INFLUENCE OF INFANT FEEDING PRACTICE ON THE NUTRITIONAL STATUS OF 6-59 MONTHS AGED CHILDREN IN MAJHI COMMUNITY OF RAMDHUNI MUNICIPALITY, SUNSARI

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Influence of Infant Feeding Practice on the Nutritional Status of the 6-59 months aged Children in Majhi Community of Ramdhuni Municipality, Sunsari

A dissertation submitted to the Department of Nutrition and Dietetics, Central Campus of Technology, Tribhuwan University, in the partial fulfillment of the requirements for the degree of Nutrition and Dietetics

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Approval Letter

This dissertation entitled INFLUENCE OF INFANT FEEDING PRACTICE ON THE NUTRITIONAL STATUS OF THE CHILDREN AGED (6-59)IN MAJHI COMMUNITY OF RAMDHUNI MUNICIPALITY, SUNSARI presented by Bristy Bohara has been accepted as the partial fulfillment of the requirements for the B.Sc degree in Nutrition and Dietetics

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Bristy Bohara

Abstract

Objective: To assess the influence of infant feeding on the nutritional status of children aged 6-59 months in majhi community of Ramdhuni Municipality.

Methods: A household descriptive cross-sectional, population based survey of under-five year age of Majhi children living in Ramdhuni Municipality,Sunsari was conducted.Census method was adopted for data collection. A structured questionnaire was administered to the mothers or caretakers. Anthropometric measurements and basic associated factors were collected. SPSS version 20 and WHO Anthro 3.2.2 version were used for data analysis. Chi-square technique was used to assess factors associated to nutritional status of children.

 Results: Prevalence of underweight, stunting and wasting was 26.3%, 29.8% and 19.3% respectively. There was significant association (P < 0.05) of initiation of breastfeeding and very close association with mother's education with wasting. There was significant association (P < 0.05) of stunting with Mother's education, Father's education, Child from elder and very close association with initiation of breastfeeding. There was significant association (P <0.05) of underweight with Vitamin A capsule and Iron Folate consumption period.

Conclusion: Result of this study indicates that under nutrition is still an important problem among aged 6 to 59 months children in majhi communityof Ramdhuni Municipality, Sunsari. To get better nutritional status of children, greater emphasis should be given to under five year children with community based awareness programs to mother and care givers. Also, the nutrition intervention programs focusing above risk factors should be launched immediately to overcome the problems.

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List Of Abbreviation

Abbreviations	Full-Form
DNA	Deoxyribose Nucleic Acid
FAO	Food and Agriculture Organization
IDA	Iron Deficiency Anaemia
Ig A	Immuno Globulin A
IYCF	Infant and Young Child Feeding
HAZ	Height for Age Z-value
MNP	Micronutrient Powder
MUAC	Mid Upper Arm Circumference
NDHS	Nepal Demographic Health Survey
ORS	Oral Rehydration Solution
PCM	Protein Calorie Malnutrition
PEM	Protein Energy Malnutrition
SD	Standard Deviation
SLC	School Leaving Certificate
UNICEF	United Nations International Children Education Fund
VAD	Vitamin A Deficiency
WAZ	Weight for Age Z-score
WHZ	Weight for Height Z-score
WHO	World Health Organization
WFP	World Food Programme

PART-1

Introduction

1.1   Introduction

Nutrition is the science of foods, the nutrients, and other substances therein, their actions, interaction and balance in relationship to health and disease; the processes by which the organism ingests, digests, absorbs, transports and utilizes nutrients and disposes the end products. In addition, nutrition is concerned with social, economic, cultural and implications of foods and eating (Srilakshmi, 2016).

Nutrition is defined as a science concerned with the role of food and nutrients in the maintenance of health. The science of Nutrition has been developed by using the combine knowledge of the physical and biological sciences. Its application involves the social sciences related to man's behaviour - Psychology, sociology, anthropology and economics (John *et al.*, 2004).

For the improvement of growth and development of infants and young children, proper feeding practice is needed. The proper feeding practice, communally recognized as IYCF practice, take in exclusive breastfeeding for 6 months with the continuation of breastfeeding up to 2 years or beyond. The initiation of breastfeeding immediately after birth, preferably within one hour; exclusive breastfeeding for the first six months; appropriate and adequate complementary feeding from six months of age while continuing breastfeeding; and continued breastfeeding up to the age of two years or beyond (USAID, 2013).

Evidences show that the feeding human milk decreases the risk of different infectious disease such as diarrhea, respiratory tract infection, urinary tract infections, bacteremia, late-onset sepsis in preterm infants and so different others (APA, 2018).

According to the NDHS 2016, 36% of children under5years of age are stunted (short for their age), 10% are wasted (thin for their height), 27% are underweight (thin for their age), and 1% are overweight (heavy for their height).

55% of children under age 2 are breastfed within 1 hour of birth, and 66% of children under age 6 months are exclusively breastfeed. 47% of children age 6-23 months receive meals with minimum recommended diversity (at least four food groups), 71% receive

meals at the minimum frequency, and 36% meet the criteria of minimum acceptable diet. 86% of children age 6-59 months received a Vitamin A capsule, 76% of children age 12-59 months received deworming medication (NDHS, 2016).

Nepal has high burden of under-nutrition among young children. Few previous studies have reported on the time of introduction of complementary feeding, meal frequency, meal diversity, and acceptable diet and their association with nutritional status. Maternal education has found to be associated with timely introduction of complementary feeding, (Kalanda *et al.*, 2006) .minimum meal frequency, minimum dietary diversity, and minimum acceptable diet (Karkee *et al.*, 2014).Other determinants that have been associated with complementary feeding practices are household wealth status, geographic location, exposure to media, maternal age and the utilization of antenatal and post natal visits.((Karkee *et al.*, 2014) (Iqbal *et al.*, 2011)

Ramdhuni lies in the terai region and lies between sub-metropolitan municipalities Baraha and Itahari. This municipality is named after famous religious site of eastern Nepal Ramdhuni. Ramdhuni has total area of 48.10 square kilometers. It has a total population of 28,549 of which 13,211 are males and 15,388 are females living in 6347 individual houses. There are 59 households of majhi , comprising of 161 males and 137 females (Anon., 2014a).

The Majhis are one of the indigenous peoples of nation of Nepal. They posses their own language, dress, culture, etc. Majhis are friendly and helpful as well as polite and shy. They catch fish in the rivers for feeding by the help of self-made hooks and nets. Their ancestral occupations boating and fishing are now completely replaced due to developmental activities countrywide (Majhi, 2018)

1.2 Statement of the problem

Malnutrition means more than feeling hungry or not having enough food to eat. Inadequate intake of protein (necessary to keep the body healthy and build muscle), calories (a measure of energy the body needs), iron (for proper blood cell function), and other nutrients make up different types of malnutrition. Poor nutrition occurs in developing countries, as well as in more prosperous areas of the world. As many as 800 million persons worldwide are affected by malnutrition. More than half the childhood deaths in developing countries are related to malnutrition (WFP, 2011)

Breast feeding is the best form of nutrition for babies and provides many benefits. Mothers should also consume healthy and balanced diet during breast feeding. Growth throughout the early stages of life is rapid: generally, at three years old a child has doubled their height and they weight about five times more than at birth. Genetic and physiological factors, environmental factors such as poor hygiene, inadequate nutrition, disease burden and poverty mean that some infants are not able to meet these growth standards. Combined breast and bottle feeding in the first weeks of life may reduce the supply of mother's breast milk and breastfeeding is difficult (NUTRICIA, 2018). Babies who are fed nothing but breast milk from birth through their first six months gets the best start to life. Exclusive breastfeeding provides babies the perfect nutrition and everything they need for healthy growth and brain development. Suboptimal breastfeeding practices, including non-exclusive breastfeeding, contribute to 11.6% of childhood deaths, equivalent to roughly 800,000 child deaths annually. Just 38% of infants are exclusively breastfeed in the first six months globally (UNICEF, 2018a).

Generally, 55% of last born children in the 2 years prior the survey were breastfed within 1 hour of birth. Opposing to the recommendation that children under age 6 months should be exclusively breastfed, only 66% of the infants under age 6 months were found to be exclusively breastfed. Besides breast milk, 6% of these young infants consume plain water, 6% consume non-milk liquids, 10% consume other milk, and 12% consume complementary food (NDHS, 2016).

They even have not sufficient land for agriculture that is why they are living impoverished kind of life. Next tragedy of Majhi people is the lands of stream shores which is free of cost are not belong to any Majhi people is the lands. Fishing was for their own survival. They do not farm fish in pools, just freely catch fish from the rivers. The Majhi also farm but they don't have enough land to fulfill their daily needs, the women specially sell "Marcha" an ayurvedic medicine for making wine and Jand i.e. a special wine making of cooked corns in the market, as well as mats made of pater. The Majhi have limited educational opportunities. They have a very low literacy level, no Majhi has a Master's degree, only 15 bachelor's degrees, 35 have certificate level qualifications and 130 have qualifications of S.LC (School Leaving Certificate) (Majhi, 2018).

Reasons for selecting Majhi Community are as follows;

1. They are one of the oldest community of Nepal

2. Most of the majhi are below the poverty line.

3. Very few research carried out in this community.

1.3   Objectives of the study

1.3.1   General objective

➢ To know about the influence of infant feeding practice on the nutritional status of children(6-59 months) of Majhi community of Ramdhuni, Sunsari

1.3.2   Specific Objective

➢ To find out the time of initiation of breast feeding.
➢ To find out the status of exclusive breast feeding.
➢ To find out the time of initiation of complementary food.
➢ To assess the different factors affecting IYCF.
➢ To assess the association between infant feeding practice and nutritional status.
➢ To suggest appropriate corrective measures.

1.4   Research Question

- What are the infant practices carried out in the Majhi community of Ramdhuni?
- What is the current Nutritional status of 6-59 months Majhi community in Ramdhuni?
- Is there any association between infant feeding practice and nutritional status of 6-59 months children?

1.5   Significance of the study

The finding of the result will be helpful:

a) Improve existing nutritional status of children by encouraging people to adopt better feeding practices.

b) Identify nutritional status of 6-59 months of Majhi children who are at risk of being malnourished and who need special care and attention.

c) Make people aware about the current real situation of nutritional status and feeding behaviour of the surroundings.

d) Act as a tool to reflect sanitary condition, socio-economic variables, feeding behaviour, degree and types of malnutrition

e) Discover the problems related to nutrition, feeding behaviour and nutritional knowledge in this community.

f) Serve as helpful guide to for any organization conduct a program related to nutrition for this community.

1.6 Limitations of the study

a) It cannot be generalized to other population as they have different feeding practice.

b) Seasonal variation may be there as this is cross sectional study done for specific period of time.

c) Respondents might not have given correct information about food consumption and pregnancy due to hesitation or prestige of family.

1.7 Assumption

Most of the Majhi children under five years of age in Ramdhuni Municipality might be malnourished because of low socio-economic status and improper feeding practices.

Part II

Literature Review

2.1   Background

Malnutrition has been responsible, directly or indirectly, for 60% of the 10.9 million deaths annually among children under five. Well over two-thirds of these deaths, which often associated with inappropriate feeding practices, occur during the first year of life. No more than 35% of infants worldwide are exclusively breastfeed during the first four months of life; complementary feeding frequently begins too early or too late, and foods are often nutritionally inadequate and unsafe (WHO 2003). Undernutrition is estimated to be associated with 2.7 million child deaths annually or 45% of all child deaths. Infant and young child feeding is a key area to improve child survival development. Optimal breastfeeding is so critical that it could save the lives of over 820000 children under the age of 5 each year (WHO, 2018a).

Millions of children in Asia face a daily challenge in achieving optimal nutrition, often as a result of their families lacking sufficient knowledge, information and resources. The best solution for providing optimal infant and young child nutrition include protecting and promoting exclusive breast feeding for the first six months of child life (APIYCNA, 2013). Exclusive breastfeeding rates were 42.5% in Bangladesh, 46.4% in India, 53.1% in Nepal. The rate of full breastfeeding ranged between 60.6% and 73.9%. Utilization of health services (more antenatal clinic visits) was associated with higher rates of exclusive breast feeding in India but lower rates in Nepal. Delivery by cesarean section was found to be a consistent negative factor that delayed initiation of breastfeeding. Nepal reported the lowest bottle feeding rate of 3.5% (Dibley *et al.*, 2010). It is estimated that 70% of the world's stunted live in Asia with Bangladesh having the second highest rate of child under nutrition in the world (Faruque *et al.*, 2008).

WHO categorize breastfeeding into three groups, and focused on the entire period since birth as described by (Labbok *et al.*, 1997).

a)   Exclusive Breastfeeding
The infant had received only breast milk from his/her mother or a wet nurse, or expressed breast milk and no other liquids or solids with the exception of drops of syrups consisting of vitamins, minerals supplements or medicine.

b)   **Predominant Breastfeeding**

The infant's predominant source of nourishment had been breast milk. However, the infant may also have received water and water-based drinks like tea and local herbal drops.

c)   **Partial Breastfeeding**

When infant's feeding included non-breast milk foods such as animal/powdered/condensed milk and/solid/semi-solid food (i.e. cereals, vegetables, fruits, lentils or meat).

2.2   Appropriate Infant and Young Child Feeding Practice

2.2.1   Breastfeeding

Breastfeeding is an unequaled way of providing ideal food for the healthy growth and development of infants; it is also an integral part of the reproductive process with important implications for the health of mothers. As a global public health recommendation, infants should be exclusively breastfeed for 6 months of life to aceive optimal growth, development and health. Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for upto two years of age or beyond (WHO, 2002).

2.2.1.1   Nutritional superiority of breast milk

Breast milk is uniquely superior for infant feeding. It is the normal food for infants from birth. Breast milk contains all of the essential nutrients, antibodies and other factors important for growth and development. It cannot be replicated.(Anon., 2017) Breast milk should be drinking within 24 hours of being produced. Although freezing and placing in a preserving container may help, it is best to drink as soon as possible. It is said to contain many immune boosting substances. The calories in Breast Milk per 100g(100ml) is 65 calories. Breast Milk is calculated to be 65Cal per 100 grams making 80Cal equivalent to 123.08g with 7.2g of mostly carbohydrates、3.5g of fat、1.1g of protein in 100g while being rich in vitamins and minerals such as Pantothenic Acid and Selenium.(Slism, 2018). Breast milk is ultimately the best source of nutrition for a new baby. Many components in breast milk help protect your baby against infection and disease. The proteins in breast milk are more easily digested than in formula or cow's milk. The calcium and iron in breast milk are also more easily absorbed (APA, 2018). Breast milk can may even help your child in later years, by reducing the risk of being overweight, and of developing

asthma , type 1 and type 2 diabetes , high cholesterol, hodgkin's disease, leukemia and lymphoma.(Kshirsagar, 2016)

2.2.1.2   Value of colostrum

Colostrum, which has also been called the "first milk", "liquid gold" or "immune milk" is a clear, sticky, thick liquid that is produced by a mother's mammary glands after the first day of her baby's birth. Colostrum is rich in proteins, carbs, lipids (fat), and immune factors. The benefits of colostrum are enormous. Colostrum encourages the occurrence of baby's first bowel movement, clearing the digestive tract of meconium (first dark stool). It contains immunoglobulin A, which is an antibody that protects the baby against infections of the throat, lungs and intestines. It contains antioxidant and anti-inflammatory properties (Anon., 2009).

