ASSESSMENT REPORT

Infant and Young Child Feeding practice, behaviour, and growth in TB-affected communities in Western Province

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Prepared by:
Dr. Raul Schneider (MD, MPH)
Schneider Global Health Consultancy

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About this Report

Prepared by	Dr Raul Schneider, International Public Health Consultant *Schneider Global Health Consultancy*
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This Assessment Report is the result of research and field assessments carried out by the World Vision Papua New Guinea (WVPNG) staff and trained enumerators, under the supervision and coordination of the World Vision Papua New Guinea Programme Quality Department and Stop TB Western Province Project Management team. A special thanks goes to all those involved in this process.

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Glossary of Acronyms

The following acronyms are used in this report

AD Plan	Annual Development Plan	NDoH	National Department of Health
ANC	Antenatal Care	NGO	Non-Governmental Organisation
ANCP	Australian NGO Cooperation Programme	NO	National Office
AP	Area Programme	ORS	Oral Rehydration Solution
CBO	Community Based Organisation	PHA	Provincial Health Authority
COVID-19	Corona Virus Disease 19	PHO	Provincial Health Office
CU2	Children Under 2	PLW	Pregnant Lactating Women
CRPs	Community Resource Person(s)	POM	Port Moresby
DFAT	Department for Foreign Affairs and Trade	PNG	Papua New Guinea
DIP	Detailed Implementation Plan	PQ	Program Quality
FAO	Food and Agriculture Organization	SD±	Standard Deviation
HAZ	Height for Age Z score (Stunting)	TB	Tuberculosis
IYCF	Infant & Young Child Feeding	TT	Tetanus Toxoid (vaccine)
M&E	Monitoring and Evaluation	WAZ	Weight for Age Z score (underweight)
MNCHN	Maternal Newborn Child Health and Nutrition	WHO	World Health Organisation
MoU	Memorandum of Understanding	WHZ	Weight for Height Z score (wasting)
MUAC	Middle-Upper Arm Circumference	WVA	World Vision Australia (Support Office)
MAD	Minimum Acceptable Diet	WVPNG	World Vision Papua New Guinea
MDD	Minimum Dietary Diversity		
MMF	Minimum Meal Frequency		
NCD	National Capital District		

Tables and Figures

1. Executive Summary

Background

The Constitution of Papua New Guinea (PNG) calls for the improvement of nutrition, making it a key development issue for the country. Almost one half of PNG children are stunted[1], impacting these children in the short term, through increased morbidity and mortality and lower levels of cognitive development than their healthier growing counterparts. Later, it has negative consequences for their lifelong health, educational and occupational outcomes. The causes of under-nutrition are many, however the predominant problem is inadequate infant and young child feeding practices. This is associated to inadequate antenatal care, poor growth monitoring practices for children and difficulty accessing health services.

Project objectives

The overall aim of this cross-sectional study was to assess feeding practices (exclusive breastfeeding, continued breastfeeding to 2 years), dietary diversity (Minimum Dietary Diversity, Minimum Meal Frequency and Minimum Acceptable Diet, Vitamin A, and iron rich food accessibility) and nutritional status and growth among children under 2 years in South, Middle and North Fly Districts of Western Province. Additionally, the assessment collected information on caregiver's antenatal care and delivery practices, nutritional practices, food security and health, water and sanitation access and practice.

Methodology

The assessment collected information from 757 households across three districts (Middle, North and South Fly) in Western Province, Papua New Guinea. The study population included children 0-2 years and their main caregivers. Household samples were chosen through convenience sampling among communities that are currently participating in the WVPNG STOP TB project.

Data collected for this assessment was primarily quantitative using adapted digital surveys. A team of six interviewers (enumerators) from each of the three districts, were selected, accompanied, and trained by staff from University of Papua New Guinea and World Vision STOP TB program staff. Data collection tools were pre-tested prior to data collection. Additional to the IYCF practices, anthropometric measurements were collected using WHO/UNICEF standard height boards and weight scales. Anthropometric data was collected by trained health staff.

The field data collected on mWater surveyor application was downloaded into excel sheets and sent to the external consultant for analysis. Data was scrutinised through a screening process to ensure accuracy and relevance and transferred to SPSS Statistics software for in depth analysis and cross tabulation of data sets. Approval to conduct the study was obtained from the Western Province Provincial Health Authority (PHA). All relevant subjects were informed about the purpose and procedures of the study. Ethical clearance was obtained from UPNG SMHS Research and Ethics Committee. Participants provided their concept prior to data collection. All safety precautions and confidentiality of participants were assured.

[1] Papua New Guinea Demographic Health Survey 2016-18. Available at: https://dhsprogram.com/pubs/pdf/FR364/FR364.pdf

Key findings

The assessment found an unusually high number of wasted children (weight for height Z-score <2 SD) children at 17.9% and lower than national average stunting prevalence. The prevalence of severely underweight children has also been an important finding. The under-nutrition prevalence found seems to be correlates to lack of adequate early newborn and infant feeding practices.

Although exclusive breastfeeding prevalence is slightly higher than the national average, colostrum feeding is only practiced by a third of caregivers resulting in newborns are missing an essential and optimal nutrition component. Caregiver's general knowledge on appropriate feeding practices was found to be acceptable, however there is a significant lack of practice of these, with early introduction of solid foods at 4 months and cultural beliefs that, among other things, limits the consumption of many iron, vitamin and protein rich foods for pregnant women and young children.

Minimum Dietary Diversity (MDD), defined by a child that consumed five or more of the 8 WHO core food groups the day prior to the survey, was very low, while the number of children that met Minimum Meal Frequency (MMF) consumption (defined as the consumption of two or more meals in children 6-8.99 months old, 3 or more meals in breastfed children aged 9-23.99 months old, or four meals in non-breastfeed children of the same age) was similar to the Southern Regional of PNG average reported in the DHS 2016-18. Minimum Acceptable Diet (MAD) was also found to be below average for the region, impacted by the low food diversity consumption reported among children and highly dependent on seasonal access, traditional crop production and land availability, all factors that contribute to food quality and quantity in a subsistence farming setting.

Health facility delivery was high (72%) and more than half of those assessed had gone to 4 or more antenatal care visits during their last pregnancy. Access to health facilities is the main barrier to institutional delivery. Health facility delivery reduces the risk of complications and mortality for pregnant women and their newborns. The assessment also found a statistically significant correlation between children that were breastfed within the first hour and those that were born in health facilities (p=0.000).

Although generally food security is considered high in PNG[2], the assessment found that, over the last 12 months, 66% of caregivers worried about food shortages, 67% of household were forced to borrow food from family members as they did not have enough to eat and 32% of households went without eating for a day or more. Food insecurity has a detrimental impact in the development of infant and young children.

Disease prevention knowledge (hand washing, sanitation use and waste disposal) was high, however the lack of practice of these was evident and reflected in the health status of children. The prevalence of diarrhoea (24%) was higher in the assessed area compared to the national average of 14%. Diarrhoea prevalence increased with age, possibly due to the introduction of foods and the poor hygiene practice in both food preparation and hand washing.

Water access and sources varied between the districts, however over 40% of households depended on rainwater while the rest used mainly boreholes and wells. Surface water the main water source for

[2] An overview of food security in Papua New Guinea. Available at : https://www.researchgate.net/publication/323004673_An_overview_of_food_security_in_Papua_New_Guinea

20% of households in North Fly district. The main type of toilets across the three districts was pit latrines. Almost a quarter of respondents practices open defecation (half of households assessed in South Fly district). Hand washing practice was found to be very poor, and although most caregivers said they washed their hands with soap and water before eating, after defecating and before feeding their children, the assessment found that only half of the households surveyed had a designated place for hand washing where soap was available.

Conclusion and recommendations

The assessment revealed a need to address the inadequate and insufficient infant and young child feeding practices, particularly the high prevalence of wasting among the children assessed which requires immediate attention through identification of malnourished children at community level, establishment of referral systems and access to treatment in well-equipped facilities that can cater for the need of severely malnourished children. Given the limited food diversity consumed, the international minimum dietary diversity and minimum meal frequencies were not met. To address these shortfalls, agricultural interventions that promote crop diversification, increased production for marketing and training on food preparation can contribute towards improved nutritional access and practice. Agricultural interventions and adequate food storage of food sources such as legumes and grains can also go a long way in better household food security.

Access to health facilities and key disease prevention mechanisms like access to safe water, hand washing and adequate sanitation contribute towards a decrease in common health problems such as high diarrhoea prevalence observed as well as a reduction in other common child diseases like respiratory infections, all main contributors to child mortality in the country.

2. Assessment rationale

The Constitution of Papua New Guinea (PNG) calls for the improvement of nutrition, making it a key development issue for the country. Nutrition during the first 1000 days, from conception up to age two years, is also a focus for the guiding principles of the National Nutrition Policy 2016-2026[3]. However, even though this first 1000-day period is also an irreversible 'critical window' for getting each child off to a good start to realise his/her potential, almost one half of PNG children are stunted, many of them severely stunted[4]. This level of stunting, a child health and national development indicator, has not changed in PNG in 30 years, despite economic growth.[5] This stunting impact children in the short term, causing them to experience higher morbidity and mortality, and lower levels of cognitive development than their healthier growing counterparts. Later, it has negative consequences for their lifelong health, educational and occupational outcomes. The origins of stunting primarily occur during the first 1000 days of life, or before children reach their second birthday.

Under-nutrition occurs in large part, because of infant and young children's inadequate diets from birth to two years of age. Studies show that during the first six months of life, many infants in PNG are not exclusively breastfed, and after six months through to the second year, the complementary food provided to infants in addition to the breast milk is inadequate, sometimes lacking protein and energy and limited by the household's food insecurity and income. However, more detailed information on infant feeding, household food insecurity and caregiver infant feeding knowledge is limited. The richest food sources of protein are dairy, flesh foods (meat), eggs, fish, and other aquatic seafood. These foods are key components of dietary diversity, which acts as a proxy measure for assessing dietary quality and micronutrient sufficiency.

In PNG as elsewhere in the world, the prevalence of undernutrition, tends to increase during the period of complementary feeding from the age of 6 to 18 months. Undernutrition in infants and young children leads to impaired immune function, and, as a result, reduced ability to fight primary and secondary infections and accelerated progression to an array of communicable disease such as tuberculosis, water borne diseases and respiratory infections among others. Undernutrition is measured by stunting, underweight and wasting, whose prevalence rates in PNG, were, respectively, 46%, 25% and 15.8% as found in the 2009-2010 Household Income and Expenditure Survey (World Bank 2015).

Western Province is the largest province in PNG by area, and has three districts—North Fly, part of which is mountainous in the North, but with plains and flood plains further south; Middle Fly, the most populous District, has hills, plains, and flood plains while South Fly, the least populous, has plains and flood plains and the Pearl River delta. However, the large size, geography and limited roads make access to health services difficult for the mainly rural population in scattered villages, with travel in many places being by foot, dinghy, or canoe, affecting health service delivery.

Little is known about the complementary feeding practices, especially minimum dietary diversity, and minimal acceptable diet among infants and young children under two years in PNG, including in Western Province. No known detailed study has been conducted on complementary feeding practices

[3] PNG National Nutrition Policy 2016-2026. Available at: https://www.health.gov.pg/pdf/PM-SNNP_2018.pdf
[4] Papua New Guinea Demographic Health Survey 2016-18. Available at: https://dhsprogram.com/pubs/pdf/FR364/FR364.pdf
[5] Short changed: the cost of child undernutrition in Papua New Guinea. Available at: https://reliefweb.int/report/papua-new-guinea/short-changed-cost-child-undernutrition-papua-new-guinea

or dietary diversity in the province. Infant and young child nutritional status surveys specifically focused on the province have also not been found. The purpose of this study will therefore be to determine infant and young child feeding practices, minimal dietary diversity, minimal acceptable diet, and nutritional status along with dietary diversity and food security among caregivers of the infants and young children under two years in the three districts of Western Province, PNG.

3. Assessment Objectives and Questions

The overall aim of this cross-sectional study is to assess the infant and young child feeding practices and dietary diversity and growth in Western Province. It also aims to assess their main caregivers' knowledge, attitudes, and practices about nutrition, and measure the nutritional status of the children under two years of age. Caregivers' dietary diversity and food insecurity will also be assessed.

This assessment aimed to gain greater insight into six main questions related to the health, nutrition, and WASH (water, sanitation, and hygiene) situation of the target population under investigation. These are:

1- Determine the prevalence of infant and young child under-nutrition.
2- Evaluate infant and young child feeding (IYCF) practices. These IYCF practices include i) Early initiation of breastfeeding; ii) Exclusive breastfeeding to 6 months; iii) Continued breastfeeding to 1 year; iv) Introduction of complementary feeding; v) Minimum Dietary Diversity (MDD); vi) Minimum Meal Frequency (MMF); vii) Minimum Acceptable Diet (MAD) and viii) consumption of iron rich foods.
3- Assess food security of the caregivers in one season.
4- Assess the two-week period prevalence of diarrhoea among children aged 6-23 months in the surveyed communities.
5- Determine the households' access to, and use of, improved WASH facilities.
6- Determine the coverage of vitamin A supplementation received during the last 6 months among the infants and young children.

Answers to these questions will contribute towards development of appropriate and effective nutrition and health education interventions in communities in the province. Appropriately designed interventions will help to improve the nutritional status and health of the younger generation, allowing them a healthier start to their lives. These tailored interventions have the potential to result in a more dynamic community-owned health system that responds to the needs of Western Province's most vulnerable community members who are also affected by the TB epidemic.

4. Methodology

4.1 Study design and population under assessment

The assessment collected information from 757 households across three districts (Middle, North and South Fly) in Western Province, Papua New Guinea.

The study population are infants and young children, 0 to 23.99 months of age and their main caregivers. Study participants were chosen through convenience sampling in villages where WVPNG is currently implementing the *Stop TB in Western Province* project. Households that had TB patients were also

included in the sample size; however, households were randomly selected and households with TB patients were not identified until the enumerators started the survey process.

4.2 Data collection tools

Data collected for this assessment was primarily quantitative. A questionnaire adapted from WHO/UNICEF/FAO complementary feeding questionnaires was used to assess the IYCF practices. These include i) Early initiation of breastfeeding; ii) Exclusive breastfeeding to 6 months; iii) Continued breastfeeding to 1 year; iv) Introduction of complementary feeding; v) Minimum Dietary Diversity (MDD); vi) Minimum Meal Frequency (MMF); vii) Minimum Acceptable Diet (MAD) and viii) consumption of iron rich foods. Additionally, household food security and WASH behaviours were also assessed.

Minimum Dietary Diversity (MDD) is defined as *"the proportion of children 6-23.9 months of age who receive foods from five (5) or more food groups out of the eight (8) food groups."*[6]
Minimum Meal Frequency (MMF) is the "proportion of breastfed and non-breastfed children aged 6-23 months, inclusive of those who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more in a day as follows: 2 times for breastfed infants 6-8.9 months; 3 times for breastfed children 9-23.9 months and 4 times for non-breastfed children 6-23.9 months."[7]
Minimal Acceptable Diet (MAD) is "the proportion of children 6-23 months of age, inclusive, who receive a minimum acceptable diet (apart from breast-milk) calculated from the breastfed children 6-23 months of age, inclusive, who had at least the minimum dietary diversity and the minimum meal frequency during the previous day."[8]

Additional to the IYCF practices, anthropometric measurements were collected using WHO-recommended instruments (UNICEF length measuring boards and infant weight scales used in health facility clinics) and procedures and recorded on the survey questionnaires. Caregivers were asked to remove any of their infant's clothing or bulky hair ornaments or shoes for the length and weight measurements to be done according to WHO-recommended anthropometric procedures. Infants and young children identified as sick or as severely acutely malnourished (SAM) during the study were referred to the health centres for treatment and management.

The questionnaires were pre-tested in a rural community other than the study area, and based on the results, adjustments were made to the data collection tools.

4.3 Procedures of data collection

A team of six trained interviewers from each of the three districts, accompanied and trained by staff from University of Papua New Guinea (UPNG) and WVPNG *Stop TB in Western Province* program staff, conducted the field interview process between March to October 2020.

The interviewers were Grade 10 graduates from each of the target districts who are fluent in the local district language(s). Interviewers were provided with training over 2.5 days on the study's objectives

[6] International Dietary Data Expansion Project. Minimum Dietary Diversity. Available at : https://inddex.nutrition.tufts.edu/data4diets/indicator/minimum-dietary-diversity-mdd
[7] Guide to DHS statistics DHS-7. Available at: https://dhsprogram.com/data/Guide-to-DHS-Statistics/Minimum_Dietary_Diversity_Minimum_Meal_Frequency_and_Minimum_Acceptable_Diet.htm
[8] International Dietary Data Expansion Project. Minimum Dietary Diversity. Available at : https://inddex.nutrition.tufts.edu/data4diets/indicator/infant-and-young-child-minimum-acceptable-diet-iycmad

and methodology including data collection approaches, with the questionnaires and use of anthropometric tools employed for data collection (adequate for age weight scales and height boards).

Randomly chosen households (with an infant or young child less than two years of age) were invited to participate. The mothers or other main caregivers, along with their child, were invited to be interviewed.

Data collection training and survey collection started in North Fly district, with the same procedure followed in Middle and then South Fly districts. Approximately five villages were visited in each district, prioritising villages identified as having a higher TB (tuberculosis) prevalence, based on results obtained from interventions conducted through the *Stop TB in Western Province* project. Other nearby villages were included in the samples if there were not enough children aged 0- 24 months in the prioritised villages.

Data/questionnaire checking was done daily after interviews were finished, and the questionnaires submitted to the fieldwork supervisor, a trained Health Extension Officer (HEA) with paediatric experience. Data from the interviews will be collected in digital form, using tablets, and thereby directly entered into the mobile mWater data collection tool. In case of network failure, paper questionnaires were also taken to data collection sites by the enumerators for manual, pen-and-paper recording.

