge investments in combating child undernutrition and child mortality, with the Integrated Child Development Services (ICDS) program establishment in 1975, for example, in recent years little improvement has been seen.[6]

Arguably, one opportunity in improving child mortality and child undernutrition lies in

improving the nutritional status of pregnant and nursing women. Women are the principal providers of nourishment to their children, but this bond is created even before the child is born. [3] The nutritional status of mothers during pregnancy influences her child's health both beneficially and adversely. Recent research has highlighted the association between undernutrition in pregnancy with maternal, fetal and infant morbidity and mortality. [7] This research indicates a link between malnutrition in early life, including the period of fetal growth, and the development later in life of chronic conditions like coronary heart disease, diabetes and high blood pressure, giving the countries in which malnutrition is already a major problem new cause for concern.[3]

Bihar, India

Bihar is the third most populous and one of the poorest states in India. [8] Nearly two in every five children under the age of three is stunted and one in four suffers from wasting. [9, 10] Additionally, according to UNICEF, more than half of Bihar's children are underweight, a proportion which is higher than the overall Indian average. [1] Bihar has developed and implemented several programs to target pregnant and lactating women in an effort to improve maternal nutrition. While strides have been made in reducing maternal and infant mortality in the last few decades, the current rates of decline remain insufficient and negligible.[11]

Problem statement

Poor nutrition during pregnancy not only leads to high maternal morbidity and mortality, but also results in high prenatal infant and child mortality rates.[12] A component of improving child malnutrition and mortality rates, therefore, lies in improving the nutritional status of

women during pregnancy and nursing. Understanding at the community level what women are eating and their perceptions of their food will help programs target the barriers and identify opportunities necessary to improve women's nutritional status and reduce maternal and infant mortality rates.

There are many potential interventions that have been implemented to improve maternal nutrition statuses in various parts of the world that may be applicable to Bihar, India. Prior to providing recommendations on how to improve maternal nutrition, it is first necessary to gain a better understanding of the context in which the maternal practices and beliefs are being carried out.

Purpose statement and research aims

This study provides formative qualitative evidence from the viewpoints of mothers, mothers-in-law and frontline workers to gain insight into the practices and perceptions of maternal nutrition in Bihar, India. The following three aims were used to guide data collection and analysis:

1. Assess current nutritional practices amongst mothers and mothers-in-law in the Patna area.
2. Determine women's understanding of how what they eat affects their child's health.
3. Identify barriers preventing mothers from eating a healthy diet.

Significance statement

This project will provide formative research on maternal nutrition in Bihar, India. This information will allow CARE India, as well other non-profits in the area, to make improvements

and adjustments to their program and specifically target the barriers and opportunities identified in the data for their interventions on maternal nutrition. Knowledge of these underlying practices about how and why certain food taboos and cultural practices exist serve the purpose of contextualizing maternal nutrition. This allows culturally appropriate and context specific recommendation to be made for improving maternal and infant mortality rates. Maternal undernutrition is an important public health problem in developing countries, and decreasing its burden is vital.

Chapter 2: Literature Review

Introduction

India has the second highest child undernutrition prevalence in the world; nearly double that of Sub-Sahara Africa.[13] Consequently, India has the highest child mortality rate in the world. [14] For the past three decades India has made great efforts to combat malnutrition, even creating the world's largest integrated early childhood program, the Integrated Child Development Services Program (ICDS) in 1975, however in recent years India has struggled to maintain reductions in child undernutrition and progress has been stagnant. [6] From 1999-2005 the proportion of underweight (severe or moderate) children under three years of age declined only marginally from 47 percent to 46 percent.[6] A 2006 World Bank study later determined ICDS program had little overall effect on nutritional outcomes.[15] Recent research has revealed that child malnutrition may begin before birth and that a mother's nutritional status before and during pregnancy effects not only her child's development in uterine, but also her child's nutritional status later in life. Improving maternal nutrition may improve child malnutrition in India.

Maternal malnutrition

According to the World Health Organization (WHO), malnutrition occurs when an individual does not consume the proper amounts of micronutrients, vitamins and minerals, and consequently their physical function is impaired. [16] A malnourished individual often finds that their body has difficultly with functions such as growth, pregnancy, lactation, physical work, and immunity. Today the world faces a double burden of malnutrition that includes both undernutrition and overnutrition or overweight. [17] Clinically, malnutrition is characterized by

inadequate (undernutrition) or excess (overnutrition) intake of protein, energy, and micronutrients such as vitamins or minerals and the frequent infections and disorders that result of this malnutrition. [16] Maternal malnutrition refers to a woman's nutritional status during pregnancy or while lactating.

Historically, malnutrition and growth failure were treated as a deficiency of protein-energy.[3] However, malnutrition is now recognized as an inadequate intake of protein in addition to vital minerals (iron, zinc and iodine) and vitamins (vitamin A) and fatty acids. [3] Many of these are substances are not produced by the human body but are essential for everyday physical functions. For this reason, supplements with these nutrients are recommended when needs cannot be met through diets. [18]

Malnutrition takes on a variety of forms that are often exhibited in combination and may contribute to one another, such as protein- energy malnutrition, iodine deficiency disorder, and deficiencies of iron, zinc and vitamin A, for example. [3] Malnourished individuals have weaker immune systems, which puts them at a greater risk for illnesses; however individuals suffering from an illness are also at greater risk for becoming malnourished.[3] In Africa, for example, one third of all child malnutrition is caused by malaria. Similarly, pregnant women are more susceptible to malaria and children born to mothers with malaria run a greater chance of being born underweight and anemic. [3]

In adults the best indicator for malnutrition is the index (BMI), which compares an individual's height for weight ratio. According to the National Institute for Health (NIH) a BMI below 18.5 is considered underweight, between 18.6 and 24.9 is normal, and a BMI greater than 25 is considered overweight. For pregnant and nursing women a mid-upper-arm circumference

(MUAC) is also used to measure and compared to a global standard for age in order to determine whether a woman is malnourished. [16]

Pregnant and nursing women require extra nutrients to fulfill their bodily functions.[18] During pregnancy, for example, women need more food, varied diet and micronutrient supplementation. [18] When energy and other nutrient intake does not increase, the body's own reserves are used, leaving a pregnant woman feeling weak. [18] Energy needs increase in the second and particularly the third trimester of pregnancy. The Institute of Medicine recommends that women who have a BMI below 19.8 before pregnancy gain a total of 28-40 pounds, a woman between 19.8 and 26 BMI gain 25-30 pounds and a woman between 26-29 BMI gain 15-25 pounds during her pregnancy. [19] According to the CORE Group, Vitamin A, Iron, Folic Acid and Iodine are recommended supplements for pregnant woman because of the difficulty in obtaining them through foods.[18]

Lactation also places high demands on maternal stores of energy, protein and other nutrients. These stores need to be established, conserved and replenished. The majority of women, unless they are extremely malnourished, can produce adequate amounts of breastmilk. The energy, protein and other nutrients in breastmilk comes from a mother's diet or her own body stores. Women who do not get enough energy and nutrients in their diets risk maternal depletion.

Causes of Malnutrition

Malnutrition is primarily the result of disease and inadequate dietary intake, but there are underlying key causes that contribute to an individual's increased likelihood of hunger, such as social, political, economic, and cultural elements. [3] Malnutrition is often considered a

condition of the poor, because the need to purchase or access adequate food or nutritional supplements requires money. But a lack of expendable income also inhibits a family from investing in education, transportation and their own health.

Food security entails having access to and control over sufficient quantities of food needed to sustain active and healthy lives. [20] This means having the ability to secure food through either production or food purchases and is dependent on household income as well as food availability and the price in local markets. Households that produce their own foods must also have access to fertile land, labor, tools and climate to produce adequate and nutritious foods, for example.

Diets vary across India especially among rural and urban habitants. According to the 2006 Hindu-CNN-IBN State of the Nation Survey, approximately 31 percent of Indians are vegetarian and 9 percent are vegetarians who consume eggs.[21] One recent study compared the diets of rural, urban and migrant populations in India, among non-vegetarians and analyzed the differences in macronutrient intake. The consumption of meat was found to be much higher in the urban settings than in rural and migrant settings.[22] There was an increased consumption of vegetables, sugars and dairy produces about rural and then migrant groups. Urban groups tended to consume more energy from protein and fat, while rural groups consumed more carbohydrates. [22] Furthermore, urban dwellers had relatively higher intake of macronutrients overall. [22]

Sanitation and clean water access also contribute to nutritional status. Malnutrition, as stated earlier, is the results of inadequate dietary intake, disease or both. [20] Diseases compromise an individual's immune system making them more susceptible to disease. Diseases contribute to loss of appetite, mal-absorption of nutrients, and loss of nutrients through diarrhea and vomiting.

Gender discrimination influences malnutrition among women and children.[3] In developing countries where malnutrition is most prevalent, women and girls face discrimination in both education and employment. These societies, including India, often favor men who are the laborers and providers of the family, while women are encouraged to stay home and tend to their domestic responsibilities. Women, who are the principal providers of nourishment for the children, suffer because the division of family resources favors the working man over the mother and her growing and developing children.[3]

Finally, the social and care environment within the household and local community can directly influence malnutrition. [20]Appropriate childcare, proper infant and young child feeding practices are essential to good nutrition and health. This includes cultural factors and resources such as income, time and knowledge of care practices as well as attitudes to modern health services, water supplies and sanitation.

Consequences of Malnutrition

Pregnancy is a period of rapid growth and development for the mother and the fetus she carries; as such nutritional deficits during this period can have profound consequences. The consequences of maternal malnutrition include, but are not limited to, increased risk of maternal complications and death, preterm birth, fetal and neonatal complications, long-term adverse effects on mother and offspring health, postpartum complications, increased infections, anemia, and birth defects. [23]

In epidemiological studies examining maternal malnutrition and its relation to birth outcomes in the Netherlands, Germany Leningrad (former Soviet Union) and China, it was determined that acute severe maternal malnutrition, especially during a woman's second or third trimester of pregnancy, but not her first, adversely affected the birth weight of her child. [24] The

Dutch study in particular found that maternal malnutrition during the second and third trimesters not only resulted in an increased risk of reduced birth weight but also birth length, and head circumference of infants.

