



**Assessment of Diet, Breastfeeding and Sanitation in Brgy. Bukang Liwayway
Kibawe, Bukidnon: A Cross-Sectional Study**

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ABSTRACT

In the Philippines, especially in far-flung areas where poverty is still common, malnutrition remains a significant problem. Factors contributing to malnutrition and their interplay with poverty in impoverished areas of the Philippines are not thoroughly investigated. An assessment of the different nutritional, health, and social factors are needed to address poverty-linked malnutrition in Brgy. Bukang Liwayway and similar contexts. One hundred forty-five (145) households that served as sampling units were randomly selected. Two (2) 24-hour food recalls were conducted to capture the usual dietary intakes and diet diversity. Questionnaires were adapted, pre-tested, and used to assess the breastfeeding knowledge, attitudes, and practices (KAP) and the Water, Sanitation, and Hygiene (WaSH) situation. Multiple nutrients were found to be inadequate in the usual diet of the participants compared with the dietary reference intakes, namely: fat (56.27%), fiber (51.24%), vitamin A (66.90%), iron (44.94%), vitamin C (70.90%), thiamin (25.56%), and riboflavin (56.67%). The mean SD diversity score of the households was 5 ± 1.25 , which indicates that the typical diet was not particularly diversified. There were alarming knowledge deficits on crucial aspects of breastfeeding, such as only a few mothers/caregivers knew the meaning (20.69%) and the physical benefits of exclusive breastfeeding to a mother (17.24%). There were also sanitary and hygiene issues needed to be addressed, such as open defecation, poor toilet facilities, a lack of soap, and occasional handwashing. The study showed that there were significant inadequacies in dietary intake, breastfeeding, and sanitation practices that need to be addressed and developed into evidence-based strategies aimed at effectively combating poverty-linked malnutrition in the region.

Keywords: Nutrition-supportive interventions, malnutrition, diet diversity, breastfeeding, Water, Sanitation, and Hygiene (WaSH)

INTRODUCTION

Poverty remains one of the world's most severe problems and the most significant impediment to development. It has many faces, and the most threatening among them are hunger and malnutrition (Peña & Bacallao, 2002). Malnutrition is a lack, surplus, or imbalance of calories and nutrients (Soeters et al., 2017). It is characterized by various forms of under- or overnutrition, which results in alterations in body composition and bodily function and deterioration of health. Malnutrition has been linked to poverty, since places with chronic poverty have higher malnutrition rates (Setboonsarng, 2005). Poverty causes hunger, which in turn leads to malnutrition. It creates a loop from which individuals are unable to break free. Malnourished people tend to be sickly and less productive, leading to continued poverty and hunger. In this premise, a two-way relationship is noted between poverty and malnutrition, in which they are both the cause and the result of one another (Siddiqui et al., 2020).

Despite social and economic progress, the global burden of malnutrition remains unreasonable. According to recent data, 800 million people are suffering from malnutrition, with 98% living in low- to middle-income nations, mainly in Sub-Saharan Africa and South Asia (Webb et al., 2018). In the Philippines where poverty is still common, different forms of malnutrition remain a significant problem. According to the recent National

Nutrition Survey results, the prevalence rates for underweight, wasting, and stunting among children under five years old were 19%, 5.7%, and 29.5%, respectively, which can all be interpreted as a public health problem of magnitude or severity ranging from medium to high (DOST-FNRI, 2022). The prevalence rates of undernutrition were highest among children under five who belonged to the poorest wealth quintile. The same pattern was observed among adults, as the prevalence rate of Chronic Energy Deficiency (CED) was highest among those who belonged to the poorest quintile (10.9%) (DOST-FNRI, 2022). Iodine deficiency and anemia rates were highest among pregnant women, while vitamin A deficiency (VAD) was highest among children under five years old (DOST-FNRI, 2022). Across all these micronutrient deficiencies, the rates have been recorded to be highest among those under the poorest wealth quintile.

Aside from poverty, there are other factors considered closely related to malnutrition. According to Ulep (2021), undernutrition during pregnancy, child nutritional deficiencies, and recurrent illness are three stressors that can lead to malnutrition in the early stages of life. These proximal pressures in the route for

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undernutrition are strengthened by distal variables such environment, mother and child health behaviors, and food security. Optimal child feeding refers to following the guidelines for infant and young child feeding (IYCF) practices, which include age-appropriate supplementary feeding and exclusive breastfeeding for the first six months of a child's life. Improper IYCF practices lead to malnutrition and/or infant death (Reinbott & Jordan, 2016). On the other hand, poor Water, Sanitation, and Hygiene (WaSH) can lead to the rise of infections in communities (Hutton and Chase, 2017). Constant infection exposure has a deleterious impact on children's linear development. Infective diseases reduce food intake, affects nutrition absorption, and hinders nutrient delivery to target organs (Dewey and Mayers, 2011). Malnutrition has a multi-level and wide-ranging cause, necessitating a multi-factorial strategy to eradicate it (Reinhardt & Fanzo). However, the investigation in the existing literature on the diverse factors contributing to malnutrition and a clearer understanding of the complex interplay between poverty and malnutrition is still scant. Therefore, an assessment of various factors linked with malnutrition is warranted to bridge this gap and contribute to the development of evidence-based strategies to address poverty-linked malnutrition in Brgy. Bukang Liwayway and similar contexts. This study is aimed to assess the nutrition, breastfeeding knowledge, attitudes, and practices (KAP), and WaSH condition in Barangay Bukang Liwayway, Kibawe, Bukidnon.