4.5 Data entry and data analysis

Data collected on mWater surveyor application was downloaded into excel sheets and sent to the external consultant for analysis. The external consultant ensured data collected was relevant through a screening process, prepared individual data sets by district and transferred this information to SPSS Statistics software for in depth analysis and cross tabulation of data sets. The evaluation data is presented either as numbers and percentages, or as mean ± SD, with normal significance tests for proportions and means respectively.

4.6 Ethical considerations

Approval to conduct the study was obtained from the Western Province Provincial Health Authority (PHA). All relevant subjects were informed about the purpose and procedures of the study. Ethical clearance was obtained from UPNG School of Medicine and Health Sciences (SMHS) Research and Ethics Committee.

The participation of the community members assessed in the study was voluntary and the subjects were requested to provide their digital consent before survey and anthropometrical data collection took place. All children who were assessed for malnutrition through anthropometrical measurements were always accompanied by their caregivers, and only weighed and measured after caregivers had provided consent. Data collection was conducted considering all safety precautions for the team involved (enumerators and project staff). As mentioned previously, data collection was mainly conducted using digital platforms. This data was only accessible and managed by the project staff team leader and WVPNG management and was kept secured in the digital platform within the WVPNG server. Names of persons were not shared, and full data sets were only accessible to those working on data analysis. The report does not contain any identifying information, assuring participants' confidentiality.

5. Limitations of the Assessment

- All the data available was scanned for errors and cleaned. Extreme cases, such as those Z-scores with standard deviations greater than ±5 was omitted from anthropometrical calculations.
- Although Minimum Meal Frequency (MMF) and Minimum Adequate Diet (MAD) were both calculated in this report, the MMF calculations were done based on a weekly food recall rather than the suggested 24-hour food recall based on WHO 2008 guidelines. This might have also affected the final findings in the MAD results as Minimum Adequate Diet calculations are based on the combination of MMF and Minimum Dietary Diversity (MDD) results. The assessment questionnaire had no 24-hour recalls, for neither caregivers nor children.

6. Assessment Results

6.1 General information of the assessment participants

Information was collected from 757 households in North, Middle and South Fly River districts, Western Province, Papua New Guinea between March - October 2020.

The sample size from each district, based on the respondent gender is detailed in the table below.

Table 6.1: Location and gender of children participating in the assessment

District	Gender		
	Male	Female	Total
Middle Fly- Balimo Urban and Rural, Aramia Gogodala and Fly Gogodala LLGs	152 (54.1%)	129 (45.9%)	281
North Fly- Kiunga Urban and Rural, Ningerum, Olsobip and Star Mountain LLGs	115 (57.5%)	85 (42.5%)	200
South Fly- Daru Urban, Fly Kiwai, Forecoast Kiwai and Oriomo Bituri LLGs	141 (51.1%)	135 (48.9%)	276
Total	408 (53.9%)	349 (46.1%)	757 (100%)

The most represented district is Middle Fly with 281 household surveys (37.1% of the total sample), closely followed by South Fly (36.5%) and North Fly which were represented with 200 samples (26.4%). The ratio of male to female children surveyed in these households is 1 female to 1.2 males. Of all the respondents, most (86.5%, n=655) knew their birth date, representing a mean age of 26.47 years (SD ± 6.41) with an age range varying from 16 to 59 years.

Most respondents were married at the time of the assessment (85.7%, n=649) and 102 (13.5%) were single. Most of those married (89.0%, n=578) lived with their spouses permanently in the households surveyed, while the rest were reported to live in the same household sporadically (10.0%, n=65), or never.

6.1.1 Education

Most respondents reported having gone to school (92.1%, n=697). On average respondents completed 7.96 years of formal schooling (SD ± 2.50, range 1-18 years). Similarly, many respondents (91.0%,

n=591) stated that their spouses had attended at least one year of school at an average of 8.93 years of formal schooling (SD ± 2.59, range 1-17 years).

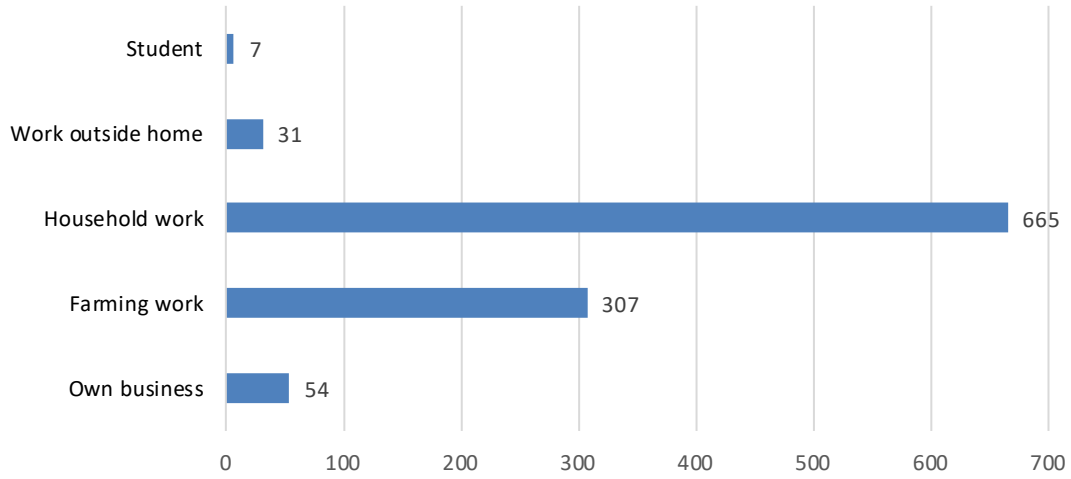
Although school attendance was high among all respondents, Middle Fly district had the lowest school attendance with 88.6% (n=249) of people reportedly going to school for at least a year compared to 95.0% (n=190) in North Fly district and 93.5% (n=258) in South Fly district.

6.1.2 Household and income/work

The households surveyed had an average of 8.0 members (SD ± 4.1, range 0-40). South Fly had the largest number of people living per household compared to the other two districts.

The type of work that respondents reported is illustrated in figure 6.1. Most of the households reported doing multiple types of work, mostly household work (n=665) and farming activities (n=307). The 54 households assessed that reported having their own personal or family business worked in table market sales and almost exclusively in the South Fly district. Other businesses include sale of firewood, fish, vegetables, and fuel. The jobs of those respondents who reported working outside the home for income (n=31), included teachers, police, nurses, pastors, treatment support officers with the *Stop TB in Western Province* project, loggers, and tailors. Seven respondents said they were still in school.

Figure 6.1: Type of work done by respondents (N=757)



Almost half of those assessed (44.3%, n=335) reported receiving royalty payments from OTML (Ok Tedi Mining Limited). Most of these households receiving royalty payments were in South Fly (60.5%, n=167) and 59.0% (n=118) in North Fly. Only 17.8% (n=50) of households in Middle Fly received royalty payments.

6.2 Child delivery practice and Family planning use

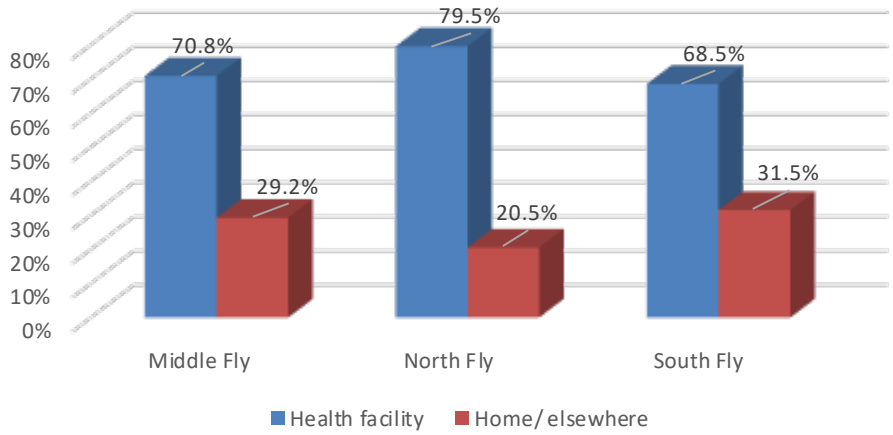
6.2.1 Child delivery practice

Of the 757 households surveyed, it was usually the youngest child in the family selected to be part of the survey questionnaire. The sample was made up of 408 boys and 349 girls.

Almost ¾ of the households reported delivering their youngest child in a health facility (72.3%, n=547). The remaining 210 households surveyed reported giving birth to their child either at home (21.5%, n=163) or elsewhere (6.2%, n=47). Of those that delivered outside the health facility or home, most

did so in the bush, fishing camps or in a boat on the way to a health facility. North Fly district had the highest health facility delivery frequency (79.5%, n=159) and South Fly the lowest (68.5%, n=189).

Figure 6.2.1: Location where the child was delivered by district (N=757)



Three quarters of respondents (74.1%, n=561) indicated that their youngest child was delivered by a trained birth attendant (nurse, midwife, or trained health worker). The remaining deliveries were assisted mainly by family members of the mother (18.9%, n=143) and nine women indicated they had delivered on their own with no assistance.

6.2.2 Antenatal care practice during the last pregnancy

Over 83% of women surveyed indicated that they had attended at least one antenatal care (ANC) visit during their last pregnancy. The average number of antenatal care visits by women surveyed during their last pregnancy was 4.6 visits (SD ±2.4, range 1-9). In total, 57.3% (n=433) of the total respondents stated they had attended four or more antenatal care visits during their last pregnancy. The lowest number of women attending ANC was reported in Middle Fly, while South Fly had the highest ANC adherence.

Table 6.2.2: Number of reported antenatal care visits by district.

Location	Number of ANC visits			
	No answer	No ANC	1-3 ANC visit	4+ ANC visits
Middle Fly	19 (6.7%)	53 (18.9%)	69 (24.5%)	139 (49.5%)
North Fly	12 (6.0%)	26 (13.0%)	49 (24.5%)	113 (56.5%)
South Fly	7 (2.5%)	8 (2.9%)	80 (29.0%)	181 (65.6%)
Total	38 (5.0%)	87 (11.5%)	198 (26.2%)	433 (57.3%)

During antenatal care visits, less than half (45.4%, n=344) of the women reported that they had received nutrition guidance or support/advice from their local health care workers.

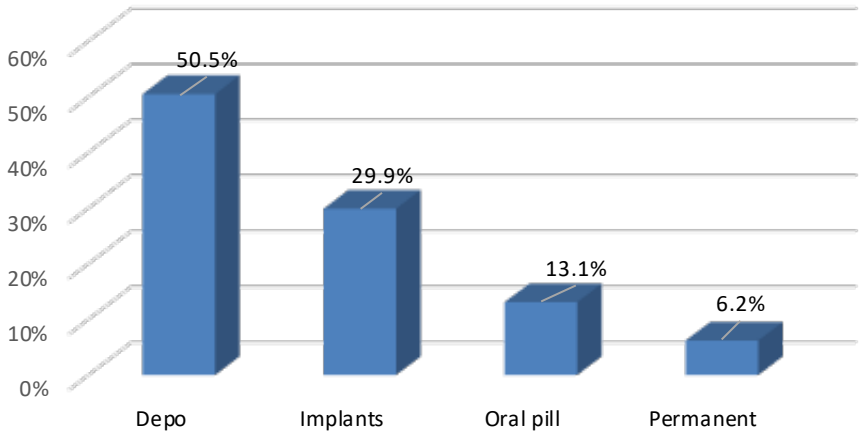
At the time of the assessment a total of 20 women (2.6%) reported being pregnant. Half of these (n=10) were in Middle Fly district.

6.2.3 Family planning

Each of the women assessed had an average of 2.66 children (SD ± 1.79), ranging in age from 0 to 11 years. Of the 2,075 children born to these 757 households, 118 children were reported to have died. This equals a mortality rate of 5.7%, which is higher than the 49.4 deaths per 1,000 under 5 years old children, reported at national level. However, it is important to note that the age of the deceased child/ren was not specified in this assessment and possibly some of the deaths reported were among children older than 5 years. No details on the causes of death were collected in this assessment.

Overall, 321 women (42.4%) reported using some form of contraception method. The district that reported the highest number of contraception use was North Fly. Out of the 200 households surveyed 60.5% (n=121) were using contraception, while in Middle Fly 63 households of 281 surveyed (22.4%) reported using some form of contraception. Among those using contraception, the most popular choice was medroxyprogesterone acetate injection (Depo) used by 50.5% of women. Other contraception types used include contraceptive implants, oral contraception pills (through a combination of an oestrogen and a progesterone) and vasectomy or tubal ligation.

Figure 6.2.3: Type of contraception reported by respondents (N=321)



6.3 Nutritional practices during pregnancy

6.3.1 Food consumption during pregnancy

The mean number of meals consumed during pregnancy was 2.75 meals a day (SD ± 0.67). There were no significant variations across the three districts in the number of meals consumed during pregnancy. North Fly district had the highest number of women consuming four or more meals in a day compared to the other districts.

Table 6.3: Number of meals consumed by pregnant women by district (N=719)

Location	Number of meals consumed			
	1	2	3	4+
Middle Fly	5 (1.9%)	73 (27.9%)	162 (61.8%)	22 (8.4%)
North Fly	8 (4.3%)	51 (27.1%)	105 (55.9%)	24 (12.8%)
South Fly	12 (4.5%)	73 (27.1%)	160 (59.5%)	24 (8.9%)
Total	25 (3.5%)	197 (27.4%)	427 (59.4%)	70 (9.7%)

A total of 306 (40.4%) women reported that they avoided some types of foods while they were pregnant with their last child. Traditional beliefs are key barriers to consumption of various types of

foods during pregnancy. The food that was avoided during pregnancy, and most mentioned by respondents, were some types of fresh and saltwater fish/shellfish (shark, catfish, stingray, eel, shells, and shrimp). Reasons provided for not consuming these foods, as mentioned previously, are strongly linked to tradition and custom belief that have been passed down from generations. Fish and seafood consumption during pregnancy is associated with causing birth complications, allergies, nausea, and vomiting, and in some places, it is pointed out that it "makes the women grow old quickly".

The need to avoid eating wild pigs during pregnancy was also mentioned by many respondents. Wild pig consumption is believed to cause the following: nausea and vomiting during pregnancy, birth and delivery complications, allergic reactions and sicker babies once born. Additionally, several respondents, such as those belonging to the Seventh Day Adventist religion, indicated they do not consume pig meat (and others such as snake, flying fox and crocodile) because of religious beliefs. Similarly, 33 respondents said they avoid eating snakes, flying fox, crocodile, cassowary, lizard, bandicoot and/or dugongs during pregnancy. Respondents also believed that the consumption of meat during pregnancy can cause birth defects, delays the development of the fetus, and is thought to be associated with newborns developing different forms of disabilities. Other foods believed to cause health problems among newborns (skin rashes and sores, itchiness, and sore throat (pharyngitis) and general respiratory infections) and during pregnancy include roots, some leaves, pumpkin tips and mosong kumu (a type of green leaf).

Other foods identified by respondents as harmful to consume during pregnancy were salty processed foods (resulting in high blood pressure and heart burn) and spicy foods (resulting in pregnancy nausea and can kill the fetus). A small number of lactating women (12.5%, n=95) indicated that they still avoided some foods that are traditionally believed to harm the infant. These foods include greasy fish, eel, pumpkin tips, snakes, pork, and spicy foods.

6.4 Nutritional knowledge and practice by caregivers for new-borns and infants

6.4.1 New-born and Infant care and feeding practices

Most of the children surveyed are looked after, during most of the day, by their own mother (85.7%, n=649), while a small number (2.4%, n=18) are looked after by their father. The remaining 12% of children (n=90) are looked after by other direct members of the family, mainly grandparents, siblings, or aunts.

The assessment show that the mother of the children surveyed are the person that most frequently feeds the child (91.0%, n=689) and decides what the child should eat (87.5%, n=662). Other children that are not with their mothers during the day are fed by their fathers (1.8%, n=14) or other family members that are left in charge of their care during the day (7.1%, n=54).

Almost all the children surveyed in this assessment had been breastfed at least once (97.5%, n=738). Eight children of the 19 not breastfed had either adopted parents or lived with other relatives who were not their biological mother. Of those mothers that had breastfed their children 66.5% (n=504) reported feeding their newborn within the first hour of birth at an average of 27 minutes from birth. A small number of mothers (3.4%, n=27) reported giving food or drink (not colostrum or breast milk) to the infant immediately after birth. These included giving extra water to six children, milk formula was given to 8 children and five premature children were kept in the hospital and given milk formula through a nasogastric feeding tube. Of these 27 children who were given other foods or liquids besides

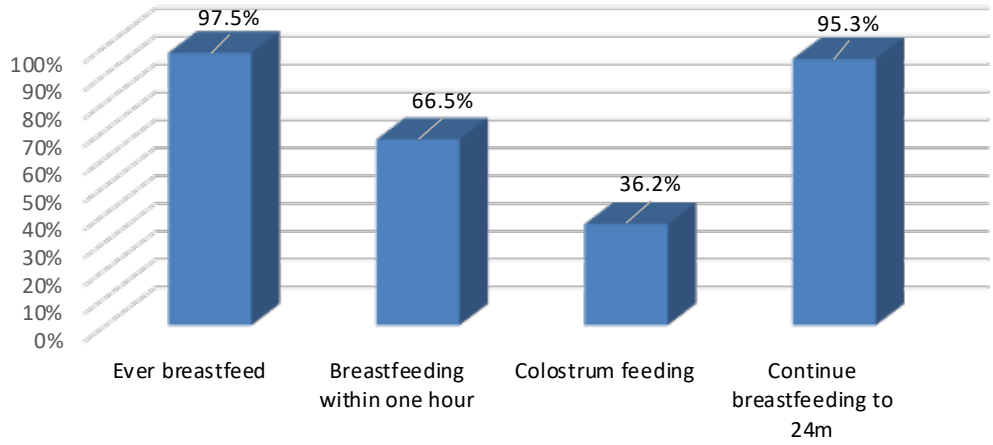
breast milk immediately after birth, eight were from Middle Fly, two from North Fly and 17 from South Fly.