Several animal studies have evaluated the effects of maternal undernutrition on fetal development. [23] These studies concluded that deficiencies of energy or macronutrients during the first trimester of pregnancy have a greater adverse effect on fetal development than during late gestation. Several studies showed that if undernutrition is prolonged to late pregnancy, fetal growth is greatly limited; this is particularly true in cases of twin pregnancies. [25]The animal studies were also able to determine that the embryo and fetus is most vulnerable to deficiencies of protein and amino acids during the pre-implantation period and the period of rapid placental development. [26, 27]

Micronutrient deficiencies have varied effects because of the diverse roles each nutrient plays in the development of the fetus.[28] During cell growth, DNA is transcribed to RNA, which is then translated to proteins, which provide the enzymes and structures of the cell. At every stage of the process micronutrients are needed, as signals (retinoic acid), or structural (zinc in transcription), for example.[28] Furthermore, different organs develop at different times during pregnancy. [28] For these reasons and their importance in fetal development, vitamin D and iron are often supplemented during pregnancy.

Vitamin A, for example, is essential for grown, development and reproduction with demonstrated roles in visions and skin development. [28] Recent animal studies have shown that in modest (50 percent) reductions in maternal retinol concentrations during late pregnancy reduce neonatal survival rate by 50 percent as well reduce in the relative weights of fetal lungs,

liver and heart. [29] However, routine supplementation of pregnant women with vitamin A is not recommended due to its potential to cause birth defects. [30]

Iron deficiency is the most common nutritional deficiency globally. [31] Iron deficiency is associated with increased risk of maternal hemorrhage, and pre-partum blood loss. [28]During pregnancy iron deficiency is a risk factor for prenatal complications like pre-eclampsia, low birth weight, prematurity and prenatal mortality. [32, 33] In rat studies it was revealed that rat pups born to mothers who were iron deficient had increased heart weights and increased blood pressure in early adulthood. [34]

In general there is scientific evidence describing the beneficial effects of micronutrient supplements on pregnancy outcomes.[28] However, research has indicated that there is the possibility that deficiencies of micronutrients and minerals are more prevalent than previously thought.[28]

Strategies for Improving Maternal Nutrition

Balanced Energy Protein Supplementation

The Institute of Medicine encourages women with low BMI to gain between 28 and 40 pounds during their pregnancy to ensure a healthy pregnancy outcome, however this recommendation may be difficult for families of lower social economic class who do not have the means to purchase additional foods. [18] A large Gambian program targeted pregnant women of low body mass and supplemented them with more than 700 calories a day. The results of this intervention showed that it reduced the risk of small-for-gestational age baby by 32 percent. [35] [36]

Iron and Folic Acid Supplementation

Iron requirements increase almost tenfold by the third trimester of pregnancy.[37] The World Health Organization (WHO) recommends iron and folic acid supplementation (120 mg iron and 400 µg folic acid) daily for at least three months in early pregnant women for the purpose of improving pregnancy outcomes and reducing maternal anemia in pregnancy.[38] Studies assessing the effects of placebos and iron and folic acid tablets given to pregnant women found that overall women taking daily iron and folic acid supplements were less likely to have low birth weight babies compared to the controls. [39]

Micronutrient Supplementation

In a review of multiple studies assessing multiple micronutrient supplementations it was concluded that interventions providing supplements with five or more micronutrients were more effective in reducing the risk of delivering low birth weight when compared with supplementation with three or fewer micronutrients. [40]

Nutritional Education and Counseling

Nutrition education and counseling (NEC) is a commonly applied strategy for improving women's maternal nutritional status during pregnancy.[41] NEC methods generally focus on enhancing maternal diet by increasing the diversity and amount of foods consumed, adequate weight gain through consumption of sufficient and balance protein and energy, and the consistent and continued use of micronutrient supplements, foods supplements or fortified foods. [41] In studies where NEC programs targeted maternal diet, even for a brief period of time, an improvement in multiple maternal and neonatal health indicators was observed. [41]

Background on Bihar

The state of Bihar, which lies in the northern and Hindi-speaking belt of India bordering Nepal, is both the country's most rural state and based on economic and social indicators the poorest. Bihar comprises 38 districts that are sub-divided into 534 development blocks, 139 towns and 44,874 villages. [8] With a population of 103.8 million, Bihar is the third most populous state in India and from 2001 to 2011 the population grew by 25 percent. More than half Bihar's districts are food insecure as a result of poverty, unequal land tenure patterns, and widespread annual flooding that devastate crops and livestock.[42] And as mentioned earlier, Bihar ranks lower than any other Indian state in the human development index. An estimated 53 percent of the women are literate, 20 points behind the male literacy rate. [8] The maternal mortality rate is 312 deaths per 100,000 live births and female life expectancy is 59.5 years, nearly seven years less than the national average. [2] Historically, Bihar has been called the state "that cannot feed itself".[43] It's lack of development originated from years of poor governance and corruption. However, in 2005 with the election of Chief Minister Nitish Kumar, a new investment in health, education and transportation was forged. In less than 10 years this new path has already made some impactful changes. This new political platform spurred an average economic growth rate of 11.3 percent between 2005 and 2010. [44] And the percentage of the population with access to primary health services has also risen.

Maternal Nutrition in Bihar

While Bihar continues to grow and develop, the status of its women and their health continues to lag behind, however. According to the latest rounds of the National Family Health Survey (NFHS) and the District Level Household and Facility Survey (DLHS), which were

conducted in 2005-06 and 2007-08 respectively, progress has not been universal in Bihar. When examining the change in maternal nutritional status from the National Family Health Survey (NFHS) between 1999 and 2006 the percentage of underweight women increased from 39 to 45 percent and in addition, the percentage of anemic women increased from 60 to 68 percent. [2, 45]

According to India's National Family Healthy Survey in 2008 (NFHS-3) approximately 28 percent of babies in Bihar were low birth weight (LBW)[2], which is defined as birth weight less than the 10^{th} percentile of weight-for-gestational-age, mainly as a result of intrauterine growth restriction (IUGR). [46, 47] Two in five children under three years of age in Bihar is stunted and one in four suffers from wasting.[10]

Early and frequent pregnancies also play a contributing part to maternal undernutrition. In Bihar, 56 percent of girls are either mothers or pregnant with their first child by the time they are 19 years of age.[2] Early marriage and childbirth practices can be particularly detrimental to a young woman as her body is continuing to grow. The added burden of a child puts her at a greater risk for low BMI. [11]

Bihar's Maternal Nutrition Programs

At the same time Nitish Kumar's plan to improve education, health and transport in Bihar was announced, The National Rural Health Mission (NRHM) was launched across all of India. The goal of the NRHM was to revitalize a crumbling public healthcare system at the village level. At the cornerstone of this reform was the introduction of a cadre of women from rural villages and hamlets called Accredited Social Health Activists or more familiarly referred to as ASHAs. ASHAs work under Anganwadi Workers (AWWs) who were created in 1975 along

with the implementation of the Child Development Services (ICDS) program. The ICDS was a revolutionary and unique program for its time demonstrating India's commitment to improving the lives of its children with the overall goal of the ICDS program aiming to improve the nutritional and health status of children and with the outcome of reducing the incidence of child mortality. Both programs employed a grass-roots strategy targeting rural communities by employing women from these communities.

ASHAs and AWWs are frontline workers selected from the village community to work in the health and nutrition programs promoted by the Indian government. The responsibilities of the AWWs and ASHA are manifold. ASHAs assist AWWs in registering women and children for immunization, antenatal and post-partum care. Generally ASHAs mobilize the potential beneficiaries to seek these services and are paid incentives based on the fulfillment of their target goals. ASHAs refer their health cases to the Anganwadi Center (AWC), which is managed by the local AWW. ASHAs also work with AWWs to further the nutrition program for adolescent girls, receive and distribute contraceptives, counsel women on birth preparedness and persuade them to seek institutional delivery and escort them to the facility for delivery, facilitate referral of difficult cases, provide nutrition and health education, promote breastfeeding and infant feeding good practices, and ensure registration of all births and deaths in the village.

Since 1975 Bihar has initiated three key programs to improving the nutritional health and development of its women: iron and folic acid supplementation, deworming, and protein-energy supplementation. Iron and folic acid (IFA) supplementation is the primary strategy for preventing anemia in women and adolescent girls in Bihar. The policy is to provide women with 100 tablets (100mg ferrous sulphate and 0.5mg folic acid) during pregnancy. [48] However, coverage has been low with only 30 percent of women receiving any IFA tablets during their last

pregnancy and only 10 percent consuming them for the recommended 90 days or more. [1] The School Anemia Control Program School is responsible for providing one IFA tablet per week to all female students aged 14-17 years. This program was rolled out in every district. Unfortunately, it is not clear what percentage of girls is actually reached by this program. [48]

Deworming is another strategy for reducing anemia in pregnant women and adolescent girls in Bihar. Health personnel are responsible for giving women a deworming pill (400mg Albendazole) during their first antenatal checkup. However, only 4 percent of women reported receiving a deworming during their last pregnancy.[2] Again, the School Anemia Control Program School is responsible for distributing deworming tablets twice a year to school-going adolescent girls.

Finally, the protein energy supplementation is the primary intervention for reducing maternal underweight and low birth weight in Bihar. Anganwadi workers (AWW) are responsible for distributing take-home food rations (3kg rice and 1.5 kg pulses per woman per month) to pregnant and lactating women registered with the Anganwadi Center (AWC). However, only 0.6 percent of the women and children under six years of age reported receiving nutritional supplements from their local AWC during their last pregnancy or nursing period. [2]

Conclusion

Globally, India has the highest hunger problem with approximately 217 million or 18 percent of the world's burden.[49] According to UNICEF, malnutrition is not merely a question of whether a person can eat enough to satisfy their immediate hunger but is a combination of inadequate dietary intake and infection. As the principal providers of nourishment, women play an important role in a child's development. However, recent research has demonstrated that a mother's role extends beyond provider and her unique nutritional status during pregnancy may

also influence the pregnancy outcomes by affecting critical development processes during the beginning stages of pregnancy.[40] For this reason, research and progress in maternal malnutrition plays an important role in improving global malnutrition.

In order to fundamentally improve maternal nutrition countries must make maternal malnutrition a priority issue and create policies and goals for improving it. Until this time global funding and attention will continue to stifle past maternal nutrition initiatives and onto programs and interventions focusing on issues deemed more important by the global public health community. However, little attention will be paid to maternal nutrition until it is properly researched and understood with clear interventions and program goals to successfully target it. On this note, the first step to improving maternal nutrition is to understand what is happening at the community level. This study conducted interviews with women at the community level to identify and understand the types of barriers they encounter in consuming healthy foods.