METHODOLOGY

Research Design and Sampling

The study employed a cross-sectional descriptive research design that gathered survey data from select households of Barangay Bukang Liwayway, Kibawe, Bukidnon, which is a certified Geographically Isolated and Disadvantaged Area (GIDA). Using Cochran's formula at 95% confidence interval, the minimum number of households served as sampling units was computed to be one hundred forty-five ($n=145$). Stratified random sampling was employed to select the identified number of sampling units out of the two hundred thirty-two (232) households living in the area at the time of the survey across all puroks. One adult (>18 years) participant from each sampling unit/household present at the time of the survey visit was randomly chosen through the lottery method to be interviewed for individual nutrient intakes, household food consumption and diet diversity, and WaSH assessment. Twenty-nine (29) mothers/caretakers with at least one (1) <6 -month-old infant within the identified sampling units were then interviewed for their IYCF knowledge, attitudes, and practices. The survey started in March and ended in June 2021, which took four (4) months to complete.

Ethical Considerations

The researcher complied all the relevant international/national protocols and regulations to maintain ethical standards. An ethical clearance/permit was secured from the Institutional Ethics Review Committee of Central Mindanao University (IERC Control Number: 0273 s. 2021).

Research Instruments

The questionnaires used were based on pre-existing and validated questionnaires. The questionnaire utilized for breastfeeding KAP was adapted from a WHO's infant and young child feeding module, which tackled the indicators used in the assessment of IYCF (WHO, 2010). The adapted questionnaire only comprised knowledge, attitudes, and practices on breastfeeding, while the other indicators of IYCF, such as complementary feeding, were not included. On the other hand, the questionnaire employed for the WaSH assessment was based on the WaSH KAP tool of the United Nations High Commissioner for Refugees (UNHCR, 2020). The indicators included in the final questionnaires were the following: water quantity, water quality, water access, sanitation, hygiene, and health (incidence of diarrhea). The questionnaires were then pre-tested for validity and reliability. A panel comprised of two (2) barangay health workers, two (2) registered nutritionist-dietitians, and one (1) public health nurse reviewed the content validity of the items. To determine whether the questionnaires were reliable, Cronbach alphas were computed using statistical software. According to the results of the reliability analyses, the Cronbach alphas of the data entered were 0.842 for breastfeeding KAP and 0.856 for WaSH, indicating good reliability. The items with weakest correlations with the other items were removed and the final versions were translated into local language.

Data Collection Procedure

The data collection started from the beginning of April 2021 to the end of June 2021 for a total duration of three (3) months. Two (2) non-consecutive 24-hour food recalls were conducted to capture the nutrient intakes. The respondents for the food recall were interviewed for the first time on a Sunday and the second time on a Wednesday. The administration of survey questionnaires for diet diversity, breastfeeding KAP, and WaSH was conducted on the same respondents but on different days. The data collection was conducted during the COVID-19 pandemic, so strict public health protocols were implemented during the interview.

Data Analysis

To assess the intake of the participants, the Dietary Reference Intakes (DRIs) of the Philippine Dietary Reference Intakes (PDRI) were used as the benchmark of adequacy. Most of the participants were middle-aged (i.e., 30-49 years) (see Table 1), thus this age group was used as the point of comparison. The DRIs for energy, fiber, and sodium are based on the Recommended Energy-Nutrient Intakes (RENIs, F 30-49 y/o). The DRIs for fat and simple sugars are computed based on the minimum Acceptable Macronutrient Distribution Range (AMDR, adults >19 y/o), the DRIs for saturated fatty acid and cholesterol are based on the standards set in the Therapeutic Lifestyle Change (TLC) dietary approach, and the rest are based on the Estimated Average Requirement (EAR, F 30-49 y/o) of the PDRI. The study is purely descriptive, so only descriptive statistics (i.e., frequency, mean, percentages, and standard

Table 1. Socio-demographic profile of adults (n=145) in Brgy. Bukang Liwayway, Kibawe, Bukidnon

Socio-Demographic Factor	Frequency (n)	Percentage (%)
Sex		
Male	33	22.76
Female	32	77.24
Age		
19-29 y/o	29	20
30-49 y/o	83	57.24
50-59 y/o	21	14.48
60-69 y/o	12	8.28
Civil Status		
Single	16	11.03
Married	101	69.66
Separated	5	3.45
Cohabiting	23	15.86
Educational Attainment		
Elementary Level	41	28.28
Elementary Graduate	18	12.41
High School Level	50	34.48
High School Graduate	18	12.41
College Level	13	8.97
College Graduate	5	3.45

deviation) were utilized to answer research objectives. The processed data were then presented through graphs and tables.

RESULTS AND DISCUSSION

Socio-Demographic Profile

The socio-demographic characteristics of participants from the selected household sampling units (n = 145) are shown in Table 1. The mean age was 40.52 years (SD = 11.59). Regarding gender, the respondents were predominantly female (77.24%). The civil status of the participants was mostly married (69.66%). The educational attainment of most respondents includes high school level (34.48%), followed by the elementary level at 28.28%, with college level as the least frequent educational attainment (8.97%).