Colostrum feeding practice was found to be very low among those assessed. Only a third of those assessed indicated they had given their new-born colostrum (36.2%, n=260). When disaggregated by districts, the assessment found that 42.2% (n=113) of women in South Fly district gave colostrum to their children as did 30.2% (n=79) of mothers in Middle Fly and 36.2% (n=68) of mothers in North Fly districts.

At the time of the assessment, 95.3% (n=703) of the children were reported to still be breastfeeding. Of the 35 children that were no longer breastfeeding, 29 were older than 12 months and five children were under 6 months. Of these five, three were adopted and the mothers of the other two children were pregnant again and therefore not lactating.

Women were asked if they had breastfed their child the day prior to the assessment. Most women (98.5%, n=692) confirmed they had done so. Forty-three women (5.8%) said that they fed their child breast milk, but not directly from the breast. Over half (55.8%) of these 43 women stated that they expressed breast milk to feed their child through cups or spoons and 19 children (44.2%) had received breast milk from another woman that was not their biological mother.

Figure 6.4.1: Newborn and infant feeding practice

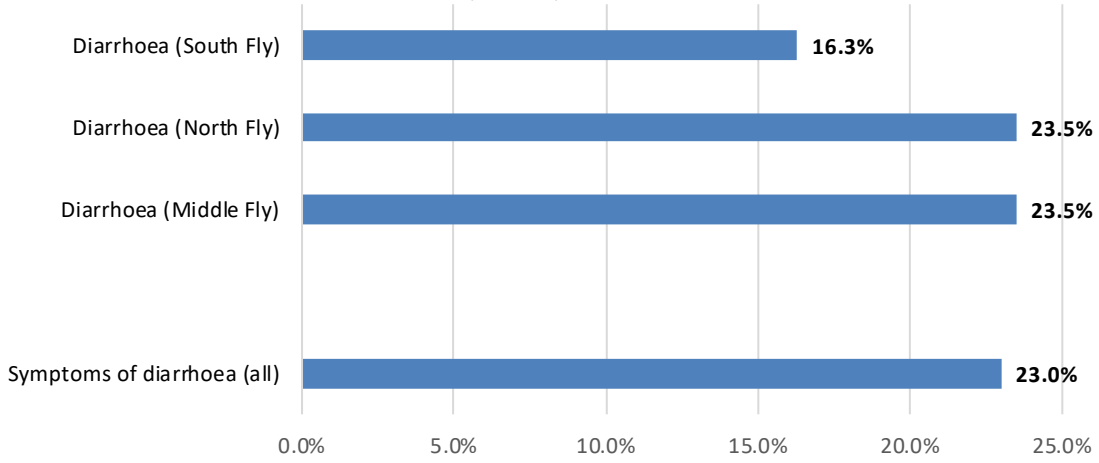


Overall, 58.9% (n=301) children 6-24 months had received at least one dose of Vitamin A. The majority (67.7%, n=204) had one dose and the rest had two or more doses. In Middle Fly, more than half of children (51.0%, n=111) had received no Vitamin A supplementation compared to 25% in South and North Fly districts.

Mothers were asked if their child had symptoms of diarrhoea over the last two weeks prior to the assessment. These include frequent (more than three loose watery stools per day) and abdominal pain and cramps. Overall, 174 (23.5%) children were reported to have presented these symptoms. The number of children that presented diarrhoea increased by age group from 16.3% (n=40) in the 0 - 5.99 months age group, peaking at 26.0% (n=50) in the 6-11.99 months age group and then decreasing within children older than a year.

Cases of diarrhoea were most common in Middle and North Fly districts where 23.5% (n=66 and n=47 respectively) children presented symptoms (including a quarter of all children 6-12 months). South Fly district had the lowest prevalence at 16.3% (n=45).

Figure 6.4.1a: Diarrhoea prevalence among children 0-24 months by district (N=174)



Both, Vitamin A supplementation through food and medication, as well as diarrhoea prevalence is presented in detail in the discussion section.

The assessment found that in 117 households (15.5%), there was at least one person who was diagnosed with TB or who was currently on TB treatment. Reported cases were evenly spread among the three districts. In Middle Fly, 48 households (17.1%) had a person who was living with TB or on treatment, in North Fly this was 28 households (14.0%) and in South Fly it was 41 households (14.9%).

6.4.2 Caregiver nutrition knowledge and practice

The survey attempted to assess the knowledge of caregivers regarding best nutritional practice. Most respondents (91.7%, n=694) said the best foods for newborns were colostrum and breast milk. Thirty-nine respondents (5.2%) did not know what the best foods for newborns were and 16 respondents said mashed solid foods like bananas, pawpaw, sweet potato, sago, and coconut milk were suitable foods for newborns.

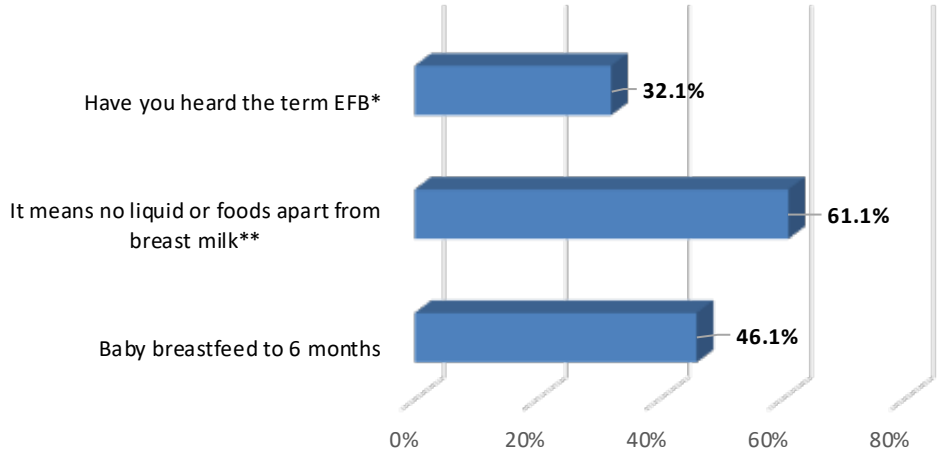
Within the same group, the respondents were asked what should be consumed by children after they turn 3 months old. Overall, three quarters of respondents (75.8%, n=574) said exclusive breastfeeding needed to be continued, this included only breast milk and nothing else. 46 (6.1%) of respondents did not know what a 3-month-old child should be eating, and 137 (18.1%) respondents said breastfeeding needed to be complemented with mashed solid foods such as banana, pawpaw, sago, crabs, and fish. Almost all respondents said that extra water needed to be given to the child, in additional to breast milk.

Over three quarters of respondents (62.2%, n=471) said that they had not heard the term "exclusive breastfeeding" and could not define it. Almost 15% (n=111) of respondents said they had heard the term being used but were not sure what it meant, and just under a quarter (32.1%, n=175) of respondents had heard about exclusive breastfeeding. However, when asked to define the term

'exclusive breastfeeding,' only 61.1% (n=107) of the 175 respondents that stated they knew what exclusive breastfeeding was and were able to answer correctly - "Exclusive breastfeeding means that the infant gets only breast milk and no other liquids or foods until 6 months of age."

When respondents were asked for how long a child should receive exclusive breastfeeding before introducing complementary feeding, less than half (46.1%, n=349) correctly said from birth to 6 months.

Figure 6.4.2: Exclusive breastfeeding knowledge (N=757)*



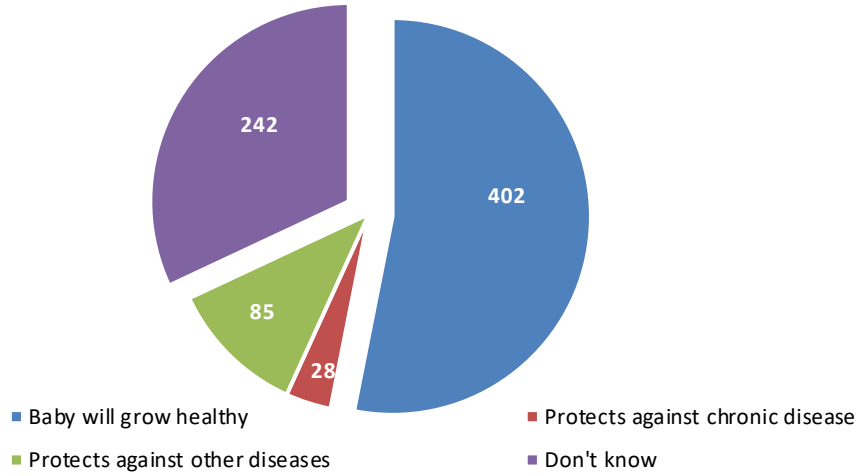
*32.1% is 175 respondents out of 757
** 61.1% is 107 of the 175 respondents that stated they knew what exclusive breastfeeding is.

When respondents were asked why they think it is important to exclusively breastfeed the child up to the age of 6 months, 202 (26.7%) said it is because babies cannot digest solid food properly before they are six months old, and 182 respondents (24.0%) said it is important because breast milk provides all the nutrients and liquids a baby needs for health in its first six months. Over a third of respondents (36.6%, n=277) did not know why it is important to practice exclusive breast feeding. Other answers provided by respondents regarding exclusive breastfeeding up to six months include: i) It prevents the child from getting sick; ii) "babies have no teeth, so breast milk is what they need"; iii) breast milk makes the baby grow strong and healthy and iv) breast milk is the best because the intestines of the infants have not fully developed yet to be able to digest solid foods.

Most mothers (75.7%, n=573) said the child should be given breast milk on demand and that they do not have a specific number of times per day that the child gets feed. Sixty (7.9%) of women specified the number of times the child should be breastfed which ranged from 3-7 times a day, while the rest (16.4%, n=124) said they did not know how often a child should be breastfed.

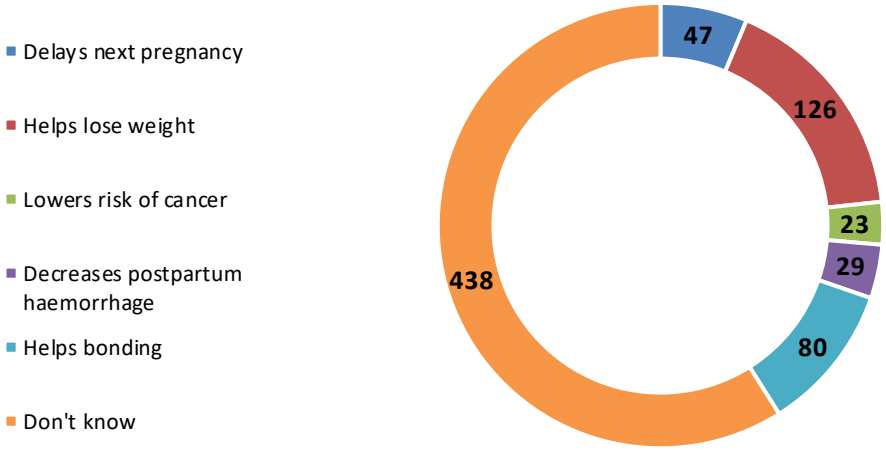
The benefits of breastfeeding identified by the caregivers include them saying that i) children will grow healthy and that breast milk will prevent the child from getting sick; ii) reduction in the possibility of being obese and suffering from chronic diseases during adulthood and iii) protection against other diseases (communicable such as water borne diseases, viruses, and bacteria). A large proportion (32%, n=242) of respondents could not mention any benefits.

Figure 6.4.2a: Benefits of breastfeeding identified by caregivers for the infant (N=757)



Several breastfeeding benefits for lactating women were identified by the respondents that participated in the assessment. The most common benefit mentioned was that it helped the mother lose the weight that she gained during pregnancy and helped the mother bond with the infant. Most respondents (57.9%, n=438) were not able to identify any benefits that breastfeeding provided to the mother.

Figure 6.4.2b: Benefits of breastfeeding identified by the respondents for the mother (N=757)

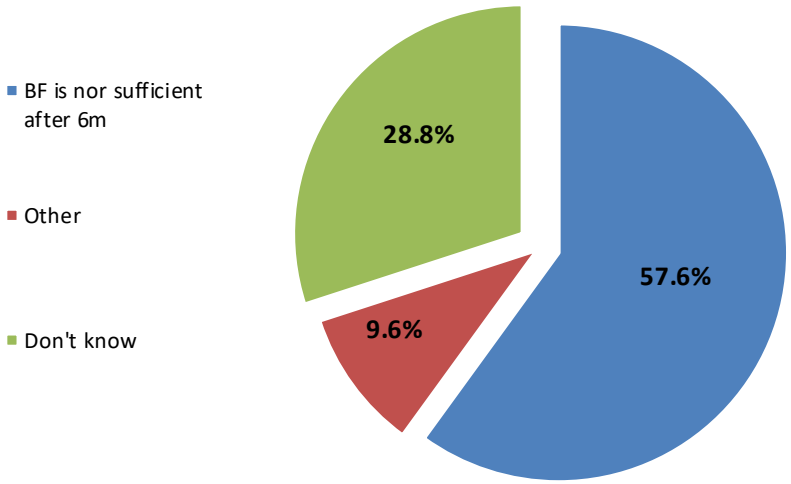


Overall, almost 70.5% (n=534) of women think exclusively breastfeeding their child is good. This answer was particularly high in South Fly district (81.9% (n=226) and North Fly district (75.5%, n=151), but significantly lower in Middle Fly district (55.9%, n=157). Despite this, overall, 30% of respondents said that exclusive breastfeeding is not good, or they are not sure how beneficial it is. In term of breastfeeding periods, answers varied among respondents; 18.2% (n=138) said they did not know for what period a child should be breastfeed, a further 22.3% said up to 6 months and 18% said beyond 2 years. However, when asked at what age children should start receiving solid foods, half (49.3%, n=373) of the respondents said at 6 months. In North Fly district 71.5% (n=143) of respondents answered that children should start eating solids at 6 months, while only 40.6% (n=114) did so in Middle Fly district, where the perceived age for the introduction of solid foods was lower, at 3.8 month (SD ± 0.15).

Among all respondents, the average age indicated to introduce solid foods was 4.42 months (SD ± 1.88) from a range of 1-9 months.

Respondents identified various reasons why it is important to start the child with solid foods (complementary feeding) after 6 months. The main reason identified was that the child needs increased caloric intake and breast milk alone cannot cope with the increased demand. Many respondents could not give a single reason for why complementary feeding is necessary. Answers classified as "Other" included respondents saying that after 6 months the child already has enough teeth to chew, and that the infant's stomach has developed enough to digest solid foods.

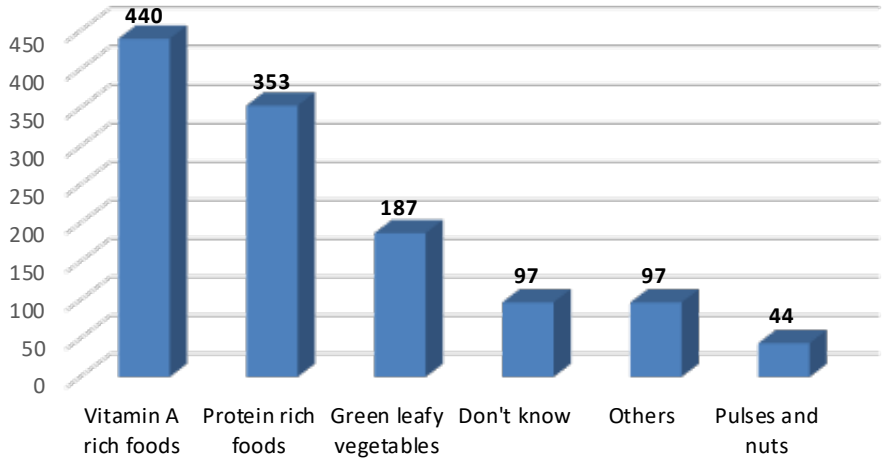
Figure 6.4.2c: Reasons why complementary feeding is necessary



As part of the assessment, participants were provided with two different pictures. One illustrated a thick, dense porridge, while the other picture had the image of a watery, runnier porridge. Respondents were asked which of the two types of porridge they would feed their child and why. Over half of the respondents (53.9%, n=408) said they would give the watery, thin porridge to their child, while a little over a third (36.5%, n=276) said they would give the child the thicker porridge and 9.6% (n=73) did not know. When asked what factors contributed to their choice, those that chose the watery porridge said that this thin porridge is easier for the child to digest and swallow. Respondents believe that since younger children only have a few teeth it is easier for them to eat soft foods and harder, more solid foods can make them choke and hurt their gums. Those that had chosen the thicker porridge said that the thicker porridge has more calories and nutrients for the child. 164 respondents did not know why they chose the picture.

Assessment participants were asked which other foods could be added to their local food staples (predominantly sago) to make it more nutritious for themselves and their families. The most mentioned addition to staples were vitamin A rich foods and vegetables such as pumpkin, carrots, sweet potatoes, mangoes, and papayas). Other mentioned food groups identified as a nutritious boost to staple foods consumed were protein rich food sources such as meats, eggs, and organ meats. Ninety-seven (12.8%) of respondents did not know which types of foods could be added to staples to make their meals more nutritious. Other sources of food identified included coconut milk, fish soups, noodles, and powdered cow milk.