Chapter 3: Methods

The objective of this study is to identify current practices and perceptions of maternal nutrition in Bihar. This study was implemented in affiliation with an ongoing program called the Integrated Family Health Initiative (IFHI). CARE India heads the IFHI program and Emory University serves as the technical consultant in the area of nutrition. This was a cross-sectional study and qualitative research methods were used to gain an understanding of practices and perceptions of maternal nutrition in Bihar, India. Qualitative methods were used in order to allow for a better understanding of current experiences and opinions among mothers, mothers-in-law and frontline workers, Association for Social and Health Activist (ASHAs) and Anganwadi Workers (AWWs). Methods included twenty-two focus group discussions (FGD) with mothers, who were defined as either currently pregnant or having a child two years or younger, mothers-in-law and frontline workers, ASHAs and AWWs. The principle investigator collected data between June 1st, 2012 and August 10th, 2012 in Bihar, India. Detailed field notes were kept while data was collected in order to contribute to the rigor of the study. Field notes were used to document methods applied in the data process. The primary data collection and analysis procedures are described below in detail.

Study location

The data from mothers and mothers-in-law were collected in the capital of Bihar, Patna, where there was the greatest concentration of research assistants and CARE staff to support the study. Bihar is India's poorest and least developed state. The capital of Bihar, Patna, is wealthier and fares better than the rest of the state overall in terms of resources for health and education. The infant mortality rate in Patna is 39 percent overall, with 30 percent in urban areas and 46

percent in rural areas.[50] Just on the outskirts of the city are thousands of individuals inhabiting makeshift homes and living in squalor. Therefore Patna offered a wide range of woman to sample from: those who lived in rural agriculture areas and those who lived proximately closer to the city and benefited from work opportunities and educational resources.

Data for mothers and mothers-in-law were collected in five blocks surrounding the Patna district: Punpun, Danepur, Sampatchak, Manee and Dulhin Bazaar. The five blocks were purposively selected for their diversity, distance, and availability of adequate participants and under recommendation from state-level officials. All five blocks were accessible by vehicle with enough time to leave the state CARE office and return the same day.

The data from the frontline workers were collected as part of an iron and folic acid (IFA) study. This study was also an IFHI affiliated research project investigating IFA consumption and distribution to pregnant women in Bihar, India. However, questions were included in the IFA study guide to generate an understanding of frontline workers' maternal nutrition perceptions. These focus groups were conducted with frontline workers from two districts: Begusarai (blocks: Cheriya Bariyarpur and Barauni) and Golpalganj (blocks: Uchkagaon and Panchdevri). Frontline workers were chosen because of their engagement with community members on issues surrounding health and nutritional needs. Additionally, frontline workers are also responsible for educating women and suggesting nutritional measures to improve their health and pregnancy outcomes.

Study population

The women included in this study were mothers, mothers-in-law, and frontline workers (AWWs and ASHAs). Mothers were defined as either currently pregnant or having a child two

years of age or younger. Mothers-in-law were not restricted and could include women of any age and with grandchildren of any age. The frontline workers were defined as currently employed and working in their local blocks, but were not restricted by years of work experience as a frontline worker or by age.

Recruitment

Recruitment for mothers and mothers-in-law utilized Patna district Block Coordinators employed by CARE. Block Coordinators worked with ASHAs and AWWs to contact women in their block who matched the study's requirements. The ASHAs and AWWs inquired whether these women were willing to participate in a discussion on local customs surrounding food and availability on the selected time and date. The ASHAs and AWWs were essential in recruitment of mothers and mothers-in-law because of their knowledge of families, pregnancies and work schedules.

In a similar manner to the mother and mother-in-law recruitment process, frontline workers were recruited through Gopalganj and Begusarai district Block Coordinators also employed by CARE. The Block Coordinators contacted local ASHAs and AWWs to inquire whether they were willing to participate in a discussion on local customs surrounding food and availability to discuss on the selected time and date.

Each block coordinator was asked to arrange FGDs: in Patna with 6-8 mothers and 6-8 mothers-in-law and in Begusarai and Gopalganj with 6-8 frontline workers in their areas. The block coordinators were asked to organize the FGDs in a quiet and conveniently located setting for the women.

Focus group discussions with mothers and mothers in law

FGDs used a semi-structured discussion guide (Appendix 1) with different guides for mothers and mothers-in-law. FGDs lasted between 30 minutes to 75 minutes with most FGDs averaging approximately one hour. Topics covered in the discussion included current eating practices; knowledge of nutrition; access to supplements; perceptions of maternal nutrition; perceptions of how maternal nutrition affects a baby's health; and their recommendations for improving the maternal nutritional intake in their communities. Prior to collecting the data the guides were piloted with one group of mothers and one group of mothers-in-law. Piloting allowed the team to gauge the clarity of the questions and to assess the ability of facilitators to lead the discussions.

Five FGDs were conducted with mothers and five with mothers-in-laws, refer to Table 1. All the FGDs were recorded and led by a trained facilitator and conducted primarily in Hindi. An assistant took notes during the discussion to aid in the transcriptions. The primary investigator observed and noted the participants' dynamics.

Focus group discussions with ASHAs and AWWs

In total, the team conducted twelve FGDs with frontline workers through the iron and folic acid (IFA) program in the Begusarai and Gopalganj districts of Bihar. The questions were also pilot tested as part of the IFA FGD guides to ensure quality of the interview guide and interviewer team dynamic. There were four research assistants, two of whom were women, and one primary investigator in the IFA study. During the FGD, two research assistants were involved: one as the facilitator and the other as the note-taker. The research assistants rotated as facilitator and note-taker during the discussions. The primary investigator did not speak Hindi

and served only as an observer. The discussions investigated general current food practices in the community especially during pregnancy and recommendations to improve maternal nutrition.

Table 1. Summary of focus group discussions

Target Group	Number of Focus Group Discussions	Location: Block
Mothers	5	Punpun Danepur Sampatchak Manee Dulhin Bazaar
Mothers-in-law	5	Punpun Danepur Sampatchak Manee Dulhin Bazaar
Association for Social Health Activists (ASHAs)	6	Uchkagaon Panchdevri Cheriya Bariyarpur Barauni
Anganwadi Workers (AWWs)	6	Uchkagaon Panchdevri Cheriya Bariyarpur Barauni
Total	22	

Ethical consideration

The International Review Board (IRB) deemed this study exempt for approval since it does not constitute human subject research, uses secondary data and is intended to provide evidence-based recommendations to CARE and Emory for future programming. All FGDs were recorded once verbal informed consent was received from each participant. All participants were instructed that they were voluntarily contributing to the discussion and could stop their involvement at any time. All data was de-identifiable and names were removed from all

transcripts. All focus group discussions took place in community centers where it was private, safe, and comfortable for participants.

The principal investigator is CITI-certified and all research assistants who helped with recruitment and the facilitation of the FGDs were trained on qualitative and ethical data collection. All staff involved in the collection and handling of the data were instructed to keep the content of the focus group discussions private and confidential. During analysis, only the immediate study team had access to the transcripts.

Data analysis

All FGDs with mothers, mothers-in-law and frontline workers were recorded with permission and transcribed verbatim into Hindi before being translated into English with local dialect words left in the transcript in brackets. A CARE staff member then checked the transcripts against the English transcripts for quality and accuracy and edited when necessary.

Analysis of data was completed using the principles of grounded theory and the analysis software, MaxQDA version 10. Line-by-line memoing was conducted on three interviews with mothers, two with mothers in law and two frontline FGDs prior to defining codes and applying them to segmented data. After thoroughly memoing the transcripts, both inductive and deductive codes were created. The first codebook consisted of eleven codes, with deductive codes including supplements, seasonal eating, dinner, breakfast, impact of nutrition on child, role of family members, knowledge source, beneficial foods and pregnancy, adverse foods and pregnancy, beneficial foods and post-partum, adverse foods and post-partum. Inductive codes were originally defined as beneficial foods and lactation, adverse foods and lactation, hot foods and cold foods.

Textual data for all twenty-two FGDs were segmented and coded. Data were retrieved and systematically reviewed using individual codes and intersections of codes. For the purposes of data retrieval by theme, types of respondents were grouped together to better identify consistencies and differences when reviewing the data.

Limitations

For the maternal nutrition data collection, both research assistants were native Hindi speakers, however the primary facilitator had little English speaking skills while the principal investigator had no knowledge of the Hindi language. This required the other research assistant to liaison information between the two researchers. In order to address this barrier, daily debriefing sessions were set-up at the end of each field day to summarize findings and to relay information back to the principal investigator to make decisions on the quality the data collected and the re-wording of questions.

While the topics discussed were neither sensitive nor controversial, having a foreigner present and a male researcher observing the discussion may have hindered the participants' abilities to freely participate in the discussions. The main facilitator of all FGDs was a woman with a concrete knowledge and experience in qualitative data, however even the most capable moderator cannot motivate a shy woman to talk in front of a stranger.

Finally, every attempt was made to conduct the discussions in a private and comfortable setting; however, there were a few unavoidable exceptions where local family members and community members were observing from a window or door. Often after watching the discussion for several minutes the spectators would return to their activities. Discussions were occasionally interrupted by flies, heat or by participants either joining or leaving the discussion

because of a crying child. These interruptions were avoided as much as possible but perceived as necessary in order to conduct the discussions in a convenient location for the participants.

Chapter 4: Results

The results examine current practices and perceptions of maternal nutrition among mothers, mothers-in-law and frontline workers in Bihar, India. Focus group discussions offer a deeper understanding of women's perceptions and practices with maternal nutrition.

Description of the Study Population

The demographic characteristics of all participants are summarized in Table 2. The average age of mothers was 25.3 years while mothers-in-law were 42.5 years of age. Twenty-one percent of mothers completed secondary schooling and 14 percent completed primary schooling. The majority of mothers (64 percent) and mothers-in-law (100 percent) reported being illiterate. Mothers and mothers-in-law were fairly evenly divided as either schedule or other backward caste, with 54 percent of mothers and 42 percent of mothers-in-law characterized as schedule caste. Finally, mothers and mothers-in-law reported their occupation as either housewives or laborers, with 54 percent of mothers reported as housewives and 50 percent of mothers-in-law.

Association for Social Health Activists (ASHAs) and Anganwadi Workers (AWWs) were on average 33.70 and 31.83 years of age respectively. All ASHAs and AWWs reported entering, but only 25 percent completed secondary schooling.

Table 2. Demographic characteristics of all focus group respondents by target group.

Target Group	Location Block	Mean Age (in years)	Literacy Rate	Castes	Religion	Occupation
Mothers	Punpun Danapur Sampatchak Manee Dulhin Bazaar	25.3	64% Illiterate 21% Secondary 14% Primary	54% Schedule Caste* 46% Other Backward Caste*	100% Hindu	54% Housewives 46% Laborers
Mothers-in-law	Punpun Danapur Sampatchak Manee Dulhin Bazaar	42.5	100% Illiterate	58% Other Backward Caste 42% Schedule Caste	100% Hindu	50% Laborers 50% Housewifes
Association for Social and Health Activists (ASHAs)	Uchkagaon Panchdevri Cheriya Bariyarpur Barauni	33.7	100% Secondary	-	-	100% Frontline worker
Anganwadi Workers (AWWs)	Uchkagaon Panchdevri Cheriya Bariyarpur Barauni	31.8	100% Secondary	-	-	100% Frontline worker

* Schedule Caste and Other Backward Caste are among the lowest castes in the Indian caste system [51]

General Food Practices

In order to understand food behaviors and practices, participants were asked to discuss a typical day and describe when food was prepared, cooked and consumed. Participants reported that meals were cooked twice a day: in the mornings and evenings. Daughters and daughters-in-law were primarily responsible for cooking all meals. Tea is prepared in the morning for everyone, and then those family members who go to work or school eat first and either take a packed lunch or eat the lunch provided by their employer. The other members of the household usually eat their first meal much later in the day, closer to noon.

Different vegetables are cooked for breakfast and dinner since food cooked in the

morning would go stale by dinnertime. The same food is cooked for all members of the family and nothing special is prepared for men or children. Participants also reported that special foods were not prepared for pregnant women. However, if a pregnant woman was hungry and wanted to eat something specific she had the autonomy to cook it herself; however this food was then shared with other family members. Participants also mentioned no special food practices among community members of different castes or religions. However, different foods and practices were reported depending on the season.

During the winter season, families consumed more food overall. Participants reasoned that families spent more time indoors and therefore engaged in eating and sleeping activities more than in the summer. There is also a preference for hot foods during the winter and participants mentioned sleeping well with a stomach full of warm foods. Finally, it was often mentioned that there was greater availability and variety of produce during the winter.

During the summer and rainy season, conversely, there were a number of explanations for restricted diets. For the most part, participants described that community members limited their intake because of the discomfort of the heat and preferred to drink cold beverages instead of eating. When food was consumed people preferred cold foods to hot and decreased the use of oil and spice. Participants also mentioned feeling irritated in the summer and having a greater fear of experiencing 'loose motion' because the stomach was often upset. Additionally, participants stated that they could not digest foods as well in the summer, as described below:

Respondent 4- See, in winter you eat as much, eat and go to bed so it is digested and in summer scared of hot exist in mind, that is why eat less.

Respondent 2- If wish then drinks sharbat (Mixture of water, sugar and lemon)

Respondent 6- In winter gets good sleep after eating.

Respondent 4- Eat less and drinks more water in summer.

Focus Group Discussion Bairia, Sampatchak

Increased work demands and not having enough time to eat in the morning was also presented as an explanation for consuming less food during the summer season. Participants mentioned eating less grain because the rain and humidity caused the rice and flour to go bad and become infested with insects. One participant recounted how her community members try to cook dinner earlier during the rainy season to avoid attracting mosquitoes and insects with a light bulb at night. On a positive note, participants noted that community members who worked in agriculture were often allowed to bring home some of the produce from the fields where they worked.

One focus group with pregnant women mentioned how pregnant women, in particular, ate less at night during the rainy season because of the discomfort and fear of going outside in the dark and rain to urinate or defecate. Compared to the winter season when participants recounted an abundance of food produced, during the summer and rainy season people described limited selection of produce available and often mentioned how they ate whatever was available in the markets. Here is an example of this:

Facilitator- Well, as aunty is saying there should be toilet, gutter, etc. So by this what impact can take place to mother and infant?

Respondent 4- There is no gutter, no toilet. We have to go toilet in the field. During rainy season before eating we think that how to eat full stomach, where will I go toilet.

Facilitator - Pregnant women cannot eat.

Respondent 4- Scared of toilet.

Respondent 1- If she goes there (In the field) then disease must occur.

Respondent 4- So there is need of toilet.

Focus Group Discussion Bairia, Sampatchak

Role of Family Members

In order to understand the family dynamics in which food decisions are made, participants were asked who in the family made decisions concerning meals. Daughters-in-law were reported as occupying primarily domestic responsibilities such as cooking meals while mothers in laws were concerned with the outside work, such as making cow dung cakes and feeding the cattle. Mothers-in-law generally decided what the family ate because she visited the markets. In nuclear families, with no mother-in-law influence, husbands were described as making the food decisions and deciding what was appropriate for a pregnant woman to eat. However, some participants argued that women are now intelligent and know what's good for them. Additionally, in these scenarios, women are the ones who go to the food markets and ultimately make the final decision surrounding what to eat, as explained below:

Facilitator: The pregnant woman herself decides or her family member decides and what about her husband? Who will decide?

Respondent 3: Her husband will decide.

Facilitator: Is her husband will decide?

Respondent 3: Yes.

Facilitator: Is it reality that the husbands will decide what their pregnant wives will

consume? Who else will decide?

Respondent 3: Sir, if things will be bought then only the pregnant women could have it. The person who buys the things for house also decides the same.

Facilitator: It means that the head of the house who buys the things, could decide the diet of the pregnant woman.

Respondent 2: The pregnant women could consume whatever is bought for the house.

Facilitator: Yes. It means that wish of the head is taken care of. What about the pregnant women's will?

Respondent 4: The will of pregnant women is also taken care of.

Facilitator: Is that so?

Respondent 2: Now, women are intelligent. People are also aware. They know what is good for them.

Focus Group Discussion, Gopalganj

Among the mothers and mothers-in-law participants, the majority dismissed 'old traditions' and insisted that when the food is ready everyone eats. Their initial answer when asked who eats first was that the men eat first; however upon further questioning it was revealed that men usually eat first because they have to go to work early. Alternatively, in some cases it was explained that men eat first to avoid tension in the family, as described below:

Facilitator - So who eats at first in the family of your village?

Respondent 3- Whoever feels hungry they eat.

Respondent 2- Mothers-in-law and fathers-in-law eat first.

Facilitator - So mothers-in-law and fathers-in-law eat first and according to sister whoever feels hungry they eat.

Respondent 2 - Means there is no any such customs in the village, it varies. Somewhere mothers-in-law and fathers-in-law eat at first and somewhere whoever feels hungry they eat.

Focus Group Discussion, Punpun

It was often mentioned that eating practices varied among families depending on the type of household they lived in. Mothers and mothers-in-law generally reported that everyone eats at the same time in nuclear families. In joint families with multiple generations, families were more likely to practice the custom where women eat last after everyone else has finished their meal.

Frontline workers also described varying practices among families, and also detailed a more rigid practice surrounding eating dynamics. Frontline workers stated that males eat first and furthermore that adults eat more and children are given less to eat. Moreover, when describing which family members ate first, frontline workers reported that no exceptions were made for pregnant women. Here is an example of this:

Facilitator - Like if there is pregnant woman in the family, how do they distribute the food?

Respondent 4- See this is rural area. So people follow the old tradition. The elders of the family are served first and then given to the pregnant woman. They have the food at last. Whatever remains after serving to others is then taken by

the pregnant woman.

Focus Group Discussion, Gopalganj

Finally, it was reported that if a woman was sick, she would discuss her problem with her husband first before conversing with her mother-in-law or the husband would relay the information back to his mother.

Knowledge of nutrition

Mothers explained that their knowledge of nutrition came from personal experience of what made them feel sick as well as through suggestions from their mothers-in-law. Similarly, mothers-in-law had a related response explaining:

Respondent 4- See earlier we were also pregnant so I ate everything.

Respondent 7- By own experience

Facilitator - You must have been told by anybody?

Respondent 4- My mothers-in-law told also.

Focus Group Discussion, Abdullachak, Sampatchak

ASHAs and AWW were reported as the primary sources of information outside of the family. Several participants mentioned learning about the benefits of green leaves, vegetables, fruits and iodized salt from a *Rogi Kalyan Samiti* program in their area. Doctors were mentioned less as a resource for knowledge but associated with a hospital where you go for serious health problems and child birth. Additionally, mothers and mothers-in-law reported that the instructions and healthy practices learned from doctors were not adopted back home. Women who deliver at a hospital are encouraged to stay at the hospital for free for two days following the

delivery to rest and eat the hospital provided meals. Participants reported that generally women who rest at the hospital will eat the foods provided by the hospital, however, once she returns home she continues the customs her family practices post-partum concerning food and not what was recommended to her by her doctor as described below:

Respondent 1- I was saying that infant are delivered at hospital and when women come at home then, those spices (battista) are given not food grains.

Facilitator - Mean whatever happens till hospital only?

Respondent 1- Yes

Facilitator- After coming back from hospital again customs of home starts?

Respondent 1- Yes, customs of home, these Litti, Kachauri and Jalebi are till hospital only.

Focus Group Discussion, Abdullachak, Sampatchak

Impact of nutrition on infant

Among participants, an understanding of how a mother's health during and after pregnancy affects her child's health was conveyed. A healthy pregnancy and a healthy newborn were calculated by either weighing the pregnant woman or weighing the baby post-delivery. Therefore, a greater emphasis was placed on weight and the quantity of food consumed by the pregnant woman. Frontline workers encouraged pregnant women to eat in greater frequency while pregnant, but not necessarily with bigger meals.

Mothers, mothers-in-law and frontline workers correlated an unhealthy newborn with an underweight newborn; however, participants also mentioned the fear of having an infant that was too big and therefore experiencing complications during birth. All participants had negative associations with delivering in a hospital. For example,

Respondent 5- *We are very poor, who has money they give so many materials, food stuff. Yes, in delivery also gets problem, has to do operation… When my daughters-in-law had to deliver baby did not give any stuffs, because infant becomes fat. By eating more have to do operation to deliver infant.*

Focus Group Discussion, Punpun

Barriers

The most common barrier mentioned by participants preventing women from eating adequately and nutritiously during and after pregnancy was money. The prevailing practice described among mothers and mothers-in-law was that people eat what they can afford. For example, both mothers and mothers-in-law stated they ate chicken because it is often the cheapest meat available, but if they had more money they would consume fish and mutton more frequently. Frontline workers discussed how pregnant woman who also work in the field don't have enough time to eat, or their domestic responsibilities don't allow them to rest and eat correctly, as described below:

Respondent 6- Everything depends on income.