Nutrient Intakes

The usual energy and nutrient intakes per day of the respondents are shown in Table 2. The mean energy intake of 1053.54 kcal/day only met 56.34% of the Recommended Energy Intake (RE) of 1870 kcal/day for females aged 30-49 years. This is considered an inadequate intake. The means for macronutrients are as follows: protein (44.60 g/d), total fat (17.54 g/d), and dietary fiber (11.53 g/day). All these intakes were assessed to be inadequate, except for protein which met 91.02% of the Estimated Average Requirement (EAR) of 49 g for females aged 30-49 years.

A similar pattern in these findings was noted

from the results of the 8th National Nutrition Survey conducted by the Food and Nutrition Research Institute in 2013, wherein the intakes for energy, fat and dietary fiber were found to be inadequate, except for protein which was determined to be adequate (Patalen et al., 2020). From the results of the more recent Expanded National Nutrition Surveys conducted in 2018 and 2019, the mean individual energy intake was computed to be lower than the Dietary Reference Intake (DRI), with protein intake met adequately by a significant number of individuals in the adult age group, a pattern still similar to the findings of this study (DOST-FNRI, 2022). Meeting the recommended levels of energy intake is significant to prevent unhealthy weight loss, chronic energy deficiency (CED), and excessive accumulation of body fat (overweight and obesity), which were found to affect health and productivity outcomes adversely (Bishwajit, 2017). It is also important to have balanced intake of fat and dietary fiber to reduce the risk of non-communicable diseases (NCDs) like cardiovascular diseases (McRae, 2017).

The means for micronutrient intakes are as follows: calcium (637.36 g/d), phosphorus (488 mg/day), iron (11.82 g/day), vitamin A (289.67 mcg RE), thiamin (0.23 mg/day), riboflavin (0.51 mg/day), niacin (11.06 mg/day) and vitamin C (36.87 mg/day). Compared to their EARs, only their calcium, phosphorus, and niacin intakes were considered adequate. The results of the NNS and ENNS have consistently shown inadequate iron and vitamin C intakes and adequate niacin intake among Filipinos (Patalen et al., 2020). In the more recent results, high prevalence rates of inadequate vitamin A, thiamin, and riboflavin intakes have been observed across age groups

Table 2. Mean \pm SD energy and nutrient intakes among adults (n=145) in Brgy. Bukang Liway-way, Kibawe, Bukidnon

Nutrient	Mean \pm SD Intake	DRI	%DRI	Interpretation
Energy (kcal)	1053.54 \pm 379.70	1870	56.34	INADEQUATE
Protein (g)	44.60 \pm 19.23	49	91.02	ADEQUATE
Fat (g)	17.54 \pm 15.76	31.17	56.27	INADEQUATE
Fiber (g)	11.53 \pm 6.54	22.50	51.24	INADEQUATE
Calcium (mg)	637.36 \pm 423.90	600	106.23	ADEQUATE
Phosphorus (mg)	488.00 \pm 233.93	580	84.14	ADEQUATE
Iron (mg)	11.82 \pm 4.14	26.30	44.94	INADEQUATE
Vitamin A (mcg RE)	289.67 \pm 308.65	433	66.90	INADEQUATE
Thiamin (mg)	0.23 \pm 0.11	0.90	25.56	INADEQUATE
Riboflavin (mg)	0.51 \pm 0.32	0.90	56.67	INADEQUATE
Niacin (mg)	11.06 \pm 5.11	11	100.55	ADEQUATE
Vitamin C (mg)	36.87 \pm 32.12	52	70.90	INADEQUATE
Simple sugars (g)	29.68 \pm 22.51	<46.30	64.13	GOOD
Sodium (g)	2.58 g \pm 2.35	<2	129.65	EXCESSIVE
Saturated fatty acid (g)	6.80 g \pm 8.04	<14.35	47.42	GOOD
Cholesterol (mg)	64.72 \pm 107.97	<300	21.57	GOOD

(DOST-FNRI, 2022). The notable deviation from that of the results of NNS/ENNS is the adequate intakes of calcium and phosphorus found in this study, which is attributed to a high intake of calcium- and phosphate-rich dried fish observed in this particular sub-population. Although micronutrient deficiencies are still a significant public health problem in the Philippines, prevalence of inadequate micronutrient intake has declined in Southeast Asia over the past 50 years (Beal et al., 2017). Consistent with the national government's efforts against micronutrient deficiencies, the provision of nutrition-supportive activities that increase micronutrient intakes (e.g., supplementary feeding, micronutrient supplementation, conditional cash transfers, improved farm-to-market roads) must be strengthened to further reduce the problem, especially in geographically isolated and disadvantaged areas (GIDAs). Micronutrients have a plethora of indispensable biological functions in the human body, notably being important in bone health (e.g., calcium and phosphorus), in the maintenance of immunocompetence and high reductive capacity against oxidative damage (e.g., vitamins A and C), in the maintenance of healthy blood production (e.g., iron) and energy metabolism (e.g., thiamin, riboflavin and niacin) (Shergill-Bonner, 2017).