Figure 6.4.2d: Food types that can be added to staples to make meals more nutritious

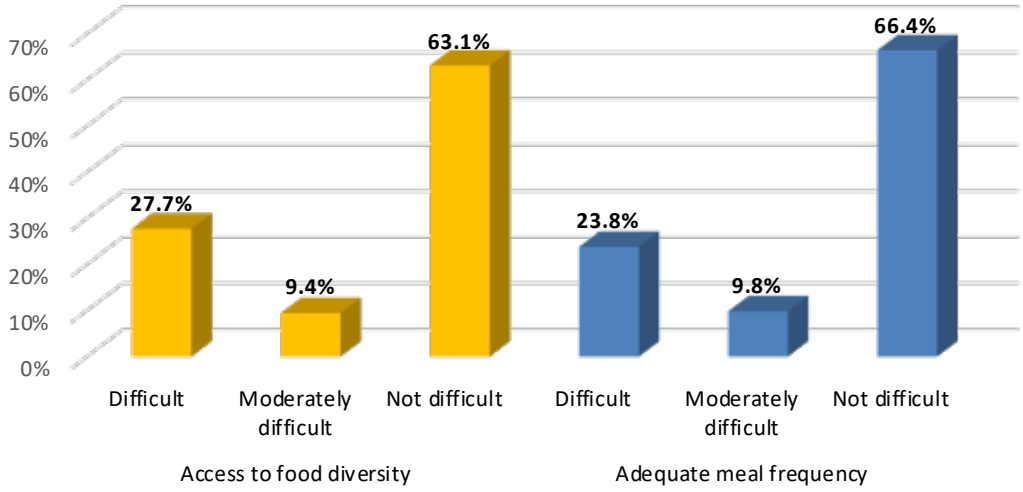


Most of the respondents (79.7%, n=603) think it is good to provide the child with a diversification of food types during the day. The reasons that food diversification is not good according to 12.5% (n=95) of respondents was that when they gave the child different types of foods the child could get diarrhoea, stomach aches and cramps, and start vomiting.

In a similar response rate, 81.1% (n=614) of the respondents assessed indicated that they thought it was important to feed the child several times a day, however almost 20% thought it was not good or were unsure if this was good practice. The reasons presented as to why it was not good to feed the child frequently during the day included thinking that feeding the child too often gives them stomach pain and makes them vomit. Other households assessed said that "*If there is no money or food it is a waste to feed the child too often*". Other respondents said that *"the child has small stomachs so do not need to eat often."*

Almost two thirds (63.1%, n=478) of those surveyed said it is not difficult for them to provide the child with different food groups. Similarly, 66.4% (n=503) of respondents said it was not difficult for them to feed their children several times a day. The main limiting factors to access food diversity include: i) a lack of money to buy types of foods that are not grown in their own gardens or hunted; ii) weather patterns and seasonal access to only some foods; iii) food collected in the gardens was limited and surplus was sold to buy other types of foods that the household could not grow. There were no significant differences in terms of difficulty in the provision of food diversity and meal frequencies between the three districts under study.

Figure 6.4.2e: Difficulty providing child with meal frequency and diversity



6.5 Food consumption among children under 6 months

6.5.1 Liquids and foods consumed by children under 6 months

Respondents were asked whether their child under 6 months had consumed any semi-solid foods or liquids the day prior to the assessment. Overall, out of the 238 children under 6 months surveyed, 21.2% (n=119) reported having consumed something else besides breast milk. Almost a quarter of children (24.9%) in South Fly had received liquids or other foods before 6 months of age, with similar rates of 20.5% recorded in North Fly and 18.7% in Middle Fly.

Among the 21% of children under 6 months old that had consumed liquids besides breast milk, the most common liquid consumed was water. More than two thirds of children under 6 months old surveyed had received extra water the day prior to the assessment. Besides water, 9.7% (n=23) of the children under 6 months had been given milk formulas (Lactogen S26 and others). Additionally, 25 children (10.5% of children under 6 months) had also received regular powdered milk, including - tinned, powdered, or fresh animal milk and/or Indo milk (flavoured milk). Overall, 46 children under 6 months (19.3%) consumed thin porridge made with mashed solid foods such as bananas, pawpaw, kaukau or rice. Some of these were mixed with breast milk to make the mixture thinner (more liquid). A larger number of children consumed this in Middle (27.9%) and North Fly (24.1%), compared to South Fly (11.6%). Consumption of tea among under 6 months old was also reported by 10.9% (n=26) of respondents. Coconut water was consumed by 16.7% (n=39) of children under 6 months, mostly in Middle Fly (27.9%) and to a lesser extent in the other two districts (10.3% in North Fly and 12.5% in South Fly districts).

Table 6.4: Types of food or liquids consumed among children under 6 months by district

Types of foods/liquids consumed among children <6 months	Districts			
	Middle (n=68)	North (n=58)	South (n=112)	Total (N=238)
Received extra water	40 (58.8%)	25 (43.1%)	25 (22.3%)	90 (37.8%)
Received infant milk formula	3 (4.4%)	9 (15.5%)	11 (9.8%)	23 (9.7%)
Received regular milk	8 (11.8%)	8 (13.8%)	9 (8.0%)	25 (10.5%)

Consumed processed juice drinks	5 (7.4%)	7 (12.1%)	6 (5.4%)	18 (7.6%)
Thin porridge (banana, kaukau, rice)	19 (27.9%)	14 (24.1%)	13 (11.6%)	46 (19.3%)
Consumed other liquids (kulau, dry coconut)	19 (27.9%)	6 (10.3%)	14 (3.8%)	39 (16.4%)
Consumed tea or milo drinks	9 (13.2%)	6 (10.3%)	11 (9.8%)	26 (10.9%)

6.5 Monthly recall of food type and consumption frequency among children and adults assessed

Monthly food consumption by type and frequency was assessed among caregiver and children. The 18 food groups assessed as presented below were developed, and then contextualised to reflect the Western Province diet. These have then been adjusted to follow the FANTA Household Dietary Diversity Score Indicator Guide (Swindale and Bilinsky, 2006). The 18 food groups were then re-classified and aggregated into 12 groups following the suggested HDDS guidelines to develop a consumption score which is presented in the *Discussion* section of this report.

6.5.1 Frequency and type of foods consumed by children assessed (N=376).

A total of 443 children were assessed on food frequency consumption. This assessment examined the consumption of food frequency of specific food types over the last month prior to the assessment survey. Food consumption was classified under four categories: consumed once a month or less; consumed once a week or less; consumed 2-5 times a week or consumed daily. The food most consumed daily was sago (sak-sak), fish (fresh and salt water) and coloured and green vegetables such as greens leaves, kumu (green edible leaves) like aipika, pumpkin, and carrots. A summary of the findings is presented on table 6.5.1, based on the reported consumption of the 18 different food groups assessed.

Table 6.5.1: Types and frequency of foods consumption (by month) among children assessed (N=443)

Type of food consumed by children (6-24 months)	Food consumption frequency			
	Once a month or less	Once a week or less	2-5 times a week	Once a day or more
1- Sago	148 (33.4%)	86 (19.4%)	43 (9.7%)	166 (37.5%)
2- Root crops	127 (28.7%)	141 (31.8%)	86 (19.4%)	89 (20.1%)
3- Rice	195 (44.0%)	105 (23.7%)	44 (9.9%)	99 (22.3%)
4- Wheat products	205 (46.3%)	122 (27.5%)	45 (0.2%)	71 (16.0%)
5- Legumes and nuts	290 (65.5%)	91 (20.5%)	31 (7.0%)	31 (7.0%)
6- Coloured vegetables	140 (31.5%)	112 (25.2%)	82 (18.5%)	109 (24.6%)
7- Green vegetables	152 (34.3%)	127 (28.7%)	86 (19.4%)	78 (17.6%)
8- Orange or yellow fruits	187 (42.2%)	147 (33.2%)	48 (10.8%)	61 (13.8%)
9- Other fruits	257 (58.0%)	109 (24.6%)	38 (8.6%)	39 (8.8%)
10- Fruit juice (processed)	256 (59.8%)	99 (22.3%)	37 (8.4%)	42 (9.5%)
11- Dairy products	399 (90.1%)	28 (6.3%)	7 (1.6%)	9 (2.0%)
12- Eggs	280 (61.0%)	105 (22.9%)	58 (12.6%)	16 (3.5%)

13- Meat or poultry	269 (60.7%)	117 (26.4%)	38 (8.6%)	19 (4.3%)
14- Fish	125 (28.2%)	93 (21.0%)	69 (15.6%)	156 (35.2%)
15- Sugar	213 (48.1%)	102 (23.0%)	47 (10.6%)	81 (18.3%)
16- Oils	255 (57.6%)	91 (20.5%)	49 (11.1%)	48 (10.8%)
17- Biscuits	192 (43.3%)	133 (30.0%)	54 (12.2%)	64 (14.4%)
18- Sweets or lollies	223 (50.3%)	116 (26.2%)	49 (11.1%)	55 (12.4%)

According to the results, sago is consumed in Middle Fly daily by 59.4% of children. This is statistically significant (p=0.001) compared to daily average consumption in South Fly (28.7%) and North Fly (13.3%).

Rice is consumed daily by 54.5% (n=54) children in South Fly. This makes it statistically significantly higher (p=0.000) compared to the daily rice consumption among children in Middle Fly (16.2%, n=16) and North Fly districts (29.3%, n=29). Bread (wheat flour-based foods) are consumed in South Fly district by almost half of the children compared to a quarter of children in the other two districts.

Daily orange and yellow vegetable consumption in South Fly (48.6%, n=53) is statistically significantly higher (p=0.007) than the reported daily consumption among children in North Fly district (20.2%, n=22).

Daily consumption of dairy products was very low across all districts, but especially for Middle Fly where only 1.1% (n=2) of the 187 children assessed reported daily dairy consumption. Similarly, in South Fly, only 2.2% of children reported daily dairy consumption, and in North Fly 3.3%. On average 90.1% (n=399) of children never consume dairy products or do so once a month or less.

Egg consumption across the three districts was also very low. In South and Middle Fly, daily egg consumption was reported at around 4%, while in North Fly it was only 1.6% (n=2). In North Fly, the consumption of meats was also very low (0.8%) as in Middle Fly (4.3%) and South Fly (7.3%). In Middle Fly, more than 84% of children consumed meat once a week or less. However, daily fish consumption in Middle Fly was high (48.1%) and statistically significantly higher when compared to daily fish consumption in North Fly (15.0%, n=18) or South Fly (30.8%, n=48). Fish was the main protein source for most of the children in this assessment and one of the key staples together with sago.

The daily consumption of sugar among children was higher (p=0.000) is South Fly district (34.6%, n=47) compared to North Fly (8.3%, n=10) or Middle Fly districts (12.8%, n=24). When comparing the consumption of processed foods in general, such as biscuits, sweets and oils, there is a statistically significant higher consumption (p=0.003) in South Fly district compared to North Fly district.

6.5.2 Frequency and type of food consumed by adults surveyed (N=757)

The assessment found that the respondents consumed an average of 2.66 (SD 0.93) meals a day. Food types were classified in the same manner as described for the children on the section above and using the same classification table as table 6.5.1, but with a sample of 757 adults representing the same number of households. The food types most consumed by adults are the same as those for the children and include are sago, fish, and green and orange vegetables.

Table 6.5.2: Types and frequency of food consumption (by month) among adults assessed (N=757)

	Food consumption frequency

Type of food consumed by adults	Once a month or less	Once a week or less	2-5 times a week	Once a day or more
1- Sago	121 (16.0%)	123 (16.2%)	96 (12.7%)	471 (55.1%)
2- Root crops	157 (20.7%)	226 (29.9%)	163 (21.5%)	211 (27.9%)
3- Rice	233 (30.8%)	178 (23.5%)	116 (15.3%)	230 (30.4%)
4- Wheat products	285 (37.6%)	228 (30.1%)	100 (13.2%)	144 (19.0%)
5- Legumes and nuts	390 (51.5%)	203 (26.8%)	72 (9.5%)	92 (12.2%)
6- Coloured vegetables	135 (17.8%)	187 (24.7%)	162 (21.4%)	273 (36.0%)
7- Green vegetables	167 (22.1%)	217 (28.7%)	184 (24.3%)	189 (25.0%)
8- Orange or yellow fruits	293 (38.7%)	250 (33.0%)	96 (12.7%)	118 (15.6%)
9- Other fruits	350 (46.2%)	201 (26.6%)	98 (12.9%)	108 (14.3%)
10- Fruit juice (processed)	358 (47.3%)	197 (26.0%)	87 (11.5%)	115 (15.2%)
11- Dairy products	661 (87.3%)	50 (6.6%)	24 (3.2%)	22 (2.9%)
12- Eggs	506 (66.8%)	163 (21.5%)	64 (8.5%)	24 (3.2%)
13- Meat or poultry	366 (48.3%)	238 (31.4%)	92 (12.2%)	61 (8.1%)
14- Fish	96 (12.7%)	176 (23.2%)	150 (19.3%)	335 (44.3%)
15- Sugar	251 (33.2%)	189 (25.0%)	107 (14.1%)	210 (27.7%)
16- Oils	331 (43.7%)	178 (23.5%)	113 (14.9%)	135 (17.8%)
17- Biscuits	267 (35.3%)	247 (32.6%)	114 (15.1%)	129 (17.0%)
18- Sweets or lollies	357 (47.2%)	201 (26.6%)	88 (11.6%)	111 (14.7%)

As with children, sago consumption among adults is very high and considered a staple food across Western Province. The assessment results show that sago is consumed in Middle Fly on daily basis by 80.1% (n=225) of adults. This is statistically higher (p=0.000) than the daily average consumption in North Fly (34.5%, n=69) or South Fly (44.6%, n=123).

Root crops such as potatoes, kaukau, yam, cassava, are also widely consumed in Western Province. A total of 35.5% (n=98) South Fly residents reported daily consumption of at least one type of root crop compared to a reported daily consumption of root crops by 28.5% (n=57) of those respondents in North Fly and 19.9% (n=56) in Middle Fly district.

As with root crops, rice is mostly consumed in South Fly district where almost half of the assessment respondents reported consuming rice daily (48.2%, n=133), this is statistically significantly higher compared to 34.0% (n=68) in North Fly (p=0.000) or 10.3% (n=29) in Middle Fly district (p=0.000). Wheat products such as bread, scones and noodles are mostly consumed on a daily basis in South Fly (29.3%, n=81), with a lower consumption rate in North Fly district (19.0%, n=38) and lower in Middle Fly (8.9%, n=25). Wheat flour-based food consumption in South Fly is statistically significantly higher in South Fly (p=0.000) compared to the lower consumption reported in Middle Fly district.

Similar to the other food groups, daily consumption of orange and green vegetables is highest in South Fly (47.1%, n=130), compared to North Fly (38.0%, n=76) and Middle Fly district (23.8%, n=67). The comparison between South and Middle Fly districts in statistically significant (p=0.001).

Daily orange and yellow fruit consumption (such as pawpaw, banana, mangoes, mandarin, and yellow watermelon) by adults was highest in South Fly (20.7%, n=57) compared to North Fly (18.5%, n=37),

and statistically significantly higher (p=0.003) than in Middle Fly district (8.5%, n=24). Similarly, other fruit consumption such as cucumber, guava, laulau, apple, and soursop were consumed by less than a fifth of adults in South Fly (18.5%) daily, compared to lower consumption in Middle Fly (12.5%, n=32) and North Fly district (11.4%, n=25).

Daily juice consumption (including all processed, high in sugar and colouring drinks like cordial and "Tang") reported by adults in the monthly food recall assessment shows a statistically significant higher consumption (p=0.000) in South Fly district (25.0%, n=69) compared to North (15.0%, n=30) and Middle Fly district (5.7%, n=16).

Dairy consumption of dairy products such as milk (fresh and powdered) and cheese is very low across all districts and not statistically significant when comparing each of these. North Fly district reported the highest daily dairy consumption at 4.5% (n=9) of respondents. Similarly, egg consumption among adults is very low and not statistically significant when comparing values between districts. Daily average consumption of eggs from any bird is 6.0% (n=12) in North Fly and 3.2% (n=24) on average across the three districts.

Although meat (poultry and red meats) is not consumed frequently daily (8.1% of respondents report consumption daily), there are no statistically significant differences between the districts. Fish (fresh water & salt water, tinned fish, smoked fish) is consumed daily by more than half of the respondents in Middle Fly (57.3 (n=161) and 40.9% (n=137) in South Fly districts.
The consumption of fish is low in North Fly (18.5%, n=37), making it statistically significantly lower compare to the other two districts (p=0.000).

Daily sugar consumption is double in South Fly (43.5%, n=120) compared to North Fly (20.5%, n=41) and Middle Fly districts (17.4%, n=49), p=0.000. In general, processed food such as biscuits (26.1%, n=72) and sweets (25.7%, n=71), both very high in sugar, are mostly consumed in South Fly district compared to the other two districts and particularly compared to Middle Fly district (p=0.000).

Oil consumption (cooking oil, margarine, simas butter, meadow lee spread) is high in North Fly district (23.0%, n=46) and almost the same in South Fly (25.4%, n=70), but statistically higher, p=0.000, than in Middle Fly district (6.8%, n=19).

6.6 Weekly recall of food type and consumption frequency among children and adults assessed

6.6.1 Weekly child food consumption recall (N=376)

Weekly food consumption among the 562 children, age 0-24 months, was assessed using a 19-food type survey. The table below presents the main results, showing the average food type consumption between the three districts and consumption by district. The narrative describes statistically significant differences observed between the districts.

Overall, the main foods consumed by children, based on the weekly food consumption recall, are sago, green vegetables, white vegetables (roots) and grains. Fruits and sugary processed foods were consumed by the same percentage (58%) of children on a weekly basis. The highest type of food reported in Middle Fly was sago (81% of children consumed it at least once in the past week); In North Fly district it was grains (78%) and in South Fly it was dark green vegetables and white root vegetables and dark greens (71%).