Respondent 1- Pulse-rice, vegetables-rice; it depends on the income of family. If income is two hundred and expenditure is four hundred then from where four hundred will be brought, from two hundred it has to be fulfilled. A family of ten people, if income is four hundred rupees and expenditure is six hundred, it has to be fulfilled in four hundred.

Respondent 3- Aunty means to say that according to money and family people do either it is the first child or second, there is no difference in that.

Focus Group Discussion, Danapur

Frontline workers outlined additional barriers preventing women from experiencing a healthy pregnancy and newborn. Early childbearing, minimal spacing between children and having too many children were argued as practices contributing to poor health outcomes. Additionally, frontline workers mentioned a mother's lack of education and low literacy rates and suggested that if women had a better understanding of their bodies they would invest in healthier behaviors.

Food Practices during Pregnancy

Overall, participants reported that special foods were not prepared for pregnant women. If a pregnant woman wanted something in particular to eat she could make it herself and eat it as she pleased, however these foods were often shared with the entire family. For example,

Facilitator - In any house one woman is pregnant and another woman is not pregnant, then for her [the pregnant woman] is something different cooked?

Respondent 7- Yes

Facilitator - What is cooked separately?

Respondent 7- Milk, tea, gram flour (Sattu).

Respondent 4- That everyone eats.

Facilitator - No, anything special that is only cooked for them?

Respondent 7- If it is cooked, then all eats.

Focus Group Discussion, Maner

Frontline workers encouraged pregnant women to eat more frequently. However, diet recommendations from family members focused on persistent food taboos rather than supplementation of more food during pregnancy.

The focus group discussions assessed current nutritional practices among women during pregnancy by asking participants which foods their community considered beneficial or harmful for mothers during and after her pregnancy. Mothers and mothers-in-law provided a long list of foods, primarily fruits and vegetables, with having either healthy or harmful effects on the mother or child during or after pregnancy. For example, green papaya was described as good for the uterus and ripe papaya good for strength and enhancing your vision. Other food items were described as having a general good or bad effect on either the mother or child. For example, grapes were described as good for pregnant woman during the mother-in-law focus group discussion. Milk, green vegetables and fruits were the most commonly mentioned beneficial food items by participants. Often participants would mention very generally that green vegetables and fruits were beneficial for a woman during pregnancy but later in the discussion they would list specific fruits and vegetables that were harmful to a pregnant woman and include these same food items.

When participants were asked which foods pregnant woman avoided in their community their responses were often more specific compared to those for beneficial foods. For example, mothers stated that eggs were harmful to pregnant women because eggs are a hot food and they start a woman's menstrual cycle prompting a miscarriage. Mothers-in-law added that jackfruit and pineapple cause stomach pain and eggplant causes itching. More generally, all participants mentioned limiting oil, spice and chili during pregnancy due to the fear of bleeding and spoiling the child. ASHAs stated that pregnant women should avoid bitter foods because they will have

gas and sour foods because it burns the blood and then the women won't have enough. Mothers mentioned that no cold food should be consumed because the baby will get cold and develop pneumonia.

Food Practices Immediately Post-Partum

It was revealed during focus groups with mothers and mothers-in-law that women were practicing a very restricted diet immediately following the delivery of their child to dry out the uterus and aid in the production of milk. The timeline and the specific diet varied by family, but the majority of participants mentioned practicing a limited diet for approximately the first 5-6 days following the delivery of their child. Overwhelmingly the most consistent factor was that women do not consume rice or bread during this period because these grains can enter the uterus. Instead women are given a variety of concoctions to clean the stomach and prevent pain or 'trouble'. One concoction called *battisa*, for example, contains milk mixed with spices and sugar and another mixture consists of sugar and ginger that warms the body and makes the uterus light. Some community members restrict water intake during this time arguing that the womb needs to dry out, as described below:

Facilitator - As baby is born, so what are the customs in your village on food?

Respondent 1- For five days rice is not given to eat.

Facilitator- For five days?

Respondent 1- Yes, it is not given for five days.

Facilitator - Well so why it is not given till five days?

Respondent 1- Does not get to eat.

Respondent 3- We give spices to eat such as raisins, Chhohara, Battisa (Mixture of 32 items) and milk also.

Women described the restrictive diet both as a practice to improve the woman's health and her body following the delivery but also to prevent further harm during her vulnerable state.

Facilitator - Okay, what are the benefits of Battisa (Mixture of 32 items)?

Respondent 3- It gives strength.

Facilitator - Okay why for five days we do not give grains?

Respondent 6- To dry uterus

Respondent 1- If she will eat food grains then it will harm.

Facilitator - What harm it does, what happens?

While several respondents described the practice enduring for several days, even weeks, some restricted their diet for only one day and incorporated vegetables and pulses into their diet.

Respondent 1- Here it happens, we do not give for only one day.

Facilitator- As you said that at our place only first day it is not given so why it is not given the first day?

Respondent 1- First day we give Jalebi, Chhena. People eat Pharahi.

Facilitator - What do people eat?

Respondent 1- Pharahi-Pharahi

Facilitator- Okay, Pharahi.

Respondent 1- Yes

Facilitator - What is the benefit of Pharahi?

Respondent 1- Pharahi is given in breakfast and at 12 o'clock rice, pulse and vegetables are given.

Facilitator - So, is there any benefit of Pharahi?

Respondent 1- There is no benefit but we give.

Facilitator - It is the customs there?

Respondent 1- Yes, unripe garlic, oil and Pharahi.

Facilitator - Okay, unripe garlic?

Respondent 1- Yes, unripe.

Facilitator - What is the benefit of that?

Respondent 1- Uterus gets strong.

Facilitator - Uterus gets strong.

Respondent 1- Yes

Focus Group Discussion, Danapur

When more substantial food entered the diet following the fast, it was described as 'plain food' and was thought to prevent trouble in the uterus compared to the usual diet. One discussion detailed giving the new mother jalebi, chena and pharahi, which are sweet breads, for breakfast and then rice and vegetables for lunch on the day following delivery. While another family gave the new mother bread and milk three times a day for six days. Generally, following the six day

diet, mothers begin to incorporate foods back into their regime but slowly and in smaller amounts because there is still a fear of stomach pain and 'trouble'. Some mothers-in-law stated that following delivery new mothers eat whatever they want, just in a reduced amount.

Mothers-in-law reported that spices, raisins and warm water were beneficial because they allow the 'waist to fall' and do not cause the womb to chill, saving the mother from a cold while also increasing lactation. Mothers mentioned consuming less food in order to prevent their child from having diarrhea. Similarly mothers described eating less cold foods and less chili to avoid 'loose motion' themselves. A few specific items were mentioned to avoid including jackfruit because it creates stomach pain for the child, bel fruit because it causes the child's ear to flow and finally jamun because it can give the child black lips.

Food Practices for Lactating Women

The responses for foods surrounding lactation were distinctive to those for pregnancy and post-partum. Mothers mentioned pulses and milk as beneficial for the production of milk and porridge was described as providing comfort to the woman. Cold foods are not given because the infant can get pneumonia, especially if it's winter time. Bel fruit was specifically mentioned because it can cause a baby's feet and hands to crack while black grapes can cause the child's lips to turn black. Here is an example of this:

Facilitator - Well, this was about pregnant women. Now you tell what are given to eat to lactating women? Which types of food are eaten by women who are lactating?

Respondent 3- Pulse is given more.

Facilitator - Which kind of pulse?

Respondent 3- Lentil

Facilitator - What happens by this?

Respondent 4- Produces milk

Focus Group Discussion, Abdullachak, Sampatchak

A summary of food practices mentioned by mothers, mothers-in-law and frontline workers with implications are outlined below in Table 3.

Table 3. Key concepts summarized in the results section.

Theme	**Summary**	**Implication**
General Food Practices: Breakfast	Daughters-in-law prepare breakfast for men and children, since they leave the house first. Daughters-in-law have tea with the family but eat later in the day around noon.	Daughters-in-laws and mothers are not prioritized but are expected to attend to the family before fulfilling their own needs.
Dinner	Daughters-in-law prepare dinner and while each family has different custom, in large families elders were still reported as eating first and most with children eating less and daughters-in-law eating last. In nuclear families, daughters-in-law had more power over food decisions and all family members ate simultaneously.	In larger families, daughters-in-law are not prioritized and instead elders are feed first. In nuclear families, while husbands can make food requests, daughters-in-law make the ultimate food decisions.
Seasonal eating	Limited availability, increased work requirements and intense heat force individuals to engage in a restrictive diet during the summer. While in the winter season individuals rest and eat more overall.	Individuals consume less nutritious meals and in less quantity during the summer and instead prefer sugary cold beverages.

Role of family members	Mothers-in-law dominate household decisions including food decisions for daughters-in-law.	The views and desires of daughters-in-law are seconded to those of the mothers-in-law's opinions.
Knowledge source	Primarily through family channels, but frontline workers and doctors were also cited as knowledgeable sources.	Frontline workers are an important resource for health messages and improving their understanding will facilitate greater knowledge of nutrition among community members.
Impact of nutrition on child	Mothers and mothers-in-law acknowledged the impact of what a pregnant or lactating woman eats and the effect on her child.	There is understanding of how a woman's habits effect her child, however there is confusion regarding the differences between the stomach and the uterus. There is also a stronger emphasis quantity and not the quality or nutritionally value of the foods given.
Positive foods for pregnancy	Milk, green vegetables and fruits were the most commonly mentioned food items as beneficial.	A very general understanding that certain food items provided strength to pregnant women.
Negative foods for pregnancy	Specific foods were described as negatively affecting a woman's health primarily fruits and vegetables.	Women limited oil, spice and chili during pregnancy.
Positive foods for post-partum	Pulses, milk and porridge were mentioned as beneficial, as well as sugary baked goods.	Women consume good protein and high calorie items, however there are few vegetables and fruits in the diet.
Negative foods for post-partum	Women practice a very restrictive diet following the delivery of their child in order to dry out the womb and make the uterus light.	Restrictive diets during initial breastfeeding can cause complications and make breastfeeding difficult for new mothers.
Positive foods for lactation	A mother's diet has returned to her original diet before the pregnancy but grains and dairy products are thought to encourage milk production.	Good variety and quantity consumed during this period.
Negative foods for lactation	Primarily fruits are avoided and the main reason was explained to be the	Certain fruits are unnecessarily excluded from a woman's diet.

	negative impact on the child, for example a baby's lips turn black if the mother eats black grapes.	
Supplements	Supplements were primarily mentioned as a resource available to those who could afford them, apart from free IFA distributed to pregnant women, and were often described as treatment rather than a preventative measure.	A possible resource for additional nutrients is not tapped-into and supplements are not recognized as supplementing a nutrient-deficient diet.

Chapter 5: Discussion

This study used qualitative data collected from focus group discussions with mothers, mothers-in-law and frontline workers to better understand what Bihar women are eating and what variables determine their food decisions. Maternal malnutrition in Bihar is not simply the result of limited food resources or cultural practices preventing women from eating nutritiously, but rather study findings show that maternal malnutrition is the consequence of a complex interplay of many factors that all contribute to maternal malnutrition in the region. These factors include knowledge of nutritional foods; women's status in the family and society, limited financial stability, and restrictive cultural diets practiced post-partum. Since the causes of malnutrition are complex, improving maternal nutrition is challenging. Interventions to improve maternal nutrition need to focus on improving mothers' decision-making power in the family surrounding food. To be successful, interventions should occur on multiple levels, addressing education, women empowerment in the family, and access to affordable nutritional foods and supplements. Some of the interventions suggested here are part of a larger plan to improve nutrition in Bihar, India. However, in the more immediate future, smaller and more realistic steps can be made to change the way mothers are valued and prioritized in Bihar, India, including additional research and advocacy within the field.

Study findings in perspective

Women's status

Consistent with similar research assessing food practices in the Indian states of Tamil Nadu and Uttar Pradesh as well as the bordering country, Bangladesh, our study found that women's low status within the family influenced their food decision-making power and the

allocation of food within their family. [11, 12] In these studies women expressed having little control over daily decisions related to household food allocation, food expenditure, health care seeking, workload and diet. However, in the Uttar Pradesh study participants stated that pregnant women are not bound by the customs and are encouraged to eat whenever they are hungry. This exemption was also mentioned among some of the Bihar participants; however, in Bihar the foods pregnant women prepared when hungry were never solely for themselves but were shared with all members of their family. In other families in Bihar it was mentioned that gender- and age- based eating order still persisted and pregnant women ate last. One Bihar respondent explained that, *if there is nothing left after breakfast then they [the daughters-in-law] eat salt and chapatti and go to work.* If women don't have the power to eat the same foods, and in the same quantities as their other family members then they don't have the power to utilize other healthy maternal nutritional practices such as increasing food intake during pregnancy. Gender-based preferential dietary and health practices are long-standing traditions that are deeply rooted in Indian society. [11] Women are often not empowered to take the first steps necessary for improving their nutritional status.[11] More immediate changes need to address these gaps through the incorporation of husbands, mothers-in-law, and other key household figures in community and societal behavioral change messages.

Dietary Taboos

The majority of mothers and mothers-in-laws in this study held strong beliefs surrounding dietary taboos, food aversions and dietary preferences. These results are consistent with similar earlier studies done in other regions of India.[11] In these previous studies it was revealed that diets during pregnancy focused more on dietary restrictions and food taboos than

with important food supplementation. In this study, participants mentioned the correlation between the mother's diet and the effects on her child. However, the practices surrounding maternal nutrition illustrated a practice where quantity of food was more important than the quality of the foods consumed. While respondents discussed the importance of adequate weight gain during pregnancy responses focused more on the health impact on the child than on the mother. Nutritional research has shown that while gaining weight is essential to a pregnancy, receiving adequate intake of micronutrients is required for the healthy development of the fetus.[7, 18] Properly conveying to mothers the difference between increasing food intake and increasing quality and nutritious food intake during pregnancy and the impact on the mother is an important undertaking.

While broadly fruits and vegetables are perceived as beneficial, through the course of the discussion mothers and mothers-in-law expressed strong opposition towards certain fruits and vegetables and could offer a cultural belief for why these specific foods items are either avoided at particular times. These cultural beliefs, like the gender- and age- based eating order, persist because they are passed on through the generations and have a strong foundation in the community. A young pregnant mother is not likely to make her own food decisions but consumes foods that are bought to her by her mother-in-law, who in turn was told to eat the same items when she was a young pregnant woman. A young mother's opinions are inferior compared to her mother-in-law who has already delivered and raised her children and is a wealth of knowledge in the community's mind.

Finally, these food taboos persist because there is no alternative knowledge and there is no reason not to accept these cultural beliefs. And while it's not necessary to dissuade community members of their cultural beliefs surrounding foods, these practices may be limiting

people's diets and women may be potentially avoiding beneficial nutrients during a period when they need as many nutrients as possible. Without specific reasoning why certain fruits and vegetables are beneficial, mothers and mothers-in-law are less inclined to consume these foods and their cultural practices surrounding food prevail. By providing, frontline works, mothers and mothers-in-law with more complete and specific information on how each fruit and vegetable is nutritionally beneficial, mothers and mothers-in-law may be more motivated to consume these foods even when a cultural belief says otherwise.

From the focus group discussion, frontline workers were seen as having a greater understanding of the nutritional value of certain fruits and vegetables but also an appreciation of local cultural practices surrounding food. Therefore frontline workers are an important bridge between knowledge and practice. However, as noted in literature research analyzing the public health interventions available in India for improving maternal nutrition, frontline workers are given incentives, such as cash, to increase the number of institutional deliveries and routine immunizations, but no such incentive exists for improving maternal health and nutrition.[48] Therefore frontline workers direct their attention to the issues that they most benefit from financially. Mothers and mothers-in-law often cited learning about the nutritional value of green vegetables and leafy greens through the *Rogi Kalyan Samiti* program, and these items were included in their discussion of general food practices. Mothers and mothers-in-law throughout the focus group discussions emphasized that they are receptive to learning about healthy food practices and want to improve their health. There is an opportunity to utilize frontline workers and redirect their efforts towards improving the health of mothers by improving their nutritional intake, especially while pregnant. Identifying positive deviants in their communities, women who gained adequate weight during pregnancy for example, may aid frontline workers in

communicating sustainable healthy behaviors to all their community members in their catchment area.

Affordability

All respondents, regardless of location, mentioned basing their food decisions on two factors: foods available in the markets and foods they could afford. These findings are supported by similar studies in Tamil Nadu and Uttar Pradesh, India where there all participants mentioned a lack of adequate household income as the primary barrier to a healthy diet during pregnancy.[11] Additionally several other studies identified poverty as a barrier for accessing essential health services making the adoption of healthy behaviors more difficult.[3, 11, 12, 48]. In this study, as well as the Tamil Nadu and Uttar Pradesh study, the difference between women who ate vegetables and fruits during pregnancy and those who did not was dependent on the socioeconomic status of their household.[11] Those women without the resources to purchase these items were described by respondents as eating either rice without vegetables or bread with salt. Those with the greatest choice in foods could afford snacks such as dried fruits, nuts and a cold soda in the summer time.

It's difficult to improve the affordability of produce when so many families in Bihar are struggling to find employment and the costs of fruits and vegetables are dependent on yearly crop production. Additionally, it's challenging to assess what proportion of a family's income is directed towards food. However, it's arguably fair to assume that families who are subsisting off of bread and salt are not redirecting their income to frivolous expenditures. In patriarchal societies, such as India, men are often in charge of the family's income and women are given an allowance for food purchases. Studies have shown that when women have more earn an income

they invest 90 percent into their families, as compared to only 30 to 40 percent for a man.[52] One method of improving nutritional food consumption therefore involves promoting women's status in society by giving women opportunities for employment, to make their own money and direct this money towards food purchases, which then benefit their children. One possibility is the creation of local microcredit opportunities for women to start their own business with combined skill training and business education.

Another potential resource to expand, which several participants mentioned in focus group discussions, was bringing home crops from the fields the men and women work in during the day. Increasing this practice, or offering employees a discount on the produce grown on fields they work, may increase consumption of fruits and vegetables overall. Even if these crops were only offered at a discount employees may be more inclined to purchase these items since they would be less expensive than the same ones founds at the local market. The creation of home gardening would also provide an opportunity for women to improve their nutritional status, engage in decisions surrounding the families' meals and provide the prospect to make an income by selling surplus to community members.

Post-partum Food Taboos

Overall the findings discussed above are consistent with similar studies looking at maternal nutrition in the Indian states of Tamil Nadu and Uttar Pradesh.[11] However, there was one particularly unique discovery in this study; all community respondents mentioned a practice where mothers consume very little nutritional food following the delivery of their child. Although the communities described varying timeframes and slightly differing food items, on the

whole all the mothers engaged in a restricted regime immediately following the delivery of their child.

In Bihar, after delivery mothers and mothers-in-law reported restricting rice and bread consumption explaining it can enter and damage the uterus. The understanding was that the uterus had just endured a traumatic event, childbirth, and needed to rest and return to its original state. A heavy substantial meal would be too much work for the body to digest. Instead mothers drink tea and milk mixtures containing herbs and spices, which help clean and tighten the uterus. A similar observation is mentioned in an anthropological study conducted in 1975. The author discovered that women were prescribed a very sparing diet up to about 2-3 weeks after delivery. [53] Additionally, some women were observed practicing a fast from all food and water for two days after their delivery. [53] The reasoning behind these practices was pregnancy was perceived mainly as a vulnerable condition and therefore the majority of foods were prohibited to pregnant women and considered dangerous to her. There was also the worry of sickness and the fear of offending the gods if women ate sacred foods. [53] While the analysis behind the restrictive diet was different in Bihar, the practice, interestingly, was comparable.

Considering respondents cited a strong correlation between what a mother eats while pregnant and the health of her child, its reasonable for them to assume the uterus and stomach share functions or are perhaps the same organ. This notion further supports educating men and women on the function of the body and how pregnancy and lactation works. A greater understanding of the body may encourage men and women to invest in healthy food practices that benefit both the mother and child.

In conclusion, participants recognized the benefits of a healthy maternal diet and the positive effects on children. However due to their status in the family, work and domestic

responsibilities and limited financial resources, healthy and adequate maternal nutrition is not a priority. Improving education for young adolescent girls is key to improving women's status in society and in their family. Furthermore, educating women provides them with the skills to think independently, engage in the workforce and practice eating habits that benefit both themselves but also their future children. Engaging men in the promotion of women is key, without the support of husbands and fathers, women will constantly be hitting a wall and struggling to demand their rights and express their opinions.

Additional Research

It's unclear to what extend the cultural food taboos described in the focus group discussion are actually practiced by mothers and mothers-in-law in the community. All respondents mentioned strong opinions towards food items, however whether these cultural beliefs are practiced, under what conditions and with what exceptions was not assessed. For example, a community member who is limited to rice and an occasional vegetable may have mentioned believing papaya causes miscarriages, however, were a community member who is also a pregnant woman given the rare occasion to eat a papaya, it's unclear whether her cultural belief would triumph over her desire to have the rare fruit. These cultural taboos are passed on from generation to generation without any explanation or questioning of the belief, but without any follow-up investigation, these beliefs may simply be beliefs that are passed on but not actually practiced.

Government Advocacy

In Bihar, the government has implemented several efficacious interventions in an attempt to reduce maternal malnutrition including a statewide iron and folic acid (IFA) distribution program, protein-energy supplement program and a de-worming intervention for pregnant women. [35, 54] And while National Rural Health Mission and Child Development Services programs are committed to improving child nutrition little attention and no direct projects or goals are dedicated to improving maternal malnutrition specifically. Arguably the reason no specific attention has been placed on improving maternal nutrition is there is little research investigating nutritional practices and knowledge among Bihar's women.

In order for real change to occur in Bihar, members within the Integrated Child Development Services needs to fully support the improvement of women's status and maternal nutrition in the country. There is already evidence that a shift to improve health and education for women is supported, however respondents often mentioned delivery in a hospital as a negative experience and one reserved for a complicated birth. The formation of a committee with the ICDS to support maternal nutrition would allow for greater advocacy and support the issue of maternal nutrition. This group of medical professionals would be responsible for creating clear targets for improvement, assisting with additional research on cultural food taboos, improving nutritional knowledge to adolescents and evaluating the capacity for hospitals, doctors and frontline workers to make changes towards improving maternal nutrition, and increase support for women's status in society among policy makers.

Global Recommendations

Worldwide there are very few programs specifically targeting the improvement of maternal nutrition. [55] Countries have committed themselves to improving the rights of pregnant and lactating women to access good nutrition through *The Convention of the Elimination of all Forms of Discrimination Against Women*. However, the World Health Organization (WHO) has neither created nor endorsed any policy targeting improved maternal nutrition. The lack of support given to maternal nutrition programs and policies is arguably a result of the weak evidence supporting the efficacy of maternal nutrition interventions. Additionally, the Millennium Development Goals (MGDs) did not recommend the improvement of any indicators associated with maternal nutrition. An important next step in improving maternal nutrition is gaining the support of the global public health community and creating policies and garnering advocacy that backs future research and interventions.

Limitations

The data collected from the frontline workers was collected in conjunction with an iron and folic acid (IFA) study occurring at the same time in Bihar but in two different districts: Begusarai and Gopalganj. The questions on maternal nutrition were added to the IFA focus group discussion guide after pilot testing and were used as questions to initial and encourage conversation among the participants. While the focus group discussion guide for the mothers and mothers-in-law was modified following debriefing sessions to further investigate post-partum and lactating practices, there was no modification to the guides for the frontline workers and therefore no responses from them on those two topics. The frontline workers were also prompted

before the discussion that they were participating in an IFA study, consequently their answers often circled back to improving IFA consumption among pregnant and lactating women instead of food practices and perceptions. With more time and resources more information from the perspective of the frontline workers could have been investigated to better understand how information on nutrition is communicated to women surrounding pregnancy.

There was little opportunity to modify the focus group guides for the mothers and mothers-in-law at the end of each day and debriefing sessions were dependent on the memory of the research assistants to recount for the primary investor unfoldings of the day's focus group discussions. And lastly, research assistants and respondents all communicated in Hindi with no knowledge of the English language and all happenings had to be translated for the primary investor at a later time.

Appendix A: Tables

Table 4. Foods mentioned during pregnancy

Food Item	Beneficial Effect	Adverse Effect	Group					
			Mothers		Mother-in-laws		Frontline Workers	
			Beneficial	Adverse	Beneficial	Adverse	Beneficial	Adverse
Fruits								
Apple								
Banana	Iron		X		X			X
Bel fruit		Child's ear flows				X		
Dry Coconut	Makes the child's skin white		X		X			
Fruit	Strength				X		X	
Grapes					X			
Green Papaya	Helps the uterus				X			
Guava	Helps night-blindness							
Jamun (local plum)		Lips become black		X				
Jackfruit		Stomach pain				X		X
Lemon	Has vitamins A, B, C, D						X	
Papaya	Contains all the vitamins, Strength and enhances vision and helps night-blindness	Starts menstral cycle and leads to miscarriage	X	X		X	X	X
Pineapple		Stomach pain				X		X
Plum						X		X
Pomegranate					X			
Pomegranate juice			X					
Raisins					X			
Vegetables								
Cucumber	Beneficial for everything and helps the uterus				X			
Eggplant		Itching				X		
Gourd						X		
Green vegetables	Strength		X		X		X	
Khesari				X				

Kohara								X
Nenua					X			
Okra					X			
Parwal					X			
Potato					X			
Pumpkin								X
Sabtata				X				
Spinach							X	
Taarkua		The child's hands and feet crack				X		
Grains								
Bhujiya					X			
Bread					X			
Chhokara					X			
Grains						X		
Lentil					X			
Moong			X					
Pulses			X		X		X	
Rice			X		X		X	
Wheat						X		
Proteins								
Chicken							X	
Chiniya			X					
Egg		Starts menstral cycle and leads to miscarriage		X			X	
Fish						X	X	
Mutton						X	X	
Dairy								
Butter	Protein, iron						X	
Curd							X	
Horlicks	Strength				X		X	
Iron Pills	Strength				X		X	
Milk	Strength		X		X		X	
Spices								
Chili		Causes Gas, makes the abdomen warm and can cause colic disease		X				X
Molasses					X			

Spices				X				
Tumeric				X				
Other								
Bitter foods								X
Flowers							X	
Juice							X	
Salt with iodine					X			
Sour foods	Burns the blood, reduces the amoung of blood and spoils the child		X					
Spicy foods			X					X
Tonic		X		X				
Water with lemon and sugar	Can't digest				X			

Table 5. Foods mentioned post-partum

Food Item	Described Beneficial Effect	Described Adverse Effect	Group			
			Mothers		Mothers-in-law	
			Beneficial	Adverse	Beneficial	Adverse
Fruit						
Bel fruit		Baby's ear flows		X		
Chhohara (dried dates)	Strength				X	
Jackfruit		Causes stomach pain for baby		X		
Jamun (local plum)		Baby's lips turn black		X		
Vegetables				X		
Green vegetables	Strength				X	
Kundri (gourd)		Not given for two years following delivery of child		X		
Nenua (sponge gourd)		Creates pain in mother's stomach		X		
Sim				X		
Grains						
Bread			X	X		X
Halva (sweet dessert)			X			
Jalebi (sweet			X		X	

bread)					
Lentil	Produces milk			X	
Moong				X	
Pharahi				X	
Pulse			X		
Rice				X	X
Dairy					
Chhena (cheese)			X	X	
Milk	Strength			X	
Spices					
Ginger	Warms the body and uterus becomes light			X	
Raisins	Strength			X	
Spices	Strength			X	
Drinks & Mixtures					
Battisa (special mixture of spices)	Strength			X	
Mixture of molasses, tumeric and milk	Cleans the stomach, helps the pain in the stomach and helps the waist get smaller			X	
Mixture of unripe garlic, oil and pharahi	Uterus becomes stronger			X	
Tea			X		
Tumeric Porridge				X	
Warm water	Prevents a cold and helps lactation			X	
Supplements					
Horlicks			X		

Table 6. Foods mentioned during lactation

Food Item	Mentioned Beneficial Effect	Mentioned Adverse Effect	Group			
			Mothers		Mother-in-Laws	
			Beneficial	Adverse	Beneficial	Adverse
Fruit						

Banana				X
Bel fruit		Baby's feet and hands crack		X
Black grapes		Baby's lips turn black		X
Guava				X
Jackfruit				X
Vegetable				
Suji			X	
Grains				
Chhena			X	
Jalebi			X	
Lentil	Helps in the production of milk		X	
Porridge	Helps in the production of milk and gives comfort to mothers		X	
Dairy				
Milk	Helps in the production of milk		X	
Drinks				
Tea			X	
Supplements				
Horlicks			X	

Appendix B: Focus Group Guides

Focus Group Discussion Guide (FGD) for Mothers-in-law

Objective: To determine group's perception and influence of diet and food habits in the family

Population: Mother In-Laws / Mothers who have a child (< one year of age) or are pregnant

Introduction:

I would like to thank you all for coming here today and sparing your time. My name is ____ and this is <note-taker> and we are both part of a Project Team with CARE, INDIA and Emory University in the United States of America. By speaking with you today, we are hoping to learn more about maternal nutrition in this community. As a mother / mother-in-law we know you have a great deal of experience and there is much we can learn from you. The knowledge you share with us will help to improve our maternal and child health programs.

I want to emphasize that this discussion is completely confidential and will only be shared with members of the research team. During the discussion, <note-taker> will be keeping notes to keep track of the discussion. If it's ok with you, we would like to record this interview. That way we won't miss anything that you have to say. The recording will be securely stored and nobody outside the research team will have access to this information. We will only use first names in the discussion and there will be no way to identifying anyone in the research. Is it okay with everyone to record this discussion? (Ensure consent from all).

Before we begin, I just want to go over some simple guidelines for today's discussion. I would like to point out that there are no right or wrong answers. We are interested in your views, so please feel comfortable to say what you honestly feel. It's okay to disagree with another's views but please let people express their views before interrupting. We want only one person to speak at a time, so that we don't miss anything or not hear what is said. We are interested in what everyone has to say, so please try to speak to the whole group not just the person beside you. Finally, I'd like to remind you that I am just a

moderator and not an expert on anything we discuss today, rather your views and opinions are most important to us!

The session should take approximately 1 hour. Are there any questions before we begin?

1. First, can you tell us your name and about your family?
    - How many members there are?
    - Who lives in the house with you?
    - How many children do you have?
    - How many grandchildren do you have?

2. Because they have so much experience mother-in laws, like yourselves, often have many responsibilities in the household and community and take on many different roles. Can you tell me the roles and responsibilities of a mother-in-law in this community?
        - Providing advisement and counsel - for what topics? To whom?
        - Do they have the "last word" on any specific topics?
3. What are the specific responsibilities that MILs have in terms of caring for their daughters-in-law?
        - During pregnancy? During labour and delivery? Immediately following delivery? Early post-partum period? Probe for whether they provide advice on how to eat?
        - Does this vary based on if this is the women's first pregnancy? How?

General Family Nutrition

Great, now I have some questions about food habits in your community.

4. Could you walk me through a typical day and describe when foods are cooked, prepared and served in your community?
    - What foods do people eat in the morning?
    - What foods do people eat at midday?
    - What foods do people eat in the evening?
    - What foods do people eat between meals?
        - Do these differ for any groups in the community (religious, economic-class, etc.)

5. Who typically cooks, prepares and serves the food in your community?

6. Are there certain foods or drinks only woman eat?
    - During Pregnancy?
    - During Lactation?

7. Do people in your community consume any fortified foods? For example salt with iodine?
    - Who consumes these foods? When?

8. How do the types of foods your community eats change depending on what time of year it is?
    - Why? Please give examples.

9. How does the amount of food your community eats change depending on what time of year it is?
    - Why? Please give examples.

Nutritional Influence:

10. In this community, who in the household generally decides what the family eats?

11. At mealtimes, can you describe for me who typically eats when?
    - Is there a particular order in which family members sit for a meal?
    - Do families eat together? Who eats first? (Men eat first; women eat "leftovers," etc.)
    - Does this change when there is a pregnant woman in the family (do they become prioritized or not)?

Maternal Nutrition:

Ok, great! Now I'm going to ask you some questions specifically about what women eat while they are pregnant.

12. What are the important food items that a woman should eat while pregnant in your community? (Special foods for pregnant women.)
    - Are there any barriers for them to obtain / eat these foods? If so, why?
    - How is this diet different from the diet of women who are not pregnant?

Probe: Seasonality and Availability

- Do pregnant women eat a different amount of food than others? (Eating down?)

Probe: Why is it different?

13. What foods are pregnant women recommended to avoid? Please give examples. Why?

14. Who generally advises your daughter in-laws on her diet while pregnant?

Impact of Nutrition on Child:

15. Who do you go to when you have health questions about your pregnancy?

16. What are some of the health problems associated with eating during pregnant?

17. What impact does what a pregnant woman eats have on her child?
    - Ask specifically about birth weight.
    - How does birth weight affect the child's health?

Conclusion:

18. If you see a woman who is weak and pregnant what would you suggest she eat?

19. What are some recommendations you have to improve the health of mothers in your community?

20. Do you have any questions for us?

Thank you for your time today. We greatly appreciate you coming to talk with us today.

Focus Group Discussion Guide (FGD) for Mothers

Objective: To determine group's perception and influence of diet and food habits in the family

Population: Pregnant women or women with a child less than one year of age

Introduction:

I would like to thank you all for coming here today and sparing your time. My name is ____ and this is <note-taker> and we are both part of a Project Team with CARE, INDIA and Emory University in the United States of America. By speaking with you today, we are hoping to learn more about maternal nutrition in this community. As a mother / mother-in-law we know you have a great deal of experience and knowledge and there is much we can learn from you. The knowledge you share with us will help us to improve our maternal and child health programs.

I want to emphasize that the discussion is completely confidential and will only be shared with members of the research team. During the discussion, <note-taker> will be keeping notes to keep track of the discussion. If it's ok with you, we would like record this interview. That way we won't miss anything that you have to say. The recording will be securely stored and nobody outside the research team will have access to this information. We will only use first names in the discussion and there will be no way to identifying anyone in the research. Is it okay with everyone to record this discussion? (Ensure consent from all).

Before we begin, I just want to go over some simple guidelines for today's discussion. I would like to point out that there are no right or wrong answers. We are interested in your views, so please feel comfortable to say what you honestly feel like. It's okay to disagree with another's views but please let people express their views before interrupting. We want only one person to speak at a time, so that we don't miss anything or not hear what is said. We are interested in what everyone has to say, so please try to speak to the whole group not just the person beside you. Finally, I'd like to remind you that I am just a moderator and not an expert on anything we discuss today, rather your views and opinions are most important to us!

The session should take approximately 1 hour. Are there any questions before we begin?

1. First, can you tell me about your family?
    - How many members there are?

- Who lives in the house with you?
- How many children do you have? Ages?

General Family Nutrition

Great, now I have some questions about food habits in your community.

2. Could you walk me through a typical day and describe when foods are cooked, prepared and served your community?
    - What foods do people eat in the morning?
    - What foods do people eat at midday?
    - What foods do people eat in the evening?
    - What foods do people eat between meals?
        - Do these differ for any groups in the community (religious, class, etc.)

3. Who typically cooks, prepares and serves the food in your community?

4. Are there certain foods or drinks only women, children or men take?
    - During pregnancy?
    - During breastfeeding?
    - During fasting? While pregnant and fasting?

5. Do people in your community consume any fortified foods? For example salt with iodine?
    - Who consumes these foods? When?

6. How do the types of foods your community eats change depending on what time of year it is?
    - Why? Please give examples.

7. How does the amount of food your community eats change depending on what time of year it is?
    - Why? Please give examples.

Nutrition Influence:

8. Who generally decides what the family eats in your community?

9. How is food distributed in your community?
    - Is there a particular order in which family members sit for a meal?
    - Do families eat together? Who eats first? (Men eat first; women eat "leftovers," etc.)
    - Does this change when there is a pregnant woman in the family (do they become prioritized or not)?

Maternal Nutrition:

Ok, great! Now I'm going to ask you some questions specifically about what women eat while they are pregnant.

10. What are the important food items that a woman should eat while pregnant in your community? (Special foods for pregnant women?)
    - Are there any barriers for to obtain / eat these foods? If so, why?
    - How is this diet different from the diet of women who are not pregnant?
        Probe: Seasonality and Availability
    - Do pregnant women eat a different amount of food than others? (Eating down?)
        Probe: Why is it different?

11. What foods are pregnant women recommended to avoid? Please give examples. Why?

12. Do pregnant women in your community consume any supplements? Which ones? Why?

13. Who generally advises your daughter in-laws on her diet while pregnant?

Impact of Nutrition on Child:

14. What are some of the health problems associated with malnutrition during pregnancy?

15. What impact does what a pregnant woman eat have on her child?
    - Ask specifically about birth weight.

- How does birth weight affect the child's health?

Conclusion:

16. What are some recommendations you have to improve the health of mothers?

17. Do you have any questions for us?

Thank you for your time today. We greatly appreciate you coming to talk with us today.

Focus Group Discussion Guide (FGD) for Frontline Workers

Objective: To determine group's perception and influence of diet and food habits in the family
Population: Frontline workers in the field at least one year. ASHAs and AWWs
Introduction:

I would like to thank you all for coming here today and sparing your time. My name is ____ and this is <note-taker> and we are both part of a Project Team with CARE, INDIA and Emory University in the United States of America. By speaking with you today, we are hoping to learn more about maternal nutrition in this community. As a mother / mother-in-law we know you have a great deal of experience and knowledge and there is much we can learn from you. The knowledge you share with us will help us to improve our maternal and child health programs.

I want to emphasize that the discussion is completely confidential and will only be shared with members of the research team. During the discussion, <note-taker> will be keeping notes to keep track of the discussion. If it's ok with you, we would like record this interview. That way we won't miss anything that you have to say. The recording will be securely stored and nobody outside the research team will have access to this information. We will only use first names in the discussion and there will be no way to identifying anyone in the research. Is it okay with everyone to record this discussion? (Ensure consent from all).

Before we begin, I just want to go over some simple guidelines for today's discussion. I would like to point out that there are no right or wrong answers. We are interested in your views, so please feel comfortable to say what you honestly feel like. It's okay to disagree with another's views but please let people express their views before interrupting. We want only one person to speak at a time, so that we don't miss anything or not hear what is said. We are interested in what everyone has to say, so please try to speak to the whole group not just the person beside you. Finally, I'd like to remind you that I am just a moderator and not an expert on anything we discuss today, rather your views and opinions are most important to us!

The session should take approximately 1 hour. Are there any questions before we begin?

General Family Nutrition

I have some questions about food habits in your community.

18. Could you walk me through a typical day and describe when foods are cooked, prepared and served in this community?
    - What foods do people eat in the morning?
    - What foods do people eat at midday?
    - What foods do people eat in the evening?
    - What foods do people eat between meals?
        - Do these differ for any groups in the community (religious, class, etc.)

19. Who typically cooks, prepares and serves the food in this community?

20. Are there certain foods or drinks only women, children or men take?
    - During pregnancy?
    - During breastfeeding?
    - During fasting? While pregnant and fasting?

Nutrition Influence:

21. Who generally decides what the family eats in this community?

22. How is food distributed in your community?
    - Is there a particular order in which family members sit for a meal?
    - Do families eat together? Who eats first? (Men eat first; women eat "leftovers," etc.)
    - Does this change when there is a pregnant woman in the family (do they become prioritized or not)?

Maternal Nutrition:

Ok, great! Now I'm going to ask you some questions specifically about what women eat while they are pregnant.

23. What are the important food items that a woman should eat while pregnant in your community? (Special foods for pregnant women?)
    - Are there any barriers for to obtain / eat these foods? If so, why?
    - How is this diet different from the diet of women who are not pregnant?
      Probe: Seasonality and Availability
    - Do pregnant women eat a different amount of food than others? (Eating down?)
      Probe: Why is it different?

24. What foods are pregnant women recommended to avoid? Please give examples. Why?

25. Do pregnant women in your community consume any supplements? Which ones? Why?

26. Who generally advises your daughter in-laws on her diet while pregnant?

Impact of Nutrition on Child:

27. What are some of the health problems associated with malnutrition during pregnancy?

28. What impact does what a pregnant woman eat have on her child?
    - Ask specifically about birth weight.
    - How does birth weight affect the child's health?

Conclusion:

29. What are some recommendations you have to improve the health of mothers?
30. Do you have any questions for us?

Thank you for your time today. We greatly appreciate you coming to talk with us today.

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