The usual intakes per day for nutrients linked with the incidence of non-communicable diseases (NCDs) are also shown in Table 2. The intakes for simple sugars (29.68 g/day), saturated fatty acid (6.8 g/day), and cholesterol (64.72 mg/day) met the criteria for good/healthy intakes as per the PDRI. However, sodium intake (2.58 g/day) was found to be excessive, and this was due to a high intake of dried fish observed in the area. One of the main dietary risks for mortality and morbidity is high sodium (Na) consumption (Naser et al., 2020). Thus, it is suggested to reduce the intake of dried fish and increase the intake of other calcium- and phosphate-rich foods (e.g., dairy products) to bring about changes in the sodium intake and

consequently reduce the risk of NCDs (Lari et al., 2021).

Diet Diversity

The percentages of households (n = 145) getting each of the dietary diversity scores (DDs) are given in Figure 1. Dietary diversity scores represent how well people obtain all the nutrients they require, since the more food groups consumed, the better their diet. If their diet is monotonous, the opposite is true. In other words, DDS is intended to demonstrate nutritional sufficiency. Increased nutritional adequacy of the diet is linked to an increase in individual DDS (FAO, 2010). The mean dietary diversity score of the participants was 5, which is interpreted as "moderate" dietary diversity on the scale. Most households (26.6%) had a dietary diversity score of 4, which is also interpreted as "moderate" dietary diversity in the lower range of the scale. A "high" dietary diversity was received by 28.3 percent of the households (those who had, 6, 7, or 8 DDS), while 5.5% of the households had "low" dietary diversity (DDS = 3). Studies have consistently shown that diverse diets promote optimal health, prevent malnutrition, and guard against a wide range of chronic illnesses and morbidity (Bi et al., 2019; Afshin et al., 2019; Hatloy et al., 1998).

Food Consumption

The percentages of households (n = 145) consuming each food group included in the dietary diversity analysis are shown in Figure 2. This complements the analysis of nutrient intakes and dietary diversity scores presented previously. The top 3 food groups consumed by the respondents were starchy staples (100%), fish, shellfish, and products (100%), and dark-green leafy vegetables (85.71%), while the three food groups that were the least eaten were flesh meats and products (14.26%), organ meats (5.71%) and eggs (5.71%). The low prevalence of

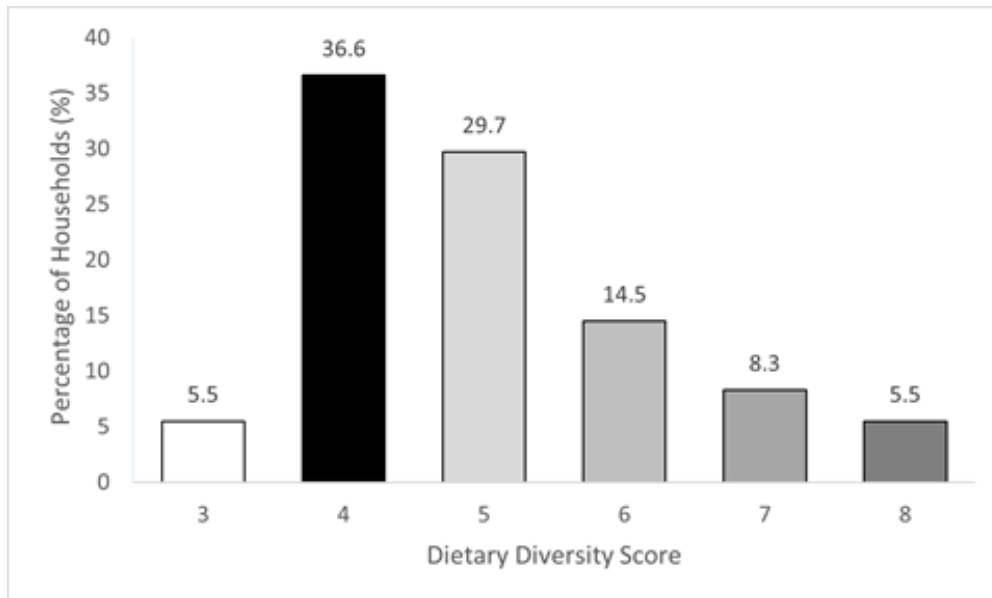


Figure 1. The results of the dietary diversity survey (n = 145)