Table 6.6.1: Type and frequency of weekly food consumption among children by districts

Weekly food consumption-child	Total weekly consumption (N=562)	Middle Fly weekly consumption (N=230)	North Fly weekly consumption (N=151)	South Fly weekly consumption (N=181)
Grains (bread, noodles, rice)	367 (65.3%)	119 (51.7%)	118 (78.1%)	130 (71.8%)
White vegetables	385 (68.5%)	140 (60.9%)	114 (75.5%)	131 (72.4%)
Sago	393 (69.9%)	186 (80.9%)	95 (62.9%)	112 (61.9%)
Legumes/nuts	231 (41.1%)	78 (33.9%)	72 (47.7%)	81 (44.8%)
Infant formula	63 (11.2%)	9 (3.9%)	31 (20.5%)	23 (12.7%)
Milks (fresh, powder)	192 (34.2%)	55 (23.9%)	65 (43.0%)	72 (39.8%)
Dairy products	25 (4.4%)	5 (2.2%)	7 (4.6%)	13 (7.2%)
Organ and other animal meats	141 (25.1%)	32 (13.9%)	56 (37.1%)	53 (29.3%)
Fish or seafood	326 (58.0%)	148 (64.3%)	80 (53.0%)	98 (54.1%)
Grubs, snails, insects	84 (14.9%)	49 (21.3%)	13 (8.6%)	22 (12.2%)
Eggs from any birds	192 (34.2%)	78 (33.9%)	65 (43.0%)	49 (27.1%)
Yellow or orange vegetables	318 (56.6%)	106 (46.1%)	95 (62.9%)	117 (64.6%)
Dark greens	381 (67.8%)	146 (63.5%)	105 (69.5%)	130 (71.8%)
Fruits (all colours)	331 (58.9%)	129 (56.1%)	93 (61.6%)	109 (60.2%)
Palm oil/nuts	34 (6.0%)	6 (2.6%)	16 (10.6%)	12 (6.6%)
Other fruits (Pitpit, sugarcane)	288 (51.2%)	126 (54.8%)	68 (45.0%)	94 (51.9%)
Oils, fats, butter	257 (45.7%)	92 (40.0%)	73 (48.3%)	92 (50.8%)
Sugary processed foods	330 (58.7%)	118 (51.3%)	99 (65.6%)	113 (62.4%)
Flavourings (Maggie cubes)	295 (52.5%)	106 (46.1%)	71 (47.0%)	118 (65.2%)

Almost two thirds of the respondents indicated that their child had consumed some sort of grain-based food (rice, bread, porridge, corn, popcorn, corn flakes, noodles, or other wheat-based foods). There was a statistically significant difference (p=0.000) between the highest grain consumption in North Fly district and the lowest in Middle Fly district (51.7%). Over two thirds of children reported eating white vegetables in the form of white sweet potatoes, white yams, kaukau, and white manioc (cassava). There was no statistically difference in the consumption rate between the districts, but Middle Fly had the lowest reported consumption.

Sago in a staple food in the districts as shown on the section above. There was a statistical difference (p=0.000) in the consumption of sago between Middle Fly district (highest) and North and South Fly districts which had a lower consumption. Less than half of children reported eating any kind of legumes including beans and peanuts over the week prior to the assessment.

Infant formula was consumed by 20.5% (n=31) children in North Fly district. This was not statistically significant compared to South Fly (p=0.069), but it was statistically significantly higher compared to Middle Fly district (p=0.000). Similarly, the consumption of milk products (non-formula) was highest in North Fly and statistically significant (p=0.005) compared to Middle Fly district.

The consumption of dairy products (cheese, fresh milk, yogurt) was very low across the three districts, but statistically significantly higher (p=0.015) in South Fly district.

Organ meat consumption in the form of liver, animal heart and kidneys and other types of meats such as red meats, poultry, and wild animals, among the assessed children was low (a quarter of children consumed at least once a week). The highest consumption reported of this food type was in North Fly district and the lowest in Middle Fly district (p=0.000).

Fish was widely consumed in all districts, but highest in Middle Fly, making this food group one of the staples. Less than one in five caregivers reported that their child had consumed grubs or insects in the week before the assessment. The highest consumption was reported in Middle Fly, being statistically higher compared to North Fly district (p=0.046).

Egg consumption from poultry, ducks, wild birds, cassowary, fouls, crocodile, and lizards was reportedly consumed by over a third of children surveyed. The highest consumption of eggs among children was in North Fly district, with this being significantly higher (p=0.002) compared to egg consumption in South Fly district.

Over half of all children reported consuming orange and yellow vegetables. Green vegetables and leaves like aipika, aupa, tulip, choco, pumpkin tips, water crest and kru gang gong among others were consumed by almost 70% of all children. There were no statistically significant differences in consumption between the three districts. Fruits (all types) were also consumed by over half of the children assessed. Other types of fruits or vegetables such as cucumber, avocado, laulau, guava, pipit, bamboo shoots, mushroom, kulau and sugarcane were consumed by half of respondents with no significant differences in consumption between the districts.

Caregivers were asked about the consumption of foods made with palm oil (red palm oil, red palm nut or red palm nut pulp sauce). Palm oil consumption was low, highest in North Fly and lowest in Middle Fly district.

Almost half of the respondents had consumed oil, fats, butter, or foods made with any of these. Almost 60% of children surveyed had consumed sugary foods, such as chocolates, sweets, candies, pastries, cakes, or biscuits in the week prior to the assessment. Sugar consumption was statistically significantly higher in North Fly compared to Middle Fly district (p=0.006).

Flavourings such as "Maggie flavouring" and other flavouring like those added to instant noodles were consumed by half of the children. The highest consumption was reported in South Fly district.

6.6.2 Weekly adult food consumption recall (N=502)

Weekly food type consumption among the 757 adult respondents is presented on the table below (Table 6.6.2). The table details 18 different food types commonly consumed by the target population. The table depicts the main findings showing the average food type consumption between the three

districts and consumption by district. The narrative describes statistically significant differences observed between the districts.

The main foods consumed by adults overall are green vegetables, sago, white root vegetables and fish. In Middle Fly district sago was the food most consumed, followed by fish; In North Fly district dark green and grains together with white root vegetables were the food types most consumed the week prior to the assessment and in South Fly dark greens and white root vegetables and grains.

Table 6.6.2: Type and frequency of weekly food consumption among adults by districts

Weekly food consumption-Adult	Total weekly consumption (N=757)	Middle Fly weekly consumption (N=281)	North Fly weekly consumption (N=200)	South Fly weekly consumption (N=276)
Grains (bread, noodles, rice)	577 (76.2%)	172 (61.2%)	181 (90.5%)	224 (81.2%)
White root vegetables	600 (79.3%)	189 (67.3%)	180 (90.0%)	231 (83.7%)
Sago	639 (84.4%)	268 (95.4%)	162 (81.0%)	209 (75.7%)
Legumes/nuts	412 (54.4%)	113 (40.2%)	142 (71.0%)	157 (56.9%)
Milks (fresh, powder)	237 (31.3%)	55 (19.6%)	88 (44.0%)	94 (34.1%)
Dairy products	44 (5.8%)	8 (2.8%)	19 (9.5%)	17 (6.2%)
Organ and other animal meats	302 (39.9%)	67 (22.2%)	117 (58.5%)	118 (42.8%)
Fish or seafood	578 (76.4%)	239 (85.1%)	143 (71.5%)	196 (71.0%)
Grubs, snails, insects	134 (17.7%)	77 (27.4%)	36 (18.0%)	21 (7.6%)
Eggs from any birds	262 (34.6%)	95 (33.8%)	90 (45.0%)	77 (27.9%)
Yellow or orange vegetables	474 (62.6%)	139 (49.5%)	137 (68.5%)	198 (71.7%)
Dark greens	664 (87.7%)	230 (81.9%)	192 (96.0%)	242 (87.7%)
Fruits (all colours)	495 (65.4%)	159 (56.6%)	152 (76.0%)	184 (66.7%)
Palm oil/nuts	81 (10.7%)	10 (3.6%)	47 (23.5%)	24 (8.7%)
Other fruits	518 (68.4%)	188 (66.9%)	142 (71.0%)	188 (68.1%)
Oils, fats, butter	478 (63.1%)	146 (52.0%)	155 (77.5%)	177 (64.1%)
Sugary processed foods	514 (67.9%)	142 (50.5%)	160 (80.0%)	212 (76.8%)
Flavouring (Maggie cubes)	575 (76.0%)	171 (60.9%)	176 (88.0%)	228 (82.6%)

Over three quarters of adult respondents indicated that they had consumed some sort of grain-based food (rice, bread, porridge, corn, popcorn, corn flakes, noodles, or other wheat- based foods). As with the results observed among children, there was a statistically significant difference (p=0.000) between the highest grain consumption in North Fly district and the lowest in Middle Fly district. Similarly, almost 80% of adults reported eating white vegetables in the form of white sweet potatoes, white

yams, kaukau, and white manioc (cassava). This was also statistically significant (p=0.000) when comparing the consumption between North Fly (90.0%, n=180) and Middle Fly (69.3%, n=189).

There was a statistical difference (p=0.001) in the consumption of sago between Middle Fly district (highest) and South Fly districts (lowest). Over half of adults reported eating legumes (beans and peanuts). Consumption of this food type was highest in North Fly and statistically significant (p=0.000) compared to the lower consumption in Middle Fly district.

The consumption of milk was highest in North Fly and statistically significant (p=0.000) compared to the lower consumption in Middle Fly district.

As with children, the consumption of dairy products (cheese, fresh milk, yogurt) was very low across the three districts, but statistically significantly higher (p=0.002) in North Fly district compared to the other districts.

Organ meat consumption in the form of liver, animal heart and kidneys and other types of meats such as red meats, poultry, and wild animals, among the assessed adults was higher compared to children, however less than half of adults (39.9%) had consumed meat products in the week prior to the assessment. The highest consumption reported of this food type was in North Fly district and the lowest in Middle Fly district (p=0.000).

Fish was widely consumed in all districts, but highest in Middle Fly, this was statistically significantly higher (p=0.001) compared to North Fly district.
One in five adults (17.7%) reported consuming grubs or insects in the last week. This was highest in Middle Fly (almost 30%) and lowest in South Fly (7.6%). This is a statistically significant difference (p=0.000).

Like with children, egg intake from poultry, ducks, wild birds, cassowary, fouls, crocodile, and lizards was reportedly consumed by over a third of the adults surveyed. The highest consumption of eggs among adults was in North Fly district being this significantly higher (p=0.000) compared to egg consumption in South Fly district.

Over half of all adults reported consuming orange and yellow vegetables. The highest consumption of coloured vegetables was in South Fly, with this statistically significant compared to the lower consumption reported in Middle Fly (p=0.001).

One of the types of foods most consumed by adults was green vegetables and leaves like aipika, aupa, tulip, choco, pumpkin tips, watercress and kru gang gong and others. Although consumption was high in Middle and South Fly districts, almost all respondents from North Fly district (96.0%, n=192) said they had eaten this in the past week. This is statistically significantly higher than consumption reported in Middle Fly district (p=0.001).

Other types of fruits or vegetables (cucumber, avocado, guava, pipit, bamboo shoots etc.) had been consumed by two thirds of respondents, with no statistical differences in consumption between the districts.

Adults were asked about the consumption of foods made with palm oil (red palm oil, red palm nut or red palm nut pulp sauce). Palm oil consumption was low overall, but substantially (and statistically) higher in North Fly district (23.5%) compared to the other districts (p=0.000).

Almost two thirds of the adults had consumed oil, fats, butter, or foods made with any of these, with this being statistically higher in North Fly (p=0.000) compared to the other two districts. Similar results are observed in the number of adults that reported consuming sugary foods (67.9%, n=514). The highest consumption was reported in North Fly district (80%), with it being statistically significantly higher compared to consumption in Middle Fly (p=0.000). Food flavourings were widely used by adults. Almost all adults in North Fly (88.0%, n=176) had consumed food flavouring at least once in the week compared to 60.9% of those in Middle Fly district (p=0.000).

6.7 Food diversity consumption

Food diversity consumption for adults and children was measured based on the weekly and monthly food type and frequency of consumption reported in the surveys conducted. Among children there were 19 different food types and 18 among adults (infant formula was exclusively asked in the child weekly consumption questionnaire).

Based on the food groups presented above, Household Dietary Diversity Scores (HDDS), taken from 12 food groups and Infant and Young Child Feeding (IYCF) Scores using 8 food groups, were developed following the FAO and WHO guidelines respectively.

As presented in the limitations section of this report, the data collected was based on weekly and monthly food type and frequency of consumption, rather than on the suggested 24-hour recall to develop the dietary scores. To develop the HDDS based on monthly consumption reported, only the daily frequencies in both adults and children (6-23 months) were considered. Food frequency consumption to determine Minimum Dietary Diversity (MDD) were also assessed among children and based only on the daily consumption reported, to adhere to the formula suggested by FAO and WHO. Details of the findings and cross tabulation with other indicators is presented in the Discussion section of this report to address the objectives of this assessment.

6.8 Nutritional status of children based on anthropometrical measurements (WHO Z-score classification)

This assessment collected anthropometrical measurements to determine the malnutrition prevalence (stunting, underweight and wasting) among children under 2 years, utilising weight, height, and age of the child to classify the nutritional status of the child. Absence of acute protein-energy malnutrition, or normal nutritional status, is defined as having a weight-for-height z-score of -2.0 or greater. Moderate acute protein-energy malnutrition is defined as having a weight-for-height z-score of -3.0 to less than -2.0.
A description of the data collection methodology and analysis is described in the methodology section of this report.

6.8.1. General description of the nutritional status of children under 2 years

The assessment found that from 466 respondents, the average weight of the youngest child at birth was 2.967 grams (SD ± 0.55) with a range of birth weight of 1,800 grams to 4,800 grams. A total of 108 children of the reported 466 samples (23.2%) weighed 2,500 grams or less at birth.

WHO SMART flags were utilised during the nutritional analysis to eliminate data errors. SMART flags are used to minimise data collection error and are based on the observed population (the specific survey population as opposed to a reference population). The range is -5 to +5 standard deviations for weight for height, height for age, and weight for age. Measures falling outside this range are not taken into consideration and excluded from the analysis.

Table 6.8.1a: General description of children assessed by age group, sex, and ratio (M:F)

Age in months	Boys	Girls	Total	Ratio
0 to 5.99 months	136 (57.7%)	102 (42.9%)	238 (100%)	1: 0.75
6 to 11.99 months	101 (52.6%)	91 (47.4%)	192 (100%)	1: 0.90
12 to 17.99 months	102 (52.3%)	93 (47.7%)	195 (100%)	1: 0.90
18 to 23.99 months	69 (52.3%)	63 (47.7%)	132 (100%)	1 : 1.0
Total	408 (53.9%)	349 (46.1%)	757 (100%)	1: 0.90

The mean of all the Z-scores values among children 0-24 months analysed have a negative tendency (towards under-nutrition, away from the value of zero in the Gaussian curve). Of these underweight and wasting are the most prevalent, however stunting prevalence is also negative (-0.34 SD).

Table 6.8.1b: Mean z-scores among children surveyed

Indicator	n	Mean z-scores ± SD
Weight-for-Height (Wasting)	731	-0.80 ±1.35
Weight-for-Age (Underweight)	720	-0.80 ±2.06
Height-for-Age (Stunting)	641	-0.34 ±2.29

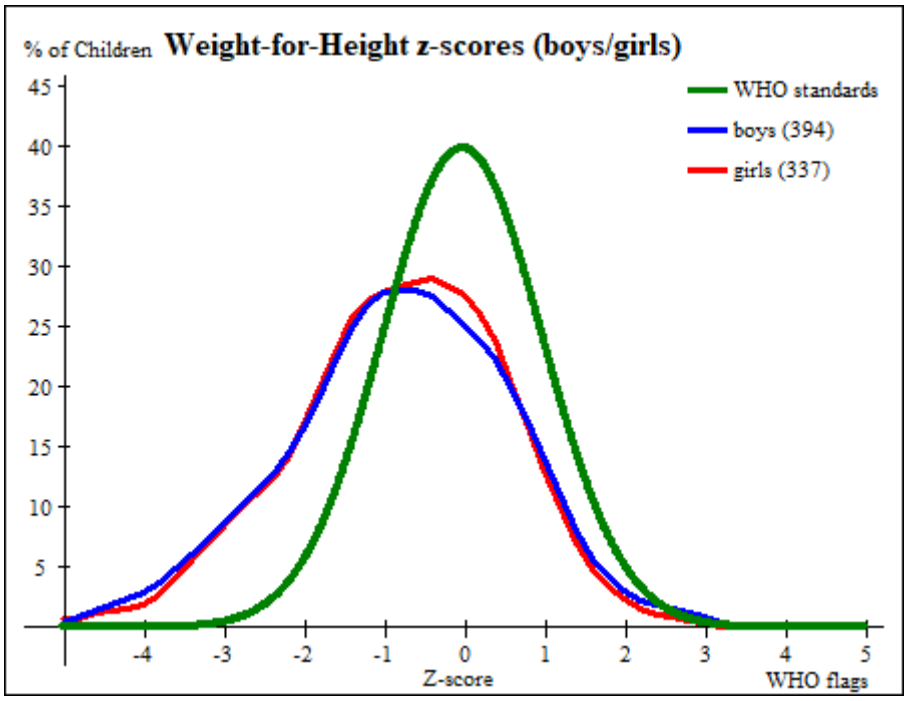
6.8.2 Prevalence of acute malnutrition among children under 2 years (Wasting)

Wasting denotes acute malnutrition. A total of 131 children of 731 (17.9%) were classified as wasted (Z-score -2 SD or less). Of these children, 83 (63.4%) were moderately wasted (Z-score between -2 SD and -3 SD) and 48 (36.6%) were severely wasted (Z-score less than -3 SD). Boys had a slightly higher wasting prevalence (18.5%, n=73) compared to girls (17.2%, n=58), although this was not statistically significant.

Overall, the highest percentage of children who were wasted were found in the 0-6 month (21.4%, n=51) and 12-18 months age groups (19.5%, n=38), and the lowest was in the 18-24 months age group (18.5%, n=24).

In the standard deviations for Z-scores by age group, as expected, the assessment shows a higher negative deviation of Z-scores in the middle age groups (6-18 months -0.80 ± 1.30), while the younger and older age groups are almost the same, within the 0-6 months age group (-0.84 ± 1.41), and the older age group of children 18-24 months (-0.81 ± 1.27).

In terms of location, Middle Fly had a total of 75 (26.7%) children classified as wasted, North Fly had 26 children classified as wasted (13.1%) and South Fly, 47 children (17.2%).