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                                        ┌─────────────────────────┐
                                        │   Nutritional Factors   │
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┌──────────────────┐                    ┌─────────────────────────┐
│    Colostrum     │                    │     Immune Factors      │
└──────────────────┘                    └─────────────────────────┘

                                        ┌─────────────────────────┐
                                        │     Growth Factors      │
                                        └─────────────────────────┘
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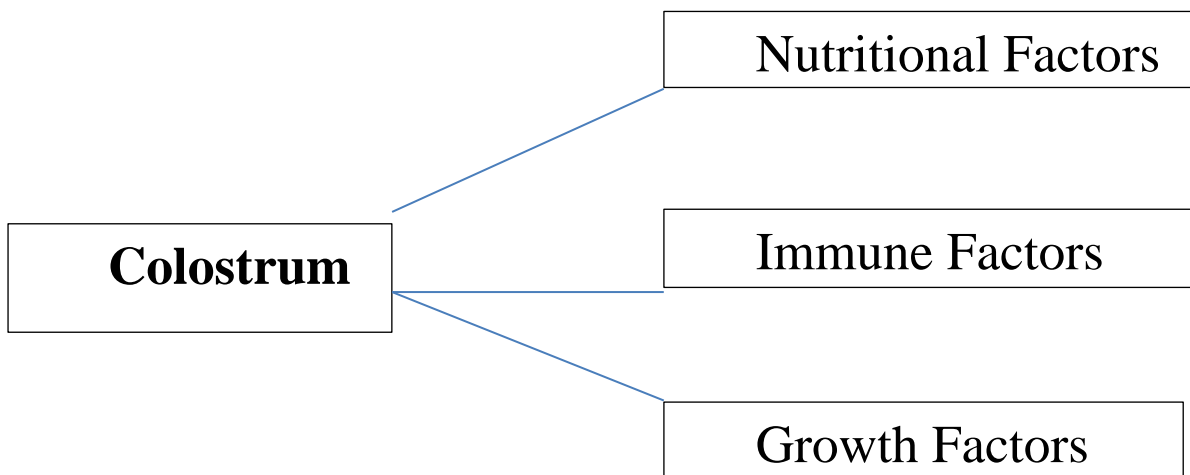
Fig 2.1: Composition of colostrum (Dr.Godhia and Patel, 2017)

Colostrum is rich in immunologic components such as secretory IgA, lactoferrin, leukocytes, as well as developmental factors such as epidermal growth factor. Colostrum also contains relatively low concentrations of lactose, indicating its primary functions to be immunologic and trophic rather than nutritional. Levels of sodium, chloride and magnesium are higher and levels of potassium and calcium are lower in colostrum than later milk (Anon., 2018a).The proteins present in help in proper growth of baby's eyes and brain. Every drop of Colostrum is precious and considered liquid gold nutrition for the newborn baby. Colostrum is the first immunization provided by nature for the newborn. It

prepares your newborn for life outside the womb. However, make sure that your baby receives it through nursing, hand expression, or pumping. Your body itself provides the natural immunization for the baby it has formed (Sethia, 2018). Colostrum has an especially important role in protecting your baby's gastrointestinal tract. A newborn's intestines are very permeable (leaky). Colostrum seals the holes by "painting" the gastrointestinal tract with a barrier which prevents most foreign proteins (from food the mother has eaten or from formula) from penetrating the gut and possibly sensitizing your baby to an allergy (Abenoza, 2013).

2.2.1.3 Exclusive Breastfeeding

American Academy of Pediatrics (AAP) strongly recommends exclusive breastfeeding for the first six months of life and that breastfeeding continues for at least 12 months. It is optimal for both babies and mothers. For babies, it can protect against infections and reduce the rates of later health problems including, diabetes, obesity, and asthma (APA, 2018) The babies who are exclusively breastfed do not require anything else namely additional food or fluid, herbal water , fruit drinks or water during six months. Breast milk alone is adequate to meet the hydration requirements even under the extremely hot and dry summer conditions prevailing in country (Anon., 2004). To enable mothers to establish and sustain exclusive breastfeeding for 6 months, WHO and UNICEF recommend:

- Initiation of breastfeeding within the first hour of life

- Exclusive breastfeeding – that is the infant only receives breast milk without any additional food or drink, not even water

- Breastfeeding on demand – that is as often as the child wants, day and night

- No use of bottles, teats or pacifiers(UNICEF, 2018b)

Breastfeeding an infant exclusively for the first 6 months of life carries numerous benefits such as lowered risk of gastrointestinal infection, pneumonia, otitis media and urinary tract infection in the infant while mothers return to her pre-pregnancy weight very rapidly and have a reduced risk of developing Type 2 diabetes (Motee and Jeewon, 2018).There are multiple lines of evidence to prove that exclusive breastfeeding for 6 months provides infants with protection against gastrointestinal infections and iron deficiency anemia. It also keeps women amenorrhic (absence of two consecutive days of

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bleeding or spotting after post-partum day number 56 or 2 months) for 6 months postpartum and helps them to avoid unplanned pregnancies that end up in abortions (Ssemukasa and Kearnay, 2014). For the first 6 months, your baby's intestine has small pores in it, like a net. If given other foods, nonhuman proteins can go through the pores into your baby's body and cause allergies. Around 6 months, the pores in your baby's intestine close up. Your baby can then eat other foods. Introducing other food or fluids can cause problems for breastfeeding and your baby's health. Breastfeeding gives your baby the body-building components that are particularly suited to his health and development. Milk from animal and plant sources do not contain the bodybuilding components particularly suited to the human body (Moffat, 2002).

2.3   Complementary Feeding

2.3.1   Importance of complementary

From the age of 6 months a baby needs more energy and nutrients than can be provided by breast milk alone. At this age a baby's digestive system is mature enough to digest a range of foods. Complementary feeding is needed to provide energy and essential nutrients required for continued growth and development. The nutrients in recommended complementary foods complement those in breast milk, hence the name. Complement means they go well together, each have a role to play (Anon., 2011).

Appropriate complementary feeding is:

- timely – meaning that foods are introduced when the need for energy and nutrients exceeds what can be provided through exclusive and frequent breastfeeding;
- adequate – meaning that foods provide sufficient energy, protein, and micronutrients to meet a growing child's nutritional needs;
- safe– meaning that foods are hygienically stored and prepared, and fed with clean hands using clean utensils and not bottles and teats;
- properly fed – meaning that foods are given consistent with a child's signals of appetite and satiety, and that meal frequency and feeding method – actively encouraging the child to consume sufficient food using fingers, spoon or self-feeding – are suitable for age (WHO, 2002).

Children fed only on their mother's milk after the six months period face the prospects of a nutritional gap and lowered immunity against preventable illnesses such as diarrhoea and pneumonia (TNN, 2018).

2.4   Nutrition of Pregnant women

A pregnant women needs:

a) An adequate nutritious diet
b) Adequate rest during last trimester.
c) Iron and Folic Acid tablets throughout the Pregnancy
d) Immunization

2.4.1   Nutritious Diet

The developing fetus obtains all of its nutrients through the placenta, so dietary intake has to meet the needs of the mother as well as the products of conception, and enable the mother to lay down stores of nutrients required for the development of the fetus and lactation after the birth. The healthy eating guidelines for pregnant women are actually very similar to those for non-pregnant women, with a few exceptions. The main recommendation is to eat a healthy, balanced diet based on the *Balance of Good Health* model, which includes plenty of starchy carbohydrates, such as bread, rice, pasta and potatoes, and is rich in fruit and vegetables. A healthy diet includes moderate amounts of dairy foods and protein containing foods, *e.g.* lean meat, fish, eggs and pulses (beans and lentils), and limited amounts of foods high in fat or sugar (Williamson, 2006). The focus should be on increasing the consumption of nutrient b –dense food and minimizing empty-calorie foods that may provide the extra energy needed but do not provide micronutrients that are needed in much higher amounts compared with increased caloric needs. Nutrition is a vital component of vital development, as baby cannot build with materials he or she do not have. Limiting exposure to damaging substances such as nicotine, caffeine, food – borne bacteria, and alcohol will also aid in the child's development (Brown, 2014).

2.4.2   Adequate rest during last trimester

Inadequate sleep is a common problem among women during pregnancy. Sleep deprivation may hamper labor outcomes (maternal and fetal). To get adequate sleep during pregnancy of at least eight hours should be advised by health care providers. Both the sleep quantity

and quality affect the duration of labor and type of delivery (Razek *et al.*, 2016). Recently the influence of maternal sleep practices on stillbirth has gained some attention. Sleep disordered breathing in pregnancy is associated with increased risk of gestational hypertension, pre-clampsia, and small-for-gestattional age (Gordan *et al.*, 2015).

2.4.3 Iron Folate Tablets During Pregnancy

Folic acid is a human engineered form of a vitamin B which is called folate. Vitamin B9 is commonly called Folic acid. In its natural form, it occurs as folate in foods like dark green leafy vegetables, whole grains and pulses, and even oranges. Folate plays a very important role in the production of RBCs or red blood cells and helps in the development of your baby's neural tube into the brain and spinal cord. So the key purpose of including folate in your diet when pregnant is because it prevents the foetus from developing neural tube defects like spina bifida and other birth defects like cleft palate (Anon., 2018b)

Iron is required to help the red blood cells transport oxygen around the body. During pregnancy, there's an extra demand for iron and other vitamins, which are needed for women, the unborn baby and the placenta. Many women find their levels of iron depleting during this time - which can cause anaemia (Newcombe, 2016).

2.4.4 Immunization

Vaccine-preventable infectious diseases are responsible for significant maternal, neonatal, and young infant morbidity and mortality. Changes in the immune response in pregnant women – which are thought to occur in order to allow the woman to tolerate the semi-allogeneic foetus – may interfere with the development of the specific immune response to pathogens. These immunological changes may alter the susceptibility of the woman and the foetus to certain infectious diseases and increase the risk of more serious outcomes. The immature adaptive immune systems of neonates and premature infants make them particularly vulnerable to morbidity and mortality due to infection.

Immunization of pregnant women can protect them directly against vaccine-preventable infections, and in so doing potentially protect the foetus. It can also directly protect the foetus and infant via specific antibodies transferred from the mother during the pregnancy (WHO/GRA, 2014)

2.5   Conceptual Framework

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                    ┌─────────────────────┐
                    │    Malnutrition     │
                    └─────────────────────┘
                              ↑
┌──────────────────┐                    ┌──────────────────┐
│   Inadequate     │ ←─── Immediate ──→ │    Diseases      │
│  dietary intake  │       Causes       │                  │
└──────────────────┘                    └──────────────────┘
        ↑                   ↕                     ↑
┌──────────────┐    ┌────────────────┐    ┌──────────────────┐
│  Inadequate  │    │ Inadequate care│    │ Insufficient     │
│access to food│    │for children and│    │ health service   │
│              │    │     women      │    │ and unhealthy    │
│              │    │                │    │ environment      │
└──────────────┘    └────────────────┘    └──────────────────┘
        ↖          Underlying Causes           ↗
           ┌──────────────────────────────────┐
           │     Resources and control        │
           │                                  │
           │ Human, Economic and organizational│
           │ resources                        │
           └──────────────────────────────────┘
                         ↑
                   Basic Causes
           ┌──────────────────────────────────┐
           │      Potential resources         │
           └──────────────────────────────────┘
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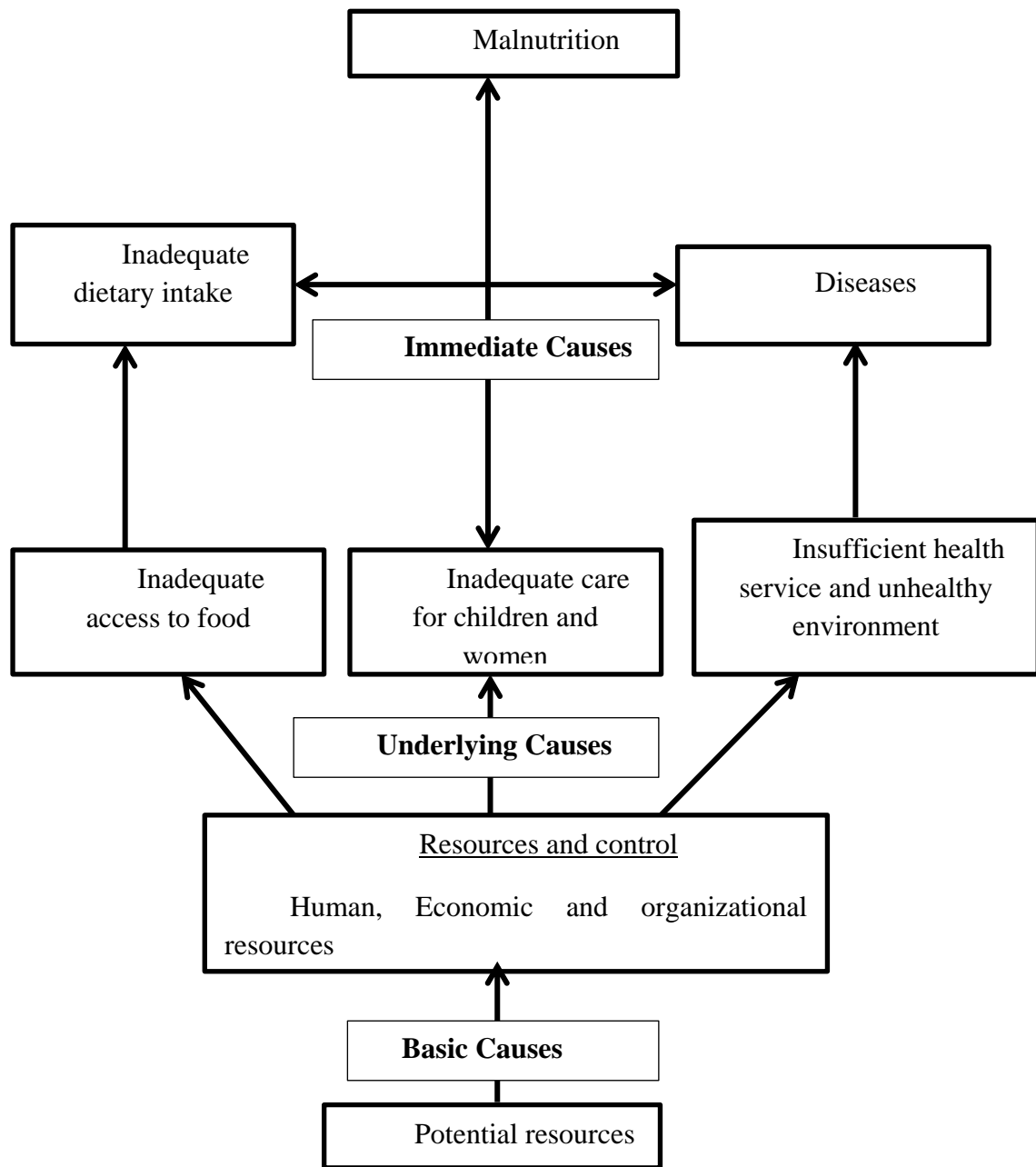
Fig.2.2 UNICEF Conceptual Framework (UNICEF, 2015)

2.6   Malnutrition

Malnutrition occurs when a person does not receive adequate nutrients from diet. This causes damage to the vital organs and functions of the body. Lack of food is the most cause of malnutrition in the poorer and developing countries.

However, in developed countries like UK or USA the cause may be more varied. For example, those with a high calorie diet deficient in vital vitamins and minerals are also considered malnourished. This includes the obese and the overweight. (DrMandal, 2017)

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers 2 broad groups of conditions. One is 'undernutrition'—which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer (Sobokta *et al.*, 2006).