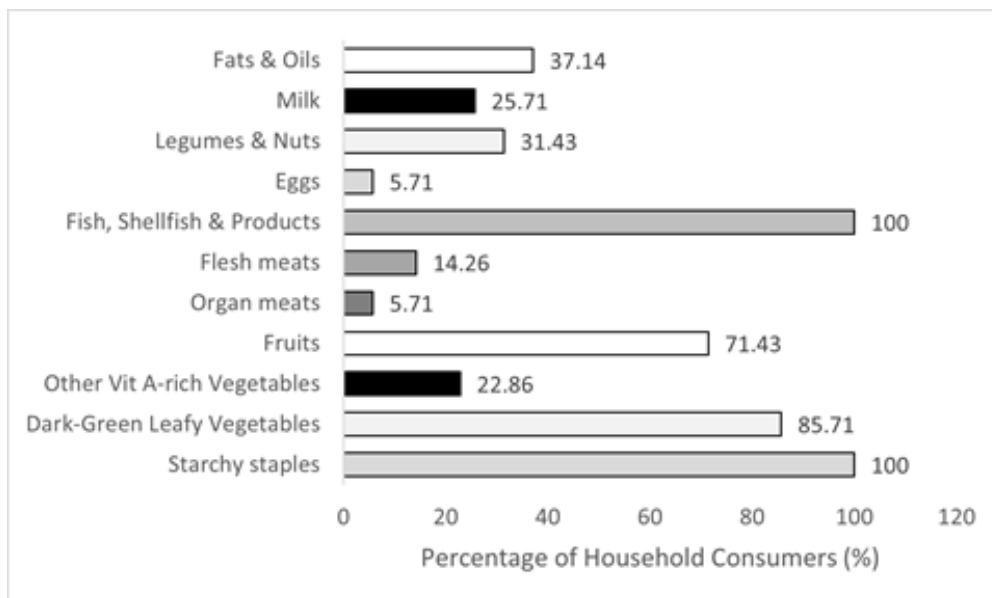


Figure 2. Percentages of households consuming food groups (n = 145)

consumption of vitamin A-rich vegetables, along with low consumption of eggs and flesh meats, contributed to the inadequate intake of vitamin A. Fats and oils were only consumed by $\frac{1}{3}$ of the respondents (37.14%), which would explain the low caloric intake in the area is not a good finding because fat is important not only in meeting calorie needs but also in the absorption of fat-soluble micronutrients like vitamin A (Albahrani & Greaves, 2016). Additionally, the main reason why inadequate iron intake was found in their area was the low consumption of flesh meats and organ meats. Low iron intake leads to iron deficiency anemia, which impairs cognitive and physical performance and subsequently reduces productivity (Coutinho & Goloni-Bertollo, 2005). Since the main reason why most of these foods are lacking in their diet is low purchasing power, nutrition-supportive strategies to make them more accessible is warranted. Furthermore, enhancing agricultural outputs would also help. A study conducted by Gonder (2011) revealed that increasing farm biodiversity had led to an increase in dietary diversity in Bukidnon.

As shown in Figure 3, corn (*Zea mays*) grits (also known locally "mais-kan-on") was the most common staple food consumed in the area, as rice was only consumed by those who had higher purchasing power. This is in contrast with the results of the ENNS (2018-2019), wherein rice is the most consumed, and corn grits only ranked 4th. Corn has lower calories, calcium, iron, and folate than rice but is higher in proteins, fats, dietary fiber, vitamin A, B vitamins, and other minerals (Siyuan et al., 2018). Thus, continued consumption of corn grits is warranted, but rice can be mixed with it to complement each other's limiting nutrients. Malunggay (*Moringa oleifera*) represents the 2nd most eaten food by the respondents. Malunggay is one of the most nutritionally dense vegetables (Peter, 2008) in the Filipino diet, so this is one promising finding. The consumption of dried fish (also known locally as "bulad") ranks 3rd on the list. Dried fish consumed in the area belong to various species. Dried fish is a cheap source of high-quality proteins, healthy fats, and key essential minerals, including iodine, zinc, copper, selenium, and calcium (Siddhnath, 2020). Dried fish eating helped residents in the area achieve their protein, calcium, and phosphate

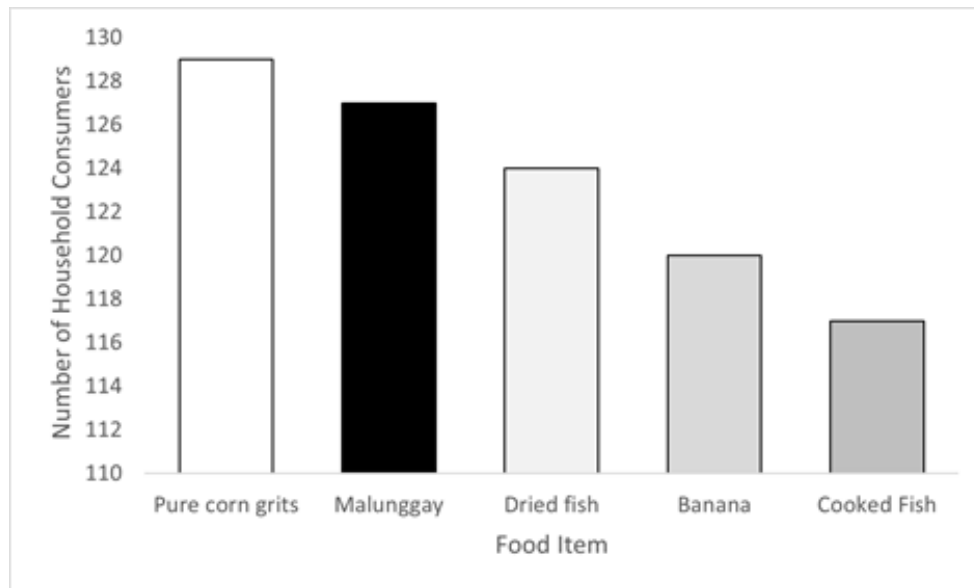


Figure 3. Percentages of households consuming food items (n = 145)

requirements, but it also contributed significantly to their high sodium intake. Although banana (*Musa acuminata* × *balbisiana*) consumption ranks 4th, this is almost exclusively the fruit eaten in the area, with other fruits being consumed only when they are in season, so interventions to diversify fruit intake are recommended. This monotony would explain their inadequate vitamin C intake. Low fruit consumption is similarly found nationwide, as shown in the recent results of ENNS (DOST-FNRI, 2022). Lastly, the 5th most frequent food eaten in the area was carp (*Cyprinus carpio*), which help provides a lot of nutrients in the area.