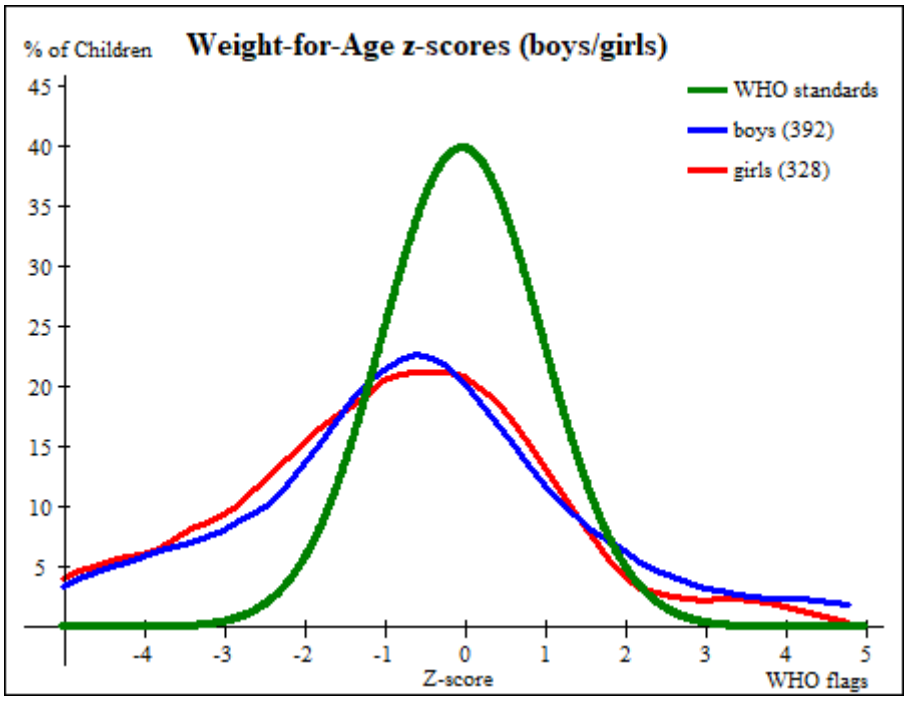


6.8.3 Prevalence of underweight among children under 2 years

The assessment found a total of 182 (25.3%) children who were classified as underweight (low weight for age presenting a Z-score of -2 SD or less). Of the total of 182 underweight children, 76 (41.8%) were moderately underweight (<-2 SD z-score and >=-3 SD z-score) and 106 (58.2%) were severely underweight. Overall, 94 (24.0%) boys and 88 (26.8%) of girls surveyed were underweight. This difference was not statistically significant.

As with children who were found to be acutely malnourished, the highest percentage of children who were underweight were found in the 18-24 month (47.0%, n=62) and 12-17.99 months age groups (26.2%, n=51), and the lowest underweight prevalence was observed in the 0-6 months age group (17.6%, n=42). The standard deviations on the Z-scores by age group show a more pronounced negative deviation in the 18-24 months age group (-1.87 ± 1.91) while it decreases in the younger age groups. The standard deviations in these groups are very wide, denoting possible data collection errors.

In terms of location, Middle Fly had a total of 94 (33.5%) children classified as underweight, North Fly district had 49 children (24.5%) and South Fly had 55 children (19.5%) classified as underweight.



6.8.4 Prevalence of stunting among children under 5 years

Stunting measures chronic malnutrition. The prevalence of stunting (low height for age presenting a Z-score of -2 SD or less) among the 641 children assessed was 19.8% (n=127). Among these, 49 (38.6%) children were moderately stunted, and 78 (61.4%) children were severely stunted. A total of 68 boys (19.7%) and 59 girls (20.0%) were stunted.

The largest number of stunted children were found in the older age group (18-24 months). A total of 62 children (47.7%) were stunted. Stunting prevalence decreased with age. Among children 12-18 months it was 23.6% (n=46), in the 6-12 months age group it was 20.4% (n=11) and in the 0-6 months it was 12.2% (n=29). The standard deviations on the Z-scores by age group show a more pronounced negative deviation in the 18-24 months age group (-1.75 ± 1.89) while it decreases in the middle age groups to 0.30 (± 2.44) in the 0-6 months age group.

In terms of location, Middle Fly had a total of 74 (26.3%) children classified as stunted, North Fly district had 52 children (26.1%) and South Fly had 50 children (18.2%).

6.8.5 Prevalence of overweight and obesity among children under 2 years

Of the 731 children assessed to determine prevalence of obesity and/or overweight during the assessment, only 11 children (1.5%) were found to be overweight (WHZ >2). There were more overweight boys (n=7) compared to overweight girls (n=4) in the assessment sample.

6.9 Caregiver and child mealtime behaviours

Of the 562 respondents, 59.6% (n=335) said that they talk to their children to encourage them to eat when they do not want to. Most of the mothers said that they call the child's name, tell them that if they eat, they will grow strong and healthy or promise them some sort of reward if they eat their food (take them to the shop, take them to town, promise them sweet foods as dessert). Others said they sing to their child and sit with them and eat together to encourage them to eat.

Some of the mothers reported that they add flavouring such as sugar and "Maggie" flavouring to the food the child consumes encourages the child to eat more. Other mothers will tell the child the food is lollies or sweets so the child will eat.
On average children received 2.3 snacks and meals during the day prior to the assessment from the mothers apart from liquids (including breast milk for those that were breastfeeding).

6.10 Household food security

Participants were asked questions about household food security. Two thirds of households (65.8%, n=498) said that at least during one point in the previous year they were worried that there would be food shortages in their home. Two thirds of households also reported running out of food in the past year and a third of households assessed reported going hungry for at least a day with no access to food. Most households reported not having food for a day or two, but of the 240 households that went hungry, these did so for an average of 1.8 days (SD ±1.4), with some households reporting having no access to food for 10-14 days.

Almost three quarters of all households that participated in the assessment said that during the last year they did not have enough to eat, and almost 80% reported that they reduced the number of food types (food diversity) consumed because they either had no access to these foods (did not grow in their gardens) or were not able to purchase them.

The disaggregated data on food security perception by districts in presented on the table below. On average, the district with the most food insecurity is Middle Fly.

Table 6.10: Household food security recall over the last 12 months defined by assessment participants

Food security perception	Total Yes (N=757)	District Middle Fly (N=281)	North Fly (N=200)	South Fly (N=276)
During the last year was there a time you would worry you would run out of food?	498 (65.8%)	217 (77.2%)	120 (60.0%)	161 (58.3%)
During the last year was there a time you were unable to eat enough food?	550 (72.7%)	215 (76.5%)	140 (70.0%)	195 (70.7%)
During the last year was there a time you ate only a few kinds of food?	596 (78.7%)	229 (81.5%)	155 (77.5%)	212 (76.8%)
During the last year was there a time you had to skip a meal?	567 (74.9%)	221 (78.6%)	150 (75.0%)	196 (71.0%)
During the last year was there a time our household ran out of food?	507 (67.0%)	213 (75.8%)	120 (60.0%)	174 (63.0%)
During the last year was there a time you were hungry but did not eat?	526 (69.5%)	215 (76.5%)	129 (64.5%)	182 (65.9%)
Did your household go without eating for a whole day or more?	240 (31.7%)	93 (33.1%)	53 (26.5%)	94 (34.1%)

6.11 Water, Sanitation and Hygiene knowledge and practice

6.11.1 Water access and use

Overall, the main source of water for all households assessed is tank water (40.0%, n=351). Almost half of the households surveyed in Middle Fly depend on rainwater/tanks for their drinking water followed by dug holes, usually within their yards. In North Fly, besides rainwater stored in tanks, dug

holes was also an important source of water, while in South Fly almost a third of households surveyed had access to piped water.

Table 6.11a: Reported main source of drinking water

Main source of drinking water	Total	Middle Fly (N=368)	North Fly (N=216)	South Fly (N=293)
Piped water		5 (1.3%)	18 (8.3%)	96 (32.8%)
Dug hole		81 (22.0%)	62 (28.7%)	45 (15.4%)
Tube/well/borehole		44 (11.9%)	19 (8.8%)	15 (5.1%)
Spring		6 (1.6%)	6 (2.8%)	1 (0.3%)
Rainwater/Tank		176 (47.8%)	66 (30.6%)	109 (37.2%)
Surface water		56 (15.2%)	45 (20.8%)	27 (9.2%)

In terms of water used for washing and cooking, the main source overall was from dug holes (28.9%, n=145), this is the same main water source reported in Middle and North Fly, but South Fly district residents used piped water (32.7%, n=68) as their main source of cooking and washing water, closely followed by dug holes.

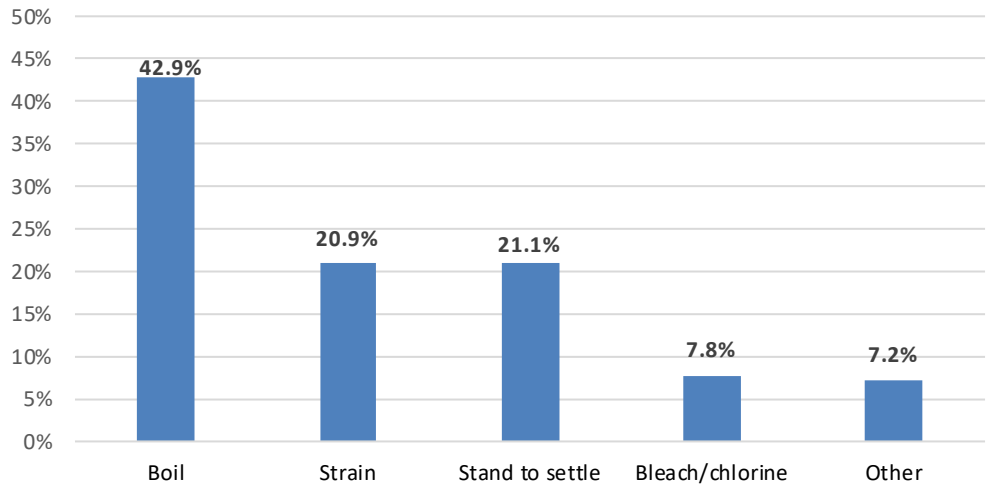
Most of the households (65.5%, n=496) obtain the water from sources outside their own yard or houses and only 3.2% (n=24) of households have piped water inside their homes.

Almost half of the households (46.9%, n=355) assessed reported shortages of water in their main drinking water sources in the last month. The main reasons associated with water shortages reported were that the water in main sources were not available or accessible (75.8%, n=269), the dry season affects the main source, water was too expensive to purchase (5.0%, n=18) and tanks were damaged.

When faced with water shortages, community members assessed generally reported digging new holes or wells to source their water (45.1%, n=101). A quarter of households surveyed in Middle Fly district said that they obtain their water from rivers and streams nearby when rainwater is not available. In North Fly, the households assessed reported that they search for water from multiple sources, usually whatever source is closest to their dwelling (bush, public taps if available, surface water or asked their neighbours to use their water). In South Fly district, the alternative water sources include digging wells, collecting rainwater, or purchasing water.

Less than half (48.2%, n=365) report treating their drinking water. Most boil their water, strain water through a cloth or let it stand. Figure 6.11.1 details the type of water treatment reported by survey respondents.

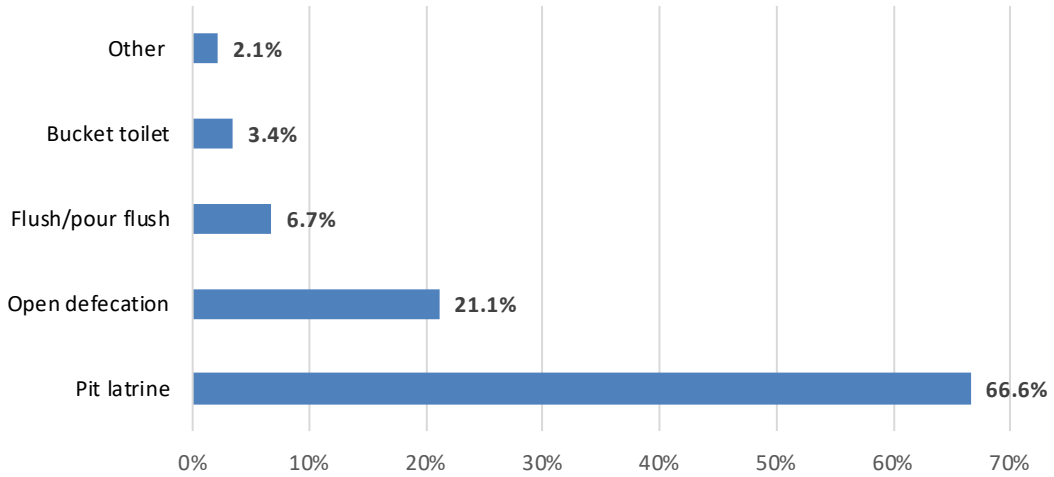
Figure 6.11.1: Water treatment and type of treatment used



6.11.2 Sanitation

Most of the households surveyed had pit latrines as their main toilet facility (66.6%, n=504). Almost a quarter of respondents practiced open defecation and had no toilet facility of any type available. It is important to note that in South Fly, almost half of those surveyed had no toilet facilities of any kind (42.4%, n=117), while in Middle and North Fly the predominant toilets were pit latrines (over 80%), while open defecation was low (2% in North Fly and 14% in Middle Fly). The few existing flush or pour flush toilets (6.7%, n=51) were mostly located in North Fly district (47.1%, n=24) and South Fly district (41.2%, n=21). Most of the "bucket toilets" reported (96.2%, n=25) were in South Fly district. Other type of toilets reported included pans (0.6%, n=5) and compost toilets (0.6%, n=5).

Figure 6.11.2: Toilet facilities used bu households assessed (N=757)

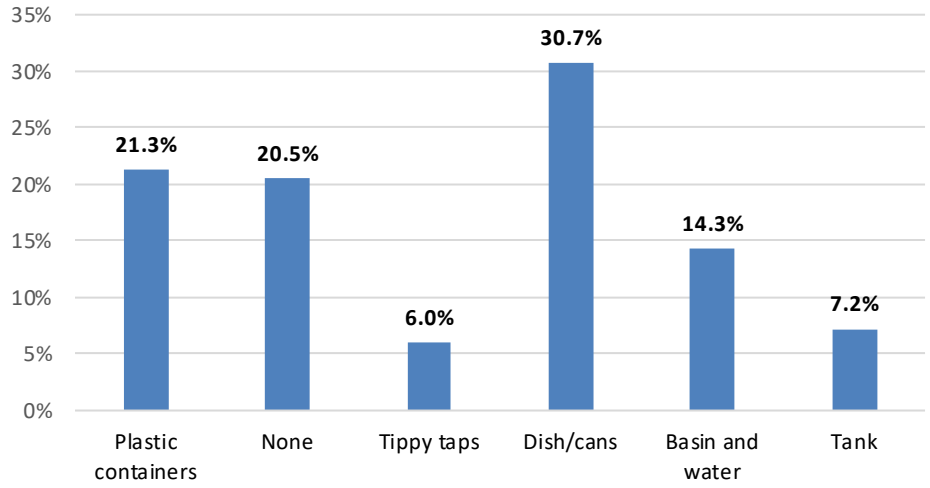


Most households had their latrines or toilets located within their own yard (60.8%, n=460), followed by outside their property (30.0%, n=227). Almost half of the toilets (46.6%) were shared toilets with others outside the assessed household and 40% of all toilets were shared with anyone (public toilets).

6.11.3 Hand washing access and practice

One in five households assessed had no hand washing facility. The most common hand washing item was a variation of dishes, cans, and buckets where water is kept and used as necessary to wash hands and clean other things in the house.

Figure 6.11.3: Hand washing access (N=757)



The assessment results show that only a little over half (55.4%, n=419) of households surveyed had a designated hand washing facility with both soap and water. Almost a quarter (23.5%, n=178) had water but no soap and the rest (20.5%, n=155) had neither water nor soap available.

Despite the large proportion of households without a designated place for hand washing or hand washing access, when respondents were asked if they had washed their hands before eating the day prior to the assessment, 89.4% (n=677) said that they had. A similar percentage (88.8%, n=672) reported washing hands before feeding their child.

7. DISCUSSION OF THE STUDY OBJECTIVES BASED ON ASSESSMENT RESULTS

This assessment aimed to gain greater insights into six main questions related to the health, nutrition, and WASH situation of the target population in Western Province. These are:

1- Determine the prevalence of infant and young child under-nutrition.
2- Evaluate infant and young child feeding (IYCF) practices. These include i) Early initiation of breastfeeding; ii) Exclusive breastfeeding to 6 months; iii) Continued breastfeeding to 1 year; iv) Introduction of complementary feeding; v) Minimum Dietary Diversity (MDD); vi) Minimum Meal Frequency (MMF); vii) Minimum Acceptable Diet (MAD) and viii) consumption of iron rich foods.
3- Assess food security of the caregivers in one season.
4- Assess the two-week period prevalence of diarrhoea among children aged 6-23 months in the surveyed communities.
5- Determine the households' access to, and use of, improved water, sanitation, and hygiene (WASH) facilities.
6- Determine the coverage of vitamin A supplementation received during the last 6 months among the infants and young children.

This discussion section aims to analyse these question and correlate interdependence among variables to find possible associations. The analysis and subsequent results will aim to identify gaps in caregivers' infant and young child feeding (IYCF) practices so that the project will be able to develop nutrition interventions to address key findings.

7.1 Prevalence of infant and young child under-nutrition

According to the 2020 Global Nutrition Report, there is limited and insufficient data on most of the nutrition indicators to evaluate PNG progress on reducing under-nutrition prevalence over the last decade. According to the mentioned report, stunting prevalence in PNG was 49.5% among children under 5 years of age. This is higher than the average for the Oceania region (38.4%). The same report indicates that the prevalence of wasting in PNG is 14.1% among children under 5 years of age (data from 2010). This is also higher than the average for the Oceania region (9.5%). The levels of both stunting and wasting in PNG are among the highest in the world[9]. However, it is important to note wide variations in the prevalence of under-nutrition among the indicators across the country. This is quite evident when reviewing different WVPNG project evaluations that have taken place in locations such as the National Capital District, Madang, the Autonomous Region of Bougainville and Morobe. All these locations present different levels of stunting, underweight and acute malnutrition (wasting) which are influenced by various factors.

