

Impact of Maternal and Paternal Education On Child Health and Nutrition: An Empirical Investigation of a Semi-Arid Tropical Indian Village



Shraddha Batra
World Food Prize Foundation
2011 Borlaug-Ruan International Intern

International Crops Research Institute for the Semi-Arid Tropics
Patancheru, Andhra Pradesh, India



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Introduction

1.1 Personal Remarks

In October of 2008, I received the opportunity to attend the World Food Prize Foundation's Global Youth Institute as a high school freshman. My introduction with the World Food Prize and its remarkable initiatives, however, began at an early age when my older sister was a Borlaug-Ruan International Intern in Taiwan. As a naive twelve year old at the time, I could not comprehend the depth of the phenomenon occurring before my eyes. As Ambassador Quinn would later explain to my parents before my own internship, "When she gets on that plane, the same person is not coming back." It was not simply Hemali's final research report or presentation that ultimately proved to me the significance of her internship. Rather, it was the social transformation she endured as an individual from an accomplished, yet simple, high school student to a passionate and committed adult, dedicated towards alleviating the world's most pressing problems which inspired me to partake in the World Food Prize Foundation's programs.

Attending the 2008 Global Youth Institute was the most enriching experience I have had in my high school career. It first engaged me in serious discussions of food security with not only development practitioners and policy-makers, but also other students. I was immediately captivated by the speakers who had so passionately dedicated their lives towards this common vision of achieving food security within the world. Listening to the previous year's interns present their summer experiences, I sat in awe and simply marveled at their life-changing journeys. In turn, this single act of participation inspired me to take action as well to address this critical global challenge.

After co-founding a non-profit development organization dedicated towards collaborating with African communities, I questioned how one can effectively empower and educate others in the field of development without achieving first-hand experience. In the field of international development, I had only been exposed to "top-down" approaches for improving food security by reading policy reports published by bilateral agencies and intergovernmental organizations. I sought to gain a first-hand understanding of the dynamics of socioeconomic challenges and the effects of development programs and policies; therefore, with this thirst for knowledge, I applied for the Borlaug-Ruan International Internship during my junior year of high school.

Upon completing the application and selection process, I was absolutely thrilled to find that I had been selected as a 2011 International Intern at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in Patancheru, India. I truly cannot express my appreciation for both the Global Youth Institute and the Borlaug-Ruan International Internship which have collectively altered every aspect of my life and fueled my passion for pursuing international development in the future.

1.2 International Crops Research Institute for the Semi-Arid Tropics

Founded in 1972, ICRISAT is a nonprofit organization which seeks to achieve a “prosperous, food-secure, and resilient dryland tropics.” The semi-arid tropics, home to more than 2 billion individuals across 55 countries, is plagued by the unfortunate effects of a heightening population and limited agricultural productivity caused by highly variable rainfall output and poor soil quality. With more than 644 million individuals suffering from these dire consequences, ICRISAT empowers these people to overcome their conditions through improved agricultural techniques and practices to achieve sustainability.

ICRISAT conducts its research through four Global Research Themes: Crop Improvement and Management, Agro-ecosystem Development, Harnessing Biotechnology, and Markets, Policy, and Impacts. Collectively, these development programs seek to “reduce poverty, increase agricultural productivity, enhance food and nutritional security and protect the environment of the dry tropics.”

This summer, I had the opportunity to research in the Markets, Policy, and Impacts Department headed by Dr. MCS Bantilan. As stated by the Global Theme’s research agenda, the MPI Department has delineated four key areas for harnessing development pathways for inclusive prosperity: 1) “Strategic assessments for agriculture and economic growth in semi-arid tropics of Asia and Africa, and its implications for agricultural research priorities; 2) Development pathways and policies for rural livelihoods; 3) Market studies, situation outlooks and institutional innovations; and 4) Impact assessment and research priority setting.”

With its headquarters in India, ICRISAT’s operations have also rapidly expanded to countries in Sub-Saharan Africa. Presently, ICRISAT has four country offices and two regional hubs in Sub-Saharan Africa. Additionally, it is one of sixteen international agricultural research centers that is funded by the Consultative Group on International Agricultural Research (CGIAR).



Background

Adequate nutrition during infancy is the pivotal stepping-stone for development and assurance of an individual's well-being. It is with this pursuit that the United Nations established the Millennium Development Goals in September 2000, making the eradication of extreme hunger and poverty by 2015 the number one goal (UNMP). The current reality, however, is still in the midst of development of achieving this goal as an estimated 925 million hungry individuals still remain, as cited by the Food and Agricultural Organization in 2011. The frequency of infant mortality and the number of children plagued by the fatal effects of disease and malnutrition have heightened significantly in the past decade around the world, and the situation in India is certainly no exception. The prevalence of malnourished and underweight children in India remains among the highest in the world, with rates that are nearly double that of Sub-Saharan Africa (World Bank). In fact, India is known to have the highest underweight prevalence among adolescent girls (UNICEF 2011). What is even more pressing in this matter is the fact that a majority of infant deaths arise from preventable illnesses such as diarrhea, typhoid, and malaria in addition to malnutrition.

Education remains one of the most of the significant elements influencing health and nutritional practices within a household. Several years ago, it had even been argued that although medical advances and health care services are essential, additional social and economic transformations such as education, are the principal driving forces in the decline of infant mortality rates (UNFPA). Today, education levels have heightened across India, making it one of the several distinguishing changes villages have been experiencing. The 2001 census illustrated the increase in literacy rates in India, with a status of 65% literate population (National Portal of India). In Andhra Pradesh, itself, the literacy rate is currently 50% (National Portal of India).

Better parenting, earnings, and access to skilled work are among the many pathways through which child nutritional status can be influenced by parental education (Tin Bergen). This paper seeks to analyze and examine these pathways through which parental education may possess benefits within households in a study village of India's SAT.

The works of Patricia Day Bidinger, Kim Chung, Walker and Ryan, and many others in the past several decades have shed light upon the socioeconomic realities in the Semi-Arid Tropics (SAT) of India. From analyzing the impacts of the prolonging food security crisis to the identification of the health and nutritional situation in villages across southern India, I initiated this research primarily in response to the trends and findings by the work of these individuals. This paper seeks to explore the effects of maternal and paternal education upon the child health and nutritional status in SAT India. In addition, it illustrates the current health and nutrition situation in the study village and compares it to statistics and findings of the past. Collectively, it illustrates the current socioeconomic dynamic roles within the study village. In turn, this research will be utilized as the basis for the development of ICRISAT's future health programs.

2.1 Objectives

The broad objective of this study was to quantify the impacts of parental education upon the child health and nutritional status of children in a village of SAT India.

The four main objectives this research study sought to investigate were:

- To investigate the nutritional status of young children across education level and class.
- To examine the nutritional awareness and the infant feeding practices followed within the study village
- To understand the sanitary and personal hygiene practices followed within the village across gender and education level.
- To study the parental awareness of contagious and non-contagious diseases and the role of parents in health decision-making processes concerning children

2.2 Hypotheses

Four hypotheses were formulated for this study, in parallel to the study's objectives.

- **Broad Hypothesis:** Maternal and paternal education offer significant positive, yet independent, benefits upon child health and nutrition. Due to the fact that mothers are the primary caregivers within a household, it is likely that their correlation with the nutritional status of children is statistically more significant than that of the fathers.
- **Objective 1 Hypothesis:** Literate parents have more children within the normal BMI range for their age than do illiterate parents. Across class, those individuals who are from large landholding households will have a majority of children within the normal range of BMI.
- **Objective 2 Hypothesis:** Since the 1980s, greater awareness, education, and counseling has been provided within the village regarding nutritional deficiencies and common diseases. As a result, it is very likely that individuals are consuming more nutritious food items such as green leafy vegetables within their diets.
- **Objective 3 Hypothesis:** The initiation of toilet production under governmental schemes has caused a slight decrease in the number of individuals defecating outside, and there has been a greater awareness in the importance of utilizing proper hand-washing techniques.
- **Objective 4 Hypothesis:** The implementation of a considerable number of medical services within the village has enabled access to health and nutrition counseling, giving rise to a greater number of individuals who are cognizant of common contagious and non-contagious diseases. Overall, the adoption of preventive health services has effectively declined, or significantly decreased, the rampant behavior of prevalent

diseases present in the past several decades. Also, health decision-making processes concerning children are performed by parental figures within the household. As the prevalence of HIV/AIDS has increased within the past decade, it is also quite reasonable to predict that the education of such serious illnesses has significantly increased.

2.3 Methodology

The study was conducted in the Dokur village of Andhra Pradesh in July 2011. The Dokur village was selected for this study, as the presence of a health clinic within the village enabled access to medical history and health information regarding individuals in the village. Three examination processes were utilized to achieve the delineated study objectives. These examinations entailed interactions through individual interviews and focus group discussions within the village. In addition, an analysis of the 2010 ICRISAT data collected in the General Endowments Survey had to be analyzed to gain a thorough understanding of the socioeconomic situation in Dokur.

Exactly forty individual interviews were administered for the study. A random sample of men and women were surveyed during the individual interviews, with a primary emphasis upon VLS participants. VLS, or Village Level Study, participants are individuals whose progress is tracked through ICRISAT's database system, allowing researchers to assess trends and patterns in villages over time. Altogether 36 individuals were VLS participants and four were Non-VLS participants in the study. Caste, age, and landholding status were not given preference, as the sample was collected randomly during the given time. Respondents were presented with multiple-choice questions which assessed their health knowledge in the areas of: sanitation, nutrition, personal hygiene, health decision-making, infant feeding practices, and diseases. I devised a specific health questionnaire to administer particularly for this study after a thorough examination of literature, as well as reference to health questionnaires previously designed by institutions such as BRAC.

Upon reviewing the data acquired from this health questionnaire, the education level of each respondent was compared to the anthropometric data of the respondent's children to evaluate whether any scholastic influences of this health knowledge exists upon the health and nutritional status of children. The Indian Academy of Pediatrics/World Health Organization standards were utilized for the data analysis, and the BMI for age was calculated. In addition, the National Institute of Nutrition-Hyderabad mean averages for height, weight, and arm circumference were also referenced for comparison of the data.

The focus group discussions, comprised of approximately twelve to fifteen individuals, enabled access to supplementary data to gain a full understanding of practices within the village. It allowed all individuals to reflect upon both prolonging issues, as well as significant improvements that have affected the village over the course of the past several decades. Two separate focus group discussions were conducted: one with women, and one with men. Doing so provided extensive insight on the similar and differing perspectives of certain issues and the overall village dynamic roles in Dokur. The primary topic of the women's focus group discussion pertained to food consumption and understanding these decisions made by parental

figures within a household. For the men's focus group discussion, a greater emphasis was placed upon the health, food, and economic influences that arise from household migration. The common theme that was examined in both focus group discussions concerned the reliability and effectiveness of medical treatment and its influence upon health decision-making within households. To attain supplementary data to complement these findings, a meeting was held with the Institute for Rural Health Studies (IRHS), the local clinic in the Dokur village.

Additionally, secondary resources and ICRISAT's VLS data from the General Endowments Survey of 2010 was referenced and utilized in this study.

2.4 Limitations of the Study

Due to time constraints presented, the study was restricted to solely the Dokur village. Had time been permitted, greater comparisons would have been made between other villages in SAT India to assess whether the conclusions in this study are applicable to other regions, as well. Ideally, the study would also have been conducted in a village of Maharashtra, in addition to Dokur. This would have served a dual purpose, as a much greater sample size could have also been achieved for the study.

Additionally, Dokur is plagued by the effects a prolonging drought, leading to an abundance of households migrating across a multitude of regions in India. As a result, numerous individuals were unable to participate in the study conducted. Also, there were several families in which only one parental figure was present to interview at the time. This restricted an analysis of results per each household and, therefore, had to be conducted through a holistic perspective of maternal and paternal figures in the village.

I also recognize that many of my observations were primarily qualitative. I developed this particular study in response to the research performed by previous scientists of the MPI Department, such as that of Patricia Day Bidinger and Kim Chung. Prior to the initiation of my study, Patricia Bidinger was the only individual to have studied factors aside from food affecting ICRISAT's study villages in a comprehensive manner. This had taken place during the 1980s and served as the basis for my comparisons. Thus, I had to gain an understanding of the current situation within the study village through qualitative observations. Had time permitted me to do so, I would have placed an emphasis on one of the study areas to quantify the impacts of parental education in an in-depth manner.

In addition, an analysis was only made between the effects of maternal and paternal education upon the child health and nutritional status within the village. For future improvement, an examination of the effects caused by other figures within a household such as grandparents should also be studied.

Dokur Village Profile Summary



Figure 1. The road map to Devarkadra mandal in Mahabubnagar district, where Dokur is situated.
Source: Maps of India, <http://www.mapsofindia.com/maps/andhrapradesh/districts/mahabubnagar.jpg>

3.1 History

The Dokur village is a part of the Mahabubnagar district in the state of Andhra Pradesh. The district of Mahabubnagar was once ruled by the Qutub Shahi dynasty (1520-1687) and the Asaf Jahi dynasty (1724-1948) before it was officially taken over by New Delhi in the year of 1948. Formerly known as “Dakur”, the Dokur village was under the supremacy of the Nizam of Hyderabad throughout the later part of the 17th century.

3.2 Present

Today, Dokur is located within the Devarkadra mandal of Mahabubnagar, which is known to be the largest district within the Telangana region and the second largest in Andhra Pradesh today. Contrary to its widespread population rise, it is considered to be the most backward district in Andhra Pradesh as it exhibits extreme poverty, low agricultural productivity, and poor literacy rates. However, agriculture remains to be the predominant means of livelihood in Dokur. Major crops grown in Dokur include: paddy, castor, and groundnut. Sorghum is also grown in considerable amounts, but pulses are grown meagerly.

In 2007, the total population in the Dokur village was 2816 people with an average family of 5, approximately a 60% increase since 1975 in which the population was 1783 individuals (Dokur Village Profile). Five major castes exist with Dokur---Forward Caste (FC), Backward Caste (BC), Scheduled Caste (SC), Scheduled Tribe (ST), and Minority.

Table: Distribution of households by caste and category, 2007

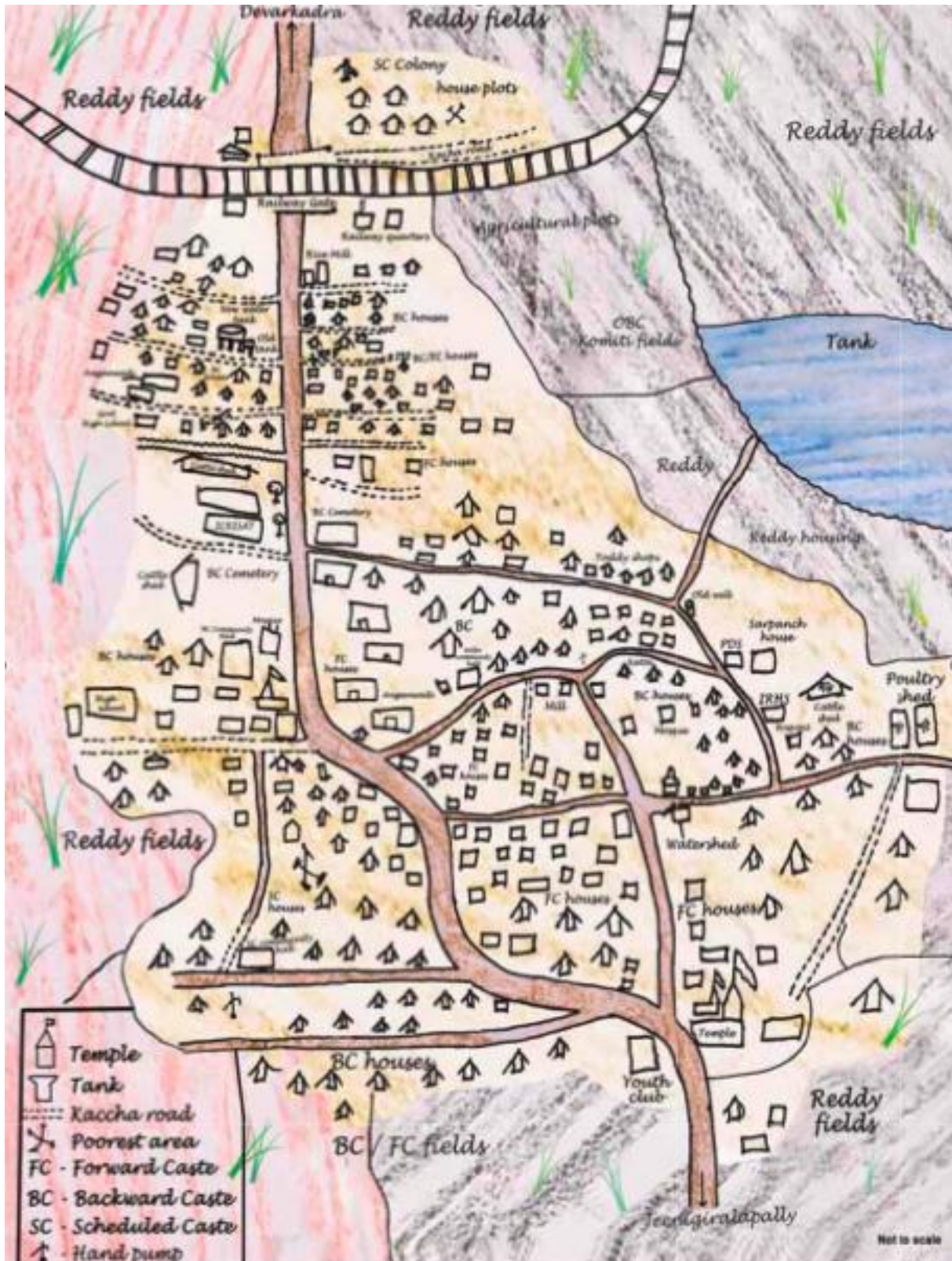
Caste	No. of Households	Percentage of households
Forward Caste	94	18.11
Backward Caste	345	66.47
Scheduled Caste	71	13.68
Scheduled Tribe	2	0.39
Minority	7	1.35

Due to the implementation of government-sponsored school education facilities in recent years, the educational opportunities have remarkably improved in the village. The literacy rate in 1975 was a mere 16%, and the situation drastically changed to 60% by 2001. Overall, the educational efforts by the government have been fruitful for Dokur.

Much like the rest of the SAT region, Dokur experiences a very hot season between the months of February and mid-June, and the winter season takes place between November and January. Perhaps the most distinguishing feature of the study village pertains to the existence of persistent droughts. As a result, agricultural households have resulted in attaining low crop-based incomes. This poor economic condition of farmers, coupled with the effects from lack of employment opportunities within the village, has led to a substantial number of families migrating across regions in India. These households seek non-farm employment opportunities such as driving, cable-work, construction work, and caste occupations (Male Focus Group Discussion). Several individuals, mostly men, migrate independently for employment while others relocate with their families, collectively.

Figure: A Social Map of Dokur Village

Source: Gandhi 2008



Nutritional Status

4.1 Introduction and Review

During the 1980s, Dr. Patricia Day Bidinger had utilized anthropometric data to analyze the nutritional status of children within the study villages. Anthropometric data refers to measurements of the human body with indices for weight, height, and arm circumference. It is a prime assessor of the health and dietary status of children and adults, indicating deficiencies that may exist and possible risk of certain diseases. For young children and infants, anthropometric data ensures a better understanding of growth and development trends over time.

Dr. Bidinger's anthropometric data was grouped from children between the ages of 1-4, 4-6, 7-12, 13-18, and adults 19 years or older. She had found that children between the ages of 7-12 years had the lowest mean weight for age, and children of age 13-18 years old were acutely underweight.

Table: Mean percent of standard anthropometric measurements obtained by select age groups in six villages, (Source: Patricia Bidinger)

Age (in years)	Number	Weight for age	Weight for height	Height for age	Arm circum.	Triceps thickness
1 to 3	53	78	85	90	82	79
4 to 6	58	78	89	92	84	78
7 to 12	82	73	85	93	82	69
13 to 18	69	76	92	93	84	62
19-86	356	81	77	95	79	49

In addition, she found deficiencies in vitamin A and B. In Dokur, a large presence of protein deficiency among children aged six or less was found.

Number of children examined	116
Number of children with 1+ deficiency signs	49
Percentage of children with deficiency signs	42.2
No. of children with vitamin A deficiency	17
No. of children with B complex deficiency	36

Dr. Bidinger's anthropometric findings were indicative of the typical diet exhibited in Dokur at the time. Andhra Pradesh villages are heavily reliant upon cereals, specifically rice, which comprise roughly 85% of the total calories. When rice prices escalate, sorghum is used to supplement the diet. During that time, diets were significantly low in iron, carotene, vitamin A, and riboflavin. As a result, anemia and progressive eye damage were quite prevalent.

Presently, rice is still considered to be the staple food in Dokur and pigeonpea is the most commonly consumed pulse. There has been an increased consumption of fruits, vegetables, pulses, milk products, and meat within the village. Sorghum is eaten in small quantities, and most households are reliant upon food grains.

4.2 Findings

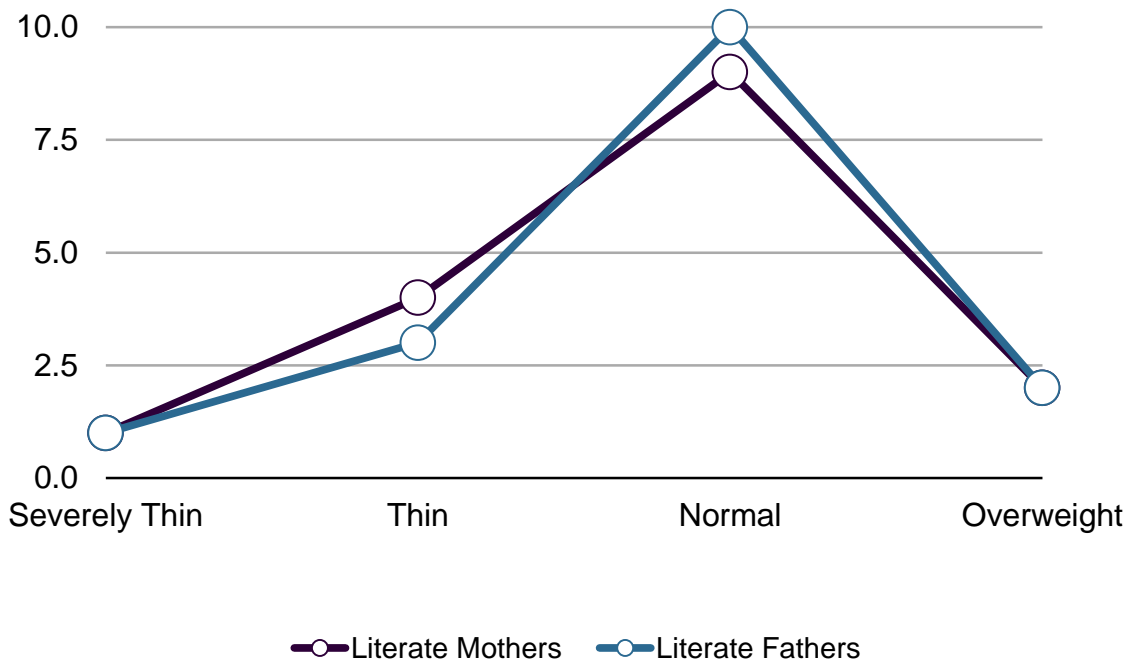
Though the Gomez classification was not used as it had been in Pat Bidinger's study, the Indian Academy of Pediatrics/World Health Organization standards were utilized to calculate the BMI for age of each respondent's child. Afterwards, the data was compared to the literacy level of each child's parents.

Table : Parental Literacy and Child BMI Status

BMI Status	Literate Mother	Illiterate Mother	Literate Father	Illiterate Father
Severely Thin (5)	1	4	1	4
Thinness (3)	3	0	2	1
Normal (30)	12	18	13	17
Overweight (1)	1	0	1	0

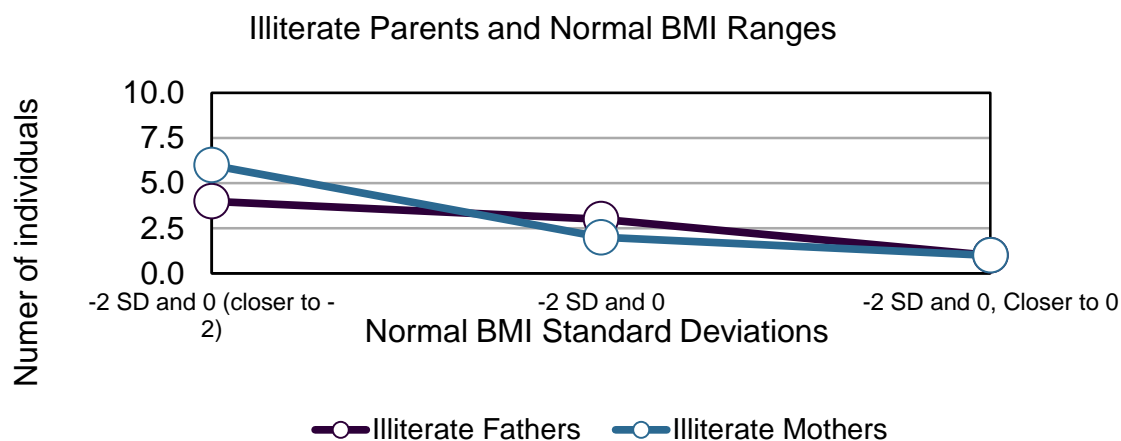
Across literacy levels, a majority of individuals had children within the normal BMI range for age.

Chart: Parental Education and BMI Status



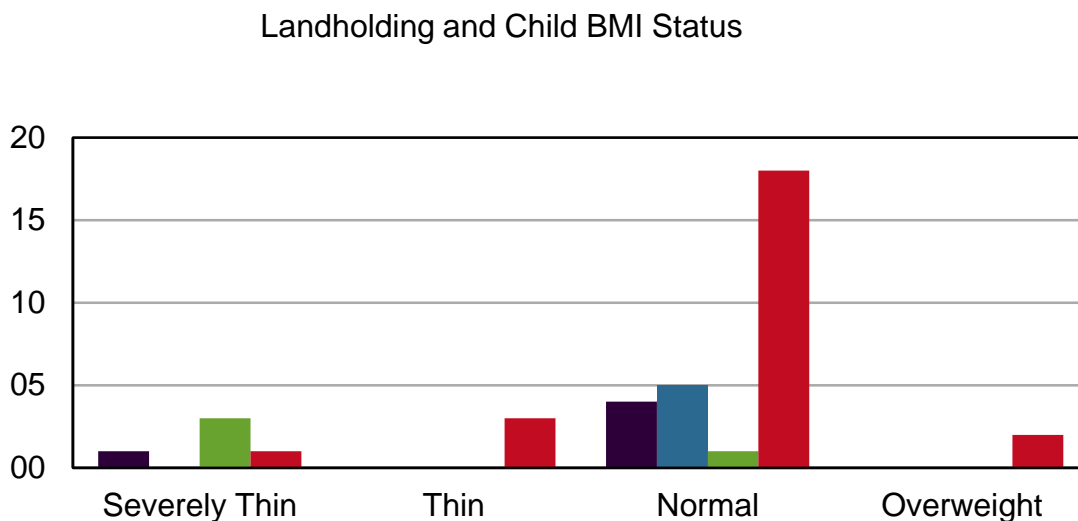
Although most individuals were within the BMI range regardless of the parental literacy level overall, a greater examination was made of normal BMI children with illiterate parents. Most children were closer to the -2 standard deviations and 0, signifying a BMI much closer to thinness than within normal means.

Chart: Illiterate Parents and Normal BMI Ranges



Overall, household caste had no significant impact upon child BMI status. Landholding status, however, correlated with the child anthropometric data. Most large landholding households had children within the normal BMI range and above. However, other landholding sized households also had children within the normal range, as well.

Chart: Landholding and Child BMI Status



When taking a further examination of children between birth to six years of age, parental literacy had shown an impact upon the height and weight measure. The National Institute of Nutrition-Hyderabad mean standards were used to compare the data. The following chart illustrates the occurrence in which all children whose parents were literate and met the weight and height requirements for their age, in comparison to those of illiterate parents in which no individual met the requirements.

Chart: Parental Literacy and children from 0-6 years of age

Child Gender	Literate Parents	Number	Meets height/weight requirements
Male	Yes	3	3
Male	No	5	0
Female	Yes	4	4
Female	Yes	4	0

Nutritional Awareness

5.1 Introduction

Inadequate child nutrition is not solely derived from poor economic conditions or insufficient access to resources within a region; it can also result from a lack of nutritional awareness. According to the Ministry of Women and Child Development, nutritional education and extension is known to be a significant long-term sustainable intervention in lessening the issue of malnutrition, as well as in heightening the nutritional status of individuals within a country altogether. Thus, it is of pivotal importance to recognize the nutritional awareness of individuals to discern what matters in education must be further emphasized within an area.

In the study village, knowledge tests concerning nutritional awareness were not presented in the past; therefore, a baseline for comparisons in improvements over time could not be utilized.

5.2 Findings

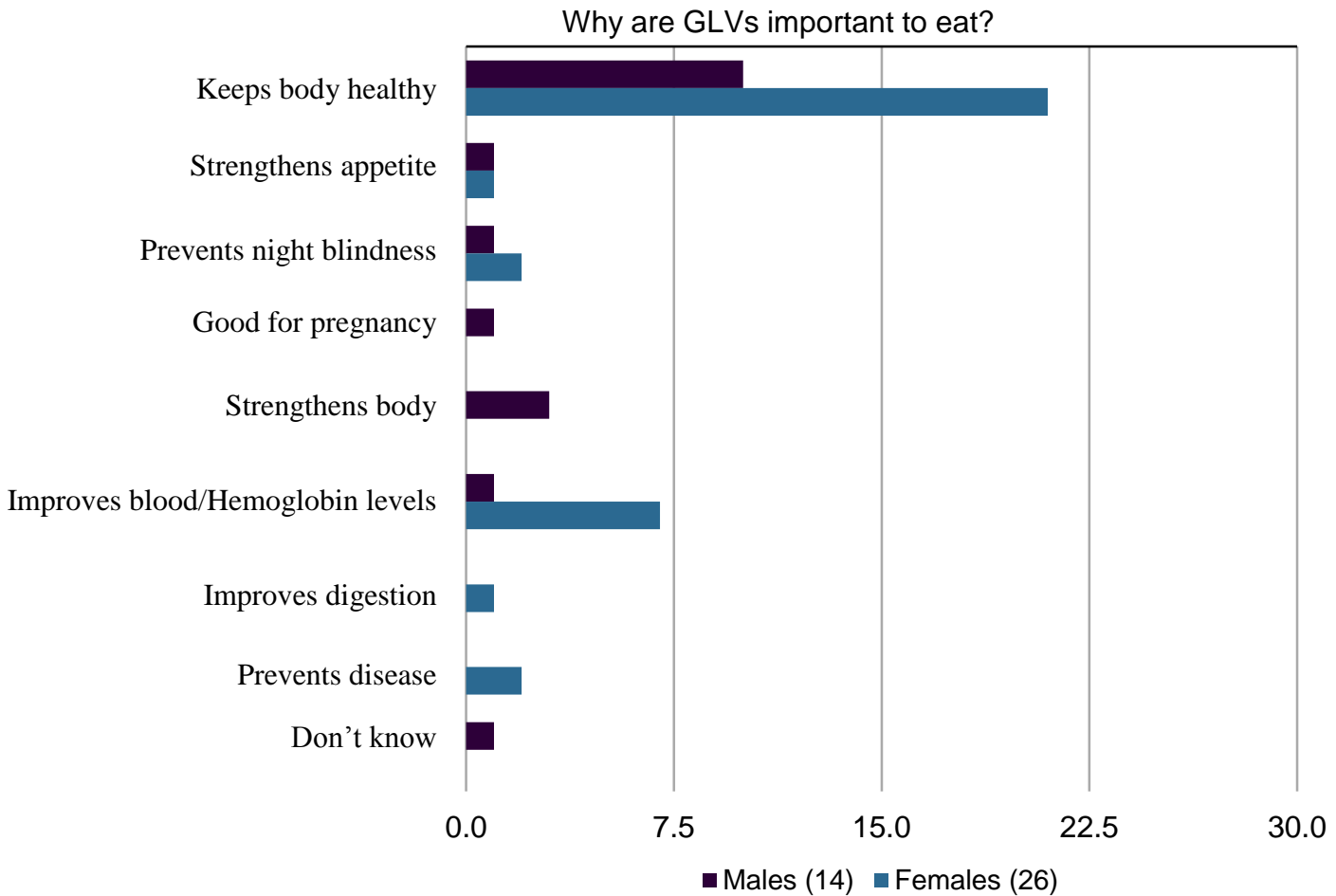
All forty VLS and Non-VLS respondents were asked a multitude of questions pertaining to nutrition, with an emphasis placed upon recognition of healthy food items and nutritional deficiencies. A comparison was between male and female respondents, as well as literate and illiterate respondents.

Green leafy vegetables are perhaps one of the most beneficial food items to be consumed within a diet. They are a notable source of iron, calcium, fiber, potassium, beta-carotene, and magnesium.

Therefore, they are ideal foods to be eaten to combat vitamin deficiencies and to reduce the risk of a multitude of diseases. In an area such as Dokur, where less variety and more deficiencies exist within a diet, green leafy vegetables are a superior source of food. During the time in which Dr. Bidinger conducted her research, strong misconceptions had existed regarding the importance of green leafy vegetables. “Green leafy vegetables were eaten on an average of fewer than once in three weeks. In reality, they are almost all consumed by the landless laborers in the villages as greens are considered to be food for the poor only (Bidinger).” Presently, the consumption rate of GLV’s has increased significantly to 95% of respondent households integrating these items within the diet at least one to two times a week every one to two weeks.

When asked why green leafy vegetables are important to eat, most respondents were able to identify that it keeps the body healthy. The nutritional knowledge of this food item is high among both men and women. Among the literate respondents, almost 15% of individuals were able to associate green leafy vegetables with preventing night blindness and improving blood and hemoglobin levels, in addition to keeping the body healthy and strengthening the body.

Chart: Awareness of GLV Importance



Additionally, I was able to prove that the misconception regarding landholding class and GLV consumption does not exist currently today by analyzing consumption rates. Though respondents from the large landholding class were the most representative to current GLV consumption, small, medium, and landless households also exhibited this occurrence equally.

Overall, the awareness of which foods contain iron is lacking, though a few individuals were able to cite green leafy vegetables. No significant difference was found in the response among illiterate or literate individuals. However, when asked why it is important to consume foods that contain high levels of iron, a few literate individuals were able to cite that it prevents anemia, increases work capacity and learning ability, and improves breathing. Though still very minimally, women were able to recognize more of these responses than men.

Table: Importance of Iron intake-Men

Response	Number	Percentage
Shortness of breath	1	7%
Don't know	13	93%

Table: Importance of Iron intake-Women

Response	Number	Percentage
Anemia prevention	1	4%
Shortness of breath	1	4%
Increased work capacity	1	4%
Don't know	24	92%

When asked which foods contain high levels of protein, respondents were able to recognize chickpeas, pigeonpea, eggs, milk, and butter as primary sources. Though 80% of all respondents were unable to provide examples of such food items.

The same phenomenon exists when examining responses to why it is vital to consume food items that are high in vitamin A. Across gender and education level, most individuals were unable to provide a response though 7% of individuals were able to recognize night blindness as a consequence of vitamin A deficiency from each group, respectively.

Infant Feeding Practices

6.1 Introduction

According to the World Health Organization, “undernutrition is associated with 35% of the disease burden in children under five.” Infant feeding practices not only influence the nutritional level of a child directly, but also significantly affect the well-being of the child in the future. In fact, proper infant feeding practices are so pivotal that the lives of approximately 1.5 million children under the age of five could be saved each year (WHO). Thus, it is of critical importance to practice proper breastfeeding and complementary feeding practices. These include: an early initiation of breastfeeding and duration for up to two years or longer, along with supplementary feeding by the time of six months (WHO). Failure to do so can possess serious consequences for children. According to a study performed by the Indian Journal of Pediatrics, “delayed initiation of breastfeeding, deprivation from colostrum, and improper complementary feeding are significant risk factors for undernutrition among under five children.”

6.2 Summary of the Past

During the 1980s, Patricia Day Bidinger had studied the infant feeding practices followed within India’s SAT villages. In Dokur, a later initiation of breastfeeding practices was found in first-born children. Nearly every mother began to breastfeed the child on the third day onwards after delivery. In later-born children, however, an earlier commencement of breastfeeding was observed.

Table 7: Onset of breastfeeding for first child; (Source: Bidinger)

Day	Percentage
Day 1	3%
Day 2	3%
Day 3	94%

Table: Onset of breastfeeding for subsequent children; (Source: Bidinger)

Day	Percentage
Day 1	50%
Day 2	44%
Day 3	6%
Day 4	0%

A majority of infants were provided supplementary feeding by the age of one, primarily consisting of soft rice. However, the delay in its consumption contributes to the presence of several vitamin deficiencies at a young age.

Table: Age at introduction of first solid food; (Source: Bidinger)

Age in months	Percentage
1 to 6	0%
6 to 9	12%
9 to 12	62%
12 to 16	26%
18 or greater	0%

Prolonged breastfeeding was also found to be extensive throughout Dokur, as it was cited that fewer than 20% of mothers stopped breastfeeding their last child by the age of two (Pat Bidinger).

6.3 Findings

Over the past several years, infant feeding practices have been influenced by both governmental schemes and long-standing cultural beliefs. For the past seven years, the awareness of the benefits of colostrum consumption has significantly heightened due to the counseling provided by the Anganwadi programs (Women’s Focus Group Discussion). Initiated in the year of 2008, the Anganwadi programs seek to improve the health and nutritional status of young children, women, and adolescent girls (Dokur Village Profile). To achieve this, the program administers supplementary nutrition programs, educates pregnant and lactating women, provides access to a community health worker, supports infants, assists dropouts in re-entering formal education systems, and provides health care for children below the age of six (Dokur Village Profile). Prior to the implementation of the Anganwadi scheme, the awareness of the importance in providing colostrum to children was not present in women. As a result, approximately 30% of the 36 respondents in the study are providing or have provided colostrum to their children, causing an earlier onset of breastfeeding practices. Colostrum, which is high in protein, minerals, vitamins, and immunoglobulins, provides passive immunity to the baby as it protects it from an array of illnesses. Thus, it is known to be one of the most beneficial components of proper infant feeding practices.

A majority of mothers are breastfeeding during the range of one to years, followed by the range of two to three years. Approximately 40% of mothers provided supplementary feeding during the time of eleven to twelve months. The supplementary food given primarily consisted of soft rice,

additional sources of milk, biscuits, and Cerelac. Additional sources included fruits, chai, sorghum roti, and eggs.

Literacy had a minimal effect upon infant feeding practices, overall. Approximately 43% of literate mothers provided colostrum to children, though most of them also began child supplementary feeding at the age of one year. They, too, breastfeed their children primarily for the duration one to two years.

Table: Duration of breastfeeding, 2011

Response	Number	Percentage
7 months	1	3%
8 months	1	3%
11 months	1	3%
1 year	5	14%
1.5 years	6	17%
2 years	10	28%
2.5 years	2	6%
3 years	8	22%
4 years	1	3%
5 years	1	3%

Table: Initiation of supplementary feeding, 2011

Duration	Number	Percentage
3 months	1	3%
6-7 months	9	27%
8-9 months	8	24%
11 months-12 months	13	40%
2 years	1	3%
4 years	1	3%

Sanitation and Personal Hygiene

7.1 Introduction

As cited by UNICEF in 2010, “almost fifty percent of the developing world’s population - 2.5 billion people - lack improved sanitation facilities, and over 884 million people still use unsafe drinking water sources.” Poor sanitation and personal hygiene practices are detrimental to a society, as individuals become more prone to acquiring critical communicable diseases. In fact, the World Health Organization cited that, “Over five million children per year die from illnesses and other conditions caused by the environments in which they live, learn, and play.” Thus, it is of pivotal importance to improve the access to safe water and sanitation services within countries of the developing world.

7.2 Summary of the Past

During the 1980s, the poor sanitation, water, and hygiene levels within Dokur had critical repercussions. In all of India’s SAT villages except for Dokur, specific areas had been set aside for defecation. In Dokur, however, it was found that defecation was carried by stagnant water ponds near every three to four houses (Pat Bidinger). As a result, diarrheal episodes and other infections were rampant throughout the village.

Table: Standards of local housing, (Source: Patricia Bidinger, 1980s)

Good	Fair	Poor
19%	68%	13%

Most villagers acquired water through domestic wells, 9 to 18 meters in depth. Water would have to be dug by hand, and most wells were between 30 to 50 years old. In Dokur, ten wells existed during that time, providing 148 individuals access to water. Altogether, water and fecal contamination were extensively prevalent. A bacterial examination performed during that time indicated the pervasiveness of coliform bacteria, illustrating a high degree of contamination.

Several years afterwards, the sanitation situation began to alter as more facilities became available. The village has provided access to an overhead tank that supplies safe drinking water to all households (Dokur Village Profile). By 2008, approximately a third of the households owned a toilet facility in their homes, generally of the pit type without a water connection, as a result of governmental schemes within the village. 110 of the 313 households at the time benefitted from the scheme.

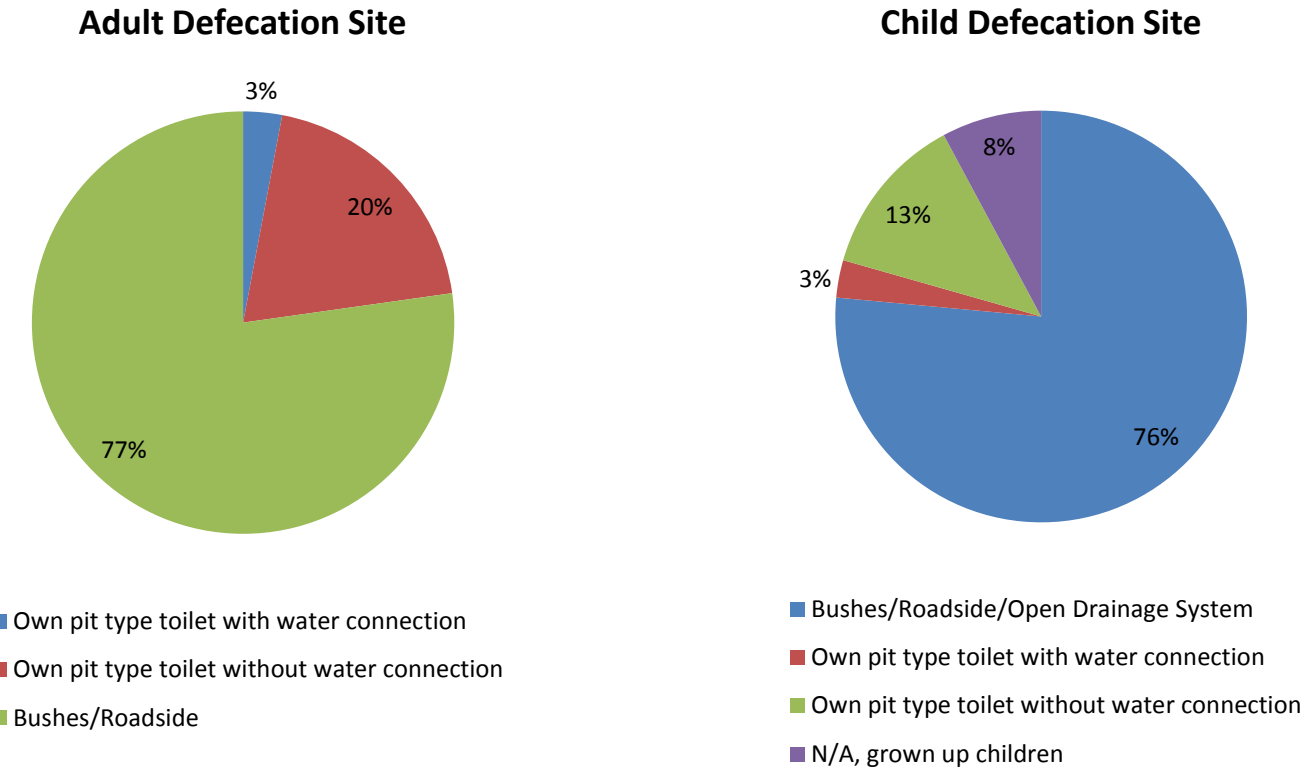
7.3 Findings

Though the access to defecation facilities has risen over the past several years, the sanitation condition within Dokur remains unfavorable. Almost 80% of adults continue to defecate outside in the bushes and roadside, and the same figure applies to children. Of the forty respondents, 33%-- or nine-- had access to a toilet within their households. Of the indicated nine households, four families had literate parents present, while the remaining five had illiterate parents.

Discrepancies currently exist between the two groups when pertaining to defecation sites. Of the four households of literate parents, 100% of individuals, including children, defecate within the toilet in their homes. In households of illiterate adults who have access to toilet facilities within their homes, however, only 40% currently defecate within their homes. The remaining 60% continue to defecate in the bushes and roadside, where infection rates are significantly higher and sanitation conditions within the village are worsened. This significant finding illustrates the profound impact that literacy has had upon sanitation and defecation within the village. Furthermore, it sheds light upon the village dynamic challenges

Furthermore, the same phenomenon is present when examining the child defecation sites within households that have access to toilet facilities. Of the four households with literate parents, 100% of children have been using the defecation facilities in the homes. In illiterate households, however, exactly 100% of the children continue to defecate outside in the bushes, roadside, and open defecation system.

Chart: Adult and Child Defecation Sites



Today, individuals still continue to utilize the village overhead tank to gain access to drinking water, for which the village administration charges a minimum fee for its usage. Though diarrheal episodes still occur today, they are less rampant than before (IRHS Discussion).

Personal hygiene practices have significantly improved over time. Almost all individuals were aware of how to maintain a healthy body and when hands should be washed. Although this is true, the practice of using soap with water when washing hands is not followed within the village. All respondent households currently use soap for bathing and washing, with the common brand being Santoor and Eta, respectively. In addition, the awareness of the importance in practicing dental hygiene is prevalent as most children currently use Colgate or Closeup as toothpaste. Almost 60% of adults, however, continue to use more traditional methods for dental cleaning such as the coal powder or neem stick. The remaining 40% use Colgate toothpaste, Closeup toothpaste, or Dabur Red Powder. There was no significant change exhibited in literate parents.

Disease Awareness and Health-Decision Making

8.1 Introduction

Communicable diseases, as defined by the World Health Organization, are caused by pathogenic microorganisms and can be spread directly or indirectly from one individual to another. In contrast, non-communicable diseases are of long duration and slow progression and do not pass directly from one individual to another. Also known as chronic diseases, non-communicable diseases are the leading cause of mortality in the world (WHO). The awareness of the spread and treatment of these diseases is of the utmost importance in developing countries, as access to medical services may be limited.

8.2 Findings

The respondents in the study were asked to identify common contagious and non-contagious diseases to test the disease awareness in the village. The most common responses concerning communicable diseases included flu, scabies, fever, and TB. Altogether, women were able to correctly identify a few more of these diseases than men. Other common responses made regarding this question were HIV/AIDS, chickenpox, lice, diarrhea, and eye problems. When asked some examples of common non-contagious diseases, heart disease, diabetes, and AIDS were the most widespread answers across both men and women. Overall, women were able to correctly identify more examples of chronic diseases than men. No significant change in responses were observed among the comparisons made between illiterate and literate individuals, as the same diseases were cited.

Health decision-making practices concerning children are primarily made by parents collectively; however, women continue to have a strong presence in the decision-making process about whether to seek child medical treatment and what type of treatment should be utilized. Oftentimes, the women will first examine the child's situation and then notify the father of the

condition. In some cases, women will make all decisions and only consult the father of the family for meeting the medical expenditures (Women’s FGD).

Table: Who takes decision to seek child medical treatment

Response	Number	Total Percentage
Husband and wife collectively	16	42%
Male/Husband of family	5	13%
Female/Wife of family	16	42%
Grandparents	1	3%

Table: Who decides on the type of treatment for the child

Response	Number	Total Percentage
Family collectively	18	47%
Male/Husband of family	6	16%
Female/Wife of family	14	37%

During the 1980s, there was very limited access to medical and health facilities in Dokur and the Mahabubnagar region, as a whole. In fact, there was only one traditional mid-wife and one local registered medical practitioner who worked part-time (Pat Bidinger). The situation has dramatically changed over the past several decades with the initiation of a multitude of programs.

The Primary Health Centre is a 30-bed hospital located in the Devarkadra mandal approximately 7 kilometers away from Dokur. Additionally, the Institute of Rural Health Studies (IRHS) clinic was initiated during the 1980s by Patricia Day Bidinger. Today, the IRHS provides basic health services to individuals from Dokur, as well as those from neighboring villages. Several local registered medical practitioners are also available in the area, and there are hospital facilities in Devarkadra and Mahabubnagar. Also, the Anganwadi Programs has also contributed extensively to the area of medical services.

Additional Significant Findings

9.1 Institute of Rural Health Studies



In 1981, Dr. Patricia Day Bidinger and Bhavani Nag founded the Institute for Rural Health Studies, a registered non-profit organization dedicated towards improving rural healthcare. The IRHS is based in the state of Andhra Pradesh, with two clinics in the Dokur village and Kotakadra village.

Reliant upon locally trained and recruited paramedics and health workers, the healthcare facility has initiated a wide range of affordable programs for the benefit of villagers. Their duties include: 1) “Screening rural women for cervical cancer by VIA and VILI, as part of a program; 2) Diagnosing and treating routine gynecological problems; 3) Teaching health education, including nutrition and reproductive health; 4) Working with mothers through all states of pregnancy and childcare; 5) Home visits to families that are unable to visit the clinic; 6) Performing lab tests, maintaining detailed patient records and helping to run the pharmacy” Perhaps the most valuable aspect of this program is the affordability of its medical care, in which patients are only charged two Rupees for consultations and lab tests and medications are inexpensive or completely free of charge.

Since its initiation, the IRHS has served 37, 230 cases in the Dokur village and 13, 350 cases in the Kotakadra village. With its continued success, countless individuals travel from neighboring villages to acquire this beneficial form of healthcare.

Although the IRHS has improved the lives of numerous individuals, I encountered a recent and developing phenomenon during my visit in Dokur. As part of my individual interviews, I had questioned where villagers acquire routine and more serious medical care. With the IRHS’s remarkable programs and persistent support within Dokur, I expected almost all villagers to respond with this healthcare facility for basic medical care. In actuality, however, I found that

most individuals from Dokur today travel to either Devarkadra or Mahabubnagar hospitals, located more than seven kilometers away, to attain the exact same care. This prompted me to investigate this occurrence through my focus group discussions and visit with the IRHS.

Discussions proved that recently, 75% of individuals coming to the IRHS for care come from surrounding villages while only 25% of villagers come from within Dokur itself. Few individuals from Dokur attend counseling sessions presently. Some individuals believe that due to the lack of a child specialist there and only a paramedical staff currently available, children are not cured properly. There is also this growing mentality that expensive medications equate to superior medical treatment. Also, recent cases in which doctor-patient confidentiality was not properly followed endangered the trust within the village.

In a region in which access to medical care and affordability is of pivotal importance, it is vital for the IRHS to gain trust of the Dokur villagers again. Villagers are spending valuable time, money, and effort traveling to attain expensive medical care that currently exists within their own village at an affordable price. This is deeply harming the Dokur village, and there is an exigent need to address this recent occurrence in the future.

9.2 Food Fallacies

Although a lack of accessibility to certain nutritious foods can contribute to low nutrient adequacy ratios within a diet, common food fallacies also prevent individuals from consuming such beneficial items. These fallacies, or cultural misconceptions and fears, are found primarily in Andhra Pradesh villages like Dokur.

During the 1980s, Dr. Patricia Day Bidinger encountered the concept of “hot” and “cold” foods. These foods do not exhibit characteristics of the food’s temperature, but rather the possible effects that may arise as a result of its consumption. “Hot” and “cold” foods are to be avoided during pregnancy, lactation, or illness. They are also not to be provided to young children.

Today, this food fallacy is still prevalent within Dokur. Examples of “hot” foods include: papaya, custard, apple, mangoes, and jamun. Guava is a common example of a “cold” food item. Additionally, there is a misconception that certain food items will negatively influence a mother’s pregnancy. Brinjowl, potatoes, roots and tubers, ridge rot, “gogu”, bottle guard, red graham, and chickpeas are avoided by lactating mothers. There is also a strong belief that consuming green leafy vegetables and other items high in iron will lead to knee pain and arthritis when women are older and are therefore consumed in a low quantity.

When children are ill, rice and vegetables are completely avoided despite their nutritional benefits. In fact, only sorghum roti (flatbread), biscuits, and milk products are provided. Additionally, non-vegetarian items are also avoided during this time as villagers believe jaundice will occur.

These widespread food fallacies are preventing individuals from integrating certain nutritious food items within their diets. It is vital to develop pathways for the future in which villagers can overcome these cultural misconceptions.

Conclusions

The research in this paper is intended to serve as the basis for ICRISAT's programs in the near-future that will be dedicated towards health issues within VLS villages. The data and observations collected within this study have provided significant insight concerning village dynamic roles and social development issues found in India and will contribute to ICRISAT's health public policy endeavors.

Personal Reflection

From my journey through the bustling streets of Hyderabad to the rural village in Dokur, my experience as a Borlaug-Ruan International Intern was the single-most transformative and memorable event I have had yet so far.

Being the first American-born citizen in a family of Indian descent, I had always felt a slight detachment towards India before the internship. Though I have always identified myself as an Indian to others, a great portion of myself had always felt guilty doing so as I lacked a true understanding of the country and its culture. I ultimately possessed a deep longing for an experience that would connect me with my own heritage. The Borlaug-Ruan Internship not only provided me with an enriching and fulfilling experience, but also made me appreciate my culture even more through this journey.

The most notable, rewarding, and unforgettable part of my internship was my village visit to Dokur. For weeks, I had been avidly reading research theses and policy reports and developing research questionnaires for my study. I was absolutely thrilled the day I learned of my travels to the study village, as I could finally implement the work I had attentively prepared. Driving across the uneven pathway in the midst of the drought-prone barren fields, I was instantly struck by the conditions before me. Lack of food and sanitation were among the few pressing situations I had witnessed. Interacting with villagers truly put into perspective the socioeconomic realities of the region and, furthermore, made me realize the intricacies of a farmer's life. My experience in Dokur was a small-scale representation of the universal problem of hunger, poverty, and malnutrition found today. It is our obligation as a global community, as organizations, and as citizens to participate in the fight against hunger and to ensure access to food.

My experience as a Borlaug-Ruan Intern this summer has created a profound impact upon my life and has instilled my lifelong devotion and passion towards international development. This summer my fellow interns became my family, Hyderabad became my playground, and ICRISAT became my home. I am forever gracious for this life-changing and incredible opportunity.

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APPENDIX

Household Health Questionnaire

Household Information:

Name of Respondent:

Household ID Number:

Family Membership Number:

Census Household Number:

Survey Household Number:

Education Level:

° 0=Illiterate, 1=Primary(1-4th std), 2=Middle(5-7th std), 3=High school(8-10th std), 4=Inter(11-12th std), 5=Diploma, 6=Graduation, 7=Post-graduation, 8=Technical degree (BE, MBBS, B.Sc.Agri.), 9=Double degree (Example, BA, B.Ed), 10=PhD, 11=Others (Specify: _____)

Sanitation

1. How can water be contaminated? A. Drop of rubbish B. Contact with dirty hands C. Water outside without lids
D. Don't know E. Others (specify)

E=If they don't clean overhead tank, F=Stored for long periods of time, G=Unclean utensils/pots

2. How do you purify water? A. Boiling B. Tablet C. Filter D. Don't know E. Other:

E. Not purified, taken as it is F=Sieve

3. What is your source of drinking water?

A. Own tap connected to house from overhead tank, B=Community/shared tap from overhead tank

3. Which disease can spread through contaminated water? A. Diarrhea/Blood dysentery B. Indigestion C. Worm Infestation D. Jaundice E. Typhoid F. Cholera G. Don't know H. Others (specify)

H. Cold/Flu-like symptoms I. Fever/Headaches J=Scabies K=Malaria

4. What are some ways to treat diarrhea at home? A. ORT/increasing fluid B. Continue feeding C. Salt and sugar solution D. Don't know E. Others

E. Nothing, go to Mahabubnagar/Devakadra doctor, F=Nothing at all, G=Porridge, H=Tablets, I=Seeds

5. Where do adults in the household defecate? A. Own Pit-type toilet with water connection B. Own Pit-type toilet without water connection C. Bushes/Roadside D. Others

D=Shared toilet connection

6. Where do children in the household defecate? A. Own pit-type toilet with water connection B. Own Pit-type toilet without water connection C. Bushes/ Roadside D. Others:

D=Open drainage system, F=N/A, grown up kids

Nutrition

1. Do you know why green leafy vegetables are important to eat? A. Prevent night blindness B. Prevents diseases C. Keeps body healthy D. Don't know E. Others (specify)

E= Improves blood/hemoglobin, F=Strengthens appetite, G=Strengthens body, H=Good for pregnancy, I=Good for digestion

2. Do you eat these types of vegetables? A. Always (4+ times a week) B. Sometimes (once every 1-2 weeks) C. Never

D=Rarely/not regularly

3. Which vegetables/foods are high in iron? A. Sorghum B. Millet C. Green leafy vegetables D. Rice E. Wheat F. Don't know G. Others (specify)

G=Amaranthus H= Fenugreek

4. Which vegetables/foods are high in protein? A. Rice B. Sorghum C. Chickpeas D. Pigeonpea (Tur Dal) E. Don't know F. Others (specify):

F=Eggs, G=Milk, H=Butter

5. Why is it important to take foods that are high in vitamin A? A. Prevents night blindness B. Prevents disease C. Don't know

6. Why is important to take foods that are high in iron? A. Prevents anemia B. Increases work capacity and learning ability C. Don't know D. Others (specify)

D= Shortness of breath E=Keeps you healthy

7. Why is it important to take anti-worm tablets every six months? A. Prevents worms and diarrhea B. Prevents anemia C. Prevents diseases D. Don't know E. Others (specify)

8. Which types of foods can be eaten directly from the refrigerator?

9. Which foods need to be cooked/boiled/prepared after taken from the refrigerator?

Personal Hygiene

1. What are the rules to keep the body healthy? A. Eat nutritious food regularly B. Take bath C. Cut nails D. Regular exercise E. Keep clean F. Don't know G. Others (specify)

G=Consistently working hard, H=Wash food/vegetables properly

2. When should you wash your hands? A. After defecation B. Cleaning babies' bottoms C. Before eating or feeding D. Before preparing/handling food E. Don't know F. Others (specify)

F= If hands are visibly dirty G=After cleaning utensils H=After cleaning house I=Once in a while

3. What soap do you use in your home for bathing or washing?

4. What tooth paste or substance/brush do you use in your home?

5. If woman: Do you/your children use a sanitary napkin?

Health Decision-Making

1. In general, how would you say your child's health is? A. Excellent B. Very Good C. Good D. Fair E. Poor

2. Compared to five years ago, how would you rate your child's health in general now? A. Much better now B. Somewhat better C. About the same D. Somewhat worse E. Much worse

3. If a child in the household is ill, who takes the decision about whether to seek outside treatment or not? A. Self B. Husband C. Someone else (specify):

4. Would you be able to influence the decision? A. Yes B.No

5. Who would decide on the type of treatment? A. Self B. Husband C. Someone else (specify)

6. Would you be able to influence the decision? A. Yes B. No

7. Where do you normally go to seek medical treatment?

Infant Feeding

1. Did you give colostrum to your children? A. Yes B. No

2. For how many days did you breast-feed the baby?

3. At which month of birth did you start supplementary feeding?

4. What did you give as supplementary feeding? A. Other milk B. Soft Rice C. Banana D. Don't know E. Others:

E=Biscuits (Parle G), F=Chai, G=Cerelac, H=Fruits, I=Sorghum roti, J=Dhal/Rasam, K=Eggs

Diseases

1. Do you know of HIV/AIDS? A. Yes B. No

2. How can the virus be transmitted? A. Through blood B. Through sexual contact C. From mother to child (breastmilk, shared blood) D. Don't know E. Syringes

3. What are some initial symptoms of AIDS? A. Chills B. Fever C. Sweats D. Swollen lymph nodes E. Weakness F. Don't know G. Chronic diarrhea H. Weight loss I. Pneumonia J. Chronic cough K. Scabies L. Loss of appetite

4. What are some serious health consequences of this condition? A. Herpes B. Tuberculosis C. Yeast Infection D. Cancer (lymph nodes, skin, lungs, bowel) E. Don't know F. Others (specify)

5. What are some examples of common contagious diseases? A. Flu B. Lice C. Scabies D. Diarrhea E. Don't know F. Others (specify) F. Fever G. TB H. Chickenpox I. AIDS J. Measles K. Fungal Infections

L. Eye Problems M. Hepatitis B and C

7. What are some examples of non-contagious diseases? A. Heart Disease B. Diabetes C. Asthma D. Don't know E. Others (specify)

E. AIDS F. Headache G. Stomachache H. TB I. Cancer J. Chickenpox K. Rheumatoid Arthritis

L. Epilepsy M. Paralysis

Immunization related information (up to 10 years of age)

Name	Age	Sex	BCG	DPT	Polio	Measles			

Focus Group Discussion

Topics to Consider:

*Migration Patterns (Men): Perhaps one of the most distinguishing features of the Dokur village is the prevalence of migration by families.

- How have these migration patterns affected the expenditures in the household?
- For how long and how often does this migration take place?
- Has this affected the food consumption for children?
- Has this affected the health of the child?
- How has this affected child education?

*Medical Treatment (Mixed) Decision-making

- Reliability (Who do you go to, and what do you do if the treatment doesn't work)
- What factors do you take into consideration when deciding whether to take your child to a medical clinic/center to get treatment?
- What are the common/recurrent illnesses at present faced by children in the village?
(Take note of differences between boys and girls)
- How often do they occur?
- Do you give any home treatments for these illnesses?
- What are some of the more serious illnesses that are commonly faced by children?
- Meeting the expenses of the treatment

*Food Consumption (Women): Understanding decisions made by parents

-What are some infant feeding practices you use?

-If money were not to be factored into the situation, what type of foods would you purchase for your children and family?

-How did these foods compare to the ones you currently purchase?

-Belief in “hot” and “cold” foods?

-Do you believe in children eating a normal diet during illness? If not, which foods are avoided