Breastfeeding Practices

The results of the breastfeeding survey from households with <6-month-old infants (n = 29) are given in Table 3. Most of the respondents (caregivers) were mothers (96.55%), had 3-4 children (44.83%), and had a high school level of education (37.93%).

For the knowledge part of the survey, most respondents were found to have the correct knowledge in four (4) out of the eight (8) questions asked. Only breastmilk should be the first food given to a newborn infant, according to 96.55 percent of respondents. A baby younger than six months should be nursed or provided breastmilk on demand, according to 75.86 percent of respondents, and 82.76 percent agreed that one benefit of exclusive breastfeeding is that the infant thrives. When asked about several methods a woman may keep up her milk production, 51.72 percent of respondents chose breastfeeding exclusively on demand. However, because these bits of information were founded on their experiences and were a part of their culture and tradition, they were expected to be well-known in communities. On the other hand, most of the caregivers did not know about the correct answers for the rest of the questions asked, which are considered technical questions. When asked about the meaning of exclusive breastfeeding, 51.72% gave an incorrect answer, and 27.59% of them simply said that they did not know it. Majority also of the respondents either did not know (27.59%) or provided an incorrect answer

(41.28%) to the question, “How long should a baby receive nothing more than breastmilk?” To the questions, “Why do you think breastmilk is the only food recommended for infants up to six months old?” and “What are the physical or health benefits for a mother if she exclusively breastfeeds her baby?” most of the caregivers said that they did not know about it. This is a worrisome problem because caregivers in the area might not be practicing exclusive breastfeeding because of this knowledge deficit. Exclusive breastfeeding is defined as the practice whereby, for the first six months of life, a newborn receives breastmilk alone (Labbok, 2000). Breastfeeding an infant exclusively for the first six months of life has several advantages, including a lower risk of pneumonia, gastrointestinal infection, urinary tract infection, and otitis media in the infant, as well as a faster return to pre-pregnancy weight and a lower risk of Type 2 diabetes in the mother (Motee & Jeewon, 2014). Nutrition-supportive interventions to increase the caregivers’ knowledge in these aspects of breastfeeding are needed.

Generally, caregivers in Brgy. Bukang Liwayway had good attitude toward breastfeeding. All of them said that exclusive breastfeeding is good for infants, while 96.55% thought that breastfeeding a baby on demand is good. Thus, they also thought of exclusive breastfeeding and breastfeeding on demand as not complex. Most of them also felt confident (62.07%) in breastfeeding their child. However, the majority did not feel confident expressing and storing their breast milk.

For the practices part, when asked whether they fed their baby with liquid other than breast milk the previous day, 37.93% of the participants responded yes. This means that they were not already practicing exclusive breastfeeding during that time. This is similar with the finding of the ENNS 2019 using only the data from Bukidnon, which revealed that only 66.2% of the young infants were exclusively breastfed (DOST-FNRI, 2022).

Water, Sanitation, and Hygiene

The results of the Water, Sanitation, and Hygiene

Table 3. Breastfeeding indicators in Brgy. Bukang Liwayway, Kibawe, Bukidnon (n=29)

Breastfeeding Indicators	Choices	Frequency	Percentages
Sex of the caregiver	M	1	3.45
	F	28	96.55
Relationship with the child	Mother	28	96.55
	Father	1	3.45
Parity (number of children; for women)	1-2	8	27.59
	3-4	13	44.83
	5 and more	7	21.14
Educational level	Elementary	8	27.59
	Elementary Graduate	3	10.34
	High School	11	37.93
	High School Graduate	4	13.79
	College Level	3	10.34
Child's sex	Male	12	41.38
	Female	17	58.62
Child's age	Below 3 m/o	13	44.83
	3 m/o and above	16	55.17
Practices Q1: Was the baby breastfed yesterday during the day or at night?	Yes	29	100
	No	0	0
Practices Q2: Did the baby consume breastmilk in other ways yesterday during the day or night?	Yes	3	10.34
	Bottle	2	6.90
	Cup	1	3.45
	No	26	89.66
Practices Q3: Did the baby have any of the following liquids yesterday during the day or at night?	Yes	11	37.93
	Plain water	8	27.59
	Powdered milk	1	3.45
	Thin porridge	1	3.45
	Rice washing	1	3.45
	No	18	62.07
Knowledge Q1: What is the first food a newborn baby should receive?	Only breastmilk	28	96.55
	Others (infant formula)	1	3.45
Knowledge Q2: Do you know the meaning of exclusive breastfeeding?	Don't know	8	27.59
	Correct answer	6	20.69
	Incorrect answer	15	51.72
Knowledge Q3: How long should a baby receive nothing more than breastmilk?	From 0 - 6 months	9	31.03
	Other	12	41.38
	Don't know	8	27.59
Knowledge Q4: Why do you think breastmilk is the only food recommended for infants up to six months old?	Because breastmilk provides all the nutrients and liquids a baby needs in its first six months	7	21.14
	Because babies cannot digest other foods before they are six months old	5	17.29
	Other	10	34.48
	Don't know	12	41.38
Knowledge Q5: How often should a baby younger than six months be breastfed or fed with breastmilk?	On demand	22	75.86
	Other	1	3.45
	Don't know	5	17.29