The results section of this reports shows the prevalence of under-nutrition and related findings. ***Among the children aged 0-23.99 months assessed, the stunting prevalence (height-for-age ≤-2 SD of the WHO Child growth standards median) was 19.8%, underweight prevalence (weight-for-age ≤-2 standard deviations (SD) of the WHO Child growth standards median) was 25.3% and wasting prevalence (weight-for-height ≤-2 SD of the WHO Child growth standards median) was 17.9%.***

The analysis of all children surveyed show a deviation of the curve towards the negative values which essentially means that most children surveyed are, to a certain degree, more malnourished than the mean. These variations differ between the different under-nutrition indicators. For example, the stunting average among children assessed was -0.34 standard deviations from zero, while those classified as underweight, and classified as wasted, deviated further towards the negative, with an average reading of -0.80 standard deviations from zero. All children that presented Z-scores less than -2 SD were considered under-nourished, while those that presented Z-scores of -3 SD or less were classified as severely malnourished.

The prevalence of stunting found among the children assessed was surprisingly low compared to the national prevalence of 49.5%. There were slightly more girls that were stunted compared to boys, but the difference was insignificant. Additionally, the assessment found high levels of stunting in the older age groups (47.7%), decreasing in the younger age groups, with the lowest prevalence among the 0-6 months age group (12.2%). Other nutrition projects conducted by WVPNG showed a tendency towards increased stunting prevalence with age. The highest stunting prevalent reported was in North and Middle Fly districts, compared to those in South Fly.

Although the prevalence of underweight children found in this assessment was higher (25.3%) than the stunting prevalence, it is still slightly lower than the average national prevalence of 27.8%, reported by the World Bank[10] (data from 2010). As with stunting, there were more underweight girls compared

[9] Country Nutrition Profiles. Global Nutrition Report. https://globalnutritionreport.org/resources/nutrition-profiles/oceania/melanesia/papua-new-guinea/
[10] https://data.worldbank.org/indicator/SH.STA.MALN.ZS?locations=PG

to boys (not statistically significant) and as with stunting, the highest number of underweight children were found in the older age groups (12-24 months), decreasing in the younger age groups. Worryingly, the prevalence of severe underweight children assessed was higher than the moderate underweight prevalence. This could be due to data collection errors, but it is something that requires further investigation as almost 60% of the children assessed and classified as underweight were categorised as severe (under -3 SD on the Z-score).

A possible explanation could be associated to the early newborn and infant feeding practices reported and will be explored in more detail in the "IYCF practices" section of this report. Middle Fly district had the highest number of underweight children (33.5%) compared to the other districts.

Wasting prevalence found on this assessment (17.9%) was higher than the national average (14.1%). According to WHO guidelines, a wasting prevalence among children under 5 years of more than 15% means that the number of children with acute malnutrition is classified as very high and demands urgent intervention. It is also important to highlight that the highest prevalence of acute malnutrition was found in the 0–6-month age group where 1 in 5 children were classified as acutely malnourished. The average birth weight among 304 children assessed was 2,967 grams which is considered within normal parameters. Almost a quarter of the children assessed had been born with less than 2,500 grams contributing to the high prevalence of malnutrition observed. It is also possible that the under-nutrition prevalence observed in the younger age groups has to do with inadequate early feeding practices such as inadequate breastfeeding practice and frequency, and early introduction to complementary feeding among other underlying causes. As age increased, the prevalence of wasting decreased, however it is only noticeable in the 18-24 months age group. ***Middle Fly district had the highest wasting prevalence at almost 27%, double what was found in South Fly district.***

Overweight prevalence was low and not a public health concern based on assessment findings among children under two years old.

Table 7.1: Prevalence on malnutrition compared to national prevalence and WHO public health cut-off points.

Malnutrition type	Assessment findings			Public health concern[11] cut-off	PNG prevalence
	Total	Moderate	Severe		
Stunting	127 (19.8%)	49 (38.6%)	78 (61.4%)	10-20% medium	49.5%
Underweight	182 (25.3%)	76 (41.8%)	106 (58.2%)	20-30% high	27.8%
Wasting	131 (17.9%)	83 (63.4%)	48 (18.5%)	>15% very high	14.1%
Overweight	11 (1.5%)	11 (100%)	0 (0.0%)	<2.5% very low	13.7%

7.2 Infant and Young Child Feeding Practices

[11] https://apps.who.int/nutrition/landscape/help.aspx?menu=0&helpid=391&lang=EN

The assessment aimed to evaluate IYCF practices in the target areas. For this, the eight WHO core indicators were investigated.

7.2.1 Early initiation of breastfeeding: Initiation of breastfeeding within the first hour of life is important for both the mother and the child. The Infant and Young Child Feeding Policy 2014-2024 specifically mentions the need for early breastfeeding initiation (National Department of Health 2014b). The first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from diseases. Early initiation of breastfeeding also encourages bonding between the mother and her newborn, facilitating the production of regular breast milk. Under this central theme the assessment evaluated the: i) Number of children who have ever been breastfed; ii) Number of women who had started breastfeeding their new-born within one hour of birth and iii) Number of children who had received colostrum.

As shown in the results section, almost all the children surveyed in this assessment had been breastfed at least once (97.5%, n=738). Of those, mothers that had breastfed their children 66.5% (n=504) reported feeding their new-born within the first hour of birth (average of 27 minutes from birth). These assessment values are higher than the reported national average according to the DHS 2016-18 report where 91% of children had ever been breastfed and 54% had been breastfed within the first hour of life. Similarly, it is slightly higher than the Western Province average of 92% of children ever breastfed and 60.4% breastfed within the first hour. The assessment found an overall low adherence to colostrum feeding with only 36.2% (n=260) mothers saying they had given their child colostrum.

There is a statistically significant correlation between children that were breastfed within the first hour and those that were born in health facilities (p=0.000), meaning that those children born at home or elsewhere were less likely to be breastfed within one hour after birth.

The lowest compliance to early breastfeeding was found in Middle Fly district where only half (50.5%) of mothers reported breastfeeding within the hour after delivery. This contrasts significantly (p=0.000) with the high prevalence of early breastfeeding practice in North Fly and South Fly districts where 86% and 78.2% of mothers respectively practiced early breastfeeding for the child under assessment.

There were no differences in early initiation of breastfeeding practices between women who had received 6 years of education or less and those that started early breastfeeding and had more than 7 years of education. There were only 27 children who reportedly received early pre-lacteal feed. There was also no difference in the number of children who had received pre-lacteal feeds from less educated mothers (3.1%) compared to those women who had 7 or more years of formal education (3.8%); (p=0.802).

Number of children ever breastfeed: 97.5%

Children breastfeed within one hour after birth: 66.5%

Number of children that have received colostrum: 36.2%

Statistically significant correlation between children that were breastfeed within the first hour and those that were born in health facilities (p=0.000)

7.2.2. Exclusive breastfeeding to 6 months: Breast milk contains all nutrients needed by children during their first 6 months of life. It is recommended that children be exclusively breastfed in the first 6 months of their life; that is, they should be given nothing but breast milk. Exclusive breastfeeding for 6 months prevents infections such as diarrhoea and respiratory illnesses and provides all the nutrients and liquids an infant requires for optimal growth and development. Feeding complementary foods within the first 6 months will have the adverse effect of reducing breast milk output, because the production and release of breast milk are modulated by the frequency and intensity of suckling[12]. The assessment found that almost 70% of children under 6 months were reportedly being exclusively breastfeed at the time the survey took place, however it is possible that this was over-reported by the caregivers surveyed. This is a little higher than the national average of 62% according to the PNG DHS 2016-18 report. Overall, the median duration of exclusive breastfeeding across PNG is 3.9 months, while in the three districts of Western Province that were assessed, it is 4.42 (SD ± 1.88).

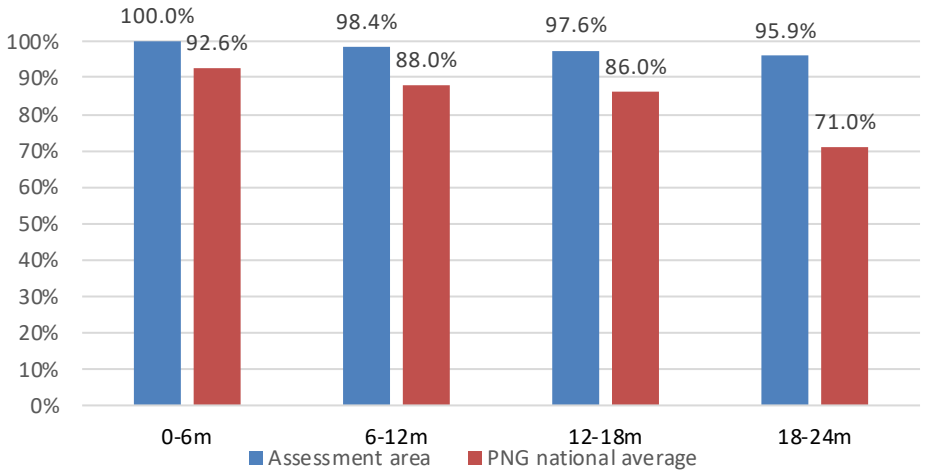
The consumption of water was the most common addition to the diet of children under 6 months that were not exclusively breastfeeding. More than a third of children consumed water daily, and more than half in Middle Fly district. Regular milk (powdered and processed milks that are not infant formula) and semi-solid foods like mashed vegetables (kaukau, banana, and pawpaw) were consumed by 20% of children as a complementary food.

Although exclusive breastfeeding practices among children under 6 months is only slightly higher than the national average, the knowledge of nutritional needs of children under 6 months among caregivers is generally higher than the national average, however the knowledge is not put into practice in many cases. Almost 92% of respondents said that the best foods for newborns are colostrum and exclusive breastfeeding. When asked what a 3-month-old should be eating, 76% of respondents said that they should be exclusively breastfed (nothing but breast milk). The rest of the respondents (24%) either did not know or said that complementary feeding should be started at 3 months.

7.2.3 Continued breastfeeding to 2 years: When the respondents were asked whether their child had been breastfed the day prior to the survey a total of 98.5% (n=692) said they had breastfed their child at least once. Continued breastfeeding is widely practiced and significantly higher than the PNG national average reported in the DHS report. ***The assessment found a higher number of children who continued to be breastfed across all age groups under 24 months compared to the national average reported in the PNG DHS report 2016-18.***

[12] Policy on Infant and Young Child Feeding Practices. PNG National Department of Health 2014b. https://www.health.gov.pg/pdf/WIYCFP_2014.pdf

Figure 7.1: Continued breastfeeding practice among children



7.2.4 Introduction of complementary feeding: After the first 6 months, breast milk alone is no longer sufficient to meet the nutritional needs of an infant. After 6 months, appropriate complementary foods should be introduced while breastfeeding is continued until age 2 or older. The transition from exclusive breastfeeding to complementing breastfeeding with family foods is when children are most vulnerable to becoming undernourished, and during this time it is important that they receive solid, semisolid, and/or soft foods. Appropriate complementary feeding should include feeding children a variety of foods to ensure that nutrient requirements are met. Fruits and vegetables rich in vitamin A should be consumed daily. Eating a range of fruits and vegetables, in addition to those rich in vitamin A, protein rich foods such as meat, poultry, fish, or eggs need to be part of the daily diet or eaten as often as possible to ensure there are sufficient sources of micronutrients to meet the child needs (WHO 2003).

Among the women assessed half (49.3%, n=373) said that complementary feeding should start at 6 months, but these answers differed significantly between districts. ***In North Fly district 71.5% (n=143) of respondents answered that children should start eating solids at 6 months, while only 40.6% (n=114) did so in Middle Fly district,*** where the perceived age for the introduction of solid foods was lower, at 3.8 month (SD ± 0.15).

The reasons identified by assessment respondent on why it is important to start the child with complementary feeding after 6 months included: i) the child needs increased caloric intake and breast milk alone cannot cope with the increased demand; ii) after 6 months the child already has enough teeth to chew, and that the infant's stomach has developed enough to digest solid foods. However, a large percentage of respondents could not give a single reason of why complementary feeding is necessary.

Assessment respondents were presented with pictures of two bowls of porridge with different consistencies. One bowl with watery porridge and the other with thick semi-dry porridge. Respondents were asked which of the two porridges they would give their child. Over half of the respondents (53.9%, n=408) said they would give the watery, thin porridge to their child, while a little over a third (36.5%, n=276) said they would give the child the thicker porridge and 9.6% (n=73) did not know. When asked what factors contributed to their choice, those that chose the watery porridge said that thin porridge is easier for the child to digest and swallow. Since younger children only have a

few teeth it is easier for them to eat soft foods and harder, these caregivers felt that more solid foods can make them choke and hurt their gums. Those that had chosen the thicker porridge said that the thicker porridge has more calories and nutrients for the child. Over 1 in 5 respondents did not know or could name provide reasons of why they chose that porridge consistency.

Sago, root crops and rice make up most of the staple diet of the assessed population. Respondents were asked what foods they could add to their staples to make them more nutritious for their families. The majority said vitamin A rich foods such as coloured vegetables and green leaves were good to increase the intake of minerals and vitamins which would help their child grow stronger. Almost a fifth of the respondents also mentioned protein rich foods (flesh meats, especially fish that is widely available in most of the communities and eggs) were an important source of nutrition that could be added to the staple foods that they consume daily. Legumes and nuts which are also a rich source of protein and fats were mentioned by less than 10% of the respondents as they are not widely consumed.

7.2.5 Minimum Dietary Diversity (MDD): Minimum dietary diversity is a proxy for adequate micronutrient density of foods. By consuming food from at least five food groups, the child has a high likelihood of consuming at least one animal source of food and at least one fruit or vegetable in addition to a staple food such as grains, roots, or tubers (WHO 2008). To align the assessment questionnaire to determine the MDD scores based on the recommended 8 food groups by WHO, the 18 food types that were part of this assessment (presented in the *Results* section of this report) were re-classified into 8 groups and children 0- 5.99 months were excluded from the analysis. The MDD therefore investigates the number of children aged 6-23.99 months who consumed five or more food groups of the eight available. These food groups are: i) Breast milk; ii) grains, roots, and tubers; iii) legumes and nuts; iv) dairy products (milk, yogurt, and cheese); v) flesh foods (meat, fish, poultry, and liver/organ meat); vi) eggs; vitamin A-rich fruits and vegetables; and vii) other fruits and vegetables. The assessment collected data on daily consumption of these food groups from those reported on the monthly food recall survey. The table below shows the consumption of each type of food groups and the percentage of children that consumed each one categorised between those that consumed 4 groups or less (not meeting MDD) and those that consumed five to eight groups.

The assessment found that ***only 7.3% (n=30) of the 410 children surveyed meet the Minimum Dietary Diversity by consuming 5-8 food groups daily.*** This is significantly lower than the 33.4% of children that meet the MDD in the Southern Region of PNG as reported in the PNG DHS 2016-18. However, it is important to note that this study collected monthly food recall by frequency (See section 6.5.1 of this report in the results section) and not the traditional 24-hour food consumption recall as suggested in the WHO MDD guidelines.

Table 7.2: Minimum Dietary Diversity (MDD) among children surveyed aged 6- 23.99 months

Age group	MDD score =5 or more	MDD score =4 or less	Total
6 to 11.99 months	10 (6.4%)	145 (93.6%)	155 (100%)
12 to 17.99 months	11 (7.5%)	136 (92.5%)	147 (100%)
18 to 23.99 months	9 (8.3%)	99 (91.7%)	108 (100%)
Total	30 (7.3%)	380 (92.7%)	410 (100%)

For those that consumed four groups or less and therefore did not meet the MDD, the core food groups were grain, roots, and tubers (a large part made up of sago which has very poor vitamin and micro-nutrient value) and to a much lesser degree (only a little over half of respondents not meeting the MDD) vitamin A rich vegetables and fruits. Continued breastfeeding (94.1%) was the most reported food group consumed among those that did not meet the MDD, which in part makes up for the lack of nutrients received, given the limited diversity in their standard diet. However, these children are older than 6 months, therefore breast milk is only a supplement to the diet they should be consuming.

For the 7.3% of children that consumed 5 food groups or more, and therefore meet the MDD, almost all of them (96.7%) had breast milk as one of the core food groups that was providing supplementary nutrients, additional to those obtained from other food groups. ***Grains, tubers, and roots were consumed by most of the children surveyed, but the group that met the MDD had a much higher consumption of Vitamin A rich vegetables and fruits and protein rich flesh food compared to those consuming 4 food groups or less.*** The combination of these food groups gives them rich sources of carbohydrates, proteins, fats, and micronutrients that are needed for optimal growth. As shown in the results section the consumption of dairy and legumes is low for all children and adults, but these were all much higher among children that met the MDD compared to those that did not.

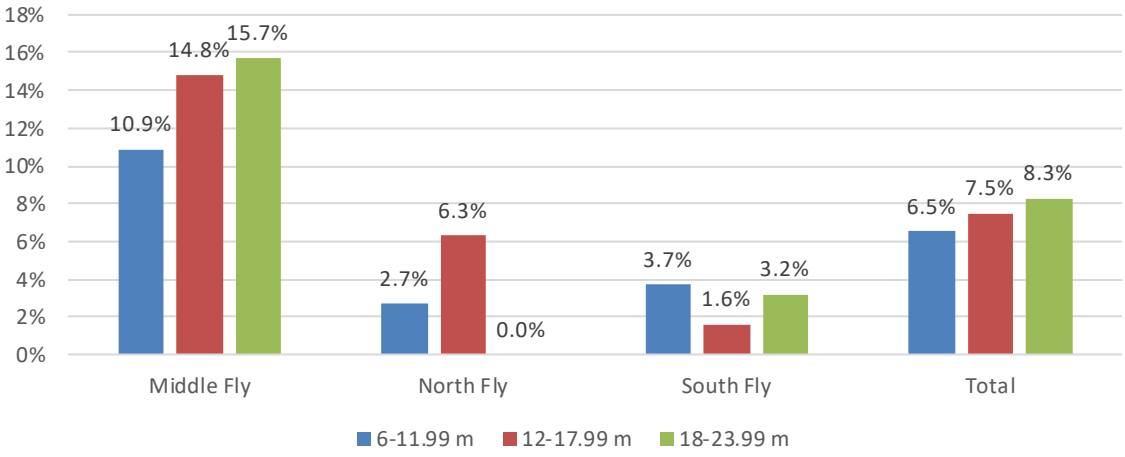
When looking at age groups, among children aged 6 to 11.99 months, 6.4% (n=10) meet the MDD. As the child grew older the percentage of those consuming 5 or more food groups increased slightly by around 2% and breastfeeding remained quite constant, an important addition to the standard food groups that meet the MDD score.

The assessment results found no correlation between children that were stunted (p=0.091), wasted (p=0.749) or underweight (p=0.178) and children that did not meet the MDD (consumed 4 or less of the food groups) compared to those that did.

When looking at MDD by districts, the assessment found that among the 410 children, the majority of the **30 children (7.3%) that *met the daily MDD (consumption of more than 5 food groups across all age groups, 6 to 23.99 months) were from Middle Fly district (13.6%, n=23), followed by North Fly with 3.2% (=3) and the lowest was in South Fly district (2.7%, n=4).***

The percentage of MDD varied significantly among the age groups even within the same districts. For example, in North Fly, only one child aged 6 to 11.99 months reached the MDD, increasing to 2 children in the older age groups (18-24 months). In general terms, with the evident exception of North Fly, Minimum Dietary Diversity (MDD) seemed to increase with age, however the number of children that met with the minimum requirements to be classified as meeting MDD is very small.

Figure 7.2: Percentage of children by age group meeting MDD



Additional to the MDD scores the assessment investigated the knowledge of caregivers on food diversification and feeding frequency.

Most of the assessment respondents (79.7%, n=603) think it is good to provide the child with a diversification of food types during the day. The reasons why food diversification is not good according to the other respondents was the belief that mixing different food types can give the child diarrhoea, stomach aches and cramps and induce vomiting. This could be possible if foods are introduced all at once in the early stages of complementary feeding (6-8 months), but most respondents knew that different food types need to be introduced progressively and in small amounts, and that they should be in liquid and semi-solid states at the beginning to ensure the child is able to swallow, digest and get used to the taste and textures of the different foods.

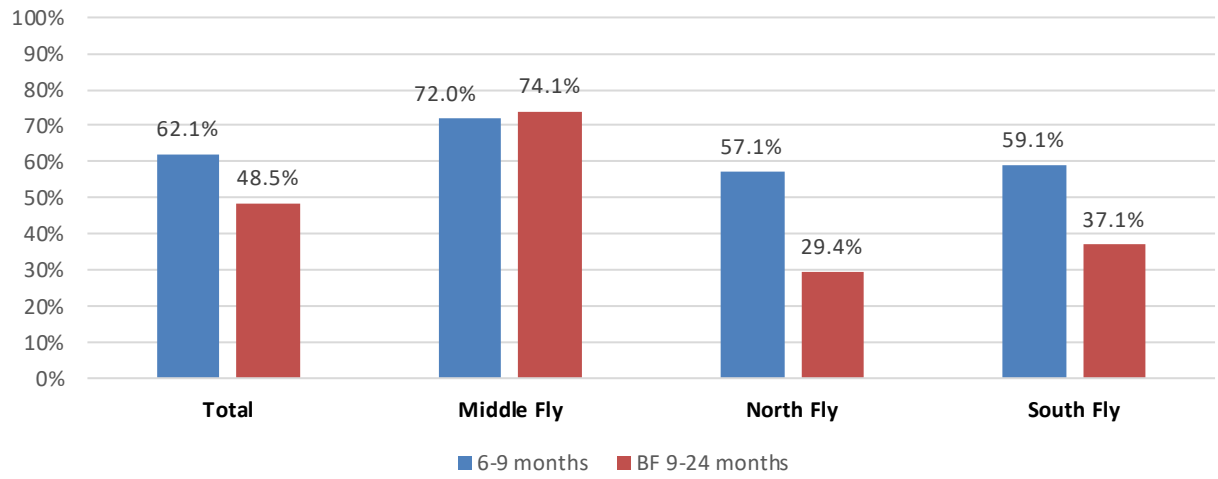
7.2.6 Minimum Meal Frequency (MMF):

Minimum meal frequency is a proxy for meeting energy requirements. Breastfed children age 6-8 months are considered to be fed with a minimum meal frequency if they receive solid, semisolid, or soft foods at least twice a day. Breastfed children age 9-23 months are considered to be fed with a minimum meal frequency if they receive solid, semisolid, or soft foods at least three times a day. Non-breastfed children age 6-23 months are considered to be fed with a minimum meal frequency if they receive solid, semisolid, or soft foods or milk feeds at least four times a day and if at least one of the feeds is a solid, semisolid, or soft food.

A total of 357 caregivers answered the questions regarding the number of meals consumed by the surveyed children the day prior to the assessment. Of these, 66 were children 6 to 8.99 months and 291 were children 9 to 23.99 months. Only 3 children in the 6- 8.99 month and 18 children aged 9-23.99 months age groups were reported as no longer breastfeed.

The assessment found that ***43 children (63.2%) aged 6 to 8.99 months meet the minimum meal frequency. Among the children 9 to 23.99 months, 149 (49.7%) meet the minimum meal frequency.*** The MMF of 63%, found in this study is higher among the 6 to 8.99 months age group compared to the national average of 51.3% reported by the PNG DHS 2016-18 for the same age group. ***The overall MMF for all age groups (6-23.99 months) was 52.2% (n=192), similar to the 47.9% reported across all age groups in the Southern Region of PNG.***

Figure 7.3: Minimum meal frequency by age group consumed by children



When comparing MMF by district, in Middle Fly district, the largest number of children aged 6 to 8.99 months and the older age group (9-24 months) achieved MMF. In both North and South Fly, over half of the children in the 6-9 months group achieved the MMF classification, but this dropped significantly to around a third of children in the older age groups. As children got older the number of meals received decreased, making them unable to reach the MMFs established.

When doing cross tabulation analysis between MMF and malnutrition prevalence, the assessment found no significant differences in the number of wasted or underweight children (-2 SD from Z-score or less) and those that did not meet the MMF. However, there is a statistically significant difference among children aged 6-9 months who received less than 2 meals and those that received 2 or more meals within the stunting prevalence ($p=0.011$). Similarly, statistically significant differences in stunting prevalence ($p=0.016$) were found among children aged 9-24 months who had received 3 meals or more a day and those that received 2 meals or less a day. There are no statistically significant differences between gender and MMF consumption by age groups. Likewise, there is no statistically significant difference in the MMF among children aged 6-24 months when comparing children living in households with TB patients and those children in households with no reported TB cases.

Information gathered on caregiver knowledge found that almost 20% of respondents said it was not good to give the child several meals a day. One of the main reasons provided by the caregivers that limited food frequency for their children included the belief that feeding the child too often will give them stomach cramps and induce vomiting. Others said that when food is limited, they feel it is a "waste to feed the child often." Additionally, others said that given that the child has small stomachs there is no need for them to eat often. The main reasons as to why children that did not meet the MFF were due to lack of food or food shortages at the time of the survey and not because parents intentionally restricted food intake to less than 2 or 3 times a day.

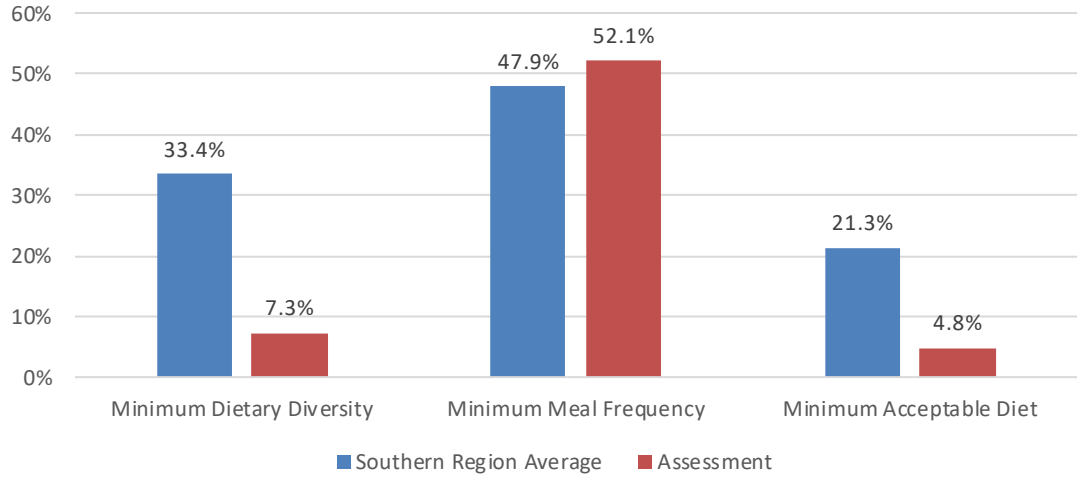
There seems to be a clear misconception between food quantity and food frequency that needs to be addressed. Feeding the child too much could potentially cause stomach upsets as those mentioned by caregivers but feeding the child small amounts of food regularly is necessary to ensure energy levels are maintained through the day and the child is satisfied. This is not known by the parents and caregivers, resulting in not meeting the MMFs required.

7.2.7 Minimum Acceptable Diet (MAD):

The Minimum Acceptable Diet (MAD) is a composite indicator made up of the indicators "Proportion of children age 6-23 months who receive a minimum acceptable diet (Minimum Dietary Diversity) and the "Proportion of children 6 to 23.99 months that met the Minimum Meal Frequency (MMF)."

Overall, only 18 of the 368 children (4.9%) aged 6-23.99 months meet with the Minimum Acceptable Diet (MAD) definition. This small number of children meeting the MAD is largely due to the low MDD scores reported, as Minimum Dietary Diversity (MDD) and Minimum Meal Frequency (MMF) are both required to calculate Minimum Acceptable Diet (MAD). Additionally, the collection of food frequency based on a monthly recall instead of the traditional 24-hour food recall recommended by reputable international organisations has made the analysis of the Infant and Young Child Feeding (IYCF) indicators intricate.

Figure 7.4: IYCF indicators on minimum acceptable diet



The IYCF indicators found in the assessment were lower than those reported for the Southern Region of PNG and the average IYCF minimum acceptable diet indicators for the PNG average, based on the PNG DHS 2016-18 report. As stated, before these are related to the way data on food consumption and recall was collected. Additionally, MMF, the only indicator similar which reflected similar values to those reported in the DHS 2016-18 under the Southern region, does not mean that the children receiving an adequate number of meals are eating sufficient food quality and quantity in each of the reported meals. It is clearly demonstrated when looking at Minimum Dietary Diversity that the recommend 5+ food groups is only consumed by a very small number of children. This in turn affected the results of the Minimum Acceptable Diet values.

7.2.8 Consumption of iron rich foods:

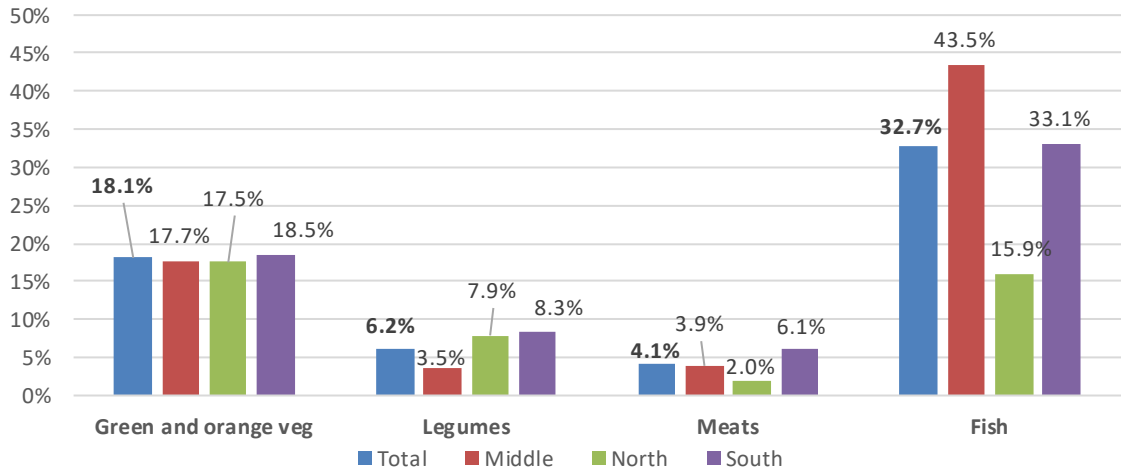
Iron helps to preserve many vital functions in the body, including general energy and focus, gastrointestinal processes, the immune system, and the regulation of body temperature. Iron deficiency impairs children's physical and cognitive development and increases the risk of morbidity[13]. One in two under-five children suffer from hidden hunger (micronutrient deficiency), and iron deficiency is the world's most common micronutrient deficiency affecting more than 2 billion people in the world. This

[13] Kassebaum NJ, Jasrasaria R, Naghavi M, Wulf SK, Johns N, Lozano R, et al. A systematic analysis of global anaemia burden from 1990 to 2010. Blood. 2014;123(5):615–24. mid:24297872
https://ashpublications.org/blood/article/123/5/615/32839/A-systematic-analysis-of-global-anemia-burden-from

is the most widespread nutritional deficiency. Iron deficiency is the primary cause of iron deficiency anaemia (haemoglobin levels of < 11g/dl). In the world, 47% of under-five children are anaemic, which is mainly attributed to iron deficiency[14]. The low oxygen-carrying capacity of blood in anaemia leads to lack of oxygen supply to the fast-growing child's brain and negatively affects mental, motor, and cognitive development, which in turn lead to social withdrawal, attention deficit, and impaired school performance of children. Iron deficiency in the absence of anaemia is even more frequent and has a similar negative impact on mental development which may be irreversible, especially in children less than 2 years, despite adequate therapy. In severe cases, iron deficiency anaemia in children is associated with increased mortality and heart failure[15].

This assessment investigated the consumption of iron rich foods based on the reported monthly recall. Iron rich foods in the food groups assessed include dark leafy vegetables, meats (including organ meats), fish, legumes, and nuts. Reported daily consumption of iron rich foods, within the monthly food recall survey, were considered to determine the frequency of consumption.

Figure 7.5: Daily iron rich food consumption among children 6- 24 months by districts



The most iron rich food consumed by children aged 6-23.99 months surveyed was fish (both fresh and salt water). However, the consumption of fish varied significantly between the districts. While Middle and South Fly had a constant fish consumption (over a third of children consumed this daily), fish consumption in North Fly district was significantly lower. Another source of food rich in iron was coloured and leafy green vegetables, which were consumed daily by a little less than a fifth of the children assessed. Consumption of coloured and green vegetables was consistent among the three districts under study. Once again, the variation of consumption between districts was significantly different.

Legumes and meats (red and poultry) were consumed by very few respondents. Both were more frequently consumed in South Fly district however consumption is low across all districts.

[14] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0253221
[15] Beard JL, Connor JR. Iron status and neural functioning. Annual review of nutrition. 2003;23:41–58. pmid:12704220. https://doi.org/10.1146/annurev.nutr.23.020102.075739

North Fly district has the lowest consumption of iron rich foods as reported in the daily intake within the monthly food recall survey. This is particularly significant when looking at iron rich food from high protein sources like fish and meats.

Overall, 34.2% (n=192) of the children aged 6- 23.99 months had consumed at least one iron rich food source daily. This percentage is lower than the 50.1% reported for Western Province in the PNG DHS 2016-18.

There are no statistically significant differences between iron-rich food consumption among children living in households with TB patients compared to households that have no TB positive household members. Overall, 36.8% (n=25) of children aged 6- 23.99 months living in households with TB patients had consumed at least one iron rich food source, this is a similar percentage to that reported among all children aged 6- 23.99 months old.

7.3 Food security of households assessed based on caregivers' perceptions

Respondents were asked to report on the household food security situation over the past 12 months. More than two thirds (65.8%, n=498) of caregivers reported that at some point over the last 12 month they worried they would run out of food and would have no source of nutrition for themselves and their children. Respondents most worried about running out of food were caregiver respondents from Middle Fly district (77.2%, n=217). This is statistically higher than the compared to the other two districts (p=0.000), however in all districts more than half of households reported being worried about being food insecure.

Almost a third (31.7%, n=240) of households surveyed reported going hungry for at least a day during the last year. There were no significant differences in the number of households going hungry for a day or more between the surveyed districts.

Over two thirds of households (67%, n=507) reported running out of food over the last 12 months. The highest percentage was in Middle Fly, with 75% of caregivers affirming this was the case (p=0.000).

Caregivers who ***worried about running out of food*** during the last 12 months: **66%**

75% of Households in Middle Fly reported ***going hungry*** for a day or more

67% of households reported ***running out of food*** in the last 12 months

32% of households surveyed ***went without eating*** for a day or more.

Cross tabulation between food security and variables such as i) educational status of the respondent, ii) number of people living in the household and occupation of the responded and respondent spouse as well as iv) There was a statistically significant difference (p=0.007) between households that had TB patients and those that did not. Households with TB patients more frequently reported running out of food during the last 12 months compared to households with no TB patients. Similarly, households with TB patients reported going without food for a day or more over the last year (p=0.020) compared to those without TB patients.

Although there is a lower number of respondents that have attended school in Middle Fly district, and this district is also the most food insecure, analysis found no statistically correlation between the two

variables. Similarly, there was no statistically significant differences in the number of children reported as stunted, underweight, or wasted against the food security variables investigated in this assessment.

7.4 Prevalence of diarrhoea among children aