India's Child Malnutrition Paradox: Role of Maternal Autonomy & Health Related Awareness

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Awareness

A dissertation
by
Aakanksha Sinha

Submitted in partial fulfillment
of the requirements for a degree of
Doctor of Philosophy

March 2016

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by

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Abstract

India has the world's highest burden of child undernutrition. Lack of income has been attributed as the primary cause of child undernutrition. However, evidence suggests that despite steady economic growth and investments in social services directed towards child welfare, undernutrition rates in India are persistent. Thus factors impacting child undernutrition are entrenched within the social fabric of a community. Previous studies indicate that countries that have higher gender inequality have poorer health outcomes for women and children. India with its dominant patriarchal structure and deep-rooted gender biases has disproportionately worse outcomes for women and children. This dissertation study was designed to do the following: 1) emphasize the importance of maternal autonomy and health related awareness as factors significantly impacting maternal health and child nutritional status and 2) use a strengths-based approach to make recommendations for child welfare policy. By applying an asset-based approach, the social capital within a community is recognized interventions can be developed using community and individual level strengths. This study fills the gap in literature on the role of maternal autonomy and health related awareness on child nutritional status, particularly in communities with high levels of gender inequality. The current study

utilized data from the India National Family Health Survey Round-3 (NFHS-3) to conduct a cross sectional analysis. The study sample consisted of urban married women between ages of 15-49 years who had at least one living child between the ages of 0-5 years (N= 9,092). It utilized the UNICEF 'model of care' and three distinct theories (i) Ecological Systems Theory, (ii) Capability Approach, and (iii) Positive Deviance Inquiry to develop the conceptual framework. Scales measuring maternal autonomy and health related awareness were developed and validated. Ordered Logistic Regression and Kohler mediation model were utilized to examine the relationship between maternal autonomy and health related awareness and child nutritional status and the mediation effect of maternal health. Implications are provided for child welfare policy and practice, social work policy and research.

DEDICATION

To my Father and Mother

Thank you for your unconditional love and sacrifices

ACKNOWLEDGEMENTS

In my journey as a Ph.D. student I have been fortunate to have mentors, friends and family who have constantly taught, encouraged and supported me. I would first like to thank my mentor and dissertation chair, Dr. Ruth McRoy. Ruth, you were the first professor who I interacted with at Boston College when I was admitted into the Master's program 6 years ago. Ever since, you have been instrumental in my learning process. Thank you for encouraging me to pursue a Ph.D. degree and for supporting me throughout the process. Your passion and wealth of knowledge in the area of child welfare and social justice has always inspired me. You have not only supported my intellectual development as a scholar and researcher, but have always been kind to check in on me and see how I was doing personally as well. I sincerely appreciate having you as my mentor, as you took out time from your extremely busy schedule to meet with me and answer any questions that I might have. I do not think that saying thank you is enough to express the gratitude I have.

Dr. Barbara Berkman, you have been a very important person in my life. I feel lucky to have taken the dissertation seminar and to have you as a part of my committee. I am thankful that you invested so much time to carefully read and critique my dissertation. It challenged me to delve deeper into my research. As I move forward in my academic career, I will always remember your words of wisdom. Dr. Melissa Sutherland, I am very grateful to you. You did not know me before I requested you to be a part of my committee. However, you were kind enough to take the risk and be a part of this journey. Your support has been invaluable. I will always remember and appreciate the fact that you were ready to trust and support me without any hesitation.

In addition to my committee, I was privileged to be mentored by several other faculty members at Boston College. Dr. Margaret Lombe, I am forever indebted to your tireless efforts in training me to be a good researcher. Your knowledge on human rights and food security sparked my passion in this subject area. You have been instrumental in making my time at Boston College intellectually stimulating. I would also like to express my sincere appreciation for Dr. Ce Shen, without whom learning and enjoying statistics would have been impossible. Thank you for being so patient and always encouraging me with your kind words. Thank you Dr. Thomas Crea, Dr. Tom O'Hare and Dr. Sara Moorman, as well, for teaching and sharpening my research skills.

A big thank you to Dr. Jim Lubben, Dr. Marcie Pitt-Catsouphes, Brenda Vitale and Deborah Hogan for taking care of all the logistical aspects of the dissertation process, so that I didn't get have to worry about getting caught in administrative red tape. Thank you, Dean Godenzi for encouraging and supporting my professional development at Boston College.

A special thank you to my Boston family. Leia, Anne and Ana Maria, I am so thankful for each one of you. I am blessed to have such amazing friends, who are more like family. This journey has become even more special, because I met the three of you. Leia, my dissertation partner, thank you for being my emergency contact for the last few years. You were there for panic calls, brainstorming sessions, and to teach me statistics. I am so thankful for you and am excited for our future as co-workers! Thanks to Antara, Joy-Anne, Megumi, Amy, Sarah, Luz Maria and Anayeli for being such great friends.

To my parents, Pravin and Kumkum Sinha today would not have been possible without you. You both have sacrificed so much at every stage of your lives to make me

who I am today. Papa, since I got interested in the field of social development, I have always looked up to you as my mentor. You have always encouraged me to think out of the box, and to always aspire for the right path no matter how difficult it may be. Thank you for being patient and hearing me speak non-stop about my dissertation on Skype at odd hours of the day and night. Papa, this Ph.D. degree is for you. I wouldn't have ever done it if you didn't push me (literally) to enroll. Mumma, thank you for being my pillar of strength. You were always there to lift my spirits high and to keep me going. Thank you for all your sacrifices and for your unconditional love and support. To my sister (Anjali), thank you for checking in on me everyday and for being my cheerleader. Thank you to my aunts who are more like my mothers, my mother and father in law and, my brother and sister in law for all your love and support.

Last, but most importantly thank you to my husband (Uttam Mukherjee). You have been so patient and supportive throughout this process. If anyone deserves the best husband prize, it is you! You were there to deal with my mood swings, to provide me with whatever I needed and brainstorm study 'hypotheses' with me. More than anyone else, you have lived, breathed and experienced this whole journey with me. Going forward, I promise to be more in control of my emotions and make up for all the time we have lost because I was locked up in the room writing my dissertation, or lost in my thoughts when you were talking to me. Thank you for being my person and I love you with all my heart.

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Chapter I. Introduction

Background

"The social fabric of each community has its own distinct pattern. This system holds intractable problems in place and must be unfrozen to allow new behaviors and mind-sets to evolve".

- Richard Pascale

Malnutrition severely impacts the well-being and development of more than 100 million children around the world (UNICEF, 2013a). Approximately 45% of all child deaths, globally, occur due to factors related to malnutrition (WHO, 2014). All these children are therefore denied their fundamental right to survival and well-being as stipulated by the International Covenant on Economic, Social and Cultural Rights (UN General Assembly, 1976), Universal Declaration of Human Rights (UN General Assembly, 1948) and the United Nations Convention on the Rights of the Child (UN General Assembly, 1989).

Malnutrition results from the lack of adequate calories and protein essential for growth and maintenance of an individual (WHO, 2014). It can refer to overnutrition leading to diseases such as obesity as well as undernutrition leading to under development, and micronutrient and vitamin deficiency. This study focuses on outcomes associated with undernutrition, as a form of malnutrition. The World Health Organization (WHO) has universal parameters to measure undernutrition (WHO, 2006; Black, Allen, Bhutta, Caulfield, de Onis, Ezzati, Mathers & Rivera, 2008). These consist of stunting (height in relation to age), wasting (weight in relation to height), and underweight (weight in relation to age).

The latest WHO-UNICEF (2015) joint report indicates that global child (under-five years of age) undernutrition rates have declined substantially between 1990 and 2014. Stunting rates declined from 255 million to 159 million, underweight rates declined from 159 million to 100 million and wasting rates declined from 58 million to 51 million (WHO & UNICEF, 2015). Additionally under-five mortality rates have declined from 90 to 46 deaths per 1000 live births (UNICEF, 2014a). Global reports on child protection suggest that the reduction in undernutrition and child mortality rates have been limited and unevenly distributed across countries (Fehling, Nelson & Venkatapuram, 2013). According to the Millennium Development Goal reports (MDG)[1] (UN-MDG, 2013; 2014) sub-Saharan Africa and South Asia continue to have moderate to high rates of child mortality, high maternal mortality as well as high levels of hunger, leading to dismal child health outcomes in these regions. Aside from countries of the Global South[2], Global North countries, such as the United States of America (USA), also report high rates of poor nutrition among children, in the form of obesity[3] and micronutrient

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[1] Millennium Development Goals (MDG) is a set of eight international development goals that were established by the United Nations in 2000. All United Nations member states and a minimum of 23 international organizations committed to help achieve these eight goals. The goals include: (i) eradicate extreme poverty and hunger (ii) achieve universal primary education (iii) promote gender equality (iv) reduce child mortality (v) improve maternal health (vi) combat HIV/AIDS, malaria and other diseases (vii) ensure environmental sustainability (viii) develop global partnership for development. The MDGs were a time specific campaign, which was supposed to achieve targets by 2015. More information of the MDGs can be found at http://www.un.org/millenniumgoals/

[2] The countries of Africa, Central and Latin America, and majority of Asia are collectively known as 'Global South'. United Nations Development Programme refers to all developing countries that are primarily in the southern hemisphere region as Global South countries.

[3] According to the Center for Disease Control (CDC) obesity refers to an excess amount of body fat, which can arise due to intake of foods that are calorie dense but have poor nutritional value.

deficiency[4] (CDC, 2014). According to Coleman-Jensen, Gregory & Singh (2014), food insecurity and poor nutrition rates have remained largely unchanged in the U.S since 2008. As of 2014, approximately 3.8 million households were unable to provide adequate and nutritious food to their children, thus impacting their overall health and nutritional status (Coleman-Jensen, et al., 2014). Therefore poor child nutritional status seems to be a cause for concern, globally, irrespective of the economic well-being of a country.

Although poverty has been attributed as the primary cause of poor child nutrition outcomes, there are many other underlying factors that contribute to this growing problem. Scholars such as Bronfenbrenner (1994), Sen (1981; 1985; 1992; 1999), Smith, Ramakrishnan, Ndiaye Haddad & Martorell (2003) and Kent (2005), amongst others have provided alternative explanations for prevalence of poor child nutrition outcomes. They have emphasized the role of political, social, economic and cultural structures as important contributors to child well-being. Developmental psychology theorist, Trommsdorff (2007; 2012) underscored the influence of cultural and social norms of a community on the actions of individuals, which in turn impacts human development. Additionally cultural contexts and norms provide restrictions or options to various members of the society, depending upon their position (Trommsdorff, 2007; 2012; Sen, 1986; 1999). Based on how societies are formed and the underlying cultural norms, optimal development is only limited to certain populations. Groups that face exclusion around the world due to cultural and social norms, include, but are not limited to, women, children, the mentally and physically disabled, refugees and immigrants, older adults, rural and tribal communities, amongst others (Dreze & Sen, 2013; Gupta, 1987; Marmot,

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[4] The Center for Disease Control (CDC) defines 'Micronutrient Deficiency' refers to deficiency of vitamins and minerals that are vital to the body's development, disease prevention and wellbeing.

2005; Pande, 2003; Shroff, Griffiths, Suchindran, Nagalla, Vazir & Bentley, 2009; Sen, 1986; 1999; 2000; Social Exclusion Unit, 2001). This social exclusion results in inaccessibility to resources, which acts as a barrier to healthy development.

Based on evidence from previous studies (for example: Agarwal & Srivastava, 2009; Ahmed, Hill, Smith, Wiesmann & Frankenberger, 2008; Ashiabi & O'Neal, 2015; Black et al., 2008; Bentley & Griffiths, 2003; Chatterjee, 2007; Desai & Johnson, 2005; Dreze & Sen, 2013; Grabowski & Self, 2012; Imai, Annim, Kulkarni & Gaiha, 2014; Lapping, Marsh, Rosebaum, Swedberg, Sternin, Sternin, & Schroeder, 2002; Marmot, 2005; Mukhopadhyay, 2015; Osmani & Sen, 2003; Puchner, 2003; Ramachandaran, 2007; Ramalingaswamy, 1996; Sen, 1981; Smith et al., 2003) that highlight the importance of cultural and social context in the development and welfare of individuals, the current study utilizes India as an example, to explore the role of gender norms in the context of maternal autonomy and health awareness, on child nutritional status. India with it diverse culture and practices, is very appropriate for examining socio-cultural impacts on the capacity of caregivers, particularly maternal caregivers, since they are the primary and continuous source of care for the child in India (Shroff et al., 2011).

India has the largest child population in the world, with approximately 453 million under the age of 18 years and 121 million under the age of 5 years (UNICEF, 2014a). It also has the world's highest burden of child undernutrition rates, which is most prevalent in poorer communities within the country (World Bank, 2013). India ranked 135[5] out of 187 countries in the Global Hunger Index[5] (WHO, 2014). The undernutrition

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[5] The Global Hunger Index (GHI) is designed to comprehensively track hunger globally and by country and region. It is calculated by the International Food Policy Research Institute (IFPRI). The GHI combines three equally weighted indicators in one index number: (1) Undernourishment (2) Child Underweight, and (3) Child Mortality. The GHI ranks countries on a 100 point scale.

rates of children under 5 years in India is approximately the same as that of the overall South Asia region average (43 percent) and is five times more than that of China and twice of sub-Saharan Africa (UNICEF, 2013a; 2013b; World Bank 2013).

India suffers from a malnutrition paradox, as despite the steady economic growth within the country, there are persistently high rates of child undernutrition (Dreze & Sen, 2013; Ramalingaswamy, Johnson & Rohde, 1996). Ramalingaswami et al. (1996) coined the term 'Asian Enigma', which attempted to explain this phenomenon. As of 2015, India has reported a growth rate of 7.4 % and has increased its Gross National Income (GNI) from $980 per capita in 1993 to $5,350 in 2015, making it one of the largest emerging economic markets (World Bank, 2015). On the other hand, India has an estimated prevalence of 51% [61 million] stunted children under-5 years of age, which makes up 34% of the total global stunting rates (WHO, 2014). Stunting is one of the primary indicators of prevalence of child undernutrition (Black et al., 2008). Additionally, 47% of children are underweight and 16% are wasted (UNICEF, 2013a). Child undernutrition is closely linked to increased vulnerability to diseases such as diarrhea, pneumonia, malaria and measles amongst others (Black et al., 2008). Additionally, severely undernourished children are at a high risk of death. Approximately 1.83 million children die before their fifth birthday in India, due to causes linked to malnutrition (UNICEF-India, 2011).

Several studies have attributed lack of income as the most immediate and direct cause for poor nutritional status of children in India (Cunningham, Ruel, Ferguson & Uauy, 2015; Klasen, 2006; Nandy, Irving, Gordon, Subramanian & Smith, 2005). Major

Zero is the best score (no hunger) and 100 is the worst, although neither of these extremes are reached in practice. More information on the GHI is on: http://www.ifpri.org/book-8018/ourwork/researcharea/global-hunger-index

international development stakeholders have also focused on income poverty as the primary cause of undernutrition within the country (Das Gupta, Lokshin, Gragnolati & Ivaschenko 2005; Gillespie & Haddad, 2003). However, when compared to sub-Saharan Africa, which has a significantly poorer economy and social development record, India fairs worse on both children and women's human development indicators (Dreze & Sen, 2013; Ramachandaran, 2007). According to Osmani & Sen (2003) irrespective of poverty levels, poor infrastructure and the growing gap between the rich and poor, India should be expected to fare better in child nutrition than it does currently as compared to other developing and least-developed countries (Osmani & Sen, 2003).

Significance

The malnutrition paradox in India suggests that, other factors besides socioeconomic status need to be taken into consideration, when exploring reasons behind child undernutrition in India as well as globally. Scholars such as Sen (1981), Lapping et al. (2002), Smith et al. (2003) and Engle, Menon & Haddad (1999) argue that factors associated with child undernutrition are complex, and cannot be attributed to the presence of poverty alone. Additionally, studies by the International Institute for Population Sciences (IIPS) and Macro International (2007) indicate that while there is a relatively higher prevalence of undernutrition in lower income households, it is not completely absent in middle and high-income households.

Gender inequality and status of women in the society have been highlighted as potential explanations for the prevalance of child undernutrition in India (Black et al., 2008; Engle et al., 1999; Osmani & Sen, 2003; Ramalingaswami et al., 1996; Sen, 2001;

Smith et al., 2003). According to Osmani & Sen (2003), although gender inequality is prevalent in most parts of the world, the deep-rooted gender biases in certain countries such as India, negatively impacts the well-being of their population. Many studies (such as: Aslam & Kingdon, 201; Bardhan, 1974; Das Gupta, 1987; Deaton & Dreze, 2002; Kishor, 1993; Saha, 2013) highlight that gender biases has a negative impact on decision making, health related awareness and overall health of women, who are predominantly the primary caregivers of children in India. Thus gender bias has a a negative affect on the well-being of maternal caregivers as well as that of their children.

As of 2015, India had an overall Gender Inequality Index[6] (GII) score of 0.617 and ranked 127 out of 146 countries (UNDP, 2015). This indicates high levels of gender disparities and overall poor outcomes for women. As of 2015, India has one of the highest rates of maternal mortality. Although the rates have reduced drastically reduced from 390 to 212 deaths per 100,000 women in the last decade, India still acounts for 19% of the total maternal deaths in the world (Save the Children, 2015). Additionally, other determinants of poor outcomes for women, including early marriage, repeated child bearing and low literacy rates are wide spread in India.

On the other hand, the averge GII score of the sub-Saharan Africa region was 0.575 indicating lower level of gender inequality as compared to India (UNDP, 2015). Evidence from studies (See: Aslam & Kingdon, 2008; Chaudhary, 2013; Deaton, 2008; Dreze & Kingdon, 2001; Himaz 2009; Holmes, 2003; Jerrim & Micklewright, 2009; Saha 2013) indicate that countries with strong "boy preference," such as India, China and

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[6] The Gender Inequality Index (GII) is an index measurement of gender disparity that was introduced in the 2010 Human Development Report by the United Nations Development Programme (UNDP). It uses three measures (i) reproductive health, (ii) empowerment and (iii) labor market participation.

other Asian countries, allocate fewer resources towards meeting female needs as compared to males. Many studies have highlighted the wide spread gender disparities and resulting disadvantages that women in most parts of India face (Black et al., 2008; Dreze & Sen, 2013; Das Gupta et al., 1998; Nussabaum, 2000; UNICEF, 2007; Victoria, Adoir, Fall, Hallal, Mortrell & Sachdev, 2008). Gender discrimination remains a historically deep rooted social phenomenon within most parts of the country and gives disproportionate importance to the welfare of males as compared to females (Bhat & Zavier, 2003; Gupta, 1987; Rosenweig & Schultz, 1982). There are many cultural and economic factors that contribute to persistent gender inequality in most parts of the country (Bhattacharya, 2006; Bhat & Zavier, 2003; Gupta, 1987). According to Baunach (2001) gender inequalities, established during the early years of an individual's life, sets the stage for later inequalities. It manifests itself in the form of lack of opportunity, lack of autonomy, differential resource allocation and general awareness including health awareness (Bardhan, 1974; Deaton, 1989; Jerrim & Micklewright, 2009; Rosenzweig & Schultz, 1982; Sen, 1999). Poor outcomes in health, education and mortality as a result of gender inequality is well documented in previous literature (Aslam & Kingdon, 2011; Bardhan, 1974; Das Gupta, 1987; Deaton & Dreze, 2002; Kishor, 1993; Saha, 2013).

Gender inequality has a detrimental impact on the well-being of women as well children. UNICEF's model of care was one of the first studies that highlighted the connection between the welfare of women and child health outcomes (UNICEF, 1990). The study indicated that maternal caregiver characteristics, such as health, autonomy, awarenes, education, amongst others, significantly impact short and long term outcomes of their children, such as mortality, physical and cognitive development, educational

achievement, and overall functioning (UNICEF, 1990) . This model has been further explored by scholars such as Smith et al. (2003), Osmani & Sen (2003), Ramachandran (2007), UNICEF (2008) and Engle et al. (1999) to highlight the importance of maternal caregiver characteristics on child nutrition. However, the majority of the literature on child nutrition and corresponding policy recommendations are still focused on the role of income poverty, as a predictor for poor child health.

The current study therefore attempts to highlight the significant role of maternal caregiver characteristics on child nutritional status. It explores the role of gender norms, specifically, maternal autonomy and maternal health related awareness on the nutritional status of children between 0-5 years, using India's National Family and Health Survey (NFHS) data (IIPS & ORC Macro, 2006).

To my knowledge this study is the first of its kind to hypothesize that maternal autonomy and health related awareness have a significant impact on child nutritional status, irrespective of socioeconomic status of the household. Additionally, no previous studies were found which have developed and validated scales on maternal autonomy and health related awareness utilizing the NFHS data. This study is the first to develop and validate a multi- dimensional scale on health related awareness, rather than utilize proxy measures such as literacy and academic education, that have been used in previous research (DeWalt & Hink, 2009; Gazmararian, Williams, Peel & Baker, 2003; Gelany & Moussa, 2013). Additionally, this study provides a unique perspective on addressing child undernutrition and utilizes an asset-based approach called the Positive Deviance Inquiry (PDI), to examine the results of the study and to provide policy and practice recommendations. The key objective of PDI is to identify specific practices that certain

groups are undertaking, which enable them to have better outcomes than others despite facing dismal conditions, such as poverty (Berggren & Wray, 2002; Bolles, Speraw, Berggren & Lafontant, 2002; Lapping et al., 2002; Mackintosh, Marsh & Schroeder, 2002; Shameera & Shobha, 1997; Sethi, Kashyap, Seth & Agarwal, 2003; Schooley & Morales, 2007; UNICEF, 1990; Zietlin, Ghassemi & Mansour, 1990).

Lastly, the study utilizes three theories, namely (i) The Ecological Systems Theory (Bronfenbrenner, 1977), (ii) The Capability Approach (Sen, 1985), and (iii) the Positive Deviance Inquiry (Zietlin, Sternin, 1990), that have been extensively used in the studies related to women and child health and nutrition. In all previous works, these theories have been used independently to explore women and child well-being. However, the current study utilizes various aspects of all three theories to develop a conceptual model to highlight the importance of non-financial factors, particularly maternal autonomy and health related awareness in determining the health of caregivers as well as the nutritional status of their children, irrespective of their socioeconomic status.

The current study thus has important policy and practice implications for child health and nutrition outcomes in India, as well as globally. Currently over 43% of the child population in India are denied the right to survival and good health. Additionally more than 100 million children suffer from undernutrition and related illnesses worldwide. Thus, undernutrition is an acute problem and might take years to solve if underlying social norms and power relations are not recognized. Based upon literary evidence by Ramalingaswamy et al. (1998) as well as Dreze & Sen (2013), financial support is not sufficient to improve the health conditions of the growing child population in India. There is a need to understand best practices and characteristics present within

households, particularly those of primary caregivers that lead to positive nutritional status of children, irrespective of their socioeconomic status. An asset based approach will help recognize the social capital in communities, and support policy makers and practitioners broaden their perspectives and develop interventions that emphasize community and individual strengths rather than income alone. These interventions will help build favorable caregiver characteristics in a more strategic manner and support better child nutritional outcomes.

Specific Aims, Research Questions & Hypothesis

The specific aims, corresponding research questions and study hypotheses are presented below:

Aim 1: Explore the influence of maternal autonomy and maternal health related awareness on child nutritional outcomes.

Q1. Is there a difference in child nutritional status based on level of maternal autonomy?

H_1: There is a difference in child nutritional status based on level of maternal autonomy.

Q2. Is there a difference in child nutritional status based on level of maternal health related awareness?

H_2: There is a difference in child nutritional status based on level of maternal health related awareness.

Q3. Does maternal autonomy have a significant effect on child nutritional status, when all demographic variables are controlled?

H_3: Maternal autonomy has a significant effect on child nutritional status, when all demographic variables are controlled.

Q4. Does maternal health related awareness have a significant effect on child nutritional status, when all demographic variables are controlled?

H_3: Maternal health related awareness has a significant effect on child nutritional status, when all demographic variables are controlled.

Aim 2: Explore the influence of maternal health on child nutritional outcomes.

Q3. Does maternal health have a significant effect on child nutritional status, when demographic variables are controlled?

H_3: Maternal health has a significant effect on child nutritional status, when demographic variables are controlled.

Aim 3: Explore the influence of maternal autonomy and health related awareness on maternal health.

Q4. Is there a difference in maternal health based on level of maternal autonomy?

H_4: Maternal caregivers with higher levels of autonomy have good health as compared to maternal caregivers with lower levels of autonomy.

Q5. Is there a difference in maternal health based on level of maternal health related awareness?

H_5: Maternal caregivers with higher level of health related awareness have good health as compared to maternal caregivers with lower levels of health related awareness.

The following chapter (Chapter 2) provides a comprehensive overview of the empirical literature on (i) the consequences of poor child nutritional status, (ii) causes of

poor child nutrition, (iii) the link between maternal caregiver autonomy and child nutritional status, and (iv) the link between maternal caregiver health related awareness and child nutritional status. Chapter 2 also describes the three theories on which the current study is based: (i) Ecological Systems Theory by U. Bronfenbrenner (1977), (ii) Capability Approach by A. Sen (1985) and (iii) Positive Deviance Inquiry by J. Sternin (1990).

Chapter 3 provides a detailed explanation of the study methodology and describes the dataset, sample, measures, and statistical analysis utilized. The study findings are presented in Chapter 4 and corresponding tables and figures are also displayed. Lastly, Chapter 5 discusses the results of the study in light of the current global and national trends of child undernutrition. It also explains the limitations of the study and provides recommendations for (i) child welfare policy and practice, (ii) social work policy, practice and education, and (iii) future research.

Chapter II. Literature Review & Theoretical Framework

Overview of Previous Literature

Consequences of Child's Poor Nutritional status

Child undernutrition remains a pervasive condition globally as it currently

impacts approximately than 165 million children under the age of 5 years worldwide

(UNICEF, 2013). The World Health Organization measures undernutrition through

anthropometric data, which includes, height for age (stunting), weight for height

(wasting), weight for age (underweight) and deficiency of essential minerals and vitamins

(Black et al., 2010). It is one of the conditions of malnutrition, obesity being the other

(WHO, 2006). Undernutrition is the most prevalent form of malnutrition in low and

middle-income countries (Deaton & Dreze, 2009; Headey, Hoddinott, Ali, Tesfaye &

Dereje, 2015).

Poor nutritional status during childhood, negatively impacts individuals in early

life, as well as throughout their life cycle. Nutrition and child welfare literature have

repeatedly highlighted the importance of proper nutrition and care during the first

thousand days of the child, starting from conception till age two (Apocada, 2010; Black

et al., 2008; Cunningham et al., 2015; Deaton & Dreze, 2008; Osmani & Sen, 2003;

Muchu, 2012; UNICEF, 2008; UNICEF, 2009). Lack of proper nutrition has harmful

effects on cognitive and physical development (Alderman, Hoddinott & Kinsey,2006;

Apocada, 2010; Colemen-Jensen et al., 2014; Forrest & Riley, 2004; Hook & Balistreri,

2006; Maxwell & Smith, 1992; Nord, 2009;Victoria, et al., 2008; Zaslow, Bronte-

Tinkew, Capps, Horowitz, Moore & Weinstein, 2009). Some of the common outcomes of

undernutrition include poor health outcomes, low academic achievement, behavioral

concerns such as depression, anxiety and, other psychosocial deficits (Howard, 2010; Nord, Andrews & Carson, 2009; Zaslow et al., 2009).

The public health journal '*Lancet*' recently published a series on Maternal and Child Undernutrition, which emphasized the negative short and long-term consequences of child undernutrition (Horton, 2008). One of the landmark articles in this series was by Black et al. (2010), which utilized the Demographic and Health Surveys (DHS) to conduct a cross-cultural study to estimate the health consequences of child undernutrition in the United Nations regions and sub regions. This study estimated that stunting, severe wasting and intrauterine growth restrictions were responsible 2.2 million deaths for children under the age of 5 years across the world. Additionally undernutrition also made children susceptible to a myriad of diseases and thus contributed to 11% of the global disease burden (Black et al., 2010).

Another study by Victoria et al. (2008) analyzed maternal and child health outcomes in five low and middle-income countries using the Demographic and Health Survey data. This study utilized five long-standing cohort studies from Brazil, Guatemala, India, Philippines and South Africa. This cross-cultural study had similar results to Black et al. (2010). The authors suggested that the common outcomes of child undernutrition, particularly in resource constrained communities, are child mortality, chronic physical and mental disabilities such as blindness, anemia, improper functioning of limbs, amongst others.

Childhood undernutrition can also have an impact on long-term physiological functioning. One of the first studies conducted on child nutrition and its long-term effects was by Barker & Osmond (1986), based in England and Wales. The study results

indicated that poor living conditions and diet had a strong correlation with diseases such as bronchitis, ischemic heart diseases, stomach cancer, and rheumatic heart diseases. Subsequent studies by Cooper, Westlake, Harvey, Javaid, Dennison & Hanson (2006), Cunningham et al. (2015), Harding & McCowan (2003), Moore, Collinson, Tamba N'Gom, Aspinall & Prentice (2006), and Victoria et al. (2008) had similar results. For example, Cooper et al. (2006) in their research on the causes of osteoporosis in later stages of life, found that poor nutrition during childhood could have a detrimental impact on the bone density. Cooper et al. (2006) recommended that focus should be on providing children a good diet in order to prevent later risks of fractures.

In addition to limiting physical growth, undernutrition also impacts cognitive development. Lack of proper nutrition can lead to structural damage of the brain, thus causing impaired infant motor development, exploratory behavior, and educational achievement (Brown & Pollitt, 1996; Cunningham et al., 2015).

A study by Alderman, et al. (2006) used a fixed effects instrumental variables estimator (MFE-IV) with panel data to examine the impact of pre-school malnutrition on the development of human capital in rural Zimbabwe. The results indicated that undernutrition is negatively associated with academic performance. This study focused on the impact of civil war and drought shocks on child health outcomes. According to them, if the median pre-school child in the study sample were in a developed high-income country, they would have been in better health and would have been in a higher grade at school. They highlighted the association between undernutrition during childhood and poor academic achievement and employability in adulthood.

Daniels & Adair (2004) utilized the Cebu Longitudinal Health and Nutrition Survey (1991-2002) to explore the association between the ratio of height to age (measured by Z scores) at 2 years of age for children and their schooling trajectory among 2198 children from Philippines. After controlling for confounders, such as maternal characteristics, household income, environmental cleanliness, amongst others, the results indicated that greater height for age ratio was a protective factor against late enrollment and grade repetition. Additionally, the study indicated that children below the age of two years who had stunted growth, had delayed school entry, higher grade repetition and drop out rates, and lower school performance.

Another study by Walker et al (2007) involved a comprehensive cross-cultural investigation of child development in more than 79 countries using information from the WHO Global Database on Child Growth and Malnutrition (2006). The study built on Grantham-McGroegor et al.'s (2007) article which highlighted that more than 200 million children under the age of 5 years in low and middle-income countries were not reaching their fullest potential in terms of health and ability. Walker, Wachs, Gardner, Lozoff, Wasserman, Pollitt & International Child Development Steering Group (2007) showed similar results to studies by Alderman et al. (2006), Behrman (1996), Li, Barnhatt, Stein, Martorell, Grajeda & Stein (2003) who emphasized on the correlation between poor health and low academic achievement.

Many studies have highlighted that the ill effects of undernutrition experienced during childhood have a prolonged impact through the various stages of life, and cause intergenerational cycle of poor health outcomes (Cunningham et al., 2015; Daniels & Adair, 2004; Hoddinott, Maluccio, Behrman, Martorell, Melgar & Agnes, 2011; Victoria

et al., 2008). Cunningham et al. (2015) conducted a meta-analysis of 12 articles that focused on child nutritional status in South Asia. In the meta-analysis, Begum & Sen (2009), Bose (2011), Desai & Johnson (2004), Sethuramen, Lansdown & Sullivan (2006), and Shroff et al. (2009) suggested that undernutrition in childhood leads to a vicious cycle of poverty. It not only limits mental and physical growth during childhood, but also has negative consequences for the overall physical, cognitive, behavioral and economic development of the individual, household and community. This aligns with the findings by Barker & Osmond (1986), Pada (2010), and Harding & McCowan (2003) amongst others.

Thus far the consequences of poor child nutritional status have been highlighted. The section below will explain the factors that cause poor child nutritional status.

Causes of Poor Child Nutritional Status

The causes of child undernutrition are multidimensional and complex. UNICEF (1990) has identified basic and underlying factors that lead to child undernutrition. These include environmental, economic and sociopolitical factors. Several studies have highlighted low socioeconomic status, ineffective governance, employment status, low educational attainment, poor sanitation, demographic characteristics such as household size, sex of head of household, birth order of children, sex of child, and housing status as plausible explanations for undernutrition and child mortality (Bhutta 2008; Checkley, Buckley, Gilmay, Assis, Guerrant, Morris & Black, 2008; Cunningham et al., 2015; Engle et al., 1999; Klasen, 2006; Nandy et al., 2005; Pryer, Rogers & Rahman, 2003;

Smith & Haddad, 2000; Smith et al., 2003; UNICEF, 1990; UNICEF, 2008; Zietlin et al.,

1990).

Bhutta et al. (2008) conducted a global review of interventions for maternal and

child undernutrition for a series on '*Maternal and Child Undernutrition'* by Lancet. The

study used a cohort model to assess the effects of nutrition based interventions on

mothers and their children in 36 countries that had 90% of the children with stunted

growth (Bhutta et al., 2008). According to the findings of the study, although current

interventions in various countries have a positive impact on child health, the results are

still dismal. To eliminate poor health outcomes, Bhutta et al. (2008) suggest that focus

should be given to underlying determinants of undernutrition such as poverty, poor

education, disease burden and lack of women's empowerment.

Klasen (2008), while reviewing the Millennium Development Goals, particularly

with respect to children's and women's health outcomes, reported similar findings as

Black et al. (2008). The study utilized data from the World Development Indicators to

conduct a cross-national study on child health and nutrition in 120 developing countries.

While recognizing the regional differences, the study investigated the dominant causes of

undernutrition across the countries. The significant explanatory variables included female

literacy, income, prevalence of diseases, access to modern sanitation, and caloric

availability (Klasen, 2008).

A study by Nandy et al. (2005) emphasized the role of income as the primary

determinant of child nutritional status. Using the Demographic Health Survey Data to

examine the causes of child undernutrition in India (N=24,396), the researchers found a

strong correlation between socioeconomic status and prevalence of undernutrition

amongst children. The most vulnerable children lived in the poorest households and they suffered from anthropometric failure on three measures. They were stunted, wasted and underweight (Nandy et al., 2005).

Similar factors were found in studies that were conducted in high-income countries such as the U.S. For example, Gunderson & Zilak (2014) recently released an extensive report on childhood food insecurity in the U.S, as a part of their work in the Research Program on Childhood Hunger, which was underwritten by the Food and Nutrition Services of the U.S Department of Agriculture. This report while highlighting poverty as the primary cause of poor nutritional status, also suggested that other determining factors could include caregiver's health, partner violence, literacy, incarceration, immigration status, amongst others. Studies by Biggerstaff, Morris, Nicholas-Casebolt (2002); Colemen-Jensen et al. (2014); Lombe, Nebbitt, Reynolds & Sinha (2015) reported similar findings.

While the above studies focused on poverty as the dominant factor to determine negative child nutritional status (Cunningham et al., 2015; Klasen, 2006; Nandy et al., 2005), other scholars such as Sen (1981), Lapping et al. (2002), Smith et al. (2003) and Engle et al. (1999) argue that factors associated with child undernutrition are complex and cannot be attributed to the presence of income poverty alone. Along these lines, a seminal paper by Ramalingaswamy et al. (1996) was one of the first works to negate the importance given to income and other financial assets as primary determinants of child undernutrition, particularly in South Asian countries. This paper while comparing outcomes of children in sub Saharan Africa and South Asia highlighted that there were lower rates of undernutrition amongst children in sub-Saharan Africa as compared to

South Asian countries particularly India, despite India having a higher Gross Domestic Product (GDP). Ramalingaswamy et al. (1996) redirected the child nutrition debate to social and cultural determinants. They emphasized the role of maternal autonomy and status of women as determinants of child nutritional status (Ramalingaswamy et al., 1996).

Similarly, Engle et al. (1999) emphasized the role of the caregiver and defined the resources that were needed by the caregiver to provide optimal care to herself as well as to the child. Some of the resources highlighted in this study included education and knowledge, physical and mental health, autonomy, social support and family economic resources (Engle et al., 1999).

More recently, a landmark research report by Smith et al. (2003) utilized the Demographic and Health Survey data by USAID to conduct a comparative study between countries of Sub-Saharan Africa and South Asia (N=117,242). This study explored the importance of women's status in child nutritional outcomes. The findings indicated that if women and men had equal status, the underweight rate for children under 3 years of age would drop by approximately 13%, thus saving 13.4 million children from poor nutritional outcomes.

Contemporary scholars such as Nussbaum (2000), Dreze & Sen (2013), Bhutta (2013), and Paul (2011) amongst others have contributed to this school of thought to draw attention to status of women in the society as a determinant of child nutritional status. Status of women has been primarily measured by factors such as autonomy or decision-making, violence, literacy, employment, and financial independence, amongst others (Dreze & Sen, 2013; Kabeer, 2001; Ibrahim & Alkire, 2007; Malhotra, 2002;

Nussbaum, 2000; Sen, 1999; Vaz, Alkire, Quisumbing & Sraboni, n.d). The following section will explore previous literature that has examined the role of women's autonomy and health related awareness as determinants of child nutritional status.

Maternal Autonomy and Child Nutritional Status

Scholars such as Sen (1999), Kabeer (2001), Malhotra (2002) and Nussbaum (2000) amongst others have emphasized the status of women in the society as a key determinant of child nutritional status. In most societies, women are the primary caregivers of children and are responsible for their survival, care and overall well-being (Smith et al., 2003). In order to successfully perform care practices and ensure healthy development, maternal caregivers need resources, good health, autonomy and social support (Engle et al., 1999; Smith et al., 2003; UNICEF, 1990). In India, particularly in the northern belt, political, economic and socio-cultural norms are deeply rooted in gender inequality, thus, restricting women's access to resources, ability to make household decisions and social support (Dreze & Sen, 2013; Desai & Johnson, 2005; Ramalingaswamy et al., 1996; Shroff et al., 2013). This in turn negatively impacts maternal health and child's overall well-being.

Maternal Autonomy. Many scholars have attempted to explain what factors determine the status of women in society. According to Malhotra (2012) status of women is impacted by: levels of gender equality, autonomy and empowerment. Empowerment is a multidimensional concept, which often consists but is not limited to inclusion of women in mainstream society, equality, power to make decisions, and to have a voice (Imai et al., 2012; Malhotra, 2012). Sen (1990) views empowerment as the freedom to make choices and achieve optimal functioning. Along these lines, Kabeer (2001) has defined

empowerment as "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them". Thus a major component of empowerment is the woman's ability to define her interests as well as have the freedom to make choices (Malhotra, 2012). Sen (1990) describes this freedom as 'agency' or 'autonomy'.

Arulampalam, Bhaskar & Srivastava (2015) suggested that autonomy could be measured by a woman's decision-making power, mobility and, control over resources. One of the earliest definitions of autonomy was provided by Dixon-Mueller (1978) who defined it as the access to and control over material and social resources within the family, community and society at large. More recently Jejeebhoy (2005, pg. 205) provided a comprehensive definition of autonomy, as the 'extent to which women exert control over their own lives within the family in which they live, at a given point of time.

A large body of research has defined autonomy in terms of financial independence alone (Anderson & Eswaran, 2009; Blumberg, 1988; Engle et al., 1991). These studies suggest that women who earn higher incomes have greater control over resources. However, contradictory evidence suggests that higher income or socioeconomic status of the woman or their household is not a determinant of level of autonomy. In most gender-biased societies, such as India, China, South Korea, Pakistan, Mexico, and Guatemala, amongst others, irrespective of whether the woman earns the income, is considered the property of the husband (Engle et al., 1999; Jejeebhoy & Sathar, 2001; Malhotra, 2012; Nussbaum, 2000). This implies that women might not have financial resources available to use for their needs, despite earning an income (Engle et al., 1999; Smith & Haddad, 2015). Findings from a study conducted by Castle (1995)

indicated that most malnourished children in the study sample belonged to women with low autonomy, but were residing in high-income households. A national rapid assessment of child nutritional status in India, has provided further evidence that undernutrition is not limited to low income cities, but is comparatively more dominant in regions with poor maternal health and high levels of gender inequality, irrespective of their financial well-being (UNICEF, 2014).

Multi-dimensionality of Autonomy*:* There exists an alternative body of literature that focuses on the multidimensionality of autonomy. These scholars have utilized indirect and direct factors to measure autonomy. For example, Balk (1994) utilized women's education and labor force participation as an indirect proxy measure for autonomy. More recent literature has however utilized direct measures, such as participation in economic and child care related decision, freedom from domestic violence, control over resources, and mobility (Durrant & Sathar, 2000; Ghuman, Lee & Smith, 2004; Ibrahim & Alkire, 2007; Black et al., 2008; Shroff et al., 2013).

Kishor & Subaiya (2008) conducted a comparative cross-cultural study of 23 countries to obtain a deeper understanding of autonomy in relation to the status of women. The main findings of the study highlighted that there was no single adequate indicator of autonomy. As such, they suggested indicators such as education, access and control over resources, media exposure, employment, amongst others to measure autonomy. Other studies by Vaz et al. (n.d), Kabeer (2002), Malhotra (2012), Jejeebhoy & Sathar (2001), Samari & Pebley (2015), and Agarwala & Lynch (2006) also recommend multidimensional indicators to measure autonomy. So far, no validated cross-cultural measure has been established to measure maternal autonomy. Currently scholars

including Dr. Ana Vaz (University of Oxford), Dr. Sabina Alkire (George Washington University) and Dr. Pierre Pratley (George Washington University) are in the process of developing a women's autonomy scale (Vaz et al., n.d.).

Link between Maternal Autonomy and Child Nutritional Status:

Although the relationship between maternal autonomy and child nutritional status has been recognized by major international policy makers, such as the United Nations, World Health Organization, International Food Policy Research Institute, World Food Programme, there is dearth of literature that explores this relationship. Some studies that have explored the relationship between women's autonomy and child nutritional status include Arulampalam et al. (2015), Begin, Frongillo & Delisle (1999), Caldwell (1993), Chowdhury (2013), Doan & Bisharat (1990), Imai et al. (2014), Jejeebhoy (1998), Johnson & Rogers (1993), Kishore (1998), Koenen, Lincoln & Appleton (2006), Nussbaum (2000), Osmani & Sen (2002), Samari & Pebley (2015), Sethuraman et al. (2006), Sen (1999), Smith et al. (2003), and Shroff et al. (2009). A summary of findings is provided below.

Shroff et al. (2009) utilized data from the National Family Health Survey (NFHS-2) and used logistic regression to examine the relationship between maternal autonomy and child stunting in Andhra Pradesh, India. The results indicated that women with higher autonomy (autonomy was measured by: access to money and freedom to choose to go to the market) were significantly less likely to have stunted children, when controlling for socioeconomic status (Shroff et al., 2009). A recent study by Imai et al. (2014) found similar results. Imai et al. (2014) utilized data from National Family and Demographic Survey (NFHS) and National Council of Applied Economic Research (NCAER) to

explore the relationship between maternal empowerment or relative bargaining power and child nutritional status in India. The study results indicate that the bargaining power of the mother, which was measured by ratio of mother's schooling years to the father's schooling years, had a significant positive effect on the nutritional status of the children (Imai et al., 2014). Additionally, the results also forecasted that maternal bargaining power would improve the height to age ratio of the child and protect against chronic illnesses in the long term (Imai et al., 2014).

Similar studies have been conducted in other countries as well. For example, Desai & Johnson (2005) conducted a cross-cultural study to examine the impact of women's ability to make independent decisions on child's health outcomes (measured as: vaccination status, nutritional status and child mortality) in 12 developing countries. The study results indicated that the impact of women's decision-making power is the greatest for child nutritional status as compared to vaccination status and child mortality. According to Desai & Johnson (2005), women's decision-making impacts the day-to-day life of the household and influences the type of food and quality of care that is provided to the child.

Begin et al's (1999) study in rural Chad explored caregiver characteristics that influence child nutritional status. They interviewed 64 households with 98 children between the ages of 12 to 71 months. Information was gathered regarding child feeding and care practices, social support, income, overall satisfaction with life, household food expenditures, amongst other demographics. The results of the study indicated that caregiver characteristics, particularly caregiver influence on child-feeding practices, level of satisfaction with life, willingness to seek advice during child illnesses and social

support were significantly associated with positive child nutritional status, even when socioeconomic status was controlled (Begin et al., 1999).

Similar to Begin et al.'s (1999) findings, Pryer et al. (2003) also suggested that maternal decision-making and physical health had greater impact on child nutritional status as compared to socioeconomic status. Pryer et al. (2003) utilized the Urban Livelihoods Study, which has data from households residing in the slum settlements of Mohammadpur sub district of Dhaka city in Bangladesh. The study results indicated that mother's nutritional status was strongly correlated with child's health outcomes. Additionally, the authors also reported that female-headed households had higher likelihood of children being in good health, even if they were poorer than the male-headed households (Pryer et al., 2003).

Some empirical evidence has suggested a negative impact of women's autonomy on child nutrition (Dancer & Rammohan, 2009; Engle et al., 1997; Sethuraman et al., 2006). Findings from studies conducted by Bose (2011) and Sethuraman et al. (2006) suggest that maternal employment is associated with poor nutritional status of children, as mothers have reduced time available to provide care. However, substantial evidence from maternal and child welfare research indicates that when women's autonomy is measured as control over resources and ability to make decisions in the household, rather than employment alone, it has a positive influence on children's overall well-being (Desai & Johnson, 2005; Engle et al., 1997; Sen, 1999; Sethuraman et al., 2006; Shroff et al., 2011).

Another caregiver characteristic that is closely related to autonomy is maternal health related awareness. Similar to maternal autonomy, the role of health related

awareness has not been explored in-depth in academic literature. Although many studies have explored the role of maternal literacy and education, the impact of health related awareness remains largely unknown. A brief synthesis of the literature related to maternal health-related awareness is provided below.

Maternal Health Related Awareness and Child Nutritional Status

The importance of maternal health related awareness and education in determining women's health as well as the well-being of their children has been highlighted continuously at many global forums, including the annual Health Awareness Campaigns by the WHO (WHO, n.d.), global reports by UNICEF (UNICEF, 2011; 2012; 2013; 2014), Millennium Development Goal reports (UN-MDG, 2010; 2011; 2012; 2013), United Nations Entity for Gender Equality and Empowerment of Women reports (UN Women, 2014), amongst others. However, there exists a significant gap in scholarly literature that examines the relationship between health related awareness and maternal and child health outcomes. Most studies have primarily explored the role of literacy or academic achievement to determine maternal and health outcomes (Arulampalam et al., 2015; Bhutta 2008; Checkley et al., 2008; Cunningham et al., 2015; Engle et al., 1999; Gunderson & Zilak, 2014; Imai et al., 2014; Klasen, 2006; Nandy et al., 2005; Nussbaum, 2000; Pryer et al., 2003; Sen, 1999; Smith & Haddad, 2000; Smith et al., 2003). These studies have indicated a strong correlation between maternal education variables such as, years of schooling completed, literacy and highest educational degree received and health outcomes. However, these researchers have not highlighted the role of health related awareness.

Maternal Health Related Awareness: The World Health Organization (WHO) provides a broad definition of health literacy[7], which is also utilized to explain health education and awareness. According to the WHO (1998), "Health literacy includes cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use the information in ways which promote and maintain good health. Health literacy means more than being able to read pamphlets and successfully make appointments. By improving people's access to health information and their capacity to use it effectively, health literacy is critical to empowerment."

The lack of a cohesive measurement tool for maternal health related awareness is a major challenge in predicting its impact on maternal and child health. DeWalt & Hink (2009) conducted a systematic review of 4,182 studies that examined the relationship between maternal health literacy and child health outcomes. These studies utilized the concepts of health literacy, health awareness and education interchangeably. The meta-analysis indicated that all studies showed a significant relationship between health literacy and child health outcomes, when all other determinants were controlled. This study also highlighted an important gap in most articles that were included in the meta-analysis. Majority of the studies utilized academic achievement or literacy as a proxy measure for health literacy, as they did not have a reliable measure for health literacy or awareness (DeWalt & Hink, 2009). Therefore while maternal health awareness and child

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[7] Health & social sciences literature utilizes the terms health literacy, health awareness and health knowledge interchangeably. The World Health Organization's broad definition of health literacy has been popularly utilized to define health awareness and knowledge as well. However, the author believes there are important differences between health literacy and awareness. For this reason, the current study uses 'Health Awareness' as a measure rather than 'Health Literacy'. An in-depth explanation is provided in the measurement section of Chapter 3.

health are correlated in all 4128 studies, these results should be interpreted with caution, due to the utilization of proxy measures.

There are a few studies that have measured maternal health awareness specifically, by using indicators such as, postnatal education, antenatal education, human immune deficiency virus (HIV)/ acquired immune deficiency syndrome (AIDS) awareness, and reproductive health awareness (Gazmararian et al., 2003; Gelany & Moussa, 2013; Khreshesh, Suhaimat, Jalamdeh & Barclay, 2011; Kalichman & Rompa, 2000; Renkert & Nutbeam, 2001; Sercekus & Mete, 2009). For example, Renkert & Nutbeam (2001) examined the concept of maternal health awareness by utilizing the concept of prenatal health literacy to guide an antenatal program. The authors conducted focus group discussions and interviews with pregnant and new mothers to gather this information. The findings of the study indicated that mothers who had higher levels of health awareness, had higher probability of successful childbirth, and improved health outcomes for the mothers themselves and their children. Another study conducted by Kalichman & Rompa (2000), hypothesized that poor health literacy is associated with negative health status, awareness and understanding of one's HIV disease status and treatment (N=339). The study utilized the Test of Functional Health Literacy in Adults (TOFHLA) to measure health literacy amongst 339 HIV infected men, women and transgendered persons residing in the U.S. The results indicated that health literacy significantly influences the health and treatment of HIV/AIDS affected individuals. Poor health literacy negatively impacts understanding of health status, ability to make decisions, and accessing care (Kalichman & Rompa, 2000).

Link between Maternal Health Related Awareness and Child Nutritional

Status: The World Health Organization (2010), in their '*Global Strategy for Infant and Young Child Feeding'* indicated that in order for children to have positive nutritional and health outcomes it is imperative for the primary caregivers to have access to consistent information on various care practices. Additionally, Victoria et al. (2008) in their study to evaluate maternal and child health in Brazil, recommended that maternal health awareness is an important determinant of child health, as it influences the overall quality of care, type of food and health services that are provided. UN Secretary Ban Ki-moon presented similar suggestions in his joint action plan report on the Millennium Development Goals (UN, 2010).

Within academic literature, the relationship between health related awareness and child health outcomes was first brought to light by Nutbeam (2000), who highlighted the plethora of research correlating academic achievement and maternal and child health outcomes, but the lack of literature in health related awareness. To bridge this gap, Nutbeam (2000) attempted to develop a conceptual framework of health literacy and its relationship with maternal and child health outcomes. The conceptual framework emphasized on health related education as an asset, which enables people to get more control over their health and factors that determine their health outcomes. Nutbeam's (2000) conceptual model of health literacy, as an asset, suggested that improved health literacy or awareness, will lead to (i) engagement in social action for health, (ii) changed health behaviors and practices, and (iii) participation in changing social norms and practices. These steps would in turn lead to improved health outcomes, healthy choices and opportunities.

Similar to Nutbeam's (2000) conceptual framework, Kickbusch (2001) also highlighted the strong relationship between health related literacy and maternal and child health outcomes. The study's main recommendations were to develop a cohesive measure of health literacy in future studies and to promote health awareness amongst the civil society as a means to increase autonomy over their health. Building on Nutbeam's (2000) conceptual model, Kickbusch (2001) also highlighted health awareness as an empowerment tool.

Link between Maternal Health and Child Nutritional Status: The correlation between maternal health and child nutrition status has been widely recognized in many studies (Black et al., 2008; Bloom et al., 2001; Cunningham et al; Engle et al., 1999; Engle & Haddad, 2000; Lim, Dandona, Hoisington, James, Hogan & Gakidou, 2010; McCullough, Kirksey, Wachs, McCabe, Bassily, Bishry, Galal, Harrison & Jerome, 1990; Rahmanifar, Kirksey, Wachs, McCabe, Bishry, Galal, Harrison, & Jerome, 1992; Smith et al., 2003; Victoria et al., 2010). The most recent UNICEF (2015) and Save the Children reports (2015) indicate that a high proportion of maternal caregivers, particularly in South Asia and sub-Saharan Africa have very low hemoglobin levels, indicating poor physical health. According to the reports, this not only has a negative impact on their overall well-being but also impacts healthy pregnancy, ability to participate in the labor market, provide quality care and maintain good health of children (Save the Children, 2015).

Engle et al. (1999) was one of the first studies to indicate a strong relationship between maternal health and child nutritional status. According to the study maternal caregivers who were anemic were more likely to have children that suffered from

stunting and low body mass index. Additionally, another study by Rahmanifar et al. (1992) suggests that maternal caregiver's health influences caregiving abilities. Maternal caregivers with poor health had reduced energy and were unable to respond to the needs of their children.

A study by Cunningham et al. (2015) indicated that maternal undernutrition and lack of important nutrients had an adverse impact on pregnancy outcomes, including maternal and child morbidity, intrauterine growth restrictions, and safe delivery. Thus maternal caregiver health not only impacts quality of care after birth, but also impacts the development of the child from the time of conception (Black et al., 2008; Osmani & Sen, 2013).

Summary of Literature Review

The review of empirical studies provides substantial evidence of the negative effects of poor nutritional status during childhood and its subsequent effects in adulthood. As mentioned in previous sections, most studies have suggested factors such as socioeconomic status, education, access to basic needs and household characteristics as primary causes of child undernutrition (Bhutta 2008; Checkley et al., 2008; Cunningham et al., 2015; Engle et al., 1999; Klasen, 2006; Nandy et al., 2005; Pryer et al., 2003; Smith & Haddad, 2000; Smith et al., 2003; UNICEF, 1990; UNICEF, 2008; Zietlin et al., 1990). Few studies have indicated a strong association between women's autonomy and child nutritional outcomes, when socioeconomic factors are controlled (Arulampalam et al., 2015; Begin et al., 1999; Caldwell, 1993; Chowdhury, 2013; Doan & Bisharat, 1990; Imai et al., 2014, Jejeebhoy, 1998; Johnson & Rogers, 1993; Kishore, 1998; Koenen et al., 2006; Nussbaum, 2000; Osmani & Sen, 2002; Samari & Pebley, 2015; Sen, 1999;

Sethuraman et al., 2006; Smith et al., 2003; Shroff et al., 2009). Additionally, there is a dearth in the literature that explores the relationship between maternal health related awareness and child nutritional outcomes (Nutbeam, 2000; Gazmararian et al., 2003; Gelany & Moussa, 2013; Khreshesh et al., 2011; Kalichman & Rompa, 2000; Renkert & Nutbeam, 2001; Sercekus & Mete, 2009). The review of literature provides evidence these indicators, that is, maternal autonomy and health related awareness, although extremely significant, have been inadequately explored as a means to address child undernutrition and mortality. This study therefore aims to contribute to the limited literature that examines the positive influence of women autonomy and health related awareness on their health as well as that of their child, despite being in an economically constrained environment. It also challenges the overemphasis on income related factors as reasons for negative nutritional outcomes and draws attention to the importance of socio-cultural norms as a determinant of child nutritional status.

Most studies mentioned above have not utilized specific theories to understand child undernutrition. Those that have utilized theories have used aspects of Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1977) to understand the influence of the environment on child well-being and the UNICEF model of care (UNICEF, 1990) to evaluate the role of maternal caregivers as determinants of child nutritional status. The current study acknowledges the importance of a strong theoretical framework in order to fully examine the role of maternal autonomy and health related awareness on child nutritional status. Therefore, this research applies three well-known theories, Ecological Systems Theory (Bronfenbrenner, 1977), Capability Approach (Sen,

1985) and Positive Deviance Inquiry (Sternin, 1990) as the conceptual framework for the current study.

The following section explains the theoretical framework and conceptual model that have been utilized in this research to explore the impact of maternal autonomy and health related awareness on child nutritional status.

Theoretical Framework

This study is conceptualized by utilizing the 'Model of Care' that was developed by UNICEF in 1990 (UNICEF, 1990). Additionally, aspects of three well-established theories, (i) Ecological Systems Theory, (ii) Capability Approach and, (iii) Positive Deviance Inquiry, are applied to further expand UNICEF's Model of Care and are described below.

Care Framework By UNICEF (1990)

The UNICEF (1990) Model of Care recognized that determinants of child and women nutritional status are multidimensional. Inadequate dietary intake and diseases are the most significant immediate causes of poor nutritional status. However the lack of food or presence of illnesses could be due to social, political, economic and cultural underlying factors, such as poverty, social exclusion, gender inequality amongst others (UNICEF, 1990). It was thus the first conceptual framework to acknowledge the relationship between income and non-income predictors of child and women nutritional status.

The UNICEF model of care thus divided the causes of poor nutritional status into three interlinked factors (i) basic causes, (ii) underlying causes and (iii) immediate causes (Engle et al., 1999; UNICEF, 1990). Basic causes refer to presence of economic resources, favorable geographical location, sociopolitical environment and overall environment. The underlying causes on the other hand are instruments that are directly impacted by the presence or lack of these basic resources. These include, caregiving behaviors, household food security, food preparation and storage, caregiver's autonomy and health, food preparation and storage, and caregiver well-being, amongst others. Lastly the immediate causes are factors that have a direct relationship with poor nutritional status, such as poor nutritional intake and illnesses/ diseases. The conceptual framework for the UNICEF model of care as explained by Engle et al. (1997) is presented in Figure 1. The current study focuses on the underlying determinants of child nutritional status. Specifically, in this study the following determinants are analyzed: maternal caregiver characteristics, particularly, autonomy, health related awareness and maternal health to determine the nutritional outcomes of the children. The study builds on the UNICEF care framework by utilizing the Capability Approach (Sen, 1985) and Ecological Systems Theory (Bronfenbrenner, 1977) to further explain the effect of the underlying determinants of child nutritional status. Additionally, the Positive Deviance Inquiry (Sternin, 1990) is used to identify protective factors that potentially reduce risks of poor nutritional outcomes for children in low resource communities.
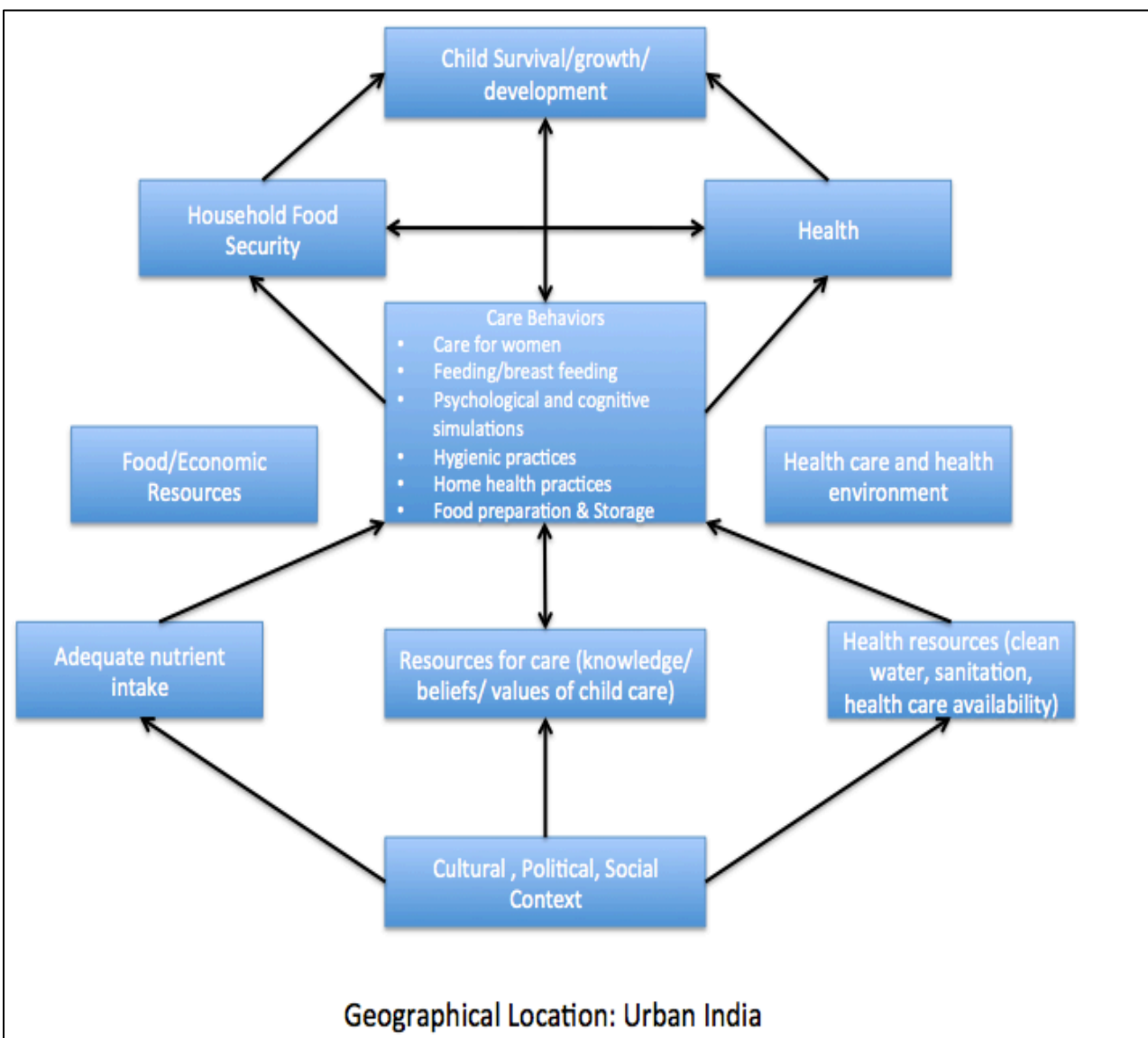
Figure 1: The Extended UNICEF Model of Care (Engle et al., 1997)

Capability Approach

This study has utilized aspects of the 'Capability Approach' to provide supporting arguments for the importance of maternal autonomy and health awareness as determinants of positive child nutritional status. Amartya Sen (1985) is the pioneer of the Capability Approach (CA). CA has connections with the works of Karl Marx, Adam Smith and Aristotle's views on human flourishing (Robeyns, 2005). Sen developed this framework as a criticism of philosophical and economic accounts that focused on narrow definitions of well-being, restricted either to utility, liberty, commodity or primary goods (Clark, 2006). Over the years, CA has developed a broad evaluative framework to understand issues of poverty, inequality, social exclusion and other aspects of human and social development (Robeyns, 2005). Alkire (2005) has described the objective of the CA, to view justice and poverty reduction as an expansion of freedom for deprived individuals (Alkire, 2005). Thus, all individuals should have access to necessary positive resources and should have the ability to make choices that matter to them (Alkire, 2005).

CA is used widely across disciplines to measure well being (Alkire, 2005; Sen 1981; 1985; 1992; 1993; 1999). Sen (1985) stated that 'the central feature of well-being is the ability to achieve valuable functioning and is not restricted to income.' Therefore, a means to any end of well-being, justice or development is to have effective opportunities to undertake actions or activities that individuals want to engage in and be whom they desire to be (Sen, 1985; Alkire, 2005). CA utilizes two core concepts of 'capability' and 'functioning' to measure well-being (Alkire, 2005; Clark, 2006; Sen 1984; 1985).

Sen (1985; 1987; 1992; 1993; 1997;1999) describes 'capability' as a person's ability to achieve a given function. According to the CA while income and commodities

are imperative for human development, there are discrepancies in 'capability' of different

people and societies to convert income into valuable opportunities (Sen, 1999). Sen

emphasizes that capabilities reflect an individual's real opportunities or freedom of

choice between possible conceptual life-styles (Clark, 2006 pp. 4; Sen, 1985, 1999).

These capabilities are impacted by personal, social and environmental attributes. Sen

calls these attributes as 'conversion factors'. According to Robeyns (2005b, p99)

"personal (physical condition, sex, intelligence, reading skills), social (social norms,

public policies, discriminating practices, gender roles) and environmental conversion

factors (climate and geographical location) play a role in successfully converting tangible

resources into valuable achievements."

Capabilities in turn impact 'functioning', which is described as real achievements

that make life valuable, and contribute to further expansion of other capabilities (Sen,

1985; 1999). For example, adequate nutritional intake for children is a functioning that

will lead to other achievements such as superior educational achievement, improved

health outcomes and employment opportunities (Robeyns, 2005b; Sen, 1985; 1992). The

CA framework emphasizes that functioning is not limited to fulfillment of one particular

achievement, e.g. adequate nourishment. Various achievements, such as education, good

health and positive familial relationships, lead to the development of '*functioning n-

tuple'*, which is the combination of multiple functioning that, defines the well-being of a

person (Clark, 2006; Sen, 1999).

Although CA provides a broad flexible framework to evaluate well-being, it has

been criticized for its lack of operationalization. Several scholars have criticized Sen for

not providing a set of important capabilities in his theoretical framework (Nussbaum,

2003; Robeyns, 2005a; 2005b; Roemer, 1996; Stewart & Deneulin, 2002; Sugden, 1993). Sen, while defending this criticism, states that selection of capabilities should be dependent upon personal value judgment rather than being imposed by others (Clark, 2006; Sen, 1993; Qizilbash, 2002). Martha Nussbaum, a feminist philosopher, is one of the most well-known contributors and critics of the CA (Nussbaum, 1990; 1995; 2000; 2003). She has provided a set of ten central human capabilities including, life; bodily integrity; bodily health; senses, imagination, and thought; emotions; practical reasoning; affiliation; respect and love other species; play and control over one's environment (Nussbaum, 1990; 1995; 2000). She advocates for these basic capabilities to be embodied in the constitution and to be guaranteed to all. Her approach to the CA is a philosophical theory of justice, whereas for Sen it is a framework for evaluative purposes (Robeyns, 2005b).

The current study has utilized CA as a guiding framework to evaluate the role of women's autonomy and health related awareness as determinants of child nutritional status. The study particularly applies Sen and Nussbaum's work on CA and gender inequality (Comin & Nussbaum, 2014; Nussbaum, 2000; 2003; Sen, 1990; 1999; 2005). Sen (1999) & Nussbaum (2000; 2003) have emphasized on the interrelationship between women's informed decision making and overall well-being of themselves, her children as well as other members of the household. Osmani & Sen (2003) while examining health deprivations in India highlighted that maternal deprivation negatively impacts the outcomes of adults and children. The study indicated that when gender inequalities result in lack of autonomy for maternal caregivers it leads it negative nutritional and health outcomes for all members of the household, including children. Sen has described

autonomy as the power and freedom to make decisions. Nussbaum (2000) & Sen (1999) suggest that only when women are active decision makers in the household as well as society, it positively impacts well-being of all members of a society, both child and adult, irrespective of their gender.

As critics of CA have raised concerns about its operationalization and utilization as a theory, this study has also incorporated other well-established theoretical models, such as the Ecological Systems Theory (Bronfenbrenner, 1977) and Positive Deviance Inquiry (Sternin, 1990).

Ecological Systems Theory

Bronfenbrenner's 'ecology of human development' paradigm was introduced in the 1970s (Bronfenbrenner, 1974; 1977) to study child development. This theory has been used since, to explain the development of various populations, such as special needs children, women, older adults, and low-income households, amongst others (For example see: Bronfenbrenner, 2009; Greenfield, 2012; Reifsnider et al., 2005; Seligman & Darling, 2009).

The Ecological Systems Theory was the first attempt to understand human development in the context of real life settings. Urie Bronfenbrenner (1977) emphasized on the complexities of human development and focused on the role of the individual's environment, as an important determinant of their well-being. According to him, material resources, formal and informal structures as well as norms and attitudes within the household and other broader ecology have an important role in determining the well-

being of an individual at early stages as well as through their life span (Bronfenbrenner, 1977; 1979; 1986; 1992).

Bronfenbrenner took concerted efforts to evolve and further develop the 'Ecological Systems Theory' from its time of conception (Bronfenbrenner, 1977; Tudge, Mokrova, Hatfield & Karnik, 2009). The fully developed theory depicts the interrelation between four PPCT concepts, also known as the 'Process- Person-Context-Time' model (Bronfenbrenner, 2005). Process includes the reciprocal regular interactions between the evolving human and his/her immediate environment. Additionally the environment where the interaction takes place influences the process (Bronfenbrenner, 2005).

Next, Bronfenbrenner (2005) also recognized the human as an active participant rather than a passive recipient of environmental influences. He described 3 types of human characteristics that impact the environment in which he/she is in (i) demand characteristics: are personal stimulus characteristics, immediately apparent to others, such as gender, age, race, etc. (ii) resource characteristics: are mental and emotional resources (e.g. past experiences and intelligence) as well as social and material resources (access to services, caregiving qualities, educational opportunities) (iii) force characteristics is the level of motivation, perseverance and temperament of the individual.

The flagship of Bronfenbrenner's theory from its conception has been the role of the environment or 'context' (Bronfenbrenner, 1977; 1999; 2005). He divided the environment into a set of four interrelated social systems:

(i)   Microsystem: this system consists of the relationship that the child has with his/her immediate surroundings (Bronfenbrenner, 1977). The microsystem therefore includes any immediate relationship or organizations that the child

interacts with, such as, family, peers, school, etc. (Ashiabi & O'Neal, 2015).

Bronfenbrenner (1995) emphasized on the microsystem as being instrumental in

the early phases of development. According to him, for the microsystem to be

effective, there needs to be regular interactions between the individual and the

microsystem over an extended period of time (Bronfenbrenner 1977; 1995;

2005). He named this as *'proximal processes'.* Example, parent-child activities.

Caregivers, specifically maternal, play a vital role in the healthy development of

a child (Black et al., 2008; Sims et al., 1972; Smith et al., 2003). Maternal health

and caregiving qualities have been highlighted by many studies as important

determinants of child well-being (Black et al., 2008; Foster & Williamson, 2000;

Scott, DeRose, Lippman & Cook, 2013; Smith et al., 2003). Children,

particularly at an early age, have most frequent interactions with their maternal

caregivers. As a result maternal caregivers have an imperative role in the child's

development, through routine activities, such as feeding, bathing, teaching, and

other caretaking tasks (Smith et al., 2003; Boyden, Dercon & Singh, 2014).

(ii)   Mesosystem: This comprises the interrelations between various microsystems that

the individual is a part of at a particular point in his/ her life (Bronfenbrenner,

1977; 2005). For example, relationship between home and school. Children from

low income communities participating in community nutritional assistance

programs are more likely to have better outcomes if there is increased parental

involvement and monitoring (Hingle, O'Connor, Dave & Baranowski, 2010).

(iii)   Exosystem: This is an extension of the mesosystem and comprises other formal

and informal social structures that individuals do not directly participate in, but

are influenced by it (Bronfenbrenner, 1977). Although the individual is not directly involved, the exosystem influences, delimits or determines his/ her development to a large extent. For example, mass media, neighborhood, government agencies, informal social networks, structures associated with distribution of goods and services, amongst others are sources that actively provide information as well as influence people's thoughts (Bronfenbrenner, 1977; 1999). With regard to child development, exosystem structures such as parent's workplace, family social networks and neighborhood/ community services have been recorded to have significant impact (Bronfenbrenner, 2005)**.** For example, maternal health care utilization has a direct impact on the health of the mother, but also significantly impacts child health outcomes (Navaneetham & Dharmalingam, 2002).

(iv)   Macrosystem: Bronfenbrenner (1977) defined macrosystem as "the overarching institutional patterns of culture or subculture, such as political, social, educational, and legal systems of which micro-, meso- and exo- system are concrete manifestations. Macro systems are conceived and examined not only in structural terms but also as informal ideologies that are present explicitly and implicitly" (pp. 515). Macrosystem broadly consists of belief systems, bodies of knowledge, material resources, customs, life-styles, opportunity structures, hazards and life course options that are embedded within the community (Bronfenbrenner, 2005 pp. 6). With regard to child well-being, the ideologies and beliefs of the caregiver play an important role in determining the caregiving techniques as well as the quality of care provided (Bronfenbrenner, 1977).

Additionally, societal ideologies, such as gender biases also influence the type and quality of care that is provided to children (Miller, 1997; Pande, 2003; Smith et al., 2003).

Finally, the last element of the full 'Ecological Systems Theory' better known as the PPCT model is 'time' (Tudge et al., 2009). Bronfenbrenner & Morris (1998) explained time to be divided into micro-time, which occurs during the course of a specific interaction; meso-time, which is the extent to which interactions occur with some consistency in the developing person's environment and lastly macro-time refers to historical events that happen during the life span of the individual. Macro-time was previously named as chronosystem (Bronfenbrenner, 1995). Chronosystem was defined as broad changes that happen in the environment that impact the individual's development (Bronfenbrenner, 1995). It therefore consists of change or consistency overtime in the characteristics of the person as well as the environment in which the person resides (Bronfenbrenner, 2005). Previous studies by Elder, Caspi, & van Nyugen (1986), Harper, Jones, McCay & Espey (2009), Marmot (2008) and Suci (2006) amongst others have highlighted global and national trends such as economic crises, conflicts, market crashes as reasons impacting the functioning of microsystems, thereby effecting child well-being. More recently worldwide phenomena such as, the Millennium development goals (MDGs) from 2000 to 2015 and the Sustainable Development Goals (SDGs) from 2015 to 2035 established by the United Nations to tackle fundamental issues of human development, has also impacted child well-being and household dynamics, through increase in services and focus on the health of children and families in low income communities (Smith & Haddad, 2014).

This study has utilized aspects of Bronfenbrenner's Ecological Systems Theory to explain the impact of broad social norms, specifically gender inequality in India, on child nutritional status. More specifically the Ecological Systems Theory has been used to understand the effect of microsystems (maternal caregiver), mesosystem (interaction between maternal caregiver autonomy and health awareness) and macrosystem (broad social norms, such as, women autonomy) on child's nutritional status.

Positive Deviance Inquiry (PDI)

Berggren & Wray (2002) define positive deviance as, the observation that in most settings a few at risk individuals follow uncommon, beneficial practices and consequently experience better outcomes than their neighbors who share similar risks and resources. The idea of positive deviance first came to light in Dr. Joe D. Wray's (1972) editorial piece, 'Can we learn from successful mothers?' According to Wray (1972), to teach child care practices and feeding techniques to low socioeconomic status (SES) mothers, there is a need to learn what successful low SES mothers, from similar communities, are practicing. In the mid 1970's Wishik & Van der Vynkct (1976) formally recognized this idea and called it 'Positive Deviance'. This approach became popular in the area of child nutrition around the world. Studies by Mata (1980) and Alvarez, Wurgaft & Wilder (1982) were amongst the first field studies conducted to understand how positive deviant behaviors predict child nutrition outcomes. In the early 1990's Sternin, Sternin & Marsh (1990) applied the positive deviance model to recognize favorable nutritional outcomes of infants and children in poor communities, as a result of the ability of some maternal caregivers to provide good quality care despite financial

hardships. Another study by Shekar, Habicht & Latham (1992) applied this model to address issues of child nutrition in Tamil Nadu, India. Sternin (1990), Zietlin (1990) & Shekar et al (1992) were instrumental in laying the grounds for the positive deviant model to be applied as a theoretical framework to evaluate child nutritional outcomes.

The positive deviance inquiry (PDI) utilizes an asset-based approach, thus encouraging policy makers and implementers to recognize and employ local best practices that certain 'deviant' individuals are practicing, leading to positive outcomes (Saleeby, 1996). The key objective of PDI has been to identify specific practices that certain groups are undertaking, which enable them to have better outcomes than others despite facing dismal conditions such as poverty (Berggren & Wray, 2002; Bolles, Speraw, Berggren & Lafontant, 2002; Lapping et al., 2002; Mackintosh, Marsh & Schroeder, 2002; Shameera & Shobha, 1997; Sethi, et al., 2003; Schooley & Morales, 2007; UNICEF, 1990; Zietlin et al., 1990). PDI has been utilized in the area of child nutrition and care practices extensively (See: Alvarez et al., 1982; Bolles et al., 2002; Cederstrom, 2009; Levinson, Barney, Bassett & Schultnick, 2007; Mackintosh, Marsh & Schroeder, 2002; Mata, 1980; Marsh & Schroeder, 2002; Pryer et al., 2003; Shekar et al., 1992; Zietlin et al., 1990). More recent studies have departed from the traditional usage of PDI to recognize non tangible assets that might lead to positive deviance. The usage of PDI has expanded to other arenas, such as gender equality, education, sports, non-profit management and, health-care amongst others (DeGroat, 2004; Dura & Sethi, 2009; Pascale, Sternin & Sternin, 2010; Zaidi, Jaffery & Moin, 2010).

This study utilized PDI to explore maternal caregiver autonomy and health awareness as a predictor of positively deviant child nutritional status. Based on PDI, the

study hypothesized that children who have maternal caregivers with autonomy and health related awareness would have better nutritional outcomes as compared to others, despite having the same economic resources. Additionally, it used PDI to highlight non-financial factors within the household and community that need to be addressed while tackling issues of child undernutrition.

Thus, this study has applied aspects of the Capability Approach, Ecological Systems Theory and the Positive Deviance Inquiry to develop a comprehensive conceptual framework to explore the role of maternal autonomy and health related awareness to determine children's nutritional status in urban India.

Conceptual Framework

The conceptual framework for this study (Figure 2) builds on the extended UNICEF model of care (Engle et al., 1997), which is presented in Figure 1. The UNICEF model of care identifies immediate and underlying factors that impact a child's survival, growth and development (Engle et al., 1997, UNICEF, 1990). Bronfenbrenner (1977) in his Ecological System's Theory indicated that child development is impacted by various factors in the environment. Ecological systems theory (Bronfenbrenner, 1977) was used to emphasize the impact of underlying factors, that is, the microsystem (maternal characteristics) as well as the macrosystem (broad social norms and geographical location) on child nutritional outcomes. Additionally, the Capability Approach (Sen, 1985) and Positive Deviance Inquiry (Sternin, 1990) help draw attention to the protective factors for child nutritional outcomes. The study hypothesized that maternal autonomy and health related awareness are assets or positive deviant behavior that lead to positive

child nutritional outcomes. Furthermore, the assets and positive deviant behavior (maternal autonomy and health related awareness) has a favorable impact on maternal health, which in turn also acts as a protective factor for child nutritional outcomes. The conceptual framework is presented in Figure 2.
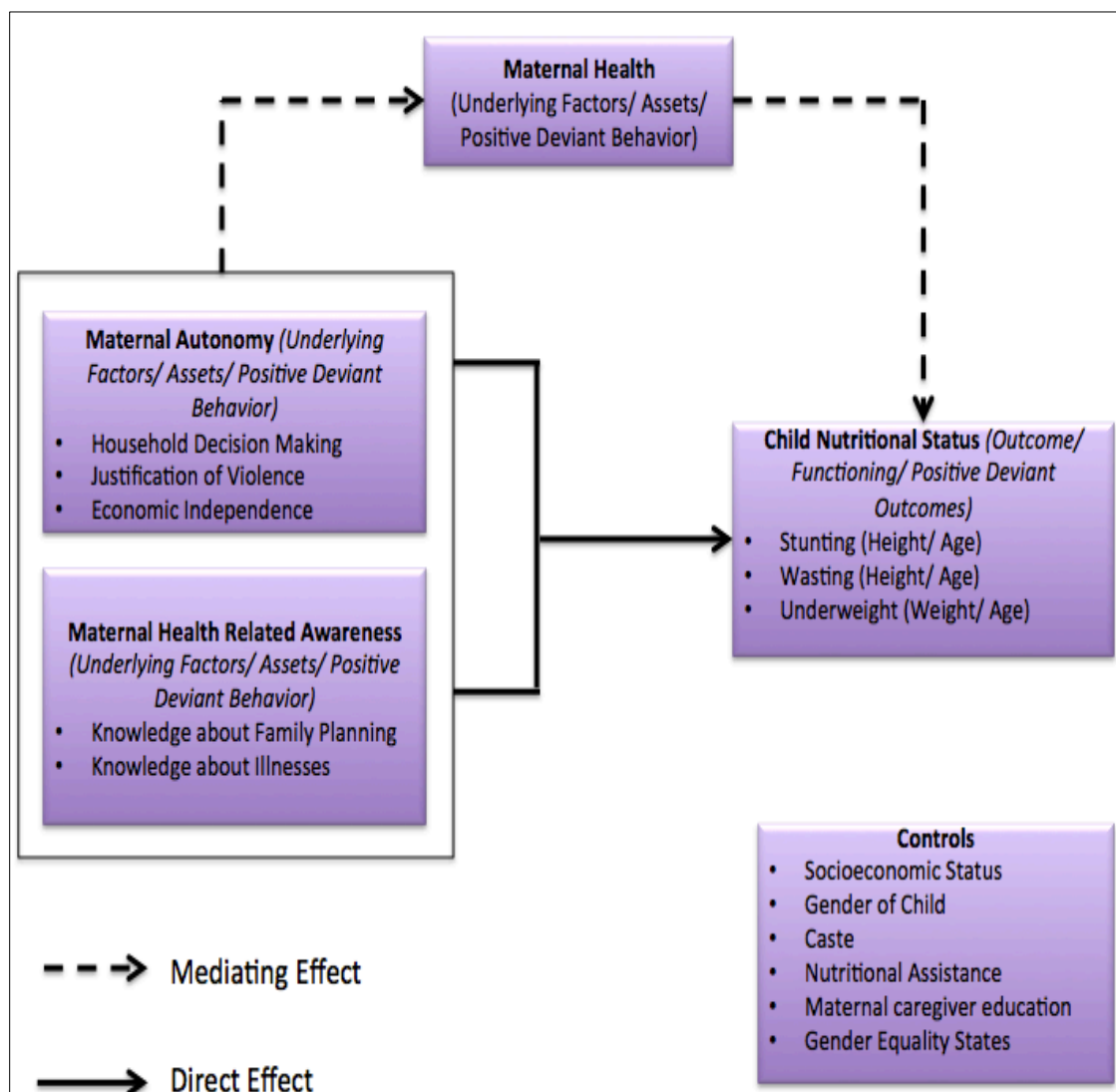
Figure 2: Conceptual Framework

Chapter III. Methods

Data and Sample

Data: The 2005-06 Indian National Family Health Survey (NFHS-3) was utilized

for this cross-sectional study. It is a nationally representative large-scale, multi-round

survey, which collects information on health and nutrition of household members,

primarily women and children (IIPS & ORC Macro, 2006). The NFHS is an initiative of

the Ministry of Health and Family Welfare (MOHFW), Government of India (GOI). The

primary objective of the survey is to provide national and state level estimates on several

health and family issues including fertility, family planning, child and maternal health,

gender, HIV/AIDS, nutrition, malaria, high-risk sexual behavior, safe injections, and

knowledge about tuberculosis, amongst others (IIPS & ORC Macro, 2006). The

International Institute for Population Sciences (IIPS), Mumbai, India is responsible for

data collection and dissemination (IIPS & ORC Macro, 2006). To date three rounds of

survey data have been collected. The NFHS-3 was preceded by NFHS-1 (1992-1993) and

NFHS-2 (1998-99).

The most recent survey, the NFHS-3, was conducted in 2005-06 and the sample

was drawn from 29 states in India in urban and rural locations. It has a representative

sample of households (N=109,041), women between 15-49 years (N=124,385) and men

between 15-54 years (N=74,369) in India (IIPS & ORC Macro, 2006). NFHS-3 includes

information on emerging health concerns in India, such as: perinatal mortality, male

involvement in the use of health and family welfare services, adolescent reproductive

health, high risk sexual behavior, family life education, safe injections and knowledge

about tuberculosis (IIPS & ORC Macro, 2006, p. 2). Additionally the NFHS-3 also

provides biomarker measurements for the sample. Blood hemoglobin levels were tested

for all women, men and children (6-59 months) to assess the prevalence of anemia.

Anthropometric[8] data for women (15-49 years), men (15-54 years) and children (0-5

years) were also collected.

The data for the NFHS-3 were collected in two phases from November 2005 to

August 2006. The funding for NFHS data collection and dissemination has been provided

by the United States Agency for International Development (USAID), Department of

International Development (DFID), the Bill and Melinda Gates Foundation, United

Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), and

Ministry of Women and Children, GOI.

Prior to conducting the current study, a proposal was sent to The Office of

Research Protections (ORB) for approval. The study has been granted an exemption from

the Boston College IRB review in accordance with 45 CFR 46.101 (b) 4.

Sampling procedure: The total sample size of the NFHS III was 124,385 women

between the ages of 15-49 years and 74,369 men between ages of 15-54 years from 29

states within India (IIPS & ORC Macro, 2006). The target sample size for each state was

determined based on the number of ever-married women in the reproductive ages that

were selected for interviews. The urban and rural sample within each state was drawn

separately and was allocated a size that was proportionate to the size of each state's urban

and rural population. A uniform sampling procedure was adopted for all states. The rural

sample was selected in two stages, (i) selection of Primary Sampling Units (PSUs), that

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[8] According to the Center for Disease Control (CDC), anthropometry is the study of the measurements of the study of measurement of the human body in terms of its dimensions of bone, muscle and adipose (fat) content. Anthropometric data helps provide substantial information regarding growth and development. Detailed information on Anthropometric data can be found at the CDC website: www. cdc.gov

is, villages with probability proportional to the population size (PPS) and, (ii) random selection of households within each PSU. For urban locations, a three stage procedure was followed, (i) wards were selected with PPS sampling, (ii) one census enumeration block (CEB) was randomly selected from each sample ward, and (iii) households were randomly selected within each CEB (IIPS & ORC Macro, 2006).

The NFHS III data collection process was carried out in two phases. Twelve states were targeted in the first phase (November 2005 to May 2006) and the remaining seventeen states were targeted in the second phase (April 2006 to August 2006). Information was collected at the individual and household level using three core questionnaires (the Household Questionnaire, Woman Questionnaire, and Man Questionnaire) (IIPS & ORC Macro, 2006). These questionnaires have been translated into 18 languages based on each state's requirement. Additionally measurements of height, weight and hemoglobin content in the blood of interviewed men, women and children (born in January 2000 or later and were at least 6 months old) were collected (IIPS & ORC Macro, 2006). The national level household response rate was 98%; for urban areas it was 97% and 99% in rural areas. The individual response rate for women, that is, the number of completed interviews per 100 eligible women, was 95% at the national level; for urban areas it was 93% and 96% in rural areas. The individual response rate for men, that is, the number of completed interviews per 100 eligible men, was 87% at the national level; for urban areas it was 85% and 90% in rural areas.

Study Sample: The current study utilized the urban sample of women and children residing in 14 major states of India [New Delhi, Maharashtra, West Bengal, Bihar, Haryana, Uttar Pradesh, Kerala, Karnataka, Tamil Nadu, Rajasthan, Mizoram, Assam,

Madhya Pradesh and Andhra Pradesh]. The states were chosen based on their Gender Inequality Index[9] (GII) and Gender-related Development Index[10] (GDI) scores. The sample was therefore restricted to seven states with low GII scores, indicating better levels of gender equality [Kerala, Tamil Nadu, Karnataka, Mizoram Maharashtra, New Delhi and Andhra Pradesh] and seven states with high GII scores indicating poor gender equality [Bihar, West Bengal, Uttar Pradesh, Haryana, Assam, Rajasthan and Madhya Pradesh] (Government of Karnataka, 2006).

The study sample consisted of women between the ages of 15 to 49 years, who were married and had at least one living child between the ages of 0-5 years [N= 9,092]. The study utilized information on women's health, education, decision-making and other demographics for the analysis. Additionally, biomarker measurements, specifically, blood hemoglobin levels and anthropometric data (height and weight) of the women and all children within the household between ages 0-5 years were utilized to measure health and nutritional status.

Measurement

The measures that were utilized in the study to explore non-financial factors impacting child nutritional status are described briefly below:

(i) Outcome Variables

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[9] Gender Inequality Index (GII) is an index to measure gender inequality, which was introduced by the United Nations Development Programme on the 20th anniversary of the Human Development Report. The GII measures the loss of achievement within a country due to gender disparity. It uses three dimensions to measure inequality (i) reproductive health (ii) empowerment and (iii) labor market participation.

[10] The Gender-related Development Index (GDI) measures human development on three basic dimensions of (i) life expectancy at birth (ii) knowledge measured by adult literacy and (iii) standard of living measured by Gross Domestic Product (GDP) per capita. It takes into account the inequality in achievement between men and women. The greater the gender disparity in basic capabilities, the lower a country's GDI in comparison to its Human Development Index (HDI).

Child's Nutritional Status: This outcome variable was measured by the nutritional status of the child. The World Health Organization (WHO) has determined universal parameters to measure child nutritional status (de Onis & Multicentre Growth Reference Study Group, 2007; WHO, 2006). These include height for age (stunting), weight for age (underweight) and weight for height (wasting). According to WHO these parameters can be used to assess the growth of children around the world, irrespective of their ethnicity, socio-economic condition and type of feeding (WHO, 2006).

The overall concept of child nutritional status was therefore measured by three outcomes (i) stunting, (ii) wasting and (iii) underweight. Each of these outcomes was a continuous variable in the original NFHS-3 dataset. For the purpose of this study these outcomes have been converted into categorical variables consisting of 3 ordered categories (i) severely poor nutritional status (ii) moderately poor nutritional status and (iii) good nutritional status. These categories have been created by using cut-off values of < -2 and > +2 Z scores, which is a common method utilized in clinical screenings by the WHO (WHO, 2015) to determine nutritional status of children (de Onis & Multicentre Growth Reference Study Group, 2007). Thus all children with Z scores below -3 are considered to have severely poor nutritional status; between -2.99 and -2 have moderately poor nutritional status; above -2 have normal nutritional status (IIPS & ORC Macro, 2006; WHO, 2006). The study will test each of these three outcomes.

Outcome 1: Stunting

(i)   Severely Poor Nutritional Status (Z Score < -3)
(ii)   Moderately Poor Nutritional Status (Z Score -2 <= -2.99)
(iii)   Good Nutritional Status (Z Score > -2)

Outcome 2: Wasting

       (i)   Severely Poor Nutritional Status (Z Score < -3)
       (ii)   Moderately Poor Nutritional Status (Z Score -2 <= -2.99)
       (iii)   Good Nutritional Status (Z Score > -2)

Outcome 3: Underweight

       (i)   Severely Poor Nutritional Status (Z Score < -3)
       (ii)   Moderately Poor Nutritional Status (Z Score -2 <= -2.99)
       (iii)   Good Nutritional Status (Z Score > -2)

(ii) Predictor Variables

Maternal Autonomy (Predictor Variable): The predictor variable '*maternal autonomy'* was measured by three constructs (i) Household Decision Making (ii) Justification of Violence, and (iii) Economic Independence. Exploratory (EFA) and confirmatory factor analysis (CFA) were utilized to develop these constructs.

According to scholars who have worked extensively in the area of women's autonomy and self determination, such as, Alkire (2013), Dreze & Sen (2013), Kabeer, (2001), Nussbaum, (2000) and Sen (1984; 1985; 1999) autonomy is defined as the freedom to make choices as well as have control over various aspects of life, such as health, childbearing capacity, finances, amongst others. Thus, the concept of autonomy is multidimensional and cannot be captured by decisions in a single area (Alkire, 2013; Kabeer, 2001; Malhotra & Schuler, 2005; Samman & Santos, 2009). A study by Ibrahim & Alkire (2007) identified a list of various dimensions of autonomy, such as, within household decision-making, domain-specific autonomy, employment, and ability to make changes in various aspects of one's life, education, and general awareness amongst others. Previous studies have also utilized similar indicators to measure autonomy (Dreze & Sen, 2013; Kabeer, 1999; Kishore & Subaiya, 2008; Malhotra & Schuler, 2005;

Sraboni et al., 2013). This study thus incorporated a number of variables to measure the overall latent construct of maternal autonomy.

Maternal autonomy was measured using three constructs: (i) Household Decision Making, (ii) Justification of Violence and (iii) Economic Independence. The construct '*Household Decision Making'* consisted of five questions: (1) Respondent has final say on own health? (2) Respondent has final say on making large household purchases? (3) Respondent has final say on making purchases for daily household needs? (4) Respondent has final say on visits to own family or relatives? (5) Respondent has final say on what to do with husband's earnings? Responses to these questions were dichotomous, where *0= no* (decision made by husband or someone else in the household) and *1= yes* (decision made by the respondent alone or with the husband).

The construct '*Justification of Violence'* consisted of five questions: (1) Respondent thinks wife beating is justified if she goes for an outing without the husband's permission? (2) Respondent thinks wife beating is justified if she neglects their children? (3) Respondent thinks wife beating is justified if she argues with her husband? (4) Respondent thinks wife beating is justified if she refuses to have sex with her husband? (5) Respondent thinks wife beating is justified if she burns the food? Responses to these questions were dichotomous, where *0= yes* (respondent thinks wife beating is justified) and *1= no* (respondent thinks wife beating is not justified).

The construct '*Economic Independence'* consisted of four questions: (1) Does respondent have a bank account? (2) Does respondent have knowledge about loans? (3) Does respondent have money for her own use? (4) Is respondent currently employed? Responses to these questions are dichotomous, where *0= no* and *1= yes.*

In order to develop these constructs, an Exploratory Factor Analysis (EFA) was conducted with principal component analysis (PCA) to test if a three-factor solution measuring the multidimensionality of maternal autonomy emerges. To facilitate the interpretation of the factor loadings the axis was rotated. The EFA results indicated a 3-factor solution. A detailed description of the questions in each sub scale along with their factor loading and squared multiple correlations (R^2) is provided in Table 1.

Next a Confirmatory Factor Analysis (CFA) was conducted. The Goodness of Fit (GOF) statistics indicated that the three subscales, that is, (i) Household Decision Making, (ii) Justification of Violence and (iii) Economic Independence were good measures of the overall concept of maternal autonomy. The Root Mean Square Error of Approximation (RMSEA) was .029, which indicated a very good fit. The Comparative Fit Index (CFI) was .981 and was greater than the TLI. The Standardized Root Mean Square Residual (SRMR) was .024. Thus the CFA goodness of fit statistics indicated that the model had a good fit. The CFA diagram and model fit are presented in Figure 3.

Maternal health related awareness (Predictor Variable): The predictor variable '*maternal caregiver health related awareness*' was measured by two constructs (i) Family Planning Awareness and (ii) Illness Awareness.

The current study measures health related awareness rather than health literacy or knowledge. Majority of the previous studies have attempted to predict child and maternal well-being based on health literacy. Health literacy as defined by the Center for Disease Control (CDC) is the degree to which an individual has the capacity to obtain, communicate, process and understand basic health information and services to make appropriate health decisions (CDC, 2015). This information is predominantly delivered

by health professionals in hospitals or other medical settings (CDC, 2015). As many households do not have ready access to medical professionals and get most of their health related information from informal sources, we examined 'health related awareness' rather than 'health literacy'. Previous studies have measured maternal health related awareness by using proxy measures such as academic achievement and literacy (Arulampalam et al., 2015; Bhutta 2008; Checkley et al., 2008; Cunningham et al., 2015; Engle et al., 1999; Gunderson & Zilak, 2014; Imai et al., 2014; Klasen, 2006; Nandy et al., 2005; Nussbaum, 2000; Pryer et al., 2003; Sen, 1999; Smith & Haddad, 2000; Smith et al., 2003). Few studies have utilized measures such as awareness of reproductive system, child feeding techniques, awareness of medical procedures and illnesses amongst others (Gazmararian et al., 2003; Gelany & Moussa, 2013; Khreshesh et al., 2011; Kalichman & Rompa, 2000; Renkert & Nutbeam, 2001; Sercekus & Mete, 2009). In order to capture health awareness on multiple issues we developed a maternal health related awareness latent variable, which was measured by two constructs (i) Family Planning Awareness and (ii) Illness Awareness.

The construct *'Family Planning Awareness'* consisted of four questions: (1) Respondent has heard of family planning on the radio? (2) Respondent has heard of family planning on television? (3) Respondent has read about family planning in the newspaper? (4) Respondent has seen information about family planning on billboards? Responses to each of these questions was dichotomous, where, *0= no* and *1= yes.*

The construct '*Illness Awareness'* consists of three questions: (1) Have you heard of the illness tuberculosis? (2) Have you heard of or ever used oral rehydration (ORS)?

(3) Can you get Acquired Immune Deficiency Syndrome (AIDS) by hugging? Responses to each of these questions was dichotomous, where, *0= no* and *1= yes.*

In order to develop these constructs, initially an Exploratory Factor Analysis (EFA) was conducted with principal component analysis (PCA). The EFA was used to test if a two-factor solution measuring the two concepts of maternal health related awareness emerged. Next, the axis was rotated in order to facilitate the interpretation of the factor loadings. The EFA results indicated a 2-factor solution. A detailed description of the questions in each sub scale along with their factor loading and squared multiple correlations (R^2) is provided in Table 2.

Next a Confirmatory Factor Analysis (CFA) was conducted. The Goodness of Fit (GOF) statistics indicated that the two subscales, that is, (i) Family Planning Awareness and (ii) Illness Awareness, were good measures of the overall concept of maternal health related awareness. The Root Mean Square Error of Approximation (RMSEA) was .034, which indicates a very good fit. The Comparative Fit Index (CFI) was .980 and was greater than the TLI. The Standardized Root Mean Square Residual (SRMR) was .017. Thus the CFA goodness of fit statistics indicated that the model had a good fit. The CFA diagram and model fit are presented in Figure 4.

Table 3: Maternal Caregiver Autonomy Item and Subscales		
Subscale	**Factor Loading**	**R2**
Household Decision Making		
1. Does maternal caregiver make decisions alone or with her husband regarding their own health?	0.57	0.3
2. Does maternal caregiver make decisions alone or with her husband regarding household purchases?	0.77	0.6
3. Does maternal caregiver make decisions alone or with her husband regarding household needs?	0.73	0.5
4. Does maternal caregiver make decisions alone or with her husband regarding visits to her family?	0.72	0.5
5. Does maternal caregiver make decisions alone or with her husband regarding expenditure of husband's earnings?	0.55	0.3
Justification of Violence		
6. Does maternal caregiver think wife beating is justified if she goes out without permission of her husband?	0.72	0.5
7. Does maternal caregiver think wife beating is justified if she neglects her children?	0.74	0.6
8. Does maternal caregiver think wife beating is justified if she burns food?	0.63	0.4
9. Does maternal caregiver think wife beating is justifed if she argues with her husband?	0.71	0.5
10. Does maternal caregiver think wife beating is justified if she refuses to have sex with her husband?	0.57	0.3
Economic Independence		
11. Does maternal caregiver have a savings account?	0.21	0.4
12. Does maternal caregiver have money for personal use?	0.61	0.2
13. Does maternal caregiver have knowledge about loans?	0.39	0.1
14. Is maternal caregiver currently employed?	0.27	0.1

Model Specification				
χ^2 **(df)**	**RMSEA (90% CI)**	**CFI**	**TLI**	**SRMS**
603.87**(69)	0.030	.982	.976	0.027

**p<0.000

Note: RMSEA with value <.05 indicates good fit with a 90% Confidence Interval CFI and TLI with a value close to .95; SRMR less than 0.05, indicates a good fit (Schumacher & Lomax, 2004)

Table 3: Maternal Caregiver Autonomy Item and Subscale

Figure 3: Maternal Autonomy Scale, Confirmatory Factor Analysis (CFA)

Table 4: Maternal Health Related Awareness Items and Subscales		
Subscale/ Items	**Factor Loading**	**R2**
Information about family planning		
1. Has respondent read about family planning in the newspaper?	0.65	0.44
2. Has respondent heard about family planning on the radio?	0.48	0.24
3. Has respondent heard about family planning on the television?	0.44	0.21
4.Has respondent seen information on family planning on billboards?	0.63	0.41
Information about common illnesses		
5. Has respondent heard about tuberculosis?	0.21	0.07
6. Does respondent think hugging can spread AIDS?	0.14	0.05
8. Has respondent heard of or used oral rehydration to cure diarrhea?	0.22	0.08

Model Specification				
χ^2 **(df)**	**RMSEA (90% CI)**	**CFI**	**TLI**	**SRMS**
163.80**(13)	0.042	.966	.945	0.021

**p<0.000
Note: RMSEA with value <.05 indicates good fit with a 90% Confidence Interval CFI and TLI
with a value close to .95; SRMR less than 0.05, indicates a good fit (Schumacher & Lomax,
2004)

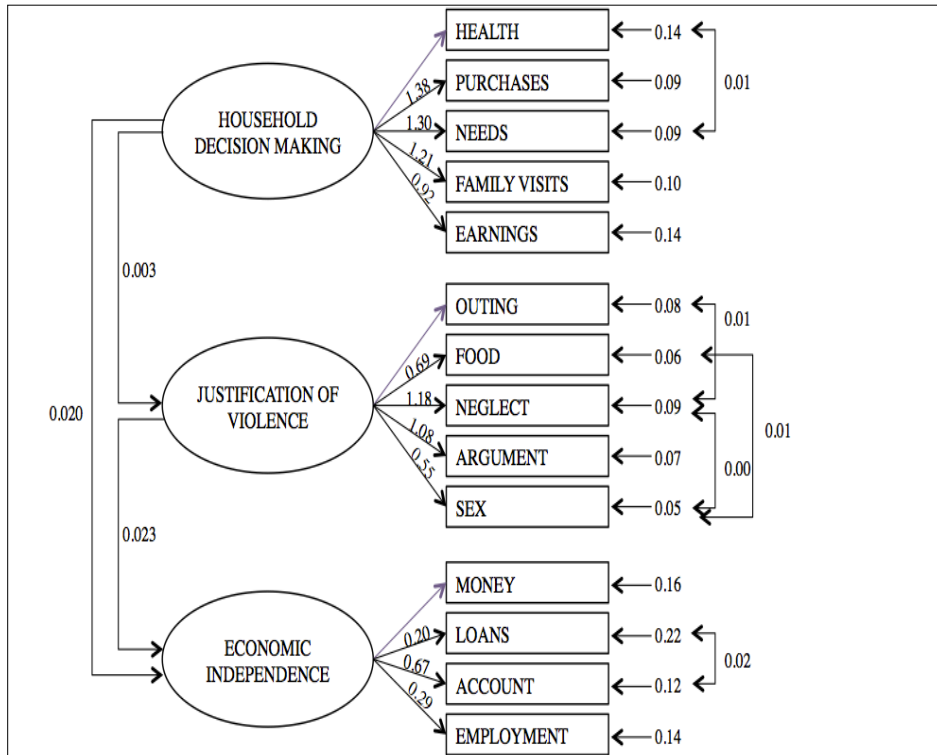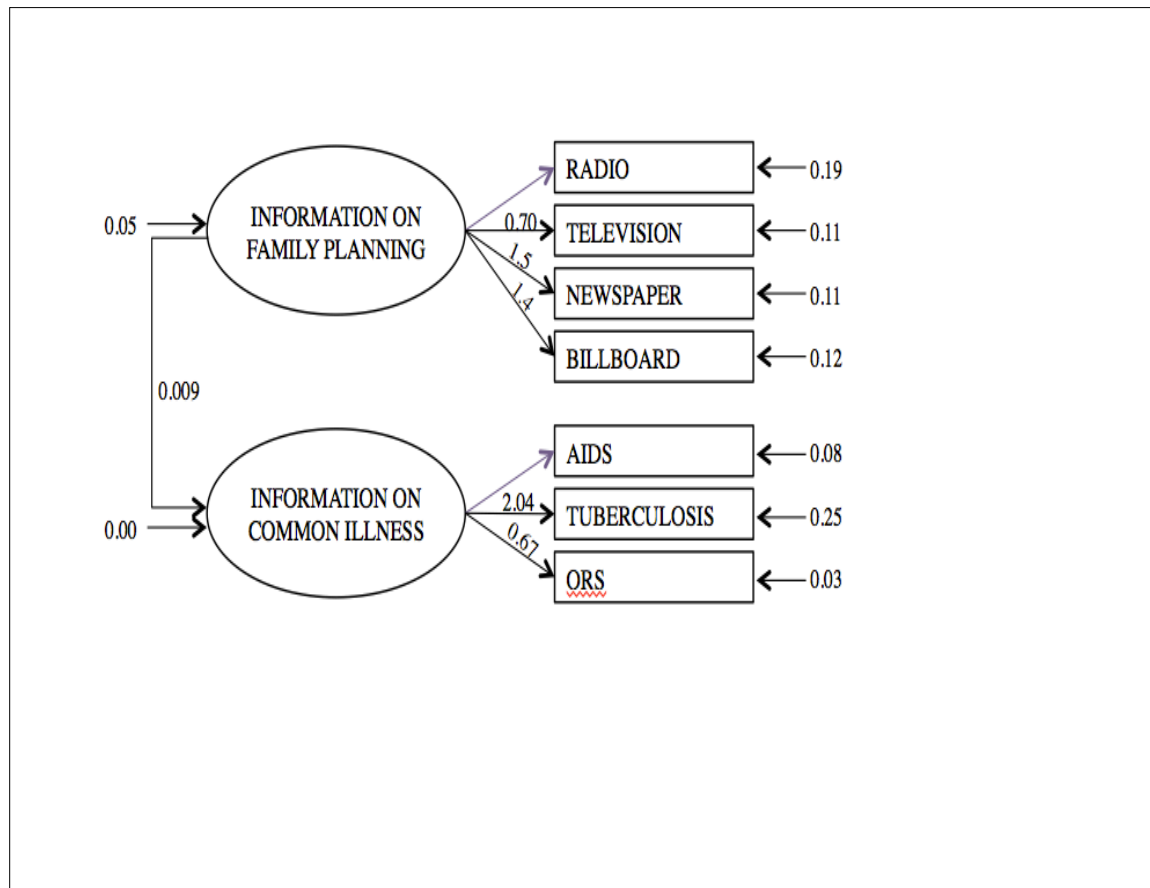*Table 4:* Maternal Health Related Awareness Items and Subscale

Figure 4: Maternal Health Awareness Scale, Confirmatory Factor Analysis (CFA)

Maternal Health (Predictor Variable): The predictor variable '*maternal health*' was measured by how anemic the maternal caregiver is. Anemia is defined as the decrease in amount of red blood cells or hemoglobin in the blood (CDC, 2015). It is popularly utilized as a measure of health status for women, particularly in the Asian and African continents (Osmani & Sen, 2003; Toteja, Singh, Dhillon, Saxena, Ahmed, Singh & Mohan, 2006). Anemia is responsible for severe poor health outcomes and mortality of maternal caregivers (Bentley & Griffiths, 2005; Toteja et al., 2006). South Asia, particularly India, suffers from very high rates of anemia amongst females, which is a reflection of poor women's health (Balarajan, Fawzi & Subramanian, 2013; Bentley & Griffiths, 2005).

Anemia was measured by hemoglobin levels (g/dl), which were categorized as *'not anemic (above 10.9 g/dl)', 'mild (10-10.9 g/dl)'* and *'moderate to severe (less than 10 g/dl)'* levels of anemia in the NHFS–III dataset. The cut-off points utilized to make these categories have been adjusted for pregnancy. For the purpose of the study, this indicator was converted to a binary variable. Maternal caregiver health was therefore measured as a dichotomous variable, where *0= poor health* (women with less than 10 g/dl) and *1= good health* (all women with greater than or equal to 10 g/dl).

Gender equality states (Predictor Variable): This predictor variable was utilized as a proxy to measure the culture of a region, specifically in relation to gender equality. This predictor variable was measured by identifying states that have higher levels of gender equality versus those states with lower levels. Fourteen major states of India [New Delhi, Maharashtra, West Bengal, Bihar, Haryana, Uttar Pradesh, Kerala, Karnataka, Tamil Nadu, Rajasthan, Mizoram, Assam, Madhya Pradesh and Andhra Pradesh] were

utilized in the analysis. The states were chosen based on their GII and GDI scores. A

dichotomous variable consisting '*gender equality states*' was created, where *0= all states*

with low gender equality, and, *1= all states with high gender equality.* The states were

divided into the two categories based on their ranking on GII scores, where the top seven

states were in the high gender equality category (Kerala, Tamil Nadu, Karnataka,

Mizoram Maharashtra, New Delhi and Andhra Pradesh) and the last seven were in the

low gender equality category (Bihar, West Bengal, Uttar Pradesh, Haryana, Assam,

Rajasthan and Madhya Pradesh). These GII and GDI rankings were obtained from the

most recent Indian National Informatics Center report (NIC, 2009).

(iii) Control Variables

In addition to the predictor variables, the study utilized various demographic

variables as controls. These included caste (0= *Scheduled caste/ tribe*, 1= *Upper caste*),

socioeconomic status[11] of the household (0= *Poor*, 1= *Middle income*, 2= *Rich*), maternal

caregiver education (0= *No education,* 1= *Primary education,* 2= *Secondary education,*

3= *Higher education*) sex of child (0= *Male*, 1= *Female*) and nutrition assistance (0= *Not*

available, 1= *Available*).

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[11] The National Family Health Survey (NFHS) utilizes the Standard of Living Index (SLI) to categorize families into poor, medium and high income households. The Standard of Living index was created by the NFHS household measures. It comprised of 27 ems, including consumer durables, agricultural machinery, housing conditions and access to basic services (water, light, fuel, etc.). The NFHS Standard of Living Index was created for All India as well as for each state (Andhra Pradesh, Madhya Pradesh, Orissa, West Bengal) with possible scores ranging from 0-67. Index scores of 0-14 indicate a low standard of living; scores of 15-24 indicate a medium standard; and scores of 25-67 indicate a high standard.

	N	%	M(S.D)	Range
Table 1				
Household and Child Demographic Characteristics (N= 9, 092)				
Household Characterisitcs				
Socioeconomic Status				
Poor	808	8.92		
Medium Income	1,258	13.84		
Rich	7,026	77.28		
Gender Equality States				
High gender equality	4,885	46.27		
Low gender equality	4,207	53.73		
Nutrition Scheme				
Yes	4,528	49.8		
No	4,564	50.2		
Child characteristics				
Gender				
Male	4,903	53.93		
Female	4,189	46.07		
Age	9,092		1.7(1.3)	0-4
Stunted Growth				
Severely Stunted	1,131	12.44		
Moderately Stunted	1,582	17.4		
Normal Health	4,821	53.02		
Wasting				
Severely Wasted	483	5.31		
Moderately Wasted	873	9.6		
Normal Health	6,178	67.95		
Underweight				
Severely Underweight	746	8.21		
Moderately Underweight	1,573	17.3		
Normal Health	5,215	57.36		

Table 1: Household and Child Demographic Characteristics

Table 2

Maternal Caregiver Demographic Characteristics (N=9092)

	N	%	M(S.D)	Range
Good Health	6,999	84.38		
Upper Caste	3,465	39.09		
Age	9,092		26.82(5.03)	15-49
Education				
No education	2,088	22.97		
Primary	1,058	11.58		
Secondary	4,378	48.15		
Higher	1,573	17.3		
Caregiver Autonomy				
Caregiver makes decision on own health alone or with husband	6134	67.54		
Caregiver makes decision on daily needs alone or with husband	5,831	64.2		
Caregiver makes decision on visits to her family alone or with husband	6,060	66.73		
Caregiver makes decision on household purchases alone or with husband	5,331	58.7		
Caregiver makes decisions on expediture of husband's earnings alone or with husband	6,291	70.2		
Caregiver does not justify wife beating for going out without permission	7,276	80.41		
Caregiver does not justify wife beating for burning food	7,978	88.22		
Caregiver does not justify wife beating when she neglects children	6,504	71.81		
Caregiver does not justify wife beating when she argues	7,150	79.29		
Caregiver does not justify wife beating when she refuses to have sex	8,215	91.69		
Has savings account	1,793	19.74		
Has knowledge of loans	3,322	36.55		
Is currently employed	1,693	18.66		
Has money for own use	4,703	51.77		
Caregiver health related awarness				
Has seen information about family planning on television	3,391	37.32		
Has heard about family planning on radio	3,391	37.32		
Has read about family planning in the newspaper	3,391	37.32		
Has seen information on family planning on billboards	3,842	42.28		
Does not think AIDS can be spread by hugging	5,979	89.91		
Has knowledge about tuberculosis	8,385	92.22		
Has heard about or used oral hydration (ORS)	7,985	88.21		

Table 2: Maternal Caregiver Demographic Characteristics

Statistical Analysis

Missing Data: Measures were taken to effectively deal with the missing values in the dataset and to ensure that it did not impact the analysis as well as the results of the study. First, the data were screened carefully to identify the missing values in the variables that were included in the statistical model. Correlations were conducted to identify any patterns in the missing values and to confirm whether they were missing at random (MAR), missing completely at random (MCAR) or not missing at random (NMAR) (Mitchell, 2010). Upon data screening, with regard to the predictor and control variables, the largest percentage of missing values was 5%. Additionally the outcome variables 'Stunting', 'Wasting' and 'Underweight' had 17% missing data. The missing values of the predictor and the outcome variables were not related. The values were thus missing completely at random (MCAR). Studies by Allison (1999), Sterne, White, Carlin, Spratt, Royston, Kenward & Carpenter (2009), Steyerberg & van Veen (2007) and Waymen (2003) suggest that missing values in the predictor variable do not cause a bias in the analysis if the missing data are unrelated to the outcome. Additionally, due to the large sample size (N=9,092) statistical power is still maintained even if the missing values are dropped when the analysis is conducted (Cheema, 2014). Therefore, listwise deletion was used to handle missing variables in this study.

Preliminary Analysis: Preliminary screening of the data was conducted to examine normality and distribution of predictor, control and outcome variables. For this purpose values for frequencies, mean, standard deviation (S.D.) and variance of each of the variables used in the study were obtained (See Table 1). Additionally bivariate analyses were conducted to examine the relationship between predictor and outcome

variables. The bivariate analyses were utilized to examine the study aim 1. Correlations and chi-squares tests were conducted to answer the following questions:

Aim1: Explore the influence of maternal autonomy and health related awareness on child nutritional outcomes.

Q1. Is there a difference in child nutritional status based on level of maternal autonomy?

H_1: There is a difference in child nutritional status based on level of maternal autonomy.

Q2. Is there a difference in child nutritional status based on level of maternal health related awareness?

H_2: There is a difference in child nutritional status based on level of maternal health related awareness.

Ordered logistic regression: Initially an ordered logistic regression was conducted to determine significant maternal and child characteristics that impact child nutritional status. For this, there were three separate models. The 1st model had "Stunting", 2nd model had "Wasting" and 3rd model "Underweight" as the outcome variables. All these three variables measure the study outcome "Child Nutritional Status". Ordered logistic regression was chosen as the method of analysis as the ordered outcome measures have more than two categories and are assumed to be in an order (Long & Freese, 2014). Ordered logistic regression (ologit) is an appropriate measure of estimation when the order of categories is meaningful but the distance between them is arbitrary (Long & Freese, 2014). It is based on the idea of a latent outcome variable, which is observed as a set of categories, but is actually a continuous variable.

The predictor variables in these models included the following: the total score of the maternal autonomy scale, total score of maternal health awareness scale and maternal health. To ascertain the impact of statewide cultural norms regarding gender autonomy on child nutritional status, 14 major states of India were divided into high gender equality status versus low gender equality status based on their GII and GDI rankings. The high gender equality status states include Kerala, Tamil Nadu, Andhra Pradesh, Maharashtra, New Delhi, Mizoram and Karnataka (NIC, 2009). The low gender equality states include Bihar, Uttar Pradesh, West Bengal, Haryana, Rajasthan, Madhya Pradesh and Assam (NIC, 2009). A dichotomous variable of "gender equality states" was thus included in the model as well. The control variables included: maternal education, gender of child, mother's caste, socioeconomic status, and enrollment in the nutrition assistance program. Values of odds ratio and standard errors for each of the models were obtained. The results are presented in Tables 5, 6, and 7. This analysis was used to examine study aims 1 and 2. The OLS regression models helped provide answers to the following questions:

Aim 1: Explore the influence of maternal autonomy and health related awareness on child nutritional outcomes.

Q3. Does maternal autonomy have a significant effect on child nutritional status, when all demographic variables are controlled?

H_3: Maternal autonomy has a significant effect on child nutritional status, when all demographic variables are controlled.

Q4. Does maternal health related awareness have a significant effect on child nutritional status, when all demographic variables are controlled?

H_3: Maternal health related awareness has a significant effect on child nutritional status, when all demographic variables are controlled.

Aim 2: Explore the influence of maternal health on child nutritional outcomes.

Q3. Does maternal health have a significant effect on child nutritional status, when demographic variables are controlled?

H_3: Maternal health has a significant effect on child nutritional status, when demographic variables are controlled.

Ordered logistic regression with mediation: After conducting the ordered logistic regression, a mediation model was tested, where maternal health mediates the relationship between maternal autonomy and health related awareness and child nutritional status, while demographic and socioeconomic variables are kept constant. For conducting this analysis, total scores of maternal autonomy scale and the maternal health related awareness scale, were first obtained and then an interaction term (maternal caregiver autonomy * maternal caregiver health related awareness) was created. Although Baron and Kenny's (Baron & Kenny, 1986) method to determine mediation effects is well known and widely used, it has received substantial criticism (Cliff & Earleywine, 1994; Collins, Graham & Flaherty, 1998; Judd & Kenny, 2010; Kenny, Korchmaros & Bolger, 2003; Kenny, Alberts, Booth, Glaser, Glassick, Ikenberry & Jamieson, 1998; MacKinnon, 2000; 2008; MacKinnon & Fairchild, 2009; MacKinnon et al., 2002; Zhao, Lynch & Chen, 2010). Additionally, as the mediating variable in the current study was dichotomous and the outcome variable was categorical, methods such as the Sobel and Goodman test (Goodman, 1960; Sobel, 1982) do not provide robust results within STATA 14 (Kohler, 2011). Therefore a mediation method by U. Kohler,

K.B. Karlson and A. Holm (2011) was used to test the mediation model. The KHB method is a general decomposition method that is unaffected by the rescaling or attention bias that arises from cross-model comparisons in non-linear models (Kohler et al., 2011). This method estimates the degree to which a control variable, Z, mediates or explains the relationship between X and the latent outcome variable Y, in a non-linear model. The KHB method has the ability to express the direct and indirect effects in terms of average effects. The partial effects are therefore interpreted as average partial or indirect effects rather than providing only estimated regression coefficients (Kohler at al., 2011). This method enables testing the effect of a dichotomous mediator (maternal health) on ordered categorical variables. It is well established that the partial effects on all the categories of ordered categorical measures are not constant (Greene & Hensher, 2010). The KHB method was used to get the average partial effects across all categories of the three outcome variables. Mediations were tested with three child nutritional status outcomes, namely, '*stunting*', '*wasting*' and '*underweight*'. The analysis explored the direct association of maternal autonomy and health related awareness with child nutritional status. Additionally, the association of maternal autonomy and health related awareness with child nutritional status, when mediated by maternal health was also obtained. Thus the OLS regression with mediation analysis was used to explore the study aim 3 and its underlying questions.

 Aim 3: Explore the influence of maternal autonomy and health related awareness on maternal health.

Q4**.** Is there a difference in maternal health based on level of maternal autonomy?

H_4: Maternal caregivers with higher levels of autonomy have good health as compared to maternal caregivers with lower levels of autonomy.

Q5. Is there a difference in maternal health based on level of maternal health related awareness?

H_5: Maternal caregivers with higher level of health related awareness have good health as compared to maternal caregivers with lower levels of health related awareness. The result of the mediation effect for '*stunting*' is presented in Table 5, '*wasting*' in Table 6 & '*underweight*' in Table 7. The tables include the total effect, direct and indirect effect. Confounding ratio and percentage are also presented to highlight the magnitude of the effect of the mediator.

Chapter IV: Findings

Sample Demographics (Univariate Results)

In order to explore and describe the predictor, control and outcome variables a series of univariate analysis were conducted. Summary of the results are displayed in Tables 1 and 2. The total study sample was 9,092. It consisted of women (15-49 years) that were married and had at least one child between the ages of 0-5 years. For the purpose of this study, the women will be referred to as maternal caregivers.

Forty-six percent of maternal caregivers were from states with low status of women and gender inequality. With regard to household characteristics, 77% of the caregivers belonged to high socioeconomic households (N=7,026). Only 9% (N=808) belonged to low income households and 14% (N=1,258) were from middle-income households. More than half of the caregivers belonged to scheduled caste/ tribes[12] (60%, N= 5,399) and the other 40% (N=3,465) were from the upper castes. Only half of the households in the sample were enrolled in the Integrated Child Development Scheme (ICDS), which is the national nutrition program serving children between 0-5 years and lactating, nursing or pregnant mothers.

The maternal caregivers ranged between 15-49 years, with a mean age of 26.82 years and standard deviation of 5.03. With regard to education, more than half of the maternal caregivers in the sample had completed secondary education or higher (65%, N= 4,378). Approximately 12% (N= 1,058) had primary schooling as their highest degree and 22% (N= 2,088) had received no education. Primary schooling in India refers to

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[12] The Constitution of India defines a Scheduled Caste or Tribe (SC/ST) as castes, tribes, races that are deemed to be Scheduled Caste under section 341 of the Constitution. SC/ST are official titles given to various groups that have been historically disadvantaged in India. These groups are alternatively referred to as *"Depressed Class", "Adivasis", "Dalits" and "Untouchables".*

grade I to grade VIII, and secondary schooling is from grade IX to grade XII. Majority of

the maternal caregivers reported to have good health (GOI, 2015). Approximately 84%

(N= 6,999) reported good health, and the remaining 16% (N= 1,296) were in poor health.

 Maternal autonomy was measured using three broad concepts (i) household

decision-making, (ii) justification of violence, and (iii) economic independence. With

regard to economic independence, 63% (N= 3,322) of maternal caregivers had

knowledge of loan programs available to them. However, majority of the sample did not

have a savings account (80%, N= 7,299), 81% (N= 7,399) were unemployed and

approximately 49% (N= 4,389) did not have any money for their own personal use. As

for maternal caregiver's household decision-making, she either made majority of the

decisions individually or jointly with the husband. Approximately 68% (N= 6,134) made

decisions regarding their health, either on their own or with their husbands. Fifty-nine

percent (N= 5,331) made individual or joint decisions with their husbands regarding

household purchases. Sixty-four percent (N= 5, 831) of the maternal caregivers made

decisions for daily requirements of members of the household alone or with the husband.

Seventy percent (N= 6,291) of the maternal caregivers decided what to do with their

husband's earnings, either individually or with their husbands. With regard to maternal

caregiver's justification of violence, majority of the maternal caregivers in the sample

reported that wife beating was not justified. The results indicate that while 80% (N=

7,276) indicated that violence was not justified if the maternal caregiver goes out of the

house without the husband's permission, approximately 20% (N= 1,816) felt that the

violence was justified. Similarly, 28% (N= 2,588) of maternal caregivers felt that wife

beating was justified, if she neglected the children's needs. Twenty-one percent (N=

1,942) believed that wife beating was justified, if she argued with her husband. Only 8% (N= 877) felt that wife beating was justified if she refused to have sexual intercourse with her husband; however 92% (N= 8,215) did not think that the violence was justified. Twelve percent (N= 1,114) of maternal caregivers reported that physical violence against them was justified if she burnt food, whereas the remaining 88% (N= 7,978) felt that the violence was not justified.

Maternal health related awareness was measured by the two broad concepts of (i) knowledge of family planning, and (ii) knowledge of illnesses. With regard to family planning knowledge, 63% (N= 5,701) reported that they had never heard about family planning on the radio, 62% (N= 5,701) reported that they had never heard about or seen information on family planning on television, 63% (N= 5,701) reported that they had never read about family planning in the newspaper, and 58% (N= 5250) reported that they had never seen any information regarding family planning on billboards. Thus majority of the sample had never been exposed to any information regarding family planning.

With regard to knowledge about illnesses, approximately 90% (N= 5,979) of the maternal caregivers reported that AIDS cannot be spread by hugging, thus indicating their awareness of the illness. Additionally, 88% (N= 7,985) of maternal caregivers had previously utilized oral rehydration (ORS) to treat diarrhea. Approximately 92% (N= 8,385) had heard of tuberculosis (TB).

With regard to child characteristics, the children of maternal caregivers ranged between 0-5 years, and were an average age of 1.7 years. In the sample, approximately 54% of the children were male and 46% were female. The nutritional status of children

was measured by three parameters: (i) Height for Age or Stunting, (ii) Weight for Height or Wasting and (iii) Weight for Age or Underweight. Approximately 20% (N= 2,713) of the children of the maternal caregivers in the sample were moderately or severely stunted. Fifteen percent (N= 1,356) were moderately or severely wasted and 26% (N= 2,319) were moderately or severely underweight. Thus approximately one fourth of the children in this sample suffered from poor nutritional status.

Bivariate Results

Next, to examine the relationship between the predictor, control and outcome variables of the study, Pearson's χ^2 was used. With regard to maternal autonomy, the results indicate that there is a significant difference between (i) household decision-making, (ii) justification of violence and (iii) economic independence, for maternal caregivers that are in high gender equality states of India compared with maternal caregivers in low gender equality states. The bivariate results indicate a significant difference between maternal caregivers living in high gender equality states as compared to those maternal caregivers living in low gender equality states and decision-making on their health (χ^2 =19.05, p<.001, df= 1). Similarly there was a significant difference for decision making with respect to household purchases (χ^2=41.14, p<.001, df= 1), daily household needs (χ^2= 51.56, p<.001, df= 1), visits to her family (χ^2 = 138.51, p<.001, df= 1), and expenditure of husband's earnings (χ^2 = 32.13, p<.001, df= 1). Additionally, the bivariate results show that there was a significant difference between maternal caregiver responses with respect to justification of violence, based on which state they lived. Overall, approximately 81% of women that lived in high gender equality states believed

that wife beating was not justified when she goes for an outing without permission, as compared to 79% women in the non-prowomen states. Although small, the Pearson's χ^2 results indicate that the difference was significant ($\chi^2 = 12.23$, p<.001, df= 1). Similar results were obtained for justification of violence when the maternal caregiver neglects her children ($\chi^2 = 176.85$, p<.001, df= 1), justification of violence when maternal caregiver refuses to have sex with her husband ($\chi^2 = 8.03$, p<.01, df= 1), and justification of violence when maternal caregiver burns food ($\chi^2 = 6.67$, p>.05, df= 1). Maternal economic independence was also significantly different for those living in high gender equality states compared to maternal caregivers living in low gender equality states. The results indicate that 22% (N= 961) of maternal caregivers in high gender equality states had a savings account as compared to 17% (N= 832) in low gender equality states ($\chi^2 = 48.05$, p<.001, df= 1). Also 45% (N= 1,899) of maternal caregivers in high gender equality states had knowledge of loan programs as compared to 29% (N= 1,423) in low gender equality states ($\chi^2 = 249.39$, p<.001, df= 1). Nineteen percent (N= 824) maternal caregivers were employed in high gender equality states as compared to 18% (N= 869) in low gender equality states ($\chi^2 = 4.78$, p<.001, df= 1). Interestingly only 42% (N= 1,761) had money for their own use in high gender equality states as compared to 60% in low gender equality states ($\chi^2 = 308.43$, p<.001, df= 1).

With regard to the maternal health related awareness, the results indicate a significant difference in family planning knowledge for maternal caregivers in high gender equality states as compared to maternal caregivers in low gender equality states. However there was no significant difference in knowledge of illnesses between maternal caregiver's, who reside in high gender equality states, and those who reside in low gender

equality states. Forty-two percent (N= 1,752) of women in high gender equality states had read about family planning in the newspaper, as compared to 34% (N= 1,639) in low gender equality states (χ^2=63.27, p<.001, df= 1). Approximately 50% (N= 2,088) of women in high gender equality states had seen information on family planning on billboards, as compared to 36% (N= 1,754) in low gender equality states (χ^2=174.16, p<.001, df= 1). Forty two percent (N= 1,752) of women in high gender equality states had heard about family planning on television, as compared to 34% (N= 1,639) in low gender equality states (χ^2= 63.24, p<.001, df= 1). Also, 42% (N= 1,752) women in high gender equality states had heard about family planning on the radio, as compared to 34% (N= 1,639) in low gender equality states (χ^2=63.24, p<.001, df= 1). The results thus indicate that maternal caregivers in states that have more gender equality and favorable conditions for women also had a higher percentage of maternal caregivers that are autonomous and health aware.

With respect to the maternal heath, Pearson χ^2 results indicated a significant difference in maternal health outcomes based on location of household, caste, socioeconomic status, highest level of education completed, maternal autonomy, maternal health related awareness. Eighty-seven percent (N= 3,300) maternal caregivers who reside in high gender equality states reported good health outcomes as compared to 82% (N= 3,699) who reside in low gender equality states (χ^2= 62.45, p<.001, df= 2). Eighty-three percent (N= 4,158) maternal caregivers belonging to SC/ST or other lower castes had favorable health outcomes as compared to 86% (N= 2,672) of those belonging to higher castes (χ^2= 12.15, p<.001, df= 1). Eighty-six percent (N= 5,499) maternal caregivers that belonged to higher socioeconomic status households reported good health,

as compared to 77% (N= 566) maternal caregivers from low socioeconomic status

households (χ^2 = 53.63, p<.001, df= 1). Ninety one percent (N= 1,274) maternal

caregivers who had completed higher education reported good health as compared to

79% (N= 1,475) maternal caregivers who had no education (χ^2 = 89.84, p<.001, df= 1). A

higher percentage of maternal caregivers that made households decisions individually or

jointly with their husbands with respect to their own health (χ^2= 6.25, p<.05, df= 1) and

visitation to their family (χ^2 = 32.13, p<.001, df= 1) reported to have good health as

compared to those who did not make these decisions. Additionally, a higher percentage

of women that believed violence against them was not justified reported good health as

compared to those that felt the violence was justified. The Pearson's χ^2 results indicated

that the difference was significant. For example, 85% (N= 5,045) of maternal caregivers

who stated that violence is not justified when she neglects children, had good health

outcomes, as compared to 82% (N= 1,932) of those that justified the violence in the case

of child neglect (χ^2= 16.55, p<.001, df= 1). Higher percentages of maternal caregivers

who had economic independence reported good health as compared to those who did not.

Eighty nine percent (N= 1,445) of maternal caregivers with a savings account, reported

good health as compared to 83 % (N= 5,548) who did not have a savings account (χ^2=

34.87, p<.001, df= 1). Eighty-seven percent (N= 2,692) maternal caregivers who had

knowledge of loan programs had good health outcomes, as compared to 83% (N= 4,307)

that did not have the knowledge (χ^2= 19.83, p<.001, df= 1). Higher percentages of

maternal caregivers that had health related awareness reported good health, as compared

to those who did not have the awareness. Eighty- seven percent (N= 2,700) of maternal

caregivers who had read about family planning in the newspaper, had good health as

compared to 83% (N= 4, 297) who did not have this information (χ^2= 23.90, p<.001, df= 1). Eighty-eight percent (N= 3,109) of maternal caregivers who had seen information on family planning on billboards had good health outcomes as compared to 82% (N= 3,888) who did not have this information (χ^2= 55.06, p<.001, df= 1). Eighty-seven percent (N= 2,700) of maternal caregivers who heard about family planning on television had good health as compared to 83% (N= 4,297) who did not have this information (χ^2= 23.90, p<.001, df= 1). Eighty-six percent (N= 4,751) of maternal caregivers who had the knowledge that AIDS cannot be transferred by hugging, had good health outcomes, as compared to 81% (N= 517) of those who did not have this knowledge (χ^2= 11.64, p<.01). Eighty-five percent (N= 6,499) of maternal caregivers who had heard of tuberculosis reported to have good health as compared to 81% (N= 498) who did not have this information (χ^2= 5.81, p<.001, df= 1). Eighty- five percent (N= 6,215) of maternal caregivers who had heard of or had utilized oral rehydration (ORS) to combat diarrhea had good health, as compared to 79% (N= 755) of those who had neither heard nor used ORS.

Finally, the study also explored if there were differences in child nutritional status based on household factors such as location of household, socioeconomic status, caste, caregiver characteristics including maternal autonomy, health related awareness, and health; and gender of the child. The results were similar for all three measures of child nutritional status (stunting, wasting and underweight). As the results for all three measures were similar, findings for the outcome measure 'stunting' has been presented. Sixty-eight percent (N= 2,290) of children that belonged to households located in states with high gender equality, reported good nutritional status as compared to 61% (N=

2,531) children who lived in states with low gender equality. Additionally, only 12% (N= 392) children in high gender equality states reported to have very poor nutritional status as compared to 18% (N= 739) children in low gender equality states (χ^2= 62.45, p<.001, df= 2). Sixty-five percent (N= 2,465) of children residing in households enrolled in the national nutrition program, that is, the Integrated Child Development Scheme (ICDS), reported to have good nutritional status as compared to 63% (N= 2,356) of children that were not enrolled in the program (χ^2= 8.80, p<.05, df= 2). Sixty-nine percent (N= 4,001) children residing in families with high socioeconomic status reported good nutritional status as compared to only 45% (N=296) in poor households (χ^2= 309.48, p<.001, df= 4). Approximately 82% (N= 3,032) of children with maternal caregivers who had completed secondary school and higher, reported good nutritional status as compared to only 77% (N= 1,329) children who had caregivers with no education. Additionally, only 6% children with maternal caregivers who completed secondary school and higher, reported severely poor nutritional status as compared to 26% of children whose maternal caregiver had no education (χ^2= 428.58, p<.001, df= 6). Sixty-nine percent children belonging to upper caste families reported to have good nutritional status, as compared to 61% children belonging to lower caste (χ^2= 64.05, p<.001, df= 2). Sixty-five percent of children with maternal caregivers who had good health also reported to have favorable nutritional status as compared to 58% children whose maternal caregiver had poor health (χ^2= 27.38, p<.001, df= 2). With respect to differences based on maternal autonomy, the chi-square results indicate that there are significant differences in child nutritional status, based on maternal decisions making on visits to the family and expenditure of husbands earnings. Sixty-four percent of children whose maternal caregiver makes decisions

herself or jointly with her husband regarding visits to the family had good nutritional status as compared to 63% children whose maternal caregiver does not make this decision (χ^2= 6.69, p<.05, df= 2). Interestingly, 67% children whose maternal caregiver did not make decisions, either individually or jointly with her husband, on how to spend her husband's earnings, had good nutritional status as compared to 62% of children whose maternal caregiver made these decisions (χ^2= 10.67, p<.01, df= 2). Additionally, there were significant differences in child nutritional status based on the maternal caregiver's justification of violence. The children of maternal caregivers who did not justify violence against them for (i) going out without permission (χ^2= 36.26, p<.001, df= 2), (ii) neglecting her children (χ^2= 9.81, p<.01, df= 2), (iii) arguing with her husband (χ^2= 30.66, p<.001, df= 2), (iv) refusing to have sex with her husband (χ^2= 15.39, p<.001, df= 2) and (v) burning food (χ^2= 11.18, p<.01, df= 2) had better nutritional status. Significant differences were also found between nutritional outcomes of children in families whose maternal caregivers had economic independence. Seventy-five percent of children whose maternal caregiver had a savings account, had better health outcomes, as compared to 61% of children whose maternal caregiver did not have an account (χ^2= 94.95, p<.001, df= 2). Sixty- seven percent children whose maternal caregivers had knowledge of loan programs had good nutritional status, as compared to 62% of children whose maternal caregivers did not have this knowledge (χ^2= 26.80, p<.001, df= 2). Interestingly, 58% of children whose mothers were employed had good health outcomes, as compared to 65% of children whose mothers were not employed (χ^2= 28.14, p<.001, df= 2).

Finally, there were significant differences in child nutritional outcomes based on maternal health related awareness. The results indicate that there were a higher percentage of children with good nutritional status, when their maternal caregivers had awareness related to family planning and illnesses. For example, 66% children with maternal caregivers who received information about family planning from newspapers, had good nutritional status, as compared to 63% of children whose maternal caregivers did not receive this knowledge (χ^2= 13.21, p<.01, df= 2). Also, 69% children whose maternal caregiver had the knowledge that AIDS does not spread from hugging, had good health outcomes as compared to 60% of children whose maternal caregiver did not have this information (χ^2= 24.16, p<.001, df= 2). Sixty-five percent of children, whose maternal caregiver had heard of or used ORS, had good nutritional status as compared to 55% children whose maternal caregivers had neither heard nor used ORS (χ^2= 36.83, p<001, df= 2).

Ordered Logistic Regression with Mediation Effects

Three separate models were run in STATA 14 to examine the (i) association of maternal autonomy and health related awareness with child nutrition status (ii) interaction effect of maternal autonomy and health related awareness on child nutrition status and (iii) mediation effect of maternal health on the relationship of maternal autonomy and health related awareness with child nutritional status, while controlling for the socioeconomic status. The three distinct models have three outcomes that all together measure the concept of "*child nutritional status*", that is stunting, wasting and underweight. The ordered logistic regression was conducted in two steps. The first step included all

predictor and control variables (Model 1), and the second step included the predictor and

control variables along with the interaction effect between maternal caregiver autonomy

and health related awareness. The mediation effect was also included in step 2. The

results of each are presented in Table 5 (Stunting), Table 6 (Wasting) & Table 7

(Underweight). Additionally, figure 5 provides a graphical presentation of the significant

direct of maternal autonomy and maternal health related awareness and indirect effect of

maternal health on child nutritional status.

Model 1: Height to Age Ratio/ Stunting

An ordered logistic regression was conducted to examine the impact of maternal

autonomy and health related awareness on stunting for children between 0-5 years in

urban India. The total number of observations for the analysis was 5,110. The model had

a likelihood ratio chi-square of 197.49, with a p-value of 0.000, thus indicating that the

model as a whole was statistically significant. The Pseudo R^2 was .017. The first step for

the analysis included all predictor and control variables. The results indicate that children

that belong high gender equality states, had 1.2 times higher odds of having good

nutritional status as compared to those residing in states with high gender inequality,

when all other factors were kept constant (OR= 1.19, p<.05). Children in high

socioeconomic households had 1.9 times higher odds of having normal height to age

ratio, indicating good nutritional status as compared to children in poor households, when

all other factors were kept constant (OR= 1.85, p<.001). Children that belong to higher or

upper caste families had 1.2 times higher odds of having good nutritional status, as

compared to those in lower caste families, when all other factors were kept constant

(OR= 1.23, p<.01). Children that belong to households that are enrolled in the Integrated

Child Development Scheme (ICDS) had 1.2 times higher odds of being in good nutritional status as compared to those children not enrolled in the ICDS, when all other factors were controlled (OR= 1.16, p<.05). Male children had 1.2 times higher odds of being in good health, as compared to female children, when all other factors were kept constant (OR= 1.17, p<.05). With regard to impact of caregiver characteristics on child's nutritional status, results indicate that when the maternal caregiver had completed higher education, the odds of the child having good nutritional status was 3.03 times greater than when the maternal caregiver had no education, given that all other factors were kept constant (OR= 3.03, p<.001). However maternal health, autonomy, and health related awareness were not significant predictors of child nutritional status.

Next, an interaction effect analysis of maternal autonomy and health related awareness on child nutritional status was conducted. The effect of the predictor and control variables remained unchanged. The results indicate that the interaction effect was not significant (OR= 1.002, p>.05). Finally a mediation effect of maternal health on the relationship of maternal autonomy and health related awareness with child nutritional status (measured as 'stunting'), while controlling for the socioeconomic status was conducted. The KHB method was utilized to obtain the mediation effect results (Kohler et al., 2011). The results indicate that the total effect of the model was significant (p<.01). This means that the impact of maternal autonomy and health related awareness on child nutritional status was significant, when the effect of caregiver health was not controlled. Thus, maternal health, autonomy and health related awareness increase the odds of the child having good nutritional outcomes by 0.006 (p<.01). When the effect of caregiver health was controlled, the odds of the child having good nutritional status was 0.005

(p<.01), leaving a significant indirect effect of 0.003 (p<.05). Kohler et al (2011) also provide confounding ratio and percentages to further understand the magnitude of the coefficients of the direct, indirect and total effect. For this model, the total effect was 1.07 times larger than the direct effect, and 7% of the total effect was due to maternal health. The results are exhibited in Table 5.

Model 2: Weight to Age Ratio/ Wasting

For the second model, an ordered logistic regression was conducted to examine the impact of maternal autonomy and health related awareness on wasting (ratio of weight for age) for children between 0-5 years in urban India. The total number of observations for the analysis was 5,110. The model had a likelihood ratio chi-square of 57.67, with a p-value < .000, thus indicating that the model as a whole was statistically significant. The Pseudo R^2 was .01. The results indicate that caregiver characteristics such as maternal autonomy, education and health are not significant indicators of child nutritional status, when measured as 'wasting'. Unlike the previous model, maternal health related awareness was a significant predictor. Children with maternal caregivers who had health related awareness had .94 times higher odds of having good nutritional status as compared to children whose maternal caregivers did not have health related awareness (OR=.94, p<.01), when all other factors were controlled. Also children that reside in households located in high gender equality states, had 1.2 times higher odds of having good nutritional status compared to severely poor or moderately poor nutritional status, when all other factors were kept constant (OR= 1.21, p<.05). Children from high socioeconomic households had 1.3 times higher odds of having good nutritional status, when all other factors were kept constant (OR= 1.34, p<.01). Children from upper caste

families had 1.2 times higher odds of having good nutritional status, when all other factors were kept constant (OR= 1.21, p<.05). Children that belonged to households that were enrolled in the Integrated Child Nutrition Scheme (ICDS), had 1.18 times higher odds of having good nutritional status as compared to those that were not enrolled in the ICDS, when all other factors were kept constant (OR= 1.18, p<.05).

Next, an interaction effect of maternal autonomy and health related awareness on wasting was conducted. The results of the effect of the predictor and control variables (maternal health, household caste, maternal education, socioeconomic status, nutrition assistance, child gender and, location of household) on child nutritional status remained largely unchanged. The only change observed when the interaction effect was added to the model, the effect of maternal health related awareness was no longer significant. The results indicate that the interaction effect was not significant (OR= .99, p>.05). Finally, a mediation effect of maternal health on the relationship of maternal autonomy and health related awareness with child nutritional status measured by "wasting", while controlling for the socioeconomic status was conducted. Interestingly, neither the total, direct or indirect effects of this model were significant. The results are displayed in Table 6.

Model 3. Weight to Height Ratio/ Underweight

For the third model, an ordered logistic regression was conducted to examine the impact of maternal autonomy and health related awareness on child nutritional status when measured as 'underweight' (ratio of weight for height) for children between 0-5 years in urban India. The total number of observations for the analysis was 5,110. The model had a likelihood ratio chi-square of 291.55, with a p-value <.001, thus indicating that the model as a whole was statistically significant. The Pseudo R^2 was 0.037. The

results indicate that maternal autonomy and enrollment in the Integrated Child Nutrition

Scheme (ICDS) did not have a significant impact on the child's nutritional status.

However, children with maternal caregiver's who had health related awareness had .96

times higher odds of having good nutritional status as compared to children who had

maternal caregivers with no health related awareness (OR= .96, p<.05), when all other

factors were controlled. Children belonging to households located in high gender equality

states had 1.38 times higher odds of having good nutritional status, rather than severely

poor or moderately poor nutritional status, when all other factors were kept constant

(OR= 1.38, p<.001). Children who belong to higher socioeconomic households had 2.5

times higher odds of having good nutritional status as compared to those in poverty,

when all other factors were kept constant (OR= 2.49, p<.001). Children who belong to

upper caste families had 1.2 times higher odds to have good nutritional status, when all

other factors were kept constant (OR=1.19, p<.05). Maternal education and health had a

positive impact on the child's nutritional status. Children with maternal caregivers who

completed higher education had 3.01 times higher odds of having good nutritional status,

as compared to children whose maternal caregivers had not completed any education,

when all other factors were kept constant (OR= 3.01, p<.001). Children with maternal

caregivers who had good health, were 1.3 times more likely to have good nutritional

status, when all other factors were kept constant (OR= 1.28, p<.01).

Next, an interaction effect of maternal autonomy and health related awareness on

'underweight' was conducted. The effect of the predictor and control variables remained

largely unchanged. The only change was that the effect of maternal health related

awareness was no longer significant (OR= 1.02, p>.05). The results indicate that the

interaction effect was not significant (OR= .99, p>.05). Finally, a mediation effect of maternal health on the relationship of maternal autonomy and health related awareness with child nutritional status (measured by 'underweight'), while controlling for socioeconomic status, was conducted. The results indicate that the total effect of the model was not significant. The direct effect of maternal health and autonomy was also not significant. However the indirect or mediated effect of caregiver health was significant (p<.01). For this model, we see that the total effect was 1.5 times higher than the direct effect and 36% of the total effect was related to caregiver health.

The next chapter elaborates on the study results in light of the current situation of child undernutrition in India as well as the three theories (i) Ecological Systems Theory, (ii) Capability Approach, and (iii) Positive Deviance Inquiry that were utilized to develop the conceptual framework. The chapter also highlights the limitations. Implications for global child welfare, social work policy and practice, and future research are provided.

Table 5: Summary of Ordered Logistic Regression with Mediation effects for Outcome Variable 'Stunting' (N= 5110)				
	Model 1		**Model 2**	
	OR	**SE**	**OR**	**SE**
Caregiver Characteristics				
Maternal caregiver autonomy	0.98	0.01	0.97	0.02
Maternal caregiver health related awareness	1.006	0.17	0.98	0.05
Maternal caregiver health	1.16	0.09	1.16	0.09
Caste	1.23**	0.07	1.23**	0.07
Education				
Primary education	1.24	0.15	1.24	0.15
Secondary Education	1.46***	0.14	1.46***	0.14
Higher Education	3.03***	0.37	3.02***	0.37
Nutrition Assistance	1.16*	0.07	1.16*	0.07
Socioeconomic Status				
Middle income	1.05	0.16	1.05	0.16
High income	1.86**	0.07	1.85***	0.25
Sex of Child (Male)	1.17**	0.07	1.17**	0.07
Gender Equality States	1.19**	0.07	1.19**	0.07
Maternal caregiver autonomy*maternal caregiver health related awareness			1.002	0.006
Maternal Caregiver Health as Mediator				
Total Effect			0.003*	0.001
Direct Effect			0.002*	0.001
Indirect Effect			0.0002**	0.0001
Confounding Ratio			1.07	
Confounding percentage			6.85	
*p<.05, **p<.01, ***p<.001				
OR= Odds Ratio				
SE= Standard Error				

Table 5: Summary of Ordered Logistic Regression with Mediation Effects for Outcome Variable (Stunting)

Table 6: Summary of Ordered Logistic Regression with Mediation effects for Outcome Variable 'Wasting' (N= 5110)				
	Model 1		**Model 2**	
	OR	**SE**	**OR**	**SE**
Caregiver Characteristics				
Maternal caregiver autonomy	0.99	0.01	1.01	0.03
Maternal caregiver health related awareness	0.94**	0.01	0.97	0.06
Maternal caregiver health	0.98	0.1	0.98	0.1
Caste	1.21*	0.09	1.21*	0.09
Education				
Primary education	0.99	0.15	0.99	0.15
Secondary Education	1.07	0.13	1.07	0.13
Higher Education	1.34	0.2	1.34	0.2
Nutrition Assistance	1.18*	0.09	1.18*	0.09
Socioeconomic Status				
Middle income	1.35	0.25	1.35	0.25
High income	1.75**	0.29	1.74**	0.29
Sex of child (Male)	1.07	0.08	1.07	0.08
Gender Equality States	1.21*	0.09	1.21*	0.09
Maternal caregiver autonomy*maternal caregiver health related awareness			0.99	0.007
Maternal Caregiver Health as Mediator				
Total Effect			0.002	0.001
Direct Effect			0.002	0.001
Indirect Effect			0	0
Confounding Ratio			0.99	
Confounding percentage			0.68	
*p<.05, **p<.01, ***p<.001				
OR= Odds Ratio				
SE= Standard Error				

Table 6: Summary of Ordered Logistic Regression with Mediation Effects for Outcome Variable (Wasting)

Table 7: Summary of Ordered Logistic Regression with Mediation effects for Outcome Variable 'Underweight' (N= 5110)	Model 1		Model 2	
	OR	**SE**	**OR**	**SE**
Caregiver Characteristics				
Maternal careigver autonomy	0.99	0.01	1.02	0.03
Maternal caregiver health related awareness	.96*	0.01	1.02	0.06
Maternal caregiver health	1.28**	0.11	1.28**	0.11
Caste	1.19*	0.08	1.19*	0.08
Education				
Primary education	1.31*	0.16	1.30*	0.16
Secondary Education	1.42***	0.14	1.42***	0.14
Higher Education	2.96***	0.38	2.98***	0.38
Nutrition Assistance	1.09	0.07	1.09	0.07
Socioeconomic Status				
Middle income	1.43*	0.22	1.42*	0.22
High income	2.46***	0.34	2.46***	0.34
Sex of Child (Male)	1.11	0.07	1.11	0.07
Gender Equality States	1.38***	0.09	1.37***	0.09
Maternal caregiver autonomy*maternal caregiver health related awareness			0.99	0.006
Maternal Caregiver Health as Mediator				
Total Effect			0.001	0.001
Direct Effect			0.007	0.001
Indirect Effect			0.0004**	0.0001
Confounding Ratio			1.56	
Confounding percentage			35.93	
*p<.05, **p<.01, ***p<.001				
OR= Odds Ratio				
SE= Standard Error				

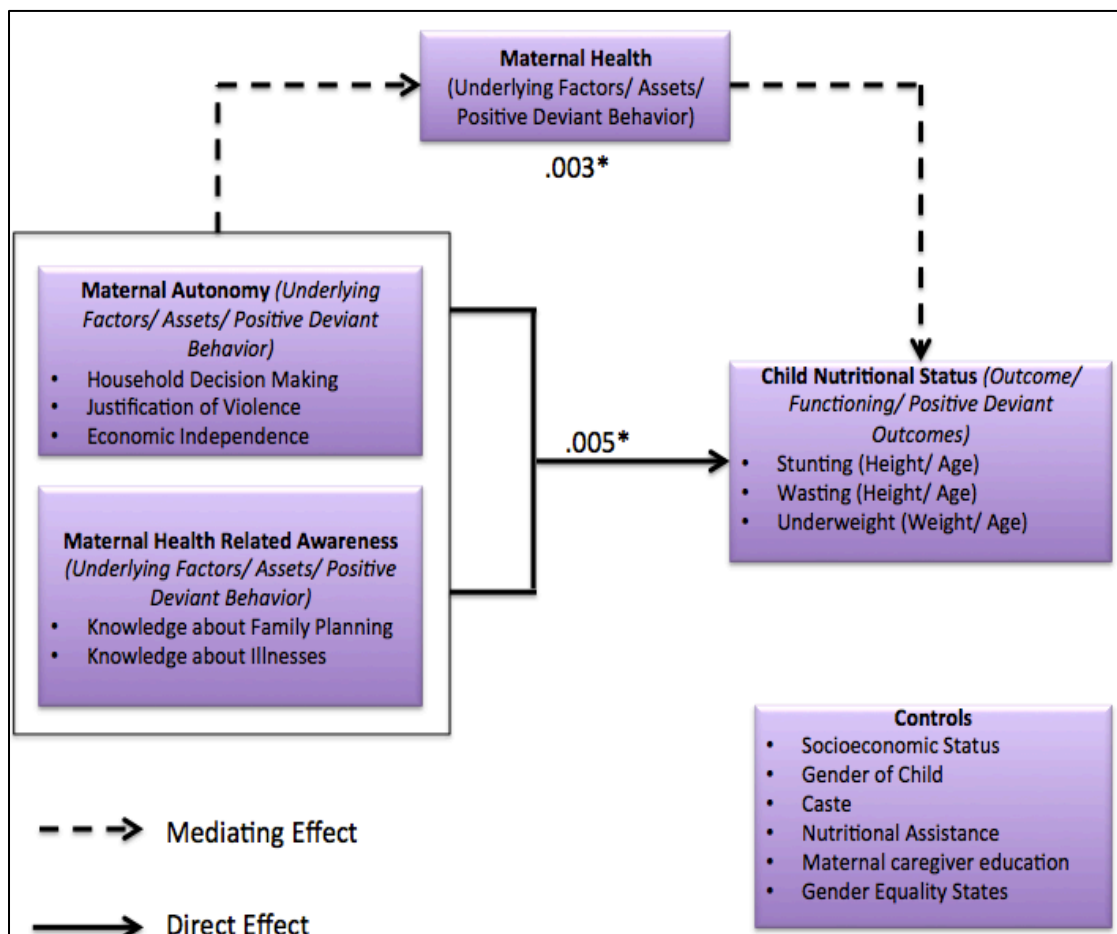*Table 7:* Summary of Ordered Logistic Regression with Mediation Effects for Outcome Variable (Underweight)

Figure 5: Direct and Indirect Effect of Maternal Autonomy and Maternal Health Related Awareness on Child Nutritional Status

Chapter V: Discussion

Discussion

The previous chapter presented the research findings on the prevalence of poor child

nutritional status in urban states of India and highlighted protective and risk factors that

impact the nutritional status of children between 0-5 years in urban India. The overall

study results indicated that approximately one-fourth of children of the maternal

caregivers in the study sample had poor nutritional outcomes. Bivariate results indicated

that there were significant differences in child nutritional status based on maternal health,

autonomy and health related awareness. Additionally significant differences in maternal

health based on maternal autonomy, health related awareness and geographical location

was reported. The ordered logistic regression results highlighted that maternal autonomy

and health related awareness did not have a significant direct effect on child nutritrional

status, when demographic variables were controlled. However, maternal autonomy and

health related awareness had a significant indirect relationship with child nutritional

status, when mediated by maternal health. The study results thus provided imperative

information to explore the study aims as highlighted in Chapter 3. The current chapter

discusses these significant findings in light of the current problems of child

undernutrition in India as well as the theoretical framework of the study.

According to Black et al. (2008), stunting is one of the primary indicators of poor

health. While majority of the children in the study sample had normal growth indicating a

good nutritional status, 30% of the child population in the sample suffered from stunted

growth. Additionally, 26% were moderately or severely underweight and 15% wasted,

that is, their weight was inappropriately low in ratio to their height. This is a significant

percentage of children that have a high probability of being at risk for short and long term negative health outcomes. Existing literature has suggested that poor nutritional status can cause vulnerability to diseases such as diarrhea, malaria, measles, cognitive and behavioral issues, as well as mortality (Apocada, 2010; Black et al., 2008; Colemen-Jensen et al., 2014; Cunningham et al., 2015; Deaton & Dreze, 2008; Osmani & Sen, 2003; Muchu, 2012; Nord, 2009; UNICEF-India, 2011). In order to tackle the growing magnitude of undernutrition, it is imperative to understand the factors at the micro and macro level (Bronfenbrenner, 1977) that positively and negatively impact child nutritional status.

Overall the study findings indicate that factors such as household location in more gender equal states, enrollment in the Integrated Child Development Scheme (ICDS), belonging to upper caste family, high socioeconomic status, maternal caregiver characteristics such as completion of higher education, good health, high level of autonomy and health related awareness are significant protective factors for child nutritional status.

Socioeconomic status of a household continues to be one of the primary predictors of child nutritional status in India. According to the Capability Approach (Sen, 1985) poverty denies individuals the opportunity to access the most basic human developmental needs that would lead to short and long term overall well-being, including a healthy body and mind. According to UNICEF (2014), poverty has a unique impact on children, as they experience emotional, material and spiritual deprivations that are important for their survival, development and realization of fundamental rights. Additionally it restricts the child's opportunity to fully engage in the civil society in their

adulthood thus promoting a cycle of poverty. One of the most severe deprivations faced by children in poverty in India is undernutrition (UNICEF, 2014).

The current study reinforces this idea as children in higher socioeconomic (SES) families had 1.9 times higher probability of not suffering from stunted growth as compared to children who were in low SES families, when all other factors were kept constant. Additionally, children in higher SES families had 1.8 times higher odds of not being wasted as compared to children who were from low SES families, when all other factors were kept constant. Also, children in higher SES families had 2.5 times higher odds of not being underweight as compared to children who were from low SES families, when all other factors were kept constant. This could be because majority of households with children in poverty, are unable to afford good quality food, care and healthy environment due to high inflation, increasing wage gap between rich and poor, rising prices and poor quality food in subsidized stores.

In addition to SES, the study findings indicated that caste was a significant predictor of child nutritional status. Caste, similar to racial categorization in the U.S, has historically played an important role in determining economic, social and educational outcomes of individuals, households and communities in India (Mukhopadhyay, 2014). The lower caste is commonly referred to as '*Scheduled Caste*'. Compared to other castes, their economic, social and educational achievements are considered to be regressive (Sarkar et al, 2006). National Family Health Survey Report 2005-06 (IPS International & ORC Macro, 2006) indicated that individuals and households of lower caste had lower literacy rates, employment rates, school enrollment, poorer health and overall well-being. The gap in outcomes of members of the lower caste group can be attributed to exclusion

from mainstream society, discrimination and unequal access to health care, education, social services, employment and economic growth. As a result children belonging to lower castes disproportionately face the burden of poor nutritional outcomes (Joe, Mishra & Navaneetham, 2009; Mazumdar, 2010; Mukhopadhyay, 2015). The results of the current study reinforce these findings as children from upper caste families were found to have 1.2 times higher odds of not being stunted, 1.21 times higher odds of not being wasted and 1.19 times higher odds of not being underweight; as compared to children in lower castes, when all other factors were controlled.

India has one of the largest national nutrition programs in the world. The Integrated Child Development Scheme (ICDS) is the Indian National Government's flagship program to improve its child nutritional status (Sinha, in Press). It has a multi-sectorial approach as it targets availability of food, immunizations, health care facilities, maternal health amongst other social and environmental factors (WCD, 2014). It serves approximately 23 million children between the ages of 0-6 years and 4.8 million expectant and nursing mothers that reside in low-income communities (NIC, n.d). Findings from studies that have evaluated the ICDS program suggest that although it is not very effective in addressing malnutrition, it helps mitigate challenges of extreme hunger (Brendenkamp & Akin, 2004; Deolalikar, 2005; Kandpal, 2011; Lokshin, Gupta, Gragnolati & Ivaschenko, 2005; Sinha, in Press). The current study results indicate that children who receive supplemental nutrition assistance from ICDS had 1.16 times higher odds of not being stunted, and 1.18 times higher odds of not being wasted as compared to children that do not receive benefits from ICDS, when all other factors were controlled. While previous studies (Brendenkamp & Akin, 2004; Deolalikar, 2005; Kandpal, 2011;

Lokshin et al., 2005; Saiyad & Seshadri, 2000) do not consider ICDS to be effective, the findings from the current study suggest that ICDS might provide the essential nutrients required to maintain good nutritional status. However this interpretation must be taken with caution, as there might be other factors such as informal supports, social networks, and community interventions, amongst others that were not controlled for in the current study analysis.

Link between maternal caregiver characteristics and child nutritional status: Bronfenbrenner's (1977) "Ecological Systems Theory" has identified the macrosystem as an important indicator of child well-being. According to the theory "the overarching institutional patterns of culture or subculture, such as political, social, educational, and legal systems are manifested in the microsystem, mesosystem and exosystem of which the child is a part"(Bronfenbrenner, 1977, p. 515). In India, the status of women is one such institutional pattern, which is manifested at the individual, household, community, and broader national level. India due to its diverse culture and socio-political environment has differing attitudes related to gender equality. The southern belt of the country has better gender equality as compared to the northern parts of the country (Shroff et al., 2008).

Kerala is a good example of a state in India with high gender equality. Located in the southern part of the country, Kerala is known worldwide to be a contradiction to the patriarchal system of India. It is India's first state to achieve 100% primary school enrollment and has highest literacy rate (92%), lowest maternal mortality rate, and a gender ratio of 1,084 women per 1,000 men (Government of Kerala, 2015). The concerted efforts by the Kerala state government to improve the status of women, has

positively impacted the overall well-being of the people in this region. Other states in this region include Tamil Nadu, Andhra Pradesh, Karnataka, Maharashtra, amongst others. On the other hand, Haryana, which is located in the northern belt of the country has high rates of maternal mortality, infant mortality, poor health outcomes for women and children, low school enrollment, literacy and employment rates and a skewed female to male ratio of 877 women to 1,000 men (Sharma, Singh, Doi & Khan, 2015). Other states in this region include Rajasthan, Bihar, Uttar Pradesh, Madhya Pradesh, and Bengal.

The diversity in status of women in these two distinct parts of the country can be explained by the complex historical, geographical, cultural, and economic influences. The subjugation of women was more prevalent in the northern parts of the country and the situation has remained largely unchanged (Shroff et al., 2009). On the other hand the southern region is considered to be a matriarchal society, where women are given an equal status to men. This is reflected in the policies at the state level as well as day-to-day functioning at the household and individual level (Osmani & Sen, 2010; Shroff et al., 2009).

The current study results reinforce the findings of previous studies, which indicate that women and children in regions with higher gender equality have better outcomes. The findings of the study show that states that were categorized as having high gender equality also had higher percentage of maternal caregivers with health related awareness and autonomy as compared to maternal caregivers in states with lower gender equality. Additionally a higher percentage of maternal caregivers residing in households in high gender equality states had good health as compared to maternal caregivers residing in low gender equality states. Also, children residing in households that were in high gender

equality states had 1.19 times higher odds of not being stunted, 1.21 times higher odds of

not being wasted and 1.38 times higher odds of not being underweight; compared to

children in low gender equality states, when all other factors were controlled. This

suggests that the regions with higher gender equality have made efforts to improve the

status of women, through education, employment, civil society awareness, and increased

access to health care, amongst other basic human needs services.

According to Arulumpalam et al (2015), Kabeer (2001), Jejeebhoy (2005), and

Nussbaum (2000) the status of women can be measured at individual and household level

by autonomy or the ability of a woman to define her interests and have the freedom to

make choices. Women's health related awareness has also been closely related to

autonomy and empowerment (Nussbaum, 2000; Smith & Haddad, 2000; Smith et al.,

2003). The study results indicated that neither maternal autonomy nor maternal health

related awareness was a significant predictor of child nutritional status, when all other

factors were controlled. This suggests that other factors in the model were probably

stronger predictors of child nutritional status. Interestingly the mediation model indicated

that maternal autonomy and maternal health related awareness had a significant impact

on child nutritional status when the relationship was mediated by maternal health, while

controlling for socioeconomic status. The results showed that the total effect of the

relationship between maternal autonomy and health related awareness and child

nutritional status (measured as stunting) was 1.5 times larger than the direct effect and

36% of the total effect was due to maternal health.

Thus, while maternal autonomy and health related awareness do not directly

impact child nutritional status, they play an important role in determining both maternal

caregiver and child health outcomes. Many studies have highlighted a strong correlation between maternal health and child nutritional status (Black et al., 2008; Cunningham et al., 2015; Dreze & Sen, 2013; Nussbaum, 2000; Victoria et al., 2008). The current study also indicated that a higher percentage of children with maternal caregivers in good health had positive nutritional status as compared to children with maternal caregivers in poor health. Maternal caregivers with health related awareness are more likely to seek information and resources to improve their health. Additionally, autonomy in various dimensions such as household decision-making, economic independence and justification for paternal violence, empowers maternal caregivers to have greater control over their health and overall well-being. The autonomy and health related awareness of the maternal caregiver therefore directly impacts her own health, and subsequently that of the child. UNICEF's (1990) model of care was one of the first studies to highlight the importance of maternal health to ascertain favorable outcomes for the child. Women with poor health have increased chances of maternal mortality, poor development of the fetus, complications at birth, infant mortality and low birth weight of babies (Black et al., 2008; Osmani & Sen, 2003). Additionally, maternal caregivers with poor health are unable to provide optimal care to the children after their birth. This includes, but is not limited to, breastfeeding, adequate and timely healthcare, emotional support, and day-to-day feeding practices including correct proportions of nutrients essential for full development. Thus maternal caregivers who are in good health will be better equipped to birth healthy babies and have the ability to provide good quality care.

The study findings therefore direct attention to maternal caregiver characteristics, specifically, maternal autonomy and health related awareness as assets. These factors

would enable maternal caregivers to make informed decisions to improve her own health outcomes, subsequently impacting the well-being of her child. According to Sen's (1985) "Capability Approach" model, the positive nutritional status of the child will lead to other benefits including better physical, cognitive and behavioral health, higher grades in school, and better job opportunities which will help to break away from the vicious cycle of poverty. Maternal autonomy and health related awareness could also be recognized as positive deviant behavior that lead to favorable outcomes for the maternal caregivers as well as their children (Sternin, 1990). The study results suggest that perhaps maternal autonomy and health related awareness are factors that can mitigate challenges posed by lack of resources. This positive deviant behavior might promote better management of limited resources, informed decision making and an increased ability to provide quality care despite financial hardships. Findings of the study therefore recognize maternal autonomy and health related awareness as assets that need to be promoted as primary protective factors for maternal and child health outcomes. It also highlights the need to restructure current nutrition programs and policies to incorporate interventions that improve the status of women at the national, community, household and individual level. Lastly, it urges child nutrition policy makers and practitioners to make concerted efforts towards recognizing underlying social and cultural factors that should be challenged in order to eradicate child undernutrition.

Limitations of the Study

While this study contributes substantially to the knowledge base on child nutrition and welfare, it has several important limitations. One of the primary limitations of this study is that it utilizes data that was collected in year 2005-06. Thus the records are approximately 10 years old. This is the most recent national level study that has data on health, nutrition and demographic characteristics of women and children in India. The fourth round of the NFHS (NFHS-IV) is currently underway (ORC Macro & IIPS International, 2015). The field data collection is in process, and projected to be available for public use within 2-3 years (DHS, n.d.). Additionally, UNICEF has conducted a 'Rapid Survey on Children' in India in 2013-14, but it does not contain variables relating to women's autonomy and health related awareness, which are critical pieces of this study (UNICEF, 2014b). Despite this limitation, it should be noted that, NFHS-III provides important information about maternal and child health and nutrition trends in India. Although there has been an overall improvement in nutritional status of children in India since 2005-06, these changes are not significant and undernutrition rates continue to be very high (UNDP, 2015). Additionally the political, economic, social and cultural trends within the urban parts of India has not transformed substantially from 2005-06. Therefore the results from NFHS-III can be utilized to highlight the importance of maternal autonomy and health related awareness on child nutritional status.

The second limitation of the study is that it uses cross-sectional data. The study is therefore unable to predict causal inferences between the predictor and outcome variables. Although information was collected at previous time points, including 1992-1993 (NFHS-I) and 1998-1999 (NFHS-II), due to issues of high attrition and the aim to

only examine women who have at least one child between the ages of 0-5 years, the study was unable to utilize data from the previous years for a longitudinal analysis. This warrants for more timely data collection with low attrition rates in the future. Despite this limitation the current study achieves its primary aim to explore the importance of maternal autonomy and health-related awareness as a predictor of child nutritional status utilizing the cross-sectional data from NFHS-III.

The third limitation of the study is that it utilizes a secondary dataset for the analysis. Although the NFHS-III has many strengths including a nationally representative sample, information on health and family characteristics, anthropometric data on women and children, and high response rate, it limits the study's scope to explore various maternal caregiver behaviors that could be assets for positive child nutritional status. Currently the measurement of maternal autonomy and maternal health related awareness is limited by the variables that are available in the NHFS-III data. In order to fully understand positive deviant behavior of maternal caregivers, it would be imperative to collect primary data from communities within India. Thus, the lack of information collected specifically to meet the objectives of this study is a challenge that should be kept in mind while reading and interpreting the findings.

Implications for Policy, Practice & Research

Child Welfare Policy & Practice

India Child Welfare Policy & Practice: India accounts for the world's highest number of

undernourished children. Approximately one-third of the undernourished children in the

world, reside in India (World Bank, 2015). According to the most recent estimates by the

World Bank (2015), 60 million children have stunted growth as a result of poor nutrition

and care in India. All these children are denied their fundamental right to survival, growth

and development as stipulated by the Universal Declaration of Human Rights (UN

General Assembly, 1948), United Nations Convention on the Rights of the Child (UN

General Assembly, 1989) and India's Constitutional Fundamental Rights (GOI, 1950).

The poor health of children not only impacts their short and long term individual well-

being, but also has a detrimental impact on the development of their future generations

thus facilitating a vicious cycle of poverty and deprivation of a full life.

The current national nutrition program, ICDS, had a budget of approximately US

$2.4 billion to serve low-income children and mothers in 2012-2013. In addition to this,

India also receives support from various local and international non-profit organizations

to address child undernutrition. Despite this, India was unable to meet the Millennium

Development Goal target to reduce hunger and malnutrition rates by half by 2015 (GOI,

2015). As of 2015, approximately 33% of the child population in India still suffers from

issues of stunting and underweight. This indicates only a 19% decline in undernutrition

rates from 1990, when the proportion of underweight children was 52% (GOI, 2015). In

the light of the Sustainable Development Goals[13] 2015-2035 (UN General Assembly, 2015), that recommits each country, including India to improve the health and well-being of children, there is a need to recognize that prevailing practices are inadequate. There is a need to evaluate the effectiveness of current programs in place and to develop asset based interventions that identify innovative practices at community level in order to bridge the gaps in the current national, state and district level nutrition intervention programs. Best practices at the community and individual level can be learned not only from successful communities within India, but also from neighboring countries in South Asia, especially Bangladesh and Sri Lanka who have made substantial strides in the area of child and maternal well-being.

Additionally, attempts should be made by policy makers and practitioners to recognize the importance of social and cultural factors in determining nutritional outcomes of maternal caregivers and children. The social and cultural norms related to gender are deeply entrenched in the Indian society and its negative effects are manifested at the individual, household, community and national level. According to Osmani & Sen (2003) "Given the uniquely critical role of women in the reproductive process, it would

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[13] The United Nations General Assembly drafted a resolution on 29th December, 2014 to launch the Sustainable Development Goals (SDGs). The SDGs is the post-2015 development agenda for the United Nations. It has to be accepted and implemented by all countries that are members of the United Nations. The SDG has 17 goals and 169 targets, which build on the Millennium Development Goals (2000-2015) and aim to meet the targets that they were unable to. The 17 SDGs are as follows: (1) end poverty, (2) end hunger, (3) good health and well-being for all, (4) quality education, (5) achieve gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) promote industry, innovation and infrastructure, (10) reduce inequalities, (11) develop sustainable cities and communities, (12) ensure responsible consumption and production, (13) Action to protect the climate, (14) conserve and sustain life below water, (15) protect and restore life on land, (16) promote peace, justice and strong institutions, and (17) strengthen partnership to achieve the goals. More information on the SDGs can be found on https://sustainabledevelopment.un.org/?menu=1300

be hard to imagine that the deprivations to which women are subjected would not have some adverse impact on the lives of all-children as well as adults- who are "born of a woman" (pp. 106). Therefore, in order to effectively address the issue of child undernutrition in India, there is a need to make concerted efforts to dismantle gender inequality and deprivations of basic human resources due to it.

Global Child Welfare Policy & Practice: Child undernutrition is not only a human rights issue in India, but is a global phenomenon that is currently impacting more than 100 million children (UNICEF, 2013). The MDG Target 1.C that had committed to reduce child undernutrition rates by half globally by 2015, has failed to reach its goal (UNDP, 2015). This indicates that the current interventions that are in place at the global and national levels in various countries are largely ineffective. An asset-based approach that was introduced by Sternin (1990) could potentially prove to be an effective intervention plan to tackle undernutrition. The Positive Deviance (PD) approach is based on the following premises: (i) solutions to seemingly intractable problems exist already, (ii) the solutions have been discovered by members of the community itself, and (iii) these innovators (positive deviants) have succeeded even though they share the same constraints and barriers as others (Pascale et al., 2010, pg. 4). Thus the PD approach encourages researchers, policy makers and practitioners to attend to the individuals and households that are outliers and their outcomes are not necessarily in line with all other members of the community. Additionally, it challenges deep-rooted social norms and suggests that underlying complex social structures need to be addressed in order to find sustainable solutions to prevalent problems such as undernutrition. For example, the

current study highlighted how deep-rooted social norms in India, specifically, gender inequality need to be addressed in order to improve maternal health and child nutritional status. It results indicated that irrespective of socioeconomic status, maternal caregivers that had autonomy to make informed decisions regarding their health and that of their child, had positive heath outcomes, which indirectly had a favourable impact on the nutritional status of the children.

The current study findings suggested an important relationship between maternal health and maternal. Thus global efforts to address child undernutrition should also focus on improving maternal health before, during as well as after pregnancy. Attention should be paid to increasing access to education, health care, nutritious food, antenatal and postnatal care to women, specifically in regions with low gender equality. Additionally measures should be focused on improving autonomy and health related awareness amongst women, which indirectly has an impact on their health outcomes (Cunningham et al., 2015; Osmani & Sen, 2013)

Thus global concerted efforts need to be made by policy makers, practitioner and researchers to identify positive deviants in various communities that address undernutrition by utilizing innovative practices. These practices should then be incorporated at the international and national level to formulate an effective intervention plan that would support countries to improve maternal and child health outcomes.

Implications for Social Work Policy & Practice

The International Federation of Social Work (IFSW) defines the social work profession as "a practice-based profession and an academic discipline that promotes

social change and development, social cohesion, and the empowerment and liberation of people.

Principles of social justice, human rights, collective responsibility and respect for diversity are central to social work" (IASSW General Assembly, 2014). According to Ife (2008) the profession has a praxis orientation. This means that social work practice and education are interdependent and have a significant impact on each other (Ife, 2008). Therefore in order for social workers to effectively tackle child undernutrition, the topic has to be included in the education curriculum as well as practice.

Child undernutrition is an understudied topic in the area of social work. The majority of social work schools in the United States as well as internationally, do not focus on access to basic needs, such as nutrition, as a pressing issue in social work practice. This subject is mostly studied in the area of public health. However, there have been significant strides to integrate social work and public health in the last few years (Jackson, 2015). The person in the environment perspective provides social work professionals a unique lens to look at issues of child undernutrition. The Council of Social Work Education has recently voiced the need for social work educators to be more informed about food insecurity and child malnutrition and to make efforts to include it in their curriculum (CSWE, 2016). Social work foundation courses that are offered in all accredited social work schools, particularly human behavior in the social environment can be restructured to highlight the micro, meso, and macro levels protective and risk factors associated with child malnutrition and its short and long term impact. Additionally courses that focus on child development and welfare should have a section on child malnutrition, as it is interrelated with their physical, behavioral and cognitive

development. Lastly, a curriculum should be developed to specifically understand social, cultural, economic and political inequalities in various countries and how it impacts child well-being. The course content and assignments should not only be directed towards understanding the inequalities, but also the strengths and resources of the community through evidence-based practice. This will support the development of sustainable solutions that can be implemented by social work practitioners.

With regard to practice, social workers have the ability to develop interventions that are strengths based, culturally responsive and community inclusive (NASW, n.d.). As a profession that interacts with individuals, families, and communities on a day-to-day basis, social workers can lead the efforts to recognize innovative and unique practices that economically deprived households utilize to meet their nutrition needs. Additionally social workers at the grassroots level can collaborate with those at the macro policy level to develop effective evidence based interventions. Additionally, social workers can actively participate in eradicating child undernutrition by building strong partnerships with various other disciplines, including public health, medicine, and economics. By doing so, social workers can provide a unique lens to understand issues of maternal and child health by recognizing root causes that are deeply imbedded in the social, cultural, and political environment.

Implications for Future Research

Social work research can contribute vastly to understand complex social and cultural dynamics within societies that lead to detrimental outcomes such as child malnutrition and mortality. Efforts such as measurement development and action oriented

research can help bridge necessary gaps in the area of child welfare literature. These steps will inform policy development, restructuring and implementation at the grassroots levels. A detailed description of the steps are provided below:

Development of Measurement Scales on Maternal Autonomy & Maternal Health Related Awareness: The current study developed and validated scales on maternal autonomy and maternal health related awareness based on the data collected in the NFHS-III. Previous research has suggested that there is no universal scale that has been developed to measure maternal autonomy. Currently scholars including Dr. Ana Vaz (University of Oxford), Dr. Sabina Alkire (George Washington University) and Dr. Pierre Pratley (George Washington University) are in the process of developing a women's autonomy scale (Vaz et al., n.d.) that would measure the multiple dimensions of autonomy highlighted in various studies including education, household decision-making, economic independence, and family planning autonomy amongst others. However, as the current study has highlighted the important role of maternal caregivers in determining child nutritional status, a scale should be developed to specifically measure 'maternal autonomy' that impacts their ability to provide quality care.

Additionally, previous research has also provided substantial evidence that there is no scale to measure maternal health related awareness. Most studies utilize proxy measures such as literacy, school education, and awareness of reproductive health, amongst other single measures; to measure health related awareness (DeWalt & Hink, 2009; Gazmararian et al., 2003; Gelany & Moussa, 2013; Khreshesh et al., 2011, Kalichman & Rompa, 2000; Renkert & Nutbeam, 2001). Health literacy scales such as "Short Assessment of Health Literacy- SAHL" (Lee et al., 2010) and "Rapid Assessment

of Adult Literacy in Medicine- REALM" (Arozullah et al., 2007) are utilized to test health literacy of patients within hospitals in most developed countries. However, there is no validated scale that can measure the multi-dimensional aspects of maternal health related awareness in low resource communities cross-culturally. The current study is the first study that has developed and validated a maternal health related awareness scale utilizing the NFHS-III data. However, in order to measure the multi-dimensionality of maternal health-related awareness, there is a need to construct and validate a maternal health related awareness scale through primary research.

Conduct Primary Research: As noted in the limitations section, one of the drawbacks of the current study is that it utilizes a secondary dataset. To achieve a comprehensive understanding of unique maternal caregiver practices that can improve child nutritional status, despite financial constraints, there is need identify and gather first hand accounts from maternal caregivers within low resource communities that are achieving positive results. In order to do so, the first step is to conduct a study utilizing "Participatory Action Research" (PAR) techniques. PAR emphasizes on the role of collective inquiry and experimentation based on experience and history of the community where the research is taking place (Whyte, 1991). This qualitative methodology will help to gather knowledge about various strategies that are being utilized by 'positive deviant maternal caregivers' in various communities. It will also help to understand where maternal caregivers are exercising their autonomy and how it is impacting their health as well as that of their children.

Secondly, timely and frequent data needs to be collected to examine the impact of maternal characteristics on child nutritional status. The National Family Health Survey (NFHS) is currently the only nationally representative sample study that collects information on health and nutrition in India. The most recent data available from this study is from year 2005-2006. The Government of India, Ministry of Statistics and Programme Implementation and the Ministry of Women and Child Welfare have been ineffective in timely collection and analysis of data on child and women health. Therefore, measures need to be taken to improve the quality of national and regional level data available to effectively track trends regarding child nutritional status.

Develop New Conceptual Model of Intervention for Child Undernutrition: The UNICEF (1990) model of care was the most comprehensive conceptual model that was developed to understand direct and underlying factors impacting child growth and development. Most studies to date have utilized this model to design and evaluate interventions for child survival, growth and overall well-being (Engle et al., 1999; Smith et al., 2000; Smith & Haddad, 2000). Although it provides a comprehensive framework, it does not offer an asset based approach. In order to effectively deal with the pervasive issue of child undernutrition that is impacting millions of children around the globe, there is a need to reconceptualize this model. This reconceptualization should be based on Sternin's (1990) idea of positive deviance, which suggests that members of the community that are suffering from persistent social injustices have already identified solutions for these problems (Pascale et al., 2010). A cross-cultural analysis should be conducted to gather information on unique and innovative practices of low-resource communities that

successfully tackle child undernutrition. The factors influencing these practices, such as caregiver, household, community and individual level characteristics should be examined. Based on the findings, a new model of intervention to address child undernutrition should be developed. The effectiveness and generalizability of the model should be tested through pilot studies in low-income communities in India as well as other low and middle-income countries. The new model of care will be more effective as it will take into account practices of local communities and will also recognize the social and cultural factors that might influence them.

Conclusion

While child undernutrition is a deeply rooted problem in India, approximately 165 million children around the globe also suffer from it. Undernutrition perpetuates a vicious cycle of poverty as it denies millions of children an opportunity to have good health, which in turn impacts their educational achievement and overall functioning during childhood. This leads to poor physical, cognitive and behavioral development during adulthood, impacting the next generation's health as well. Thus, in order to develop a healthy community, nation and world it is imperative to eradicate the undernutrition epidemic. Although income is an important predictor of child nutritional status, maternal autonomy and health related awareness help get to the root of the nutrition crises. Maternal caregivers that have autonomy and health related awareness are empowered to make informed decisions about their own health as well as that of their child. The maternal caregivers therefore not only have good health, but also are capable to birth healthy children and provide quality care to them.

The steady rates of undernutrition call for a reevaluation of current policy and practices addressing child health. Given the important role of maternal caregivers to determine child health, there is need to develop policies that dismantle gender inequalities and provide services to improve their general health awareness and autonomy. In order to develop effective interventions, policy makers, social workers and researchers have to make collective efforts. Additionally, it is imperative to partner with communities that have successfully addressed child undernutrition, in order to understand local innovative solutions. Only if we redefine our approach to undernutrition, by addressing the causes, particularly deep-rooted social inequalities rather than the consequences of undernutrition, will we be able to fully eradicate child undernutrition and break the cycle of poverty.

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