Knowledge Q6: What are the benefits for a baby if he or she receives only breast-milk during the first six months of life?	He/she grows healthily	24	82.76
	Protection from diarrhea and other infections	5	17.29
	Other	1	3.45
	Don't know	4	13.79
Knowledge Q7: What are the physical or health benefits for a mother if she exclusively breastfeeds her baby?	Helps her lose the weight she gained during pregnancy	2	6.90
	Delays fertility	3	10.34
	Other	2	6.90
	Don't know	22	75.86
Knowledge Q8: Please tell me different ways a mother can keep up her milk supply	Breastfeeding exclusively on demand	15	51.72
	Manually expressing breastmilk	2	6.90
	Having a good nutrition/eating well/having a healthy or diversified diet	7	21.14
	Drink enough liquids during the day	16	55.17
	Other	2	3.90
	Don't know	6	20.69
Attitudes Q1: [Perceived benefits] How good do you think it is to breastfeed your baby exclusively for six months?	Not good	0	0
	Not sure	0	0
	Good	29	100
Attitudes Q2: [Perceived barriers] How difficult is it for you to breastfeed your baby exclusively for six months?	Not difficult	21	72.41
	Slightly difficult	7	21.14
	Difficult	1	3.45
Attitudes Q3: [Perceived benefits] How good do you think it is to breastfeed your baby on demand, that is when the baby wants to feed?	Not good	0	0
	Not sure	1	3.45
	Good	28	96.55
Attitudes Q4: [Perceived barriers] How difficult is it for you to breastfeed your child on demand?	Not difficult	19	65.52
	Slightly difficult	9	31.03
	Difficult	1	3.45
Attitudes Q5: How confident do you feel in breastfeeding your child?	Not confident	1	3.45
	Slightly confident	8	27.59
	Confident	18	62.07
Attitudes Q6: How confident do you feel in expressing and storing breastmilk so that someone else can feed your baby?	Not confident	10	34.48
	Slightly confident	9	31.03
	Confident	10	34.48

(WaSH) survey from the randomly selected household sampling units (n = 145) are given in Table 4. The primary source of water used by many households for different purposes in the area is the barangay-wide water network, which is ultimately sourced from Brgy. Kagawasan. Most respondents (93.10%) were connected to the water source for more than 12 hours per day. Most of the households liked the taste of their drinking water (51.72%) and believed that the available water met their needs as well (92.41%). These findings indicate that most people in the area have no problems with water. When it comes to sanitation, most of the households had toilets with water flush of either the sit down- (39.31%) or squat-type (28.97%). However, a significant proportion of the households still

have pit latrines (28.97%). The use of pit latrines is still considered a poor sanitation facility and a poor indicator of health (Njuguna, 2019). It's especially concerning that four (4) of them were discovered to have no toilet facilities at all. Additionally, there were also nine (9) respondents who said that they sometimes defecate in an open area, a behavior that can lead to contamination of drinking water and outbreak of waterborne diseases (Montgomery & Elimelech, 2007).

Open defecation is also widespread among children, with feces being collected and disposed of by burying (33.10%), disposal in the toilet (29.97%), or disposal elsewhere (e.g., a body of water, trash pit) (31.03%). This practice has

WaSH Indicator: Water	Choices	Frequency	Percentages
What is the primary source of drinking water for your household?	Brgy network	119	2.07
	Water vender/Delivery	16	11.03
	Private/communal well	10	6.90
What is the primary source of water for domestic use in your household?	Brgy network	73	50.34
	Private/communal well	52	35.86
	Nearby body of water	20	13.79
What is the water source for cooking?	Brgy network	115	79.31
	Water vender/Delivery	15	10.34
	Private/communal well	15	10.34
How often does your household have running water from the network?	Not connected	0	0
	Less than 4 hours per day	1	0.69
	5 to 12 hours per day	9	6.21
	More than 12 hours per day	135	93.10
Is the water you are receiving enough to satisfy your needs?	Yes	134	92.41
	No	11	7.59
How does your drinking water taste?	Excellent	20	13.79
	Good	75	51.72
	Acceptable	48	33.10
	Unacceptable	2	1.38
WASH Indicator: Sanitation & Hygiene			
What sort of toilet do you have?	Sit down toilet with water flush	57	39.31
	Squat toilet with water flush	42	28.97
	Pit latrine	42	28.97
	None	4	2.76
Where do you and another adult household members (excluding children under 5) usually go to defecate?	Single household latrine	141	97.24
	Shared household latrine	2	1.38
	Communal/public latrine	1	0.69
	Open defecation	1	0.69
Do adults from your household sometimes defecate in the open?	Yes	136	93.79
	No	9	6.21
Where do children under 5 from this household usually go to defecate?	Collected and disposed in latrine	42	28.97
	Collected and disposed elsewhere	45	31.03
	Nothing is done with it	6	4.14
	Buried it	48	33.10
	Other	4	2.76
How often do your family member bath/shower?	Everyday	126	86.90
	4 times or more per week	16	11.03
	At least once a week	3	2.07

When do you usually wash your hands with soap? (More than one answer is possible)	Before mealtimes	84	57.93
	After mealtimes	28	19.31
	Before bed	23	15.86
	Before cooking	78	53.79
	After using the toilet	112	77.24
Does the latrine most often used have handwashing facilities with soap?	Yes, with soap and water	94	64.83
	Sometimes	39	26.90
	No	12	8.28
Where does your household dispose of domestic waste?	Household pit	25	17.24
	Communal pit	17	11.72
	Designated open area	10	6.90
	Undesignated open area	7	4.83
	Bury it	38	26.21
	Burned	33	22.76
	Other	15	10.34
WaSH Indicator: Health			
Has anyone in your household <5 years of age had unusual diarrheal symptoms (watery/bloody diarrhea for a few days) in the past four weeks?	Yes	139	95.86
	No	6	4.14
Has anyone in your household >5 years of age had unusual diarrheal symptoms (watery/bloody diarrhea for a few days) in the past four weeks?	Yes	144	99.31
	No	1	0.69

been consistently linked with child malnutrition through mechanisms such as malabsorption of nutrients owing to parasitic infection and persistent diarrhea (Rahman et al., 2020). The most frequent disposal methods of solid waste were burying (26.21 percent) and burning (22.76 percent). In terms of personal hygiene, most participants bathe everyday (86.90%). Washing of hands with soap was commonly practiced after using the toilet but not really before mealtimes (57.93%), before cooking (53.79%), after mealtimes (19.31%), or before bed (15.86%). Soap was only available sometimes in 26.90% of the households and not available at all in 8.28% of the households. Sanitation these days has become important not only in the maintenance of good nutritional status but also in the prevention of COVID-19 (WHO, 2020). The incidence of diarrheal symptoms was also rare in the past four (4) weeks before the time the data were collected. However, this number was likely a result of underreporting. Studies have shown that communicable diseases like diarrheal diseases are frequently underreported in communities (CDC, 2012). Causes of underreporting include a lack of knowledge of reporting requirements and a belief that unrecognized diarrheas are a part of the normal development of infants and children (Pradhipasen, 1997).

The findings of the study in Barangay Bukang Liwayway, Kibawe, Bukidnon, a Geographically Isolated and Disadvantaged Area (GIDA) with a high rate of poverty, indicate that the identified dietary deficiencies, suboptimal breastfeeding practices, and sanitation issues have direct links to poverty within the community. Firstly, the

observed imbalances in dietary and nutrient intakes can be attributed to the limited access and affordability of diverse and nutrient-rich foods. Poverty often restricts individuals' purchasing power, resulting in a higher reliance on inexpensive, energy-dense but nutrient-poor food options (Siddiqui et al., 2020). The observed knowledge deficits and suboptimal breastfeeding practices in the community can also be influenced by poverty. Limited access to healthcare services, including prenatal and postnatal care, can hinder the dissemination of accurate and comprehensive information about breastfeeding practices (Olanade et al., 2019). Furthermore, economic constraints can prevent mothers from exclusively breastfeeding due to the need to return to work early or lack of support systems, affecting optimal infant feeding practices (Lesorogol et al., 2018). The identified sanitation issues, such as open defecation and poor toilet facilities, are often associated with inadequate infrastructure and limited access to basic amenities, which can be prevalent in poor communities (Njuguna & Muruka, 2017). Poverty can hinder the provision of proper sanitation facilities, clean water supply, and hygiene education, contributing to unsanitary conditions and increased risk of food-/ waterborne diseases.

CONCLUSION AND RECOMMENDATIONS

The study showed that the usual diet of people in Barangay Bukang Liwayway, Kibawe, Bukidnon was adequate in proteins, calcium, phosphorus, and niacin but inadequate in calories, fats, fiber, vitamin A, iron, vitamin C, thiamin, and riboflavin. The usual diet has also been

found to be excessive in sodium. The typical diet was not particularly diversified. While the attitudes towards breastfeeding were generally good, there were significant knowledge deficits on the key aspects, such as the meaning and advantages of exclusive breastfeeding. It has also been found that at least one-third of the infants were not exclusively breastfed. There were no major perceived issues with water supply; however, there were sanitary problems to be addressed, such as open defecation and poor toilet facilities. In addition, there were issues with personal hygiene, such as a lack of soap and occasional handwashing. These gaps are intertwined with malnutrition faced by individuals and families living in poverty.

To correct the dietary deficiencies found, more orange-yellow-colored vegetables, fruits, nuts, seeds, and legumes, as well as animal-based food items, including flesh meats, milk and dairy products, and eggs, must be consumed. It is crucial to enhance knowledge, attitudes, and practices of exclusive breastfeeding among caregivers to ensure optimal infant nutrition. Additionally, efforts should be made to improve sanitation conditions, including access to clean and safe toilet facilities, promoting proper hygiene practices, and addressing issues related to open defecation. Thus, it is recommended to develop and implement nutrition-supportive activities, such as improving access to nutritious food, enhancing healthcare services, promoting income-generating opportunities, and investing in sanitation infrastructure to help alleviate poverty-linked malnutrition.

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