2.6.1   Causes of Malnutrition

a) Lowered food intake of food due to

    i. Increase in population

    ii. Low production

    iii. Exhaustion of stocks

b) Ignorance -Wrong infant feeding practices, inability to make correct choice of food resulting in over/Undernutrition.

c) Economic conditions-Lowered purchasing power causing Undernutrition/higher purchasing power causing overnutrition.

d) Stress conditions -Inability to meet the increased nutrient needs during periods of rapid physical growth, e.g. in young children, adolescents, pregnant woman and lactating mothers; Nutrient demands also increases during illnesses.

e) Poor personal Hygiene and environmental sanitation - Increased susceptibility to infections and and thereby illnesses.(Anon., 2014b)

2.6.2   Types of malnutrition

The main types of malnutrition prevailing in humans children are protein energy malnutrition (PEM) and micronutrient malnutrition , following are the brief descriptions of the types of malnutrition:

2.6.2.1 Protein energy malnutrition

In children, protein–energy malnutrition is defined by measurements that fall below 2 standard deviations under the normal weight for age (underweight), height for age (stunting) and weight for height (wasting) (Anon., 2014b). Wasting indicates recent weight loss, whereas stunting usually results from chronic weight loss. Of all children under the age of 5 years in developing countries, about 31% are underweight, 38% have stunted growth and 9% show wasting. Protein– energy malnutrition usually manifests early, in children between 6 months and 2 years of age and is associated with early weaning, delayed introduction of complementary foods, a low-protein diet and severe or frequent infections.(Muller and Krawinkel, 2005)

a) **Kwashiorker:** A childhood disease that is caused by protein deprivation. Early signs include apathy, drowsiness, and irritability. More advanced signs are poor growth, lack of stamina, loss of muscle mass, swelling, abnormal hair (sparse, thin, often streaky red or gray hair in dark-skinned children), and abnormal skin that darkens in irritated but not sun-exposed areas. An enlarged and protuberant belly is common. Kwashiorkor disables the immune system, rendering the affected individual susceptible to a host of infectious diseases. It is responsible for much illness and death among children worldwide. Also known as protein malnutrition and protein calorie malnutrition(PCM). Severe deficiency of protein + inadequate caloric intake = kwashiorkor.(Kshirsagar, 2016).

b) **Marasmus:** The term marasmus is derived from the Greek word *marasmos,* which means wasting. Marasmus involves inadequate intake of protein and calories and is characterized by emaciation. Marasmus is a severe form of protein-energy malnutrition caused by a shortage of protein and calories in the body. Without these vital nutrients, the body becomes dangerously low in energy and important functions begin to stop. (Mehta, 2016)Marasmus is caused by a severe nutritional deficiency in general. It is usually found in very young infants and very young children. It can be prevented by breastfeeding. It is actually caused by the total or partial lack of nutritional elements in the food over a period of time .(Muller and Krawinkel, 2005).

c) **Marasmic Kwashiorker:** Marasmic-kwashiorkor is the third form of protein-energy malnutrition. Those affected by this condition experience a combination of

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marasmus and kwashiorkor. As such, they will show symptoms of both conditions as well. For example, someone with marasmic-kwashiorkor may:

- Be extremely thin and show signs of wasting

- Have excessive fluid buildup in other parts of their body

- Be severely dehydrated

Like with kwashiorkor, it is extremely important that someone showing marasmic-kwashiorkor receives immediate medical treatment. It is more difficult to recover as time goes on, and they face a high risk of death as the condition worsens. (Muller and Krawinkel, 2005)

2.6.2.2   Micronutrient Malnutrition

a) **Vitamin A Deficiency**: Vitamin A is an essential micronutrient for the immune system and plays an important role in maintaining the epithelial tissue in the body. Severe vitamin A deficiency (VAD) can cause eye damage and is the leading cause of childhood blindness and lowered immunity. VAD also increases the severity of infections such as measles and diarrheal disease in children and slows recovery from illness. VAD is common in dry environments where fresh fruits and vegetables are not readily available. The availability of stored vitamin A also depends on a child's general nutritional status (NDHS, 2016). Severely malnourished, protein-deficient children synthesize RBP at a much reduced rate. Serum retinol levels may therefore be sub normal, even if stores are high. Moreover a diseased liver cannot store as much retinol, or make as much RBP, as normal one.(Sommer, 1995)

b) **Iodine Deficiency:** Iodine deficiency is the world's most prevalent, yet easily preventable, cause of brain damage. Serious iodine deficiency during pregnancy can result in stillbirth, spontaneous abortion, and congenital abnormalities such as cretinism, a grave, irreversible form of mental retardation that affects people living in iodine-deficient areas of Africa and Asia. (WHO, 2018b)NDHS 2016 tested for the presence of iodine in household salt by using a rapid test kit. Overall, salt was tested in 99% of the households. Results showed that 95% of the households had iodized salt .The proportion of households with iodized salt is lowest in mountain

ecological zone (90%), in Province 6 (85%), and in the lowest wealth quintile (84%) (NDHS, 2016).

c) **Iron Deficiency:** Iron deficiency refers to the reduction of iron stores that precedes overt irondeficiency anemia or persists without progression. Iron-deficiency anemia is a more severe condition in which low levels of iron are associated with anemia and the presence of microcytic hypochromic red cells.(Camaschella and Longo, 2015)Anaemia affects roughly a third of the world's population; half the cases are due to iron deficiency. It is a major and global public health problem that affects maternal and child mortality, physical performance, and referral to health-care professionals. Children aged 0–5 years, women of childbearing age, and pregnant women are particularly at risk. Several chronic diseases are frequently associated with iron deficiency anaemia—notably chronic kidney disease, chronic heart failure, cancer, and inflammatory bowel disease.(sLopez *et al.*, 2016) Overall, the prevalence of anaemia among children 5-59 months is 53%, with 26% mildly anaemic, 26% moderately anaemic, and 1% severely anaemic. (NDHS, 2016).

d) **Zinc Deficiency:** Zinc is an essential trace element with a key role in numerous basic cellular functions in humans. It is crucial to the normal function of the immune system and is involved in DNA synthesis, cellular division, proliferation, and growth. Zinc is also required during pregnancy for optimal growth and development of the fetus and for maternal tissue expansion (Chandyo *et al.*, 2009a). The mineral zinc is necessary for proper function of your immune system. Zinc also helps cells divide and grow and assists the body in healing wounds. Deficiency symptoms include frequent infections, hair loss, poor appetite, problems in tasting and smelling and long healing times for wounds. Zinc deficiency can be stopped or prevented by eating nuts, legumes, yeast and whole grains. Zinc is also found in beef, pork and lamb (WFP, 2011).Zinc deficiency is a major public health problem in many developing countries. However, its prevalence is still unknown in most populations. Women of reproductive age in developing countries are highly vulnerable to nutritional deficiencies, including that of zinc (Chandyo *et al.*, 2009b).Data on zinc deficiency based on population surveys are still lacking from many developing countries. Less precise estimates, such as those based on national food balance sheets and on the prevalence of clinical manifestations of zinc deficiency, like stunting and diarrhea in children, have been used instead. However,

these proxies are influenced by several factors and are rather unspecific markers of zinc deficiency (Chandyo *et al.*, 2009a).

2.7   Assesment of Nutritional Status

Assessment of nutritional status of community is one of the first steps in the formulation of any public health strategy to combat malnutrition. The principle aim of such an assessment is to determine the type, magnitude and distribution if malnutrition in different geographic areas to identify at risk groups and to determine the contributory factors. In addition fractural evidence of the exact magnitude of malnutrition is essential to sensitize administrators and politicians to obtain allocation of materials and human resources and to plan appropriately (Srilakshmi, 2016). A state of the human body resulting from the balance between intake of food and expenditure of energy is known as the nutritional status (R. K. Adhikari and E. M. Krantz, 2013). The nutritional status reflects the degree to which physiologic needs for nutrients are being met. Appropriate techniques of assessment can detect nutritional deficiency in the early stages of development so that dietary intake can be improved through proper counseling and nutritional support before more severe condition appears (Y. Joshi, 2008).

Nutritional assessment can be defined as the interpretation of information's obtained from anthropometric, dietary, biochemical and clinical studies. The information obtained is used to determine the health status of individual or population groups as influenced by their intake and utilization of nutrients. Nutritional assessment is done for survey, surveillance, screening and monitoring (Y. Joshi, 2008).

Nutrition assessment is the best way to determine whether or not people's nutritional needs are effectively being met, once food is available and easily accessible. Nutrition assessment provides timely, high-quality and evidence-based information for setting targets, planning, monitoring and evaluating programmes aiming at eradicating hunger and reducing the burden of malnutrition (FAO, 2002).

Nutritional assessment is essential in order to:

a) Identify the undernourished or over-nourished state of an individual or a community and estimating the optimum energy and nutrient intake to promote growth and well-being.

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b) To gauge the prevalence of malnutrition in the clinical setting, this is found to be high, in the range of 48% to 50%. Also it is associated with suboptimal surgical outcome, increased rate of infection, longer hospital stay, impaired wound healing, frequent hospital stay, impaired wound healing, frequent hospital readmission for the elderly, more frequent post-operative complication and increased risk of death.

c) To plan health programs.

A number of public health problems afflict a large population of the world. In order to improve the situation, several numeric measurements are required in order to act as a baseline (S. A. Joshi, 2016).

The nutritional assessment may require encompassing nations, communities, vulnerable segments of communities or individuals. It may be done as a part of an exercise to document current status as compared with post status or as specific attempt to evaluate the, impact of an intervention programs (Ramchandran, 1987).

There are three main aims of nutritional assessment of a community. They are:

1. To judge the magnitude and geographical distribution of malnutrition.
2. To know the effect of ecological factors that may directly or indirectly be responsible.
3. To suggest corrective measures especially with the participation of the affected community.

The assessment of nutritional status of an individual member of a community is accomplished by carrying out clinical, biochemical, anthropometric and biophysical examinations. To determine the nutritional status of any given community or section of community, it is necessary to apply such techniques to all its various members (WHO, 1962).The assessment of nutritional status can be done by using the following information:

a) **Direct method**

Deals with the individual and measures objective criteria

- ✓ Anthropometric methods
- ✓ Biochemical methods
- ✓ Clinical methods
- ✓ Dietary procedures

b) Indirect method

Use community indices that reflect the community nutritional status or need

1. Dietary intake
2. morbidity and mortality rates
3. as specific mortality
4. vital statistics

c) Ecological factors

1. Socio-economic status
2. housing and environmental hygiene
3. health and education services
4. conditioning infection

2.7.1   Anthropometry

This technique is concerned with the measurement of physical dimension and the gross composition of the human body at different age levels and degrees of nutrition (S. A. Joshi, 2016). Nutritional Anthropometry has most commonly been conducted on preschool children, the age group in which PEM is usually most prevalent and most severe.

Anthropometric measurements are of two types; single measurements which have to be interpreted in relation to age (e.g. weight, height, head circumference) and a ratio of two measurements which to some extent is independent of age e.g. weight for height ratio, mid upper arm to head circumference ratio (R. K. Adhikari and M. E. Krantz, 2013). It is necessary to select those methods of anthropometry depending on the purpose and objective of the survey. It is necessary for nutritionist to keep in mind that this tool is of greatest value in the assessment of growth failure and malnutrition (S. A. Joshi, 2016).

The measurements vary with age and degree of nutrition and as a result are useful in assessing imbalances of protein and energy. They can be used to detect moderate as well as severe degree of malnutrition in children as well as severe degree of malnutrition in children as well as in adults.

The technique also provides information on past nutritional history which cannot be obtained in other assessment techniques. Anthropometric incidences can be derived directly from a single one measurement, i.e. weight for age, height for age, head

circumference for age or from combination of raw measurements, such as weight and height, skin fold thickness at various sites or limb circumferences. Some combinations, i.e. triceps skin fold and mid upper arm muscle area and mid upper arm fat area (Y. Joshi, 2008).

Advantages of anthropometric assessment

  i. The procedures used are simple, safe and non-invasive and can be used for the large population surveys.
 ii. Equipment required is inexpensive.
iii. A semiskilled person can also perform the measurement procedure.
 iv. The methods are precise and accurate.
  v. Information on past long term nutritional history can be obtained
 vi. Mild to moderate malnutrition can be detected.
vii. Changes in nutritional status over time or over time or over the generation changes can be observed (Y. Joshi, 2008).

Limitation of Anthropometry

  i. Relative insensitive to short term nutritional status,
 ii. Cannot identifies specific nutrient deficiencies,
iii. Measurements like skin-fold are difficult to carry out in obese people,
 iv. There may be ethnic differences in fat deposition

The commonly used anthropometric measurements or indicators of nutritional status for pre scholar children are briefly discussed below:

1.   Weight for height: Weight and height of child is measured using standard Seca digital balance and stadiometer respectively and index is expressed in standard deviation units from the median of WHO child growth standards adopted in 2006. Children whose weight-for-height is below minus one standard deviations is considered mildly wasted similarly below minus 2 and 3 standard deviations are considered moderately and severely wasted respectively.

2. Weight for age: Children whose weight-for-age is below minus two standard deviations from the median of the reference population are considered underweight. The measure reflects the effects of both acute and chronic under nutrition.

3. Height for age: Children whose height-for-age is below minus two standard deviations from the median of the reference population are considered stunted or short for their age. Stunting is the outcome of failure to receive adequate nutrition over an extended period and is also affected by recurrent or chronic illness.

4. Mid upper arm circumference: children whose mid upper arm circumference is below 12.5cm are considered malnourished. Hence it is significant during the diagnosis of protein energy malnutrition. Measurement should be taken by flexible, non-stretch tape made of fiber glass or steel.

5. Oedema: Accumulation of fluid in interstitial cells is called as oedema it also reflects PEM.

6. Head and chest circumference: Measurement of head circumference is important because it is closely related to brain size. It is often used with other measurements to detect pathological conditions too.

2.7.2 Biochemical test

Biochemical test is used primarily to detect subclinical deficiency states or to confirm a clinical diagnosis. Some of its examples are hemoglobin estimation, serum protein, urine creatinine, serum retinol etc.

Blood and urine are the two quantitative determinants fairly easily available body fluids, which are used in biochemical assessment of the nutritional status. A wide range of tests can be used for assessing malnutrition but it is necessary to use those tests that are feasible in rural field conditions. Ideally, the sample should be easily collectable, stable during transport, not affected by a recent meal or by water load and capable of giving information which is not already available by non-biochemical techniques (S. A. Joshi, 2016). For biochemical test it must be remembered that knowledge of the unique metabolism of each particular nutrient, including its storage in the body, the possibility of synthesis and the mode of excretion must also be taken into consideration.

Nutrients generally examined biochemically are:

- Proteins
- Vitamin A
- Vitamin D
- Ascorbic acid

- Thiamine

- Riboflavin

- Niacin

- Iron

- Folic acid

- Vitamin B_{12}

- Iodine

2.7.3   Clinical Examinations

Clinical examinations is one of the most practical and important methods used in assessing the nutritional status of the community (S. A. Joshi, 2016). It is least sensitive approach, is used in nutritional surveys of population groups because they involve an assessment of the health of those parts of the body that can be readily observed in a routine physical examination and do not involve obtaining blood, urine or tissue samples (Y. Joshi, 2008).

External examination of the body for changes in superficial epithelial tissues especially skin, eyes, hair and buccal mucosa may be carried out. Similarly, organs close to the surface of the body may be examined, e.g. the parotid and thyroid glands (S. A. Joshi, 2016).

It may be necessary to supplement these methods by certain physical tests. The main advantages of this method is that since it is based on observation of physical sings, it is relatively inexpensive and does not required any elaborate field equipment or even laboratory. As interpretation is based on observations of signs of deficiency diseases, one must be confused by the identical appearances. Most signs of malnutrition are not specific to lack of one nutrient and can often be produced by various non-nutritional factors. If these signs are associated with bio-chemical or other tests it may help to identify the nutrient/nutrients responsible (S. A. Joshi, 2016).

2.7.4   Dietary Procedures

Various classifications have been devised and suggested for the collection of dietary data. However, there are two major categories of methods. The first is the group methods and the second is based on dietary intakes of an individual. This is determined by record or

recall of all foods consumed over a specified period of time. This is the most commonly used methods for the field surveys.

2.8 Indicator of nutritional status

A report by WHO in 1976 listed the lowering nutritional status indicators based on body dimensions, birth weight, weight for height, height for age , weight for age, arm circumference.

The weight/height anthropometric measures are almost always included because they provide very useful information at a relatively low cost. However, a variety of other indicators may be used, including market prices for food, indicators of agricultural production and other livelihood systems, and morbidity and mortality data.

These indicators all involve the direct measurement of a person's height and weight, followed by a comparison with what is normal or acceptable for their sex and age. The comparison is especially important in the case of children under five, since healthy children are still growing rapidly at this stage of their lives. These indicators of nutritional status have a number of advantages:

i.   They are a simple and practical way of describing the problem;

ii.   They are useful proxies for a number of constraints to human welfare, such as inadequate access to food and/or the presence of infections and other environmental risks;

iii. They are strong predictors of the risk of subsequent morbidity, functional impairment   and mortality, whether at the level of the individual, a group or a whole population;

iv.   They are appropriate indicators for assessing the success or failure of interventions (FAO, 2001).

The nutritional indicators are used to measure nutritional imbalance resulting in under nutrition (assessed from underweight, wasting and stunting) and overweight. Child growth is internationally recognized as an important indicator of nutritional status and health in populations.

The percentage of children with a low height for age (stunting) reflects the cumulative effects of under nutrition and infections since and even before birth. This measure can therefore be interpreted as an indication of poor environmental conditions or

long-term restriction of a child's growth potential. The percentage of children who have low weight for age (underweight)can reflect 'wasting' (i.e. low weight for height), indicating acute weight loss, 'stunting', or both. Thus, 'underweight' is a composite indicator and may therefore be difficult to interpret (WHO, 2010).

Some indicators of nutritional status:

Stunting: It is defined as the percentage of children, aged 0 to 59 months, whose height for age is below minus two standard deviations (moderate and severe stunting) and minus three standard deviations (severe stunting) from the median of the WHO Child Growth Standards. Stunting is associated with an under developed brain, with long-lasting harmful consequences, including diminished mental ability and learning capacity, poor school performance in childhood, reduced earnings and increased risks of nutrition related chronic diseases, such as diabetes, hypertension, and obesity in future (UNICEF, 2013).

Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. On a population basis, high levels of stunting are associated with poor socioeconomic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices (Onis and Blössner, 2003).Stunting starts from pre-conception when an adolescent girl and who later becomes mother is undernourished and anemic; it worsens when infants' diets are poor, and when sanitation and hygiene is inadequate. It is irreversible by the age of two. Child survival and health is inseparably connected to reproductive and, maternal health (UNICEF, 2013).

Wasting: - Wasting is characterized by rapid loss of fat and muscle weight loss. Wasting is classified as either moderate or severe based on body measurements. Wasting or thinness indicates in most cases a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. However, wasting may also be the result of a chronic unfavorable condition. Provided there is no severe food shortage, the prevalence of wasting is usually below 5%, even in poor countries (Onis and Blössner, 2003).

Underweight: Weight-for-age reflects body mass relative to chronological age. It is influenced by both the height of the child (height-for-age) and his or her weight (weight-

for-height), and its composite nature makes interpretation complex (Onis and Blössner, 2003).

Mid - Upper-Arm Circumference: Measurement of the mid-upper arm appears to be most useful in practice. This reason is easily accessible, even with a young child sitting in front of the examiner on his mother's lap. The arm circumference is measured to the nearest 0.1 cm with a flexible steel or fiber- tape, which must be placed gently, but firmly, round the limb to avoid compression of the soft tissue (WHO, 1966).

Part III

Materials and Methodology

3.1   Research Design

A household descriptive cross-sectional, population based survey of under-five year age of Majhi children living in Ramdhuni Municipality, it consists of;

1. Household Survey with the help of questionnaire
2. Anthropometric Measurements of 6-59 months children
3. Food consumption score

3.2   Study Variables

The study variables were divided into two categories:

a) Dependent variables

1. Stunting(height for age): Height for age below -2SD from the National center for Health Statistics/WHO reference median value(NCHS/WHO)
2. Wasting(weight for height): Weight for Height below -2SD from the NCHS/WHO reference median value.
3. Underweight (weight for age): Weight for age below -2SD from NCHS/WHO reference median value.

b) Independent variables

1. Socio-economic and demographic factors: family size, family type, income occupation, education
2. Child Characteristics: gender, birth order, child birth weight, age groups
3. Child caring practice: initiation of breast feeding, colostrum feeding, pre-lacteals feeds, exclusive breastfeeding, etc
4. Maternal characteristics: marriage age, age at pregnancy,iron folate supplementation, etc
5. Environmental and sanitation characteristics

3.3   Study Area

The study was conducted in majhi community of Ramdhuni municipality.

3.4   Target Population

The measurement is taken 6-59 months of majhi community children were selected for the survey and interview was taken from mothers.

Inclusion and exclusion criteria:

Inclusion criteria: Every household of majhi was included and children aged 6-59 months were taken.

Exclusion criteria: The study participants who are seriously ill or who were not available at household during the survey.

3.5   Sampling Frame

Nutritional survey was conducted in Majhi Community of Ramdhuni.The sampling frame was based on the data obtained from" Ramdhuni Bhasi Nagarpalika ko Paswachitra, 2073.. The frame was the listing of no of household found in Ramdhuni, Municipality. Each and every child of majhi community was included.

3.6   Research Instrument

Equipments used during the survey were:

i) Weighing machine (1 piece): For measuring the weight of the children.Digital weighing machine with the capacity of 100 kg and having the least count of 0.1 kg, manufactured by Microlife Pvt. Ltd was used. The following paragraph describes the technique used for measuring weight of children.

The subject was without shoes and minimal clothing.The subject was standing on the center of the scale platform with his/her weight equally distributed to both legs.In case for young infants weight was taken carrying the child by mother/caretaker and later on substract to calculate the weightof the child.

ii) Height measuring scale (stadiometer) (1piece): For measuring the height of children. The height measuring tape was taken. It was prepared under the supervision of Central Campus of Technology, Department of Nutrition and Dietetics. The technique used for measuring height of the child was as follows:

For children above two years, they were asked to stand on vertical bar, removing their shoes and heels together, head position such that the line of vision was perpendicular to the body, arms hanging freely by the side and back of the head,. buttocks and heels were in contact with the wall. Height was recorded to the nearest 0.1 cm.

For the children below two years, they were laid on the ruled board of the infantometer (length measuring scale for children below two years). The board has attached fixed piece of wood at one end and moveable piece at the other. The child was stretched out on the board and moveable end flat is pressed against the bottom of the child foot and the measurements were taken.

iii)   Mid Upper Arm Circumference (MUAC) tape (1 piece)

Technique for measuring MUAC:

The subject was asked to bend his arms 90 degree with his/her palm facing upward MUAC was taken on the left hand midway between the elbow and shoulder joint so that the hand was simply relaxed and hanging by the side.

iv) Set of questionnaire

A well designed set of questionnaire was used to collect information on household characteristics, food consumption, feeding practice ,health status and health facility.

3.9   Pre-testing

Preliminary visit was done and designed questionnaire was tested before conducting final survey. Pre-testing was performed in few under five year children from a selected area under sampling procedure. The pre- testing was conducted in order to maintain accuracy and clarity of questionnaire, to check the consistency in interpretation of questions and to identify ambiguous items. After review of questionnaire all suggested changes were made before being administered in the actual study.

3.10   Validity and reliability

To ascertain the degree to which the data collection instrument measure what they purposed to measure, the instrument was validated by comparing with standard known weights(for weighing balance). The questionnaires was pre-tested prior to data collection to ascertain content and face validity.

Reliability means absence of errors of measurement in a measuring instrument. Reliability means measures obtained from a measuring instrument, i.e the truth measures of the property measured. This definition implies the accuracy of the scale.

3.11 Data collection techniques

The data was collected with the help of structured questionnaire form, by face to face interview with mother of child with the help of structured questionnaire in which answers of every questions was coded and recorded with unique identity number for each household of 6-59 months.

3.12 Data processing and analysis

Data collected were coded first and was entered in WHO Anthro 3.2.2 and Microsoft excel 2010. The prevalence of stunting, wasting and underweight was explained.

Then the data was entered into Statistical Package for Social Sciences (SPSS) version 20.0. Chi-square test was used to identify the associated factors of malnutrition. Verified test parameters were used to establish the relationships between the variables and nutritional status of children.

3.13 Logistical and ethical considerations

Permission to conduct survey in Ramdhuni-Bhasi Municipality was obtained from office of that municipality. Verbal and written consent from parents/care taker of study subjects was obtained and the objective of the study was explained lucidly to them. Privacy and confidentiality of collected information was ensured at all level.

PART IV

Result and Discussion

The census with sample size 57 was conducted in Ramdhuni-Bhasi municipality,majhi community, Sunsari to find the Influence of Infant feeding practice on the nutritional status of 6-59 months children. The results and findings of the study are presented in following headings.

4.1   Socio-economic and Demographic characteristics

The study shows that the major occupation of fathers was foreign employment with the highest percentage of 42.1%, the second main occupation of fathers was found to be both the agriculture and labor with 19.3% and the fathers engaged in service, business and other were 3.5%, 7% and 8.8% respectively. Most of the mothers worked as housewife with highest percentage of 70.2%, 14% of mother's occupation was agriculture,10.5% of mothers were involved in business, 3.5% of mothers were involved in labor and 1.8% were for foreign employment. The study shows that 17.5% of the household had annual income less than 1 lakhs, 45.6% of the household had annual income in range between 1 to 3 lakhs whereas 36.8% of the household earned more than 3 lakhs annually.

Table 4.1(a) Socio-demographic characteristics of study population

Variables	Frequency	Percent
Father's occupation		
Agriculture	11	19.3
Service	2	3.5
Labor	11	19.3
Business	4	7

Foreign Employment	24	42.1
Others	5	8.8
Mother's occupation		
House wife	40	70.2
Foreign Employment	1	1.8
Labor	2	3.5
Business	6	10.5
Agriculture	8	14
Annual Income		
<1 lakh	10	17.5
1-3 lakh	26	45.6
>3 lakh	21	36.8

There were 64.9% nuclear families and 35.1% joint families. 56 households were permanent residents and only 1 was temporary resident. 73.7% percent of families under the survey had only one under five-year child and 26.3% percent had more than one under five year children as shown in Table 4.1. The educational status of fathers of surveyed children were depicted as 3.5% illiterate, 8.8% informal, 33.3% primary level, 49.1% secondary level and 5.3% with bachelor and above. Similarly, 7% of the mothers were illiterate, 14 % having informal education, mothers having primary level education were

29.8%, mothers having secondary level education were 47.4% and mother who had studied bachelor and above were 1.8%.

Table 4.1(b) Socio-demographic characteristics of study population

Variables	Frequency	Percent
Type of Family		
Single	37	64.9
Joint	20	35.1
No. of under 5 years child		
Only one	42	73.7
More than one	15	26.3
Father's Education level		
Illiterate	2	3.5
Informal	5	8.8
Primary	19	33
Secondary	28	49.1
Bachelor and above	3	5.3
Mother's Education level		
Illiterate	4	7

Cont….

Informal	8	14
Primary	17	29.8
Secondary	27	47.4
Bachelor and above	1	1.8

4.2   Child characteristics

Out of 57 children of age group 6 − 59 months taken in study, 40.4% were females and 59.6% were males. Among 57 selected children, 56.1% were first child, 28.1% second child, 8.8% third child and 4% other child of their parents.

8.8% of children had low birth weight (less than 2.5 kg), 66.7% of children had normal birth weight (2.5 kg and above) and 24.6% of respondents didn't know the birth weight of their children. Percentage ofbirths with a reported birth weight below2.5kilogramregardless of gestational age. Information on a baby's birth weight is important because birth weight is an indirect indicator of maternal nutrition as well as a predictive indicator of potential neonatal death and of malnutrition if the child survives (NDHS, 2016).It might be due to under nutrition in women before and during pregnancy (Srilakshmi, 2014).

The mean ± SD age of children was 32.38 ± 17.09 months. The children of age 6-59 months were categorized according to WHO standard in 5 groups and shows that age group 48-59 months and 36-47 months had the highest percentage (22.8%), followed by 6-11 months (21.1%), 24-35 months (17.5%), and the least was 12-23 month (15.8%). 54.4% of surveyed children have growth chart and 45% do not have growth chart.

Table 4.2 Child characteristics of study population

Variables	Frequency	Percent
Gender		
Female	23	40.4
Male	24	59.6
Birth Order		
First	32	56.1
Second	16	28.1
Third	5	8.8
Other	4	7
Child birth weight		
<2.5kg	5	8.8
>2.5kg	38	66.7
Don't know	14	24.7
Age Groups(months)		
6-11	12	21.1
12-23	9	15.8

24-35	10	17.5
36-47	13	22.8
48-59	13	22.8
Growth Chart		
Yes	31	54.4
No	26	45.6

4.3 Child caring practices

This survey shows that 75.4 % of mother breastfed their child within 1 hour of the delivery which is more than the national data which shows 55% are breast feed within 1 hour of birth (NDHS, 2016), 15.8% of them breastfed their child within 8 hour whereas 5.3% of mother breastfed their child after 24 hours of delivery and 2% didn't know the time of initiation of breastfeeding.

87.7% of the mothers in survey fed colostrum to their children while 12.3% of mothers didn't feed colostrum milk to their children. 93% of children were fed nothing before initiation of breast milk while 7% were fed honey-ghee and cow's milk

Among the study sample, 64.9% were exclusively breastfed for first six months while 35.1% were not exclusively breastfed for six months which is less than the national data 66 % of children were exclusively breastfed (NDHS, 2016). Thus, not following exclusive breastfeeding was seen as a problem in the study area.

Most of child initiated complementary feeding at the age of 6 months with 54.4%, following at the age of less than 4 months with 21.1%, 7 months and more with 10.5% and 5.3% and 8.8% children were fed at the age of 4 months and 5 months respectively. The type of complementary food given to children was Jaulo 29.8%, followed by Dal/Bhat 24.6%(14), Dal/Bhat/Tarkari 17.5% (10), Locally made Lito 15.8% and 8.8% and 3.5%

were given Processed foods and *others* respectively.91.2% of children were fed with Iron Rich Food and rest 8.8% were not fed with Iron Rich Food.96.5%(55) children's parents included Vitamin A rich food in their complementary food and other 3.5%(2) did not included.56.1% child were given fat from Plant origin while 7% were given fat from Animal Origin and 36.8% were given fat from both sources.

19.3% were fed MNP(Micro-Nutrient Powder) distributed by the government and 80.7% were not fed with MNP. It is mostly due to the lesser accessibility to the MNP. 98.2% households use packaged iodized salt and1.8% used non-iodized salt. This finding is similar to that of National Demographic and Health Survey 2016 which revealed that more than 95% of households were using iodized salt (NDHS, 2016). Regarding Vitamin A supplementation, 96.5% were given Vitamin A capsule and 86% deworming tablet during the last Vitamin A campaign. Similarly, the effectiveness of National Vitamin A supplementation program was more than to that of the country as the national data on Vitamin A supplementation showed 86% children aged 6-59 months received vitamin A supplement and 76% of 12-59 months received worm infestation tablets (NDHS, 2016).

Table 4.3 Distribution of different Child caring practices

Variables	Frequency	Percent
Time of initiation of breastfeeding		
Within 1 hour of birth	43	75.4
Within 8 hour of birth	8	15.8
Within 24 hours of birth	3	5.3
Don't know	2	3.5
Colostrum Feeding		
Yes	50	87.7

Cont….

No	7	12.3

Feeding Prelacteals

Nothing	53	93
Honey and ghee	4	7

Exclusive Breastfeeding

Yes	37	64.9
No	20	35.1

Time of initiation of complementary Food

Less than 4 months	12	21.1
4 months	3	5.3
5 months	5	8.8
6 months	31	54.4
7 months and more	6	10.5

Type of Complementary Food

Locally made Lito	9	15.8
Jaulo	17	29.8
Dal/Bhat	14	24.6

Dal/Bhat/Tarkari	10	17.5
Processed foods	5	8.8
Others	2	3.5
Feed Iron Rich Food		
Yes	52	91.2
No	5	8.8
Feed Vitamin A Rich Food		
Yes	55	96.5
No	2	3.5
Types of Fat Used		
Plant Origin	32	56.1
Animal Origin	4	7
Both	21	36.8
Fed MNP		
Yes	11	19.3
No	46	80.7
Types of Salt Used		

Iodised	56	98.2
Non-Iodised	1	1.8
Vaccination According to Schedule		
Yes	55	96.5
No	2	3.5
Fed Vitamin A capsule after 6 months		
Yes	55	96.5
No	2	3.5
Fed worm infestation tablet after 1 year		
Yes	49	86
No	8	14

4.4   Maternal characteristics

The mean age of mothers under the survey was found to be 26.21±6.31 with the mother of minimum age of 16 years to maximum age of 41 years. The legal age of marriage in Nepal for both gender should be more than twenty years (NLC, 1971). But in study area still 61.4% of mothers were found to be married before the age of less than or equal to 20 years and only 38.6% of mothers got married after the age of 20 years. The minimum and maximum age of mother at their marriage were 14 years and 28 years respectively while the mean age of mother at marriage was 19.07±3.495 years.

40.35% of mother had their first pregnancy at age of less than or equal to 20 years while 59.65% of mother were above 20 years during their first pregnancy. The mean age of

mothers at first pregnancy in this survey was found to be 20.49±3.79 years. The minimum age of mothers at their first pregnancy was 16 years and maximum age was 32 years.

Most of them 82.5% have taken vaccination during pregnancy but 17.5% haven't taken the vaccination.It was due to the lack of awareness. They were unware about the importance of vaccination during pregnancy and their effects in the nutritional status of their children. The frequency of the meal during their pregnancy are also varied,35.1% took their meal less than 3 times during pregnancy,59.6% and 5.3% took their meal 3-4 times and more than 4 times respectively.

87.7% were supplemented with iron and folate tablets during their pregnancy while 12.3% of mothers weren't supplemented. As from previous line,12.3% didn't consumed iron and folate tablets,50.9% consumed iron and folate tablets less than 225 days and 36.8% consumed 225 days. Regarding knowledge about preparation of ORS, 42.1% of respondent had knowledge about ORS preparation and 57.9% replied that they were unknown about ORS preparation. 45.6% know how to prepare Poshilo Jaulo.45.6% know about MNP and 54.4% didn't know about MNP and Poshilo Jaulo

Table 4.4 Distribution of maternal characteristics in study population

Variables	Frequency	Percent
Marriage Age		
≤20 years	35	61.4
>20 years	22	38.6
Age at first pregnancy		
≤20	23	40.35
>20	34	59.65
Vaccination During Pregnancy		
Yes	47	82.5

Cont….

41

No	10	17.5
Food Consumption During Pregnancy		
Less than 3	20	35.1
3-4	34	59.6
More than 4	3	5.3
Iron Folate Supplementation		
Yes	50	87.7
No	7	12.3
Iron Folate Supplementation Period		
Less than 225	29	50.9
225 days	21	36.8
Didn't consume	7	12.3
Knowledge of Preparation of ORS		
Yes	24	42.1
No	33	57.9
Knowledge of Preparation of Poshilo Jaulo		
Yes	26	45.6
No	31	54.4
Knowledge of MNP		
Yes	26	45.6

No	31	54.4

4.5   Environmental and sanitation characteristics

Safe drinking water and proper sanitation and hygienic practices are basic necessities for good health. Table 4.5 shows that the main source of drinking water used by the household was tube well 78.9%, 12.3% uses spring water and rest 8.8% uses tap water. Only 14.03% of household purify water before drinking while rest 85.96 % of household drink water without purifying. 17.5% households under the survey did not have toilet facility and 82.5% households had toilet facility. Every mother in the study wash their child before feeding child.91.2% uses soap water for hand washing whereas 7% uses only water

Nearly half i.e.49.1% households managed their waste product by burning, 38.6% households managed waste by throwing it in environment and 12.3% by burial method. 82.5% doesnot have refrigerator in their house and rest 17.5% have refrigerator in house. Members from 5.3% households were affected by the diarrhea and 94.7% are not affected.

Table 4.5 Environmental and Sanitation characteristics of study population

Variables	Frequency	Percent
Source of Drinking Water		
Tube well	45	78.9
Tap Water	5	8.8
Spring	7	12.3
Water Treatment Method		
Yes	8	14.03
No	49	85.96

Toilet Facilities		
Openly	10	17.5
Closely	47	82.5
Handwashing Methods and materials		
Kharani Pani	1	1.8
Soap Water	52	91.2
Only Water	4	7
Household Waste Management		
Bury	7	12.3
Burn	28	49.1
Dispose in Environment	22	38.6
Refrigeration Of Food		
Yes	10	17.5
No	47	82.5
Diarrhoea affected in last 2 weeks		
Yes	3	5.3
No	54	94.7

4.6 Prevalance of malnutrition in 6-59 months children of Majhi Community of Ramdhuni Municipality
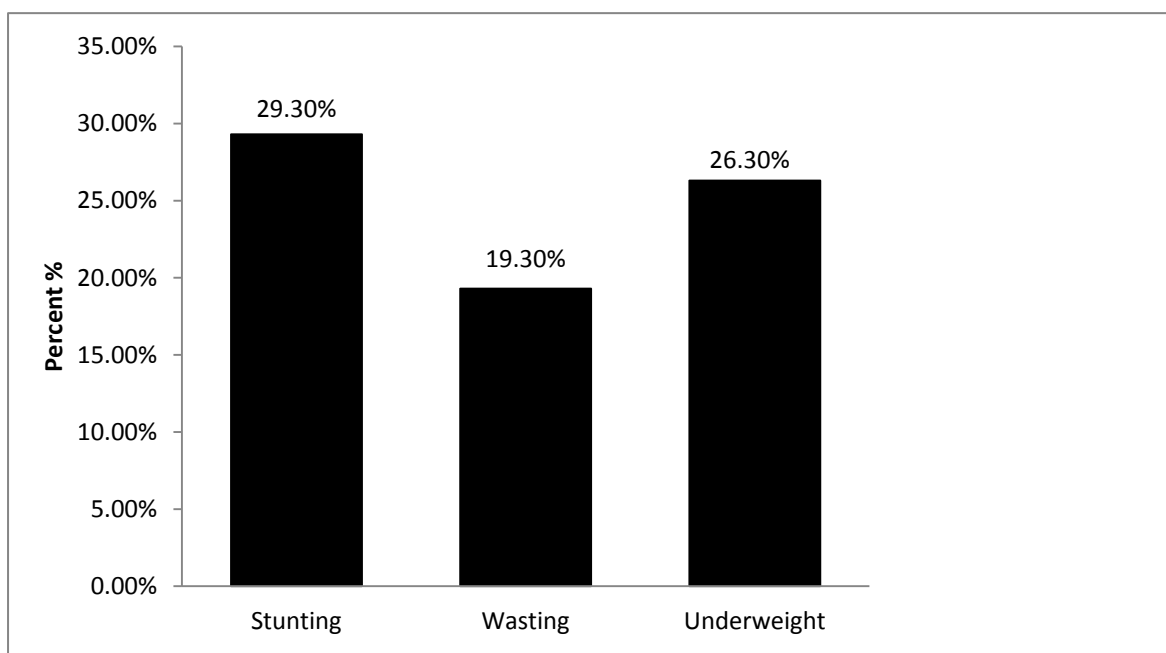
Fig:4.1 Prevalence of malnutrition

The prevalence of malnutrition in 6-59 months aged children of Majhi Community residing in Ramdhuni Municipality were found to be 29.8% stunted, 19.3% wasted and 26.3% underweight. Among 29.8% stunted, 26.3% were found to be moderately stunted and 3.5% were found to be severely stunted. Similarly, out of 19.3% wasted children 12.3% were moderately wasted and 7% were severely wasted. Among 26..3% of underweight children, 19.3% were moderately underweight and 7% were severely underweight.

NDHS 2016 showed that the prevalence of stunting, wasting and underweight was found to be 36%, 10% and 27% respectively. The prevalence of stunting and wasting was slightly higher than the national data but the prevalence of underweight was similar to the national data.

Similar study was conducted in Ramdhuni Municipality which showed that the prevalence of stunting, wasting and underweight were found to be 46.4%, 5.2% and 13% respectively (Bista, 2017).

Table:4.6 Age distribution of malnutrition

Age group (months)	N	WHZ%		HAZ%		WAZ%	
		<-3	<-2	<-3	<-2	<-3	<-2
6-11	11	18.2	27.3	0	0	18.2	18.2
12-23	10	0	0	10	20	0	10
24-35	11	0	0	0	27.3	0	9.1
36-47	12	8.3	41.7	0	33.3	16.7	50
47-59	13	7.7	23.1	7.7	15.4	0	30.8

From the above table wasting was found higher in the age group of 6-11 months children, stunting and underweight was more prevalent in the age group of 36-47 months children.

4.7 Nutritional status according to gender

Table 4.7 : Nutritional status according to gender

	<-3 Z-score	<-2 Z score	>-2 Zscore
Wasting(WHZ)			
Male	(1)1.8%	(3)5.3%	(19)33.3%
Female	(3) 5.3%	(4)7%	(27)47.4%
Stunting(HAZ)			

Cont….

Male	(1)1.8%	(5)8.8%	(17)29.8%
Female	(1)1.8%	(10)17.5%	(23)40.4%
Underweight **(WAZ)**			
Male	(0)0%	(5)8.8%	(18)31.6%
Female	(4)7%	(6)10.5%	(24)42.1%

From Table 4.7,it was seen that 1.8% of male 5.3% were found to be severly wasted.Similarly, 5.3% of male and 7% of female children's was moderately wasted.The survey showed that prevalence of wasting was slightly higher in female than in male.

The result showed that 1.8% of male and 1.8% of female children were found to be severely stunted and 8.8% of male and 17.5% of female children were moderately stunted.Overall, the survey showed that prevalence of stunting was higher in female than in male.

In the case of underweight 0% of male and 7% of female children were severely underweight and 8.8% of male and 10.5% of female children were moderately underweight.The result showed that underweight was found to be higher in female than in male.

4.8 Distribution of Malnutrition in children according to weight for height
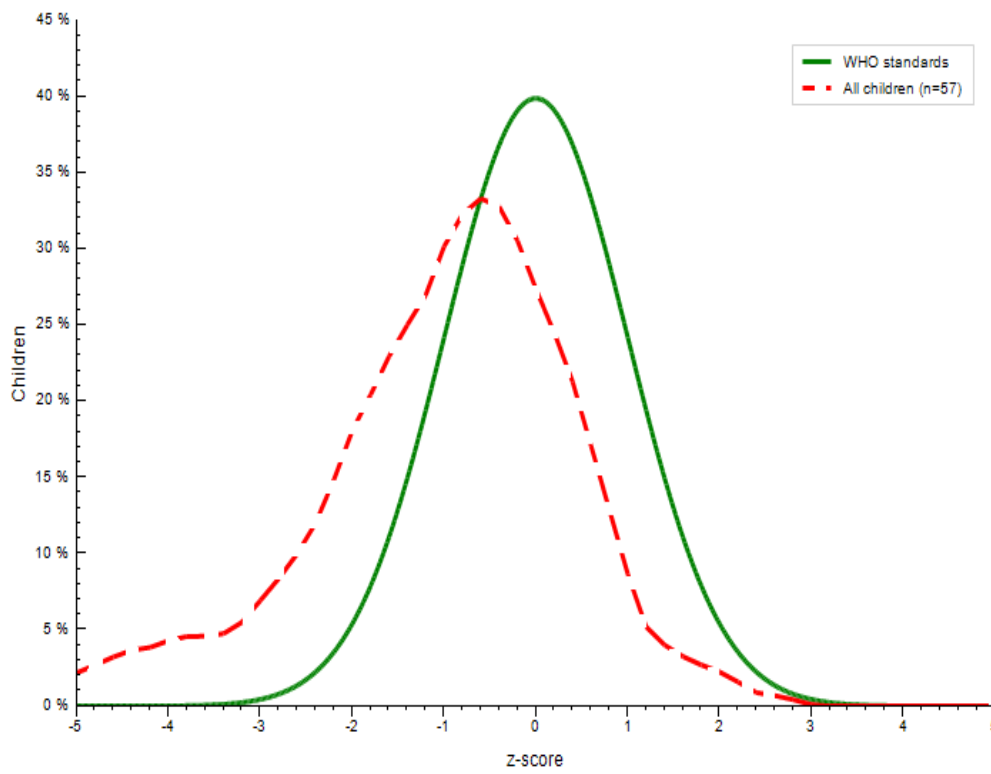
Fig:4.2 Distribution of wasting among 6-59 months children of majhi community in Ramdhuni Municipality

Out of 57 surveyed children, study shows that the highest percentage of wasting (50%) was found in the age group 36-47 months followed by (45.5%) and(30.8%)in the age group of 6-11 months and 47-59 months respectively whereas children from age group 12-23 months and 24-35 were found to be normal.

A WHZ < -2 defines the presence of acute malnutrition (wasting). Among 57 children taken for the survey in Ramdhuni Municipality , the prevalence of wasting was found to be 19.3% where, 12.3% were moderately wasted and 7% were severely wasted as shown in fig 4.2.

The median weight-for-height z-score of survey children was found to be -1.01 which is less by 1.01 with reference to WHO standard. This is why curve is slightly skewed to the left side of the WHO standard curve showing the prevalence if wasting among the study population as shown in the Fig 4.2

4.9 Factors associated with Wasting

Table 4.8 : Factors affecting wasting

Factors		WHZ		Chi-square	P-value
		Normal	**Wasted**		
Father's Education	Bachelor & above	(3) 5.2%	(0)0%		
	Secondary Level(8-12)	(22)38.6%	(6)10.5%	2.171	0.975
	Primary Level	(14) 24.6%	(5)8.7%		
	Informal	(5)8.7%	(0)0%		
	Completely Illiterate	(2)3.5%	(0)0%		
Mother's Education	Bachelor & above	(1)1.8%	(0)0%		
	Secondary Level(8-12)	(23) 40.4%	(4)7.1%	8.415	0.394
	Primary Level	(12) 21.1%	(5)8.8%		
	Informal	(6)10.5%	(2)3.5%		
	Completely Illiterate	(4)7%	(0)0%		

Mother's Occupation	Agriculture	(7)12.3%	(1)1.8%		
	Bussiness	(5)8.8%	(1)1.8%		
	Foreign Employment	(0)0%	(1)1.8%	15.028	0.059
	Labor	(1)1.8%	(1)1.8%		
	House wife	(33)57.9%	(7)12.3%		
Child from Elder	First	(26) 45.6%	(6)10.5%		
	Second	(13) 22.8%	(3)5.3%	2.988	0.81
	Third	(4)7%	(1)1.8%		
	Other	(3)5.2%	(1)1.8%		
Initiation of Breastfeeding	Within 1hr of Birth	(38)66.66%	(5)8.77%		
	Within 8hr of Birth	(5)8.8%	(4)7%	13.478	0.036*
	Within 24 hr	(2)3.5%	(1)1.8%		
	Others	(1)1.8%	(1)1.8%		

Exclusively Breastfeed	Yes	(27)47.4%	(10)17.5%	4.273	0.113
	No	(19)33.3%	(1)1.8%		
Vitamin A Capsule	Yes	(44)77.2%	(11)19.3%	0.496	0.78
	No	(2)3.5%	(0)0%		
Types of Salt Used	Iodized	(45)78.9%	(11)19.3%	0.243	0.885
	Non-Iodized	(1)1.8%	(0)0%		
Iron Folate consumption Period	Less than 225 days	(26)45.6%	(3)5.3%		
	225 days	(14) 24.6%	(7) 12.3%	4.911	0.297
	Didn't consumed	(6)10.5%	(1)1.8%		

*Statistically Significant (P-value <0.05)

The Chi-square test revealed that there is significant association of wasting with initiation of breastfeeding (0.036) and and very close association with mother's occupation (0.059).Whereas there is no significant association of wasting with Father's education, Mother's education, Child from elder, Exclusively Breastfeed, Vitamin A capsule, Type of salt Used and Iron Folate Consumption Period.

Initiation of Breast feeding has significant association with wasting. Children who are breastfeed soon after the birth are less stunted. Promotion of early initiation of breastfeeding has the potential to make a major contribution to the achievement of the child survival millennium development goal, 16% of neonatal deaths could be saved if all infants were breastfed from day 1 and 22% if breastfeeding started within the first hour. Breastfeeding-promotion programs should emphasize early initiation (Edmond *et al.*,

2006). Above table shows that wasting is closely associated with mother's occupation. As we know more the income of the mother, mother are likely to contribute their income in food budget which directly affects the nutritional status of children. This can be also proved from Nigerian studies which shows children whose mothers were unemployed and non-formally educated are more malnourished in all the study years.(Onubogu *et al.*, 2016)

4.10 Distribution of malnutrition of children according to height for age
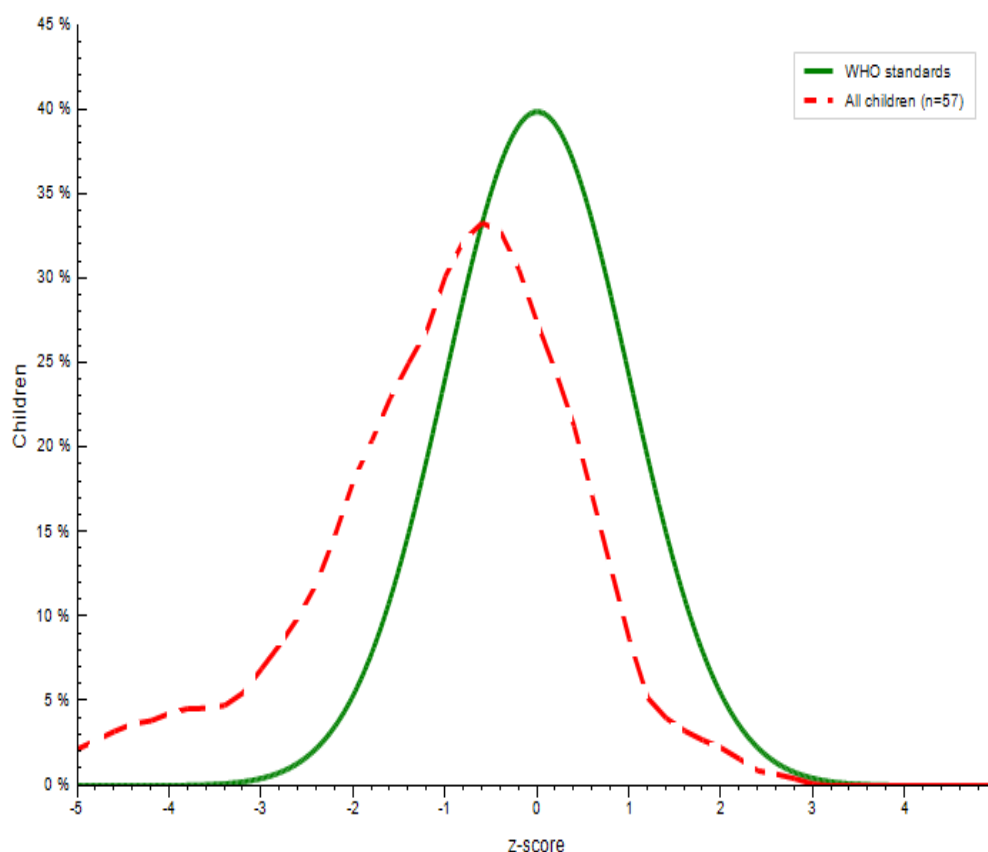
Fig:4.3 Distribution of stunting among 6-59 months of majhi community in Ramdhuni

Out of 57 surveyed children, study found that the highest percentage of stunting (33.3%) was found in the age group 36-47 months followed by 30%, 27.3% and 23.1% stunted population of the age group 12-23, 24-35 and 47-59 months respectively. No children taken for the survey were reported to be stunted in the age group 6-11 months as shown in the fig above.

A HAZ of < -2 defines the presence of chronic malnutrition (stunting). Among 119 children taken for the survey in Ramdhuni , Municipality, the prevalence of stunting was

found to be 29.8% where, 26.3% were moderately stunted and 3.5% were severely stunted as shown in fig above.

The median height for z-score of survey children was found to be -0.6 which is less by 0.6 with the reference to WHO standard.This is why the curve showing the prevalence of stunting among study population**.**

4.11   Factors associated with Stunting

Table 4.9: Factors affecting stunting

Factors		HFZ		Chi-square	P-value
		Normal	**Stunted**		
Father's Education	Bachelor & above	(1)1.8%	(2)3.5%		
	Secondary Level(8-12)	(23)40.4%	(5)8.8%	19.514	0.012*
	Primary Level	(11)19.3%	(7)12.3%		
	Informal	(4)7%	(1)1.8%		
	Completely Illiterate	(1)1.8%	(1)1.8%		
Mother's Education	Bachelor & above	(1)1.8%	(0)0%		
	Secondary Level(8-12)	(20)35.1%	(7)12.3%	28.21	0.000*
	Primary Level	(12)21.1%	(5)8.8%		
	Informal	(6)10.5%	(2)3.5%		
	Completely Illiterate	(1)1.8%	(3)5.3%		
Mother's Occupation	Agriculture	(7)12.3%	(1)1.8%		

	Bussiness	(5)8.8%	(1)1.8%		
	Foreign Employment	(0)0%	(1)1.8%	8.637	0.374
	Labor	(1)1.8%	(1)1.8%		
	House wife	(27)47.4%	(13) 22.9%		
Child from Elder	First	(25)43.9%	(7) 12.3%		
	Second	(12)21.1%	(4)7%	14.437	0.025*
	Third	(2)3.5%	(3)5.3%		
	Other	(1)1.8%	(3)5.3%		
Initiation of Breast feeding	Within 1h	(31)54.4%	(12)21.1%		
	Within 8h	(5)8.8%	(4)7%	11.903	0.064
	Within 24 h	(2)3.5%	(1)1.8%		
	Others	(2)3.5%	(0)0%		
Exclusively Breastfeed	Yes	(23) 40.4%	(14) 24.6%	3.545	0.17
	No	(17) 29.8%	(3)5.3%		
Vitamin A Capsule	Yes	(39) 68.4%	(16) 28.1%	0.635	0.728
	No	(1)1.8%	(1)1.8%		

Cont….

Types of Salt Used	Iodized	(40)70.2%	(16)28.1%	27.991	0.00*
	Non-Iodized	(0)0%	(1)1.8%		
Iron Folate consumption Period	Less than 225 days	(22)38.5%	(7)12.28%		
	225 days	(15)26.31%	(6)10.52%	5.054	0.282
	Didn't consumed	(3)5.3%	(4)7%		

*Significantly Associated(P-value<0.05)

From the table it can be concluded that there is significant association between Father's Education(0.012),Mother's Education(0.00),Child from Elder(0.025)with stunting whereas there is a close association of Initiation of Breast feeding(0.064) with stunting. There is no significant association with Mother's Education, Exclusively Breastfeed, Vitamin A capsule and Iron Folate Consumption.

Mother's education have significant association with mother's stunting. Educated mother's are likely to be more aware about child health. Mother's education is the best predictor for health and nutrition inequalities among infants and young children in rural Uganda.This suggests a need for appropriate formal education of the girl child aimed at promoting child health and nutrition. (Wamani *et al.*, 2004)

From the above table, it is clearly seen that there is significant association between child from elder and stunting. Eldest child is less likely to be stunted than other child. According to the study conducted by Seema Jayachandran and Rohini Pande, a preference for the oldest son ,who is expected to take care of aging parents, inherit the property, and perform post-death rituals for parents ,might be the reason behind increased child stunting in India.(Tarar, 2017)

4.13   Distribution of malnutrition of children according to weight for age
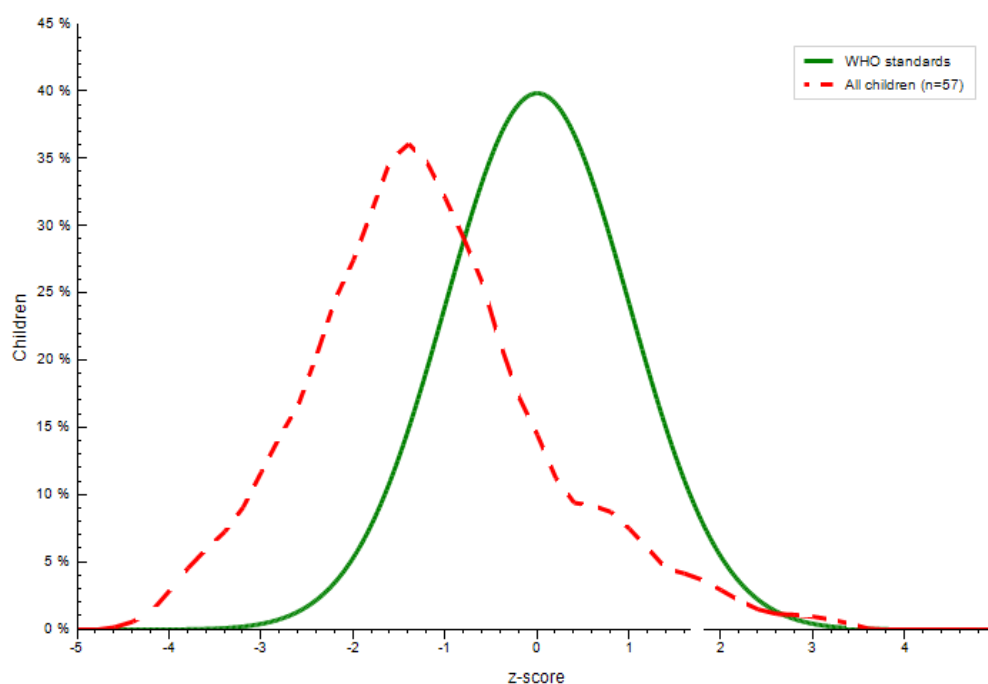
Fig:4.4 Distribution of underweight among 6-59 months of majhi community in Ramdhuni municipality

Out of 57 surveyed children, study showed the highest percentage of underweight (66.7%) was found in the age group 36-47 months followed by 36.4%, 30.8%, 10% and 9% were underweight population of the age group 6-11, 47-59, 12-23 and 24-35 months respectively.

AWAZ of< -2 defines the presence of chronic malnutrition (underweight). Among 57 children taken for survey in Ramdhuni Municipality, the prevalence of underweight was found to be 26.3%   where, 19.3% were moderately underweight and 7% were severely underweight.

The median weight for age z-score of survey children was found to be -1.40 which is less by 1.40 with reference to WHO standard. This cause the curve slightly skewed to the left side of WHO standard curve showing the prevalence of underweight among study population as shown in Fig 4.4

4.12 Factors associated with underweight

Table 4.10: Factors affecting underweight

Factors		WHZ		Chi-square	P-value
		Normal	**Underweight**		
Father's Education	Bachelor & above	(2)3.5%	(1)1.8%		
	Secondary Level(8-12)	(20)35.5%	(8)14%	2.171	0.975
	Primary Level	(14)24.6%	(5)8.8%		
	Informal	(4)7%	(1)1.8%		
	Completely Illiterate	(2)3.5%	(0)0%		
Mother's Education	Bachelor & above	(1)1.8%	(0)0%		
	Secondary Level(8-12)	(20)35.1%	(7)12.3%	6.692	0.57
	Primary Level	(12)21.1%	(5)8.8%		
	Informal	(6)10.5%	(2)3.5%		
	Completely Illiterate	(3)5.3%	(1)1.8%		
Mother's Occupation	Agriculture	(7)12.3%	(1)1.8%		
	Bussiness	(5)8.8%	(1)1.8%		
	Foreign Employment	(0)0%	(1)1.8%	13.05	0.11

	Labor	(1)1.8%	(1)1.8%		
	House wife	(29)50.9%	(11)19.3%		
Child from Elder	First	(23)40.4%	(9)15.8%		
	Second	(14)24.6%	(2)3.6%	5.794	0.447
	Third	(3)5.3%	(2)3.5%		
	Other	(2)3.5%	(2)3.5%		
Initiation of Breast feeding	Within 1hr of Birth	(34)59.6%	(9)15.8%		
	Within 8hr of Birth	(5)8.8%	(4)7%	11.275	0.08
	Within 24 hr	(2)3.5%	(1)1.8%		
	Others	(1)1.8%	(1)1.8%		
Exclusively Breastfeed	Yes	(25)43.9%	(12)21%	2.993	0.224
	No	(17)29.8%	(3)5.3%		
Vitamin A Capsule	Yes	(42)73.7%	(13)22.8%	8.668	0.013
	No	(0)0%	(2)3.5%		
Types of Salt Used	Iodized	(41)71.9%	(15)26.3%	0.364	0.834nt….
	Non-Iodized	(1)1.8%	(0)0%		
Iron Folate consumption Period	Less than 225 days	(25)43.9%	(4)7%		

225 days	(13)22.8%	(8)14%	10.599	0.031
Didn't consumed	(4)7.0%	(3)5.3%		

The significant association was found between supplementation of Vitamin A capsule(0.013), Iron Folate consumption period(0.031) with underweight whereas there is no significant association with father's education, mother's education, mother's occupation ,child from elder, initiation of breast feeding, exclusive breast feeding and types of salt used.

In this study, there was significant relation between Vitamin A capsule supplemenation and underweight which shows, children who have missed their Vitamin A supplementation after 6 months are likely to be underweight. Inadequate intake of Vitamin A can lead to improper growth and development such as underweight (WHO, 2017)

This study also reveals significant association between iron folate consumption period with underweight. WHO recommends , Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron* and 400 µg (0.4 mg) folic acid** is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight, and preterm birth. If it is not consumed as recommended, it contributes to the low birth weight, lowered resisitance to infection, poor coginitive development and reduced work capacity (WHO, 2012)

Conclusions

This study generally shows the Influence of Infant Feeding practice on the nutritional status of the children of 6-59 months. Following conclusions can be drawn from this study;

1. 75.4% of were breast fed within 1 hr of birth, 15.8% and 5.3% were breast fed within 8 hrs and 24 hrs respectively. While rest 5.3% don't know the initiation time.

2. 64.9% were exclusively breast fed whereas 35.1% were not exclusively breastfed

3. 21.1% , 5.3% and 8.8% initiated complementary feeding at the age of less than four, four and five months respectively. 54.4% were given complementary feed at the age of 6 months and 10.5% at the age of 7 months

4. The prevalence of stunting, wasting and underweight was found to be 29.8% ,19.3% and 26.3% respectively. MUAC measurement was found to be normal of all surveyed children.

5. The prevalence of wasting was found to be more in 6-11 months children and underweight and stunting was found more in 36-47 months children.

6. Initiation of breastfeeding is directly associated with wasting and mother's occupation have close relation with wasting.

7. There is significant association of Father's Education, Mother's Education, child from elder and very close association of initiation of breastfeeding with stunting.

8. Vitamin A supplementation and Iron Folate consumption period is directly proportional to underweight.

Part-VI

Recommendations

Based on the results of this study following recommendation could be made in order to improve the infant feeding practice of children of majhi community.

a. Appropriate intervention programs like supplementary feeding programs and distribution of Multi-nutrient powder(MNP) to improve the nutritional status of children.

b. Public awareness program regarding water purification technique should be given as they were unaware of arsenic in ground water.

c. Promotion of locally available nutritious food and programmes for nutritious recipe should be conducted at local level.

d. Similar cross-sectional descriptive or longitudinal survey can be conducted at to determine the magnitude and distribution of malnutrition and other probable causes of malnutrition.

Part-VI

Summary

Influence of Infant Feeding on the nutritional status of the children of majhi community of Ramdhuni municipality, Sunsari was carried out by taking 57 children of Majhi community.Cencus sampling method was taken for data collection.

Fifty seven childrens of Majhi community were taken. Anthropometric measurements (like height, weight, MUAC, edema) were taken to acess the nutritional status of Majhi children ans structured questionaires was ask to know about the feeding practices. The data collected were analyzed using SPSS version 20 and WHO Anthro 3.2.2 version and chi-square test was used to test the association between factors assumed responsible for malnutrition.

Prevalence of underweight, wasting, and stunting was 26.3%, 19.3% and 29.8% respectively. When analysis was done to find the factors associated with malnutrition, the survey showed that prevalence of malnutrition was higher in female than in male. Prevalence of stunting and underweight was more prevalent in 36-47 months age and wasting was more prevalent in 6-11 months.

Nearly all households were headed by males. Regarding family type, 64.9% were from nuclear family while 35.1% from joint families. Annual income of the 36.8% families was more than 3 lakhs, 45.6% of families were between one lakh to three lakh and only 17.5% of families were below one lakh.

66.7% had 2.5 or more than 2.5 kg ,8.8% have low birth weight and 24.6% didn't know the birth weight.75.4% children were feed with breast milk within 1 hr of birth and 87.7% of children were given colostrum milk after birth.Whereas 7% of children were given prelacteal feeds.Most of child initiated complementary feeding at the age of 6 months with 31%', following at the age of less than 4 months with 12%, 7 months and more with 10.5% and 5.3% and 8.8% children were fed at the age of 4 months and 5 months respectively. 67.3% children were given Dal/bhat as their complementary food.91.2% children were fed Iron rich food and 96.5% were fed with Vitamin A rich food 96.5%. 19.3% children were fed with MNP. 96.5% of children were vaccinated according to the schedule.

40.35% mothers were pregnant before 20 years and 59.65% mothers were pregnant after 20 years. 98.2% of household uses iodised salt. 82.5% have got vaccination during their pregnancy.

82.7% of mothers were supplemented iron folate tablets during their pregnancy and lactation period.42.1% mothers have the knowledge of preparation of ORS solution. 45.6% have knowledge of Poshilo Jaulo and MNP.

More than one-third (78.9%) of household uses tube-well water for drinking ,12.3% and 8.8% uses spring and tap water respectively for drinking purpose. Most of the mother (91.2%) uses soap water as hand washing material before feeding child, 7% uses only water and 1.8% uses kharani pani. Nearly half (49.1%) burn their household waste, 38.6% dispose in the environment and 12.3% bury their house hold waste. 17.5% have refrigerator in their home and 82.5% donot have refrigerator in their home. 94.7% households were not affected with diarrohea and 5.3% were affected with diarrohea.

Chi-square test analysis of the determinants of nutritional status indicated that, there was significant association (P < 0.05) of initiation of breastfeeding and very close association with mother's education with wasting. There was significant association (P < 0.05) of stunting with Mother's education, Father's education, Child from elder and very close association with initiation of breastfeeding. There was significant association (P <0.05) of underweight with Vitamin A capsule and Iron Folate consumption period.

Results of this study indicate that malnutrition among 6-59 months children is still an important problem in majhi community of Ramdhuni-Bhasi Sunsari. Also, study confirmed that mother's education, father's education, child from elder, time of initiation of breastfeeding, Vitamin A capsule consumption and Iron folate consumption period were the risk factors associated with malnutrition in majhi community of Ramdhuni-Bhasi Municipality. These findings are of great importance to the stake holders as they identify potential actions that can be used to improve the existing nutritional status of children of this community. Thus, to reduce the existing prevalence of malnutrition in majhi community Ramdhuni Municipality appropriate interventional program should be implemented.

References

Abenoza, A. (2013). Here's Why Colostrum Is So Important for Your Newborn. Breastfeeding New born. Retrieved from https://www.holisticallyloved.com/blog/2014/7/2/colostrum. (Last update September 5, 2014). [Accessed 7 April, 2018].

Adhikari, R. K. and Krantz, E. M. (2013). "Child Nutrition and Health" (4th ed.). Educational Publishing House. Kathmandu, Nepal.

Adhikari, R. K. and Krantz, M. E. (2013). Deficiency Diseases. *In:* "Child Nutrition and Health" (4th ed.).). pp. 114-120. Jamal, Kathmandu. Educational Publishing House.

Anon. (2004). "Nationa Guidelines on Infant and Young Child Feeding". Food and Nutrition Board (Ministry of Human Resource Development of Women and Child Development), India. p. 26. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwin0silsZbaAhWJvI8KHakGDGUQFggnMAA&url=http%3A%2F%2Fwww.wcd.nic.in%2Fsites%2Fdefault%2Ffiles%2Fnationalguidelines.pdf&usg=AOvVaw0Q5qvg8f7N3J8plBaehT09.

Anon. (2009). Colostrum. Breast-Feeding.com. Retrieved from https://www.breastfeeding-problems.com/colostrum.html. (Last update January 23, 2018). [Accessed 4 April, 2018].

Anon. (2011). National Nutrition Week. DOH, ASDA, CGCSA, UNICEF, USAID. Retrieved from https://www.nutritionweek.co.za/70links.html. (Last update December 13, 2011). [Accessed 10 April, 2011].

Anon. (2014a). Description of Ramdhuni Municipality. Retrieved from ramdhunibhasimun.gov.np/en/node/29. (Last update 17 January, 2017). [Accessed 1 June, 2018].

Anon. (2014b). Nutrition. *In:* "Food and Nutrition" (Vol. 2).). p. 110. Home Science.

Anon. (2017). "Industry Supporting both Breast milk and Infant Formula" (s1st ed.). Australia. Infant Nutrition Council. Retrieved from http://www.infantnutritioncouncil.com/resources/breastmilk-information/. [Accessed March 31, 2017].

Anon. (2018a). Colostrum: The Mind-Blowing Superfood for Your Baby. Mama Natural. Retrieved from https://www.mamanatural.com/colostrum/. [Accessed 7 April, 2018].

Anon. (2018b). Importance of iron and folic acid in pregnancy. Zen Parent. Retrieved from https://zenparent.in/pregnancy/importance-iron-folic-acid-pregnancy. (Last update 27 May, 2018). [Accessed 1 June, 2018].

APA. (2018). "What's in the Breast Milk?" (1st ed.). American Pregnancy Association. Retrieved from http://americanpregnancy.org/first-year-of-life/whats-in-breastmilk/. [Accessed 31 March 2018].

APIYCNA. (2013). "Asia Pacific Infant and Young Child Association". p. 1. Retrieved from http://apiycna.org/our-priorities/optimal-infant-and-young-child-nutrition-and-development/. [Accessed 22 February, 2018].

Bista, P. (2017). Factors Associated with Nutritional Status of 6-59 Months Children in Ramdhuni-Bhasi Municipality, Sunsari. B.sc Nutrition and Dietetics Dissertation. Tribhuwan University, Nepal.

Brown, L. R. (2014). "Nutritional Requirements During Pregnancy". Jones and Bartlett Publishers.

Camaschella, C. and Longo, D. L. (2015). Iron-Defeciency Anaemia. *The New England Journal of Medicine*. (19), 1832-1844.

Chandyo, R. K., Strand, T. A., Mathisen, M., Ulak, M., Adhikari, R. K., Bolann, B. J. and Sommerfelt, H. (2009a). Zinc Deficiency Is Common among Healthy Women of Reproductive Age in Bhaktapur, Nepal. *The Journal of Nutrition*. **139** (3), 594-597.

Chandyo, R. K., Strand, T. A., Mathisen, M., Ulak, M., Adhikari, R. K., Bolann, B. J. and Sommerfelt, H. (2009b). Zinc deficiency is common among healthy women of reproductive age in Bhaktapur, Nepal. [Abstract]. Journal of Nutrition. **139**, 594-597. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/19158229. [Accessed 21 Jan, 2009].

Dibley, M. J., Roy, S. K., Senarath, U., Patel, A., Tiwari, K., Agho, K. E. and Mihrshahi, S. (2010). Across-Country Comparisons of Selected Infant and Young Child Feeding Indicators and Associated Factors in Four South Asian Countries *Sage Journals*. **31** (2), 366-379.

Dr.Godhia, M. L. and Patel, N. (2017). Colostrum - its Composition, Benefits as a Nutraceutical - A Review. *Current Research in Nutrition and Food Science*. **5** (3), 180-405.

DrMandal, A. (2017). Causes of malnutrition. News Medical Life Sciences. Retrieved from https://www.news-medical.net/health/Causes-of-malnutrition.aspx. (Last update 3 August, 2017). [Accessed 19 April, 2018].

Edmond, K. M., Zandoh, C., Quigley, M. A., Amenga-Etego, S., Owusu-Agyei, S. and Kirkwood, B. R. (2006). Delayed Breastfeeding Initiation Increases Risk of Neonatal Mortality. *Aap News and Journals Gateway*. **117** (3), 1.

FAO. (2001). Assessing nutritional status and vulnerability [Report]. Economic and Social Development Department. Retrieved from http://www.fao.org/docrep/003/y1500e/y1500e04.htm.

FAO. (2002). Nutrition Assessment. Food and Agriculture organisation of the United Nations. Retrieved from http://www.fao.org/nutrition/assessment/en/. [Accessed 23 March,2018].

Faruque, A. S. G., Ahmed, A. M. S., Ahmed, T., Islam, M. M., Hossain, M. I., Roy, S. K., Alam, N., Kabir, I. and Sack, I. (2008). Nutrition: Basis for Healthy Children and Mothers in Bangladesh. *BMC*. **26** (3), 325-339.

Gordan, A., Greenow, C., Bond, D., Morris, J. and Jeffery, H. (2015). Sleep Position, Fetal Growth Restriction, And

Late-Pregnancy Stillbirth. *Obstetrics and Gynecology*. **125** (2), 9.

Iqbal, K., Khanam, M., Agho, K. E., Dibley, M. J. and Roy, S. K. (2011). Determinants of inappropriate complementary feeding practices in infant and young children in bangladesh: Secondary data analysis of demographic health survey 2007 Wiley Online library. Retrieved from https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1740-8709.2011.00379.x. [Accessed May 30,2018].

John, S., Parimalam, S., Karthiga, S. and Chellappa, A. (2004). "Nutrition and Dietetics" (1st ed.). Tamilnadu Textbook Corporation. College Road, Chennai.

Joshi, S. A. (2016). "Nutrition and Dietetics" (4th ed.). McGraw Hill Education (India) Private Limited. Chennai.

Joshi, Y. (2008). "Basic of Clinical Nutrition" (2nd ed.). Jaypee Brothers Medical Publishers (P) Ltd. New Delhi, India.

Kalanda, B. F., Verhoeff, F. H. and Brabin, B. J. (2006). Breast and complementary feeding practices in relation to morbidity and growth in Malawian infants. **60**.

Karkee, R., Lee, A. H., Khanal, V. and Binns, C. W. (2014). Infant Feeding Information, Attitudes And Practices: A Longitudinal Survey In Central Nepal. *International Breastfeeding Journal*. **9** (14).

Kshirsagar, G. (2016). Nutritional value of breast milk. Retrieved from https://raisingtwinsblog.com/2016/05/16/nutritional-value-of-breast-milk/. (Last update May 16, 2016). [Accessed 31 March, 2018].

Labbok, M. H., Belsey, M. and Coffin, C. J. (1997). A call for consistency in defining breast-feeding. *American Public Health Association*. **87** (6), 1060-1061.

Majhi, S. (2018). Majhi in Nepal. A Ministry of Frontier Ventures. Retrieved from https://joshuaproject.net/people_groups/13231/NP. [Accessed 1 June,2018].

Mehta, F. (2016). Everything you need to know about marasmus [Newsletter]. Medical News Today. Retrieved from https://www.medicalnewstoday.com/articles/313185.php. [Accessed 22 April, 2018.]

Moffat, T. (2002). Breastfeeding, wage labor, and insufficient milk in peri-urban Kathmandu, Nepal. **21**.

Motee, A. and Jeewon, R. (2018). Importance of Exclusive Breastfeeding and Complementary Feeding among Infants. *Current Research In Nutrition and Food Science*. 17.

Muller, O. and Krawinkel, M. (2005). Malnutrition And Health In Developing Countries. **3** (173), 279-286.

NDHS. (2016). "Nepal Demographic and Health Survey". New Era (Ministry of Health), Nepal. p. 636. Retrieved from http://www.mohp.gov.np/. [Accessed May 9, 2018].

Newcombe, R. (2016). Iron and Folic acid in Pregnancy. Baby and Pregnancy. Retrieved from http://www.babyandpregnancy.co.uk/ironfolicacidpregnancy.html. (Last update 2 June, 2016). [Accessed 1, June, 2018].

NLC. (1971). Marriage Registration Act, 2028 (1971) (Vol. 4): Nepal Law Commmission.

NUTRICIA. (2018). Bringing Science to early life. Retrieved from https://www.nutricia.com/en-hk/early-life-nutrition.html. [Accessed 23 January,2018].

Onis, M. and Blössner, M. (2003). Global Database on Child Growth and Malnutrition. *The World Health Organization Global Database on Child Growth and Malnutrition: methodology and applications* **32**, 518-526.

Onubogu, C., Onyeka, I., Esangbedo, D., Ndiokwelu, C., Okolo, S., Ngwu, E. and Nwaru, B. (2016). Changes in Breastfeeding and nutritional status of nigerian children between 1990 and 2008,and variations by region, area of residence and maternal education and occupation [Abstract]. Paediatr Int Child Health. 12. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/27077624. [Accessed 29 Jan 2016].

Ramchandran, P. (1987). "In Nutrition:Monitoring and Assessment". Oxford University Press. India.

Razek, A. A., Ayoub, G., Bhatia, A. M., Alhalaiqa, F., Farahat, H. and Albashtawy, M. (2016). The Relationship Between Sleep Disturbance In Late Pregnancy And Labor Outcomes *Journal of Nursing and Health Science (IOSR-JNHS)*. **5** (6), 12-16.

Sethia, R. (2018). 11 Benefits of colostrum. Parenting healthy Babies. Retrieved from https://parentinghealthybabies.com/health-benefits-colostrum-newborn/. (Last update August 24, 2017). [Accessed 7 April 2018].

Slism, C. (2018). Breast Milk. Slism. Retrieved from http://slism.com/calorie/113051/. [Accessed 31 March 2018].

sLopez, A., Cacoub, P., Macdougall, I. C. and Peyrin-Biroulet, L. (2016). Iron deficiency anaemia. *Elsevier*. **387** (10021), 907-916.

Sobokta, L., Soeters, P., Meier, R. and Berner, Y. (2006). Undernutrition- Simple and Stress Starvation. *Malnutrition*. (5), 9.

Sommer, A. (1995). "Vitamin A deficiency and its consequences" (3rd ed.). Geneva. World Health Organization. p. 88. [Accessed 21 April, 2018].

Srilakshmi, B. (2014). "Dietetics" (7th ed.). New Age International (P) Ltd. New Delhi,India.

Srilakshmi, B. (2016). "Nutrition Science" (15th ed.). New Age International Pvt. Ltd. New Dehli,India.

Ssemukasa, E. L. and Kearnay, J. (2014). SIX MONTHS OF EXCLUSIVE BREASTFEEDING RECOMMENDATION: HOW APPLICABLE IS THE UNIVERSAL EXCLUSIVE BREASTFEEDING RECOMMENDATION POLICY? *ajfand*. **14** (4), 14.

Tarar, U. (2017). Eldest son preference is main cause of Child Stunting in India. *Daily Pakistan Global*. Retrieved from https://en.dailypakistan.com.pk/world/eldest-son-preference-is-main-cause-for-child-stunting-in-india/. [Accessed Jan 28 2018].

TNN. (2018). Importance of Complementary Feeding. *Entertainment Times*. ETimes. September 4, 2013. Retrieved from https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/Importance-of-complementary-feeding-in-kids/articleshow/22285089.cms. [Accessed 10 April 2018].

UNICEF. (2013). Stunting [Report]. UNICEF. India, india. Retrieved from http://unicef.in/Whatwedo/10/Stunting.

UNICEF. (2015). Causes of Malnutrition. UNICEF. Retrieved from http://www.unicef.org. [Accessed 1 June, 2018].

UNICEF. (2018a). 1000 Golden Days [Report]. UNICEF. USA(United states of America), USA(United States of America). Retrieved from https://thousanddays.org/resource/listening-to-americas-mothers/. [Accessed 23 January 2018].

UNICEF. (2018b). "NUTRITION". WHO. Retrieved from http://www.who.int/nutrition/topics/exclusive_breastfeeding/en/. [Accessed April 2, 2018].

USAID. (2013). Sbcc Pathways For Improved Maternal, Infant, And Young Child Nutrition Practices. *Spring*.

Wamani, H., Åstrøm, N. A., Tumwine, J. K. and Peterson, S. (2004). Mothers' education but not fathers' education, household assets or land ownership is the best predictor of child health inequalities in rural Uganda. *BMC*. **3** (9).

WFP. (2011). Forms of Malnutrition.

WHO. (1962). Expert Committee On Medical Assessment of Nutritional status [Report]. 258. World Health Organisations. Geneva, Switzerland, Switzerland. Retrieved from http://whqlibdoc.who.int/trs/WHO_TRS_258.pdf.

WHO. (1966). *The Assessment of the Nutritional Status of the Community. Geneva: World Health Organiation.* (1966).

WHO. (2002). Report of the global consultation and Summary of guiding principles for complementary feeding of the breastfed child [Report]. ISBN 92 4 154614. World Health Organization. Geneva, Swizerland. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwiPqqLuw63aAhWJwI8KHV2iBAYQFggwMAE&url=http%3A%2F%2Fwww.who.int%2Fnutrition%2Fpublications%2FComplementary_Feeding.pdf&usg=AOvVaw2yLuWjHR_ZTi9X1NwXjfJT. [Accessed 1 June, 2018].

WHO. (2010). "COUNTRY PROFILE INDICATORS Interpretation Guide". Geneva, Switzerland. WHO Press. pp. 1-3.

WHO. (2012). "Daily iron and folic acid suplementation in pregnant women". Geneva. Department of marking pregnancy safer. p. 6. [Accessed 1 June, 2018].

WHO. (2017). "Malnutrition". Geneva. World Health Organization. Retrieved from www.who.int/mediacentre/factsheets/malnutrition/en/. [Accessed 20 April, 2018].

WHO. (2018a). "Infant and young child feeding". Geneva. WHO. Retrieved from http://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding.

WHO. (2018b). "Micronutrient deficiencies". World Health Organization. p. 1. Retrieved from http://www.who.int/nutrition/topics/idd/en/.

WHO/GRA. (2014). "Safety of Immunization During Pregnancy". Geneva. Global Advisory Committee on Vaccine Safety. p. 30. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=14&cad=rja&uact=8&ved=0ahUKEwiZ6Lzf1bTbAhVUeysKHcZwC48QFgh8MA0&url=http%3A%2F%2Fwww.who.int%2Fvaccine_safety%2Fpublications%2Fsafety_pregnancy_nov2014.pdf&usg=AOvVaw1ftp7nudRH2bh1Jo56Obdi. [Accessed 1 June, 2018].

Williamson, C. S. (2006). Nutrition in Pregnancy [Report]. British Nutrition Foundation. London,UK, U.K. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=6&cad=rja&uact=8&ved=0ahUKEwiQ4bCGn7zaAhXCro8KHUiJCg4QFghhMAU&url=http%3A%2F%2Fwww.drshanbourmd.com%2Fwebdocuments%2FACOG-Nutrition-During-Pregnancy.pdf&usg=AOvVaw1_RXJcOS1JorRMvZd6ndor. [Accessed 15 April, 2018].

Appendices

Appendix-A

Consent Letter

<div align="center">

केन्द्रीय प्रविधि क्याम्पस

हात्तिसार, धरान

पोषण तथा आहार विज्ञान, चौथो वर्ष

मन्जुरीनामा

</div>

नमस्कार,

मेरो नाम बृष्टि बोहोरा हो । म केन्द्रीय प्रविधि क्याम्पस, धरानमा पोषण तथा आहार विज्ञान, चौथो वर्षमा अध्ययनरत विद्यार्थी हो । यस संकायको चौथो वर्षको पाठ्यक्रम अर्न्तगत म सोधपत्र गरिरहेको छु । मेरो सोधपत्रको विषय "रामधुनी नगरपालिकामा बसाबोस गर्ने ६ देखि ५९महिनाका माभ्mी बच्चाहरुको पोषण स्थितिमा शिशु आहारको प्रभाव कस्तो रहेछ"भन्ने हो। यो अध्ययनको उद्देश्य यस क्षेत्रको परिवारहरु खाद्य सुरक्षित छन् या छैनन् र ६ देखि ५९महिनाका बच्चाहरुका पोषण स्थितिको बारे जानकारी संकलन गर्नु रहेको छ । यो जानकारीले मेरो अध्ययनलाई सहज बनाई मलाई सहयोग गर्नेछ र यसले यस क्षेत्रको पोषण स्थितिलाई सुधार गर्नका लागि पनि केहि मद्दत गर्न सक्नेछ । तपाईको घर यस अध्ययनको लागि छानिएको छ र म तपाईलाई यस सर्वेक्षणका प्रश्नहरु गर्ने छु र साथै तपाईको बच्चाको केहि नाप लिनेछु । अध्ययनका केही प्रश्नहरु नितान्त व्यक्तिगत पनि हुन सक्छन् र तपाईले दिनु भएको सबै जानकारीहरु महत्वपूर्ण हुनेछन् र सो जानकारीहरु एकदमै गोप्य राखिनेछ साथै तपाईले दिनुभएको सुचना तथा तथ्याङ्कको दुरुपयोग गरिनेछैन । यो अध्ययनमा तपाईको सहभागिता स्वेच्छिक हुनेछ । यदि तपाईलाई कुनै वा सबै प्रश्न व्यक्तिगत वा संवेदनशील लागेमा उत्तर नदिन पनि सक्नुहुन्छ । तर म यो आशा गर्दछु कि तपाई यस अध्ययनमा सहभागी हुनुहुनेछ ।

के तपाई यस अध्ययनमा सहभागी हुन इच्छुक हुनुहुन्छ ?(इच्छुक भए मात्र प्रश्न गर्ने नभए अन्तवार्ता टुङ्ग्याउने)

म यस अध्ययनमा सहभागी हुन इच्छुक छु र यस अध्ययनका लागि आवश्यक पर्ने मेरो बच्चाको नाप तौल लिन अनुमति दिन्छु ।

घरमूलीको सहि/औठा छापस   सर्वेक्षण गर्नेको सहि

सर्वेक्षण गरेको मिति:

स्थानः

Appendix-B

a. General Information

1. Name of the child

   _____(male/female)

2. Date of birth

Year	Month	Day

3. Was there any special occasion during child birth?specify…….

4. Age: _____(in years)
5. Respondent
        a)Mother   b)Father   c)Other member

6. Mother's name:_____

7. Mother's age:_____(in years)

8. Address: Municipality_____
                 Ward number:_____

b. Family Description

8. No. of total family members: _____

9. Who is the head of HH?

   a) Father   b) Mother

10. No. of children below 5 years:_____

     11. Types of family?

         a) Single   b) Joint

12. Type of house

   a)Permanent   b)Temporary   b)Temporary

13. What is the main income source of your family?

    a)Agriculture   b)employment   c)Labor

    d)Business   e)Remittance   f) Others

15. Mother's educational qualification

   a)Bachelor &above   b)secondary level(8-12)

   c) Primary level   d)Informal

   e) Completely illiterate

16. What is the occupation of child's mother?

   a. Service   b.Agriculture

c. Business   d. Foreign employment

e. Labor   f. Housewife

g. Others_____

17. Annual income of your family

a. Less than 1lakh   b.1-3 lakh   c. Above 3 lakh

c) Child's information

18. Which child is this (From the elder) ?   (First/Second/Third)

19. Do you have growth chart?

a. Yes   b. No

19. Weight at the time of birth? (Birth card)

a) less than 2.5kg   b)more than 2.5kg   c)Don't know

20. Is there death of any child in your household?

a) Yes   b) No

21. If yes how many? _____

Reason of death? _____

d) Child care information

22. Did you breast fed your child?

a. Yes   b.No

23. If Yes then when did you initiate breast feeding?

a. Within 1 hour of birth   c. within 24 hr

b. Within 8 hours of birth   d. cannot remember   e. Other _____

24. If not, what is the reason?

a. Lack of tradition   b.Because it is harmful

c. It is unhygienic   d. Child cannot swallow

e. others

25. Do you know about colostrum?

a.Yes   b. No

25. Did you feed colostrums to your baby?

a. Yes   b. No

26. Did you exclusively breast fed your baby for first six months?

a. Yes   b. No

27. If NO, then till when did you breastfeed exclusively? _____ Months

28. Did you feed any food before 6 months beside breastmilk?

a. Yes   b. No

28.What others foods/liquid did you provide?

a. Formula Milk   b.Water/Fruit juice

29. How long did you breastfed your child?

a. Less than 1year   b. Upto 1 year

c. Upto 2 years   d. Above 2 years

30. Do you still breastfeed your child?

    a. Yes   b. No

31. When did you stop breastfeeding?

    a. Less than 1 year   b. 1 year

    c. 2 years   d. After 2 years

29. Which feeding material do you use?

    a.Bottle   b. Spoon

30. What was the reason behind not exclusively breastfeeding?

    a. Other family members thought milk was not sufficient.

    b. Medical complications.

    c. Child cried a lot when only breastfed.

    d. Child didn't sleep properly at night.

    e. Others_____

31. What did you feed to your baby before feeding colostrums milk.?

    a. None   b. Honey &ghee   c. Cow's milk   d. others

32. How many times did you feed breast milk per day?

    a. 3-6   b.6-8   c. more than 8

33. When did you start giving complementary food to your child?

    a. 4months   c. 6months

    b. 5months   d. 7months or more

34. Which complementary food did/do you give to your baby?

    a. Jaulo   b. Locally made lito

    c. Dal/bhat   d. Dal/bhat/tarkari

    e. Processed food (cerelac, lito, Powder milk)

    f. Others_____

35. Do you feed iron rich (peas,dark greenleafy,red meat,poultry)foods to your baby?

    a. Yes   b. No

36. Do you feed Vitamin A(broccoli,egg,sweet potato) rich food to your baby?

    a. Yes   b. No

37. Do you know about POSHILO JAULO??

    a. Yes   b. No

38. Do you know about MNP(Micronutrient Powder)?

    a. Yes   b. No

39. How did you fed MNP?...........................

39. Did you fed it to your baby?

    a.Yes   b. No

40. If No, then why?

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41. What type of salt do you use in your home?

    a. Iodized salt   b. Non- Iodized salt

E. Health and immunization information

42. Have you vaccinated your child according to the schedule?

    a. Yes   b. No

43. If NO why did you miss it?

    a. Thought it is not necessary.

    b. There was shortage of that vaccine in the centre.

    c. Child had cried a lot/had fever after getting the previous one.

    d. Other (_____)

44. If NO which one did you miss?

    a. Polio   c. DPT

    b. BCG   d. PCV

    e. OPV   f. IPV

    g. JE

45. Did your child receive Vitamin A capsule after 6 months?

    a.Yes   b. No

46.Did your child receive worm infeststion tablets after 1 year?

    a. Yes   b. No

47. Did you get vaccination during pregnancy?

    a. Yes   b. No

48. Did you take iron and folate tablet during pregnancy?

    a. Yes   b. No

49. Do you know how to prepare ORS at home?

    a. Yes   b. No

f. Mother's information

50. Mother's age when she got married? ……………….. years

51. Mother's age during first pregnant? …………….years

52. Death of any child under five? If yes, how many …………

53. Cause of death…………………………………

54. How much food did you take during pregnancy?

    a. More than usual   b. Less than usual

    c. As usual

55. Frequency of meal during pregnancy?

    a. Less than 3   b. 3-4

    c. More than 4

56. Did you take iron folate tablets during pregnancy?

   a. Yes   b. No

57. Do you know how to prepare ORS at home?

   a. Yes   b. No

55. What type of salt did you use in your home?

   a. Iodized   b. Non- Iodized

G. WASH

56. Where does your family member get drinking water from main source?

   a. River/ surface water   b. Tap water

   c. Spring

57. Do you treat water before feeding your child?

   a. Yes   b. No

58. Which treatment method do you use?

   a. Piyush, aqua tabs or other chlorination   b. Filtration

   c. SODISH   d. Boiling   e. None

59. Do you wash your hand before feeding your child?

   a.Yes   b. No

60. In which condition do you wash your hand?

   a. After defecation   b. Before & After cooking

   c. Before defecation   c. All of the above

61. How did you wash your hand?

   a. Kharani pani   b. Soap water

   c. Only water

60. Where does your family member defecate?

   a. Openly   b. closely (latrine)

61. Has anyone in your HH has diarrhea within last 2 week?

   a. Yes   b. No

62. Who in your HH was affected?

   a. Adult male   b. Adult female   c. Male child

d. Female child   e. Male child under 5yr

f. Female child under 5 yrs

63. Do you wash fruits and vegetables before eating them?

   a. Yes   b. No

63. How would you manage HH waste?

a. Bury   b. Burn   c. Dispose into environment

Appendix-C

Map of Ramdhuni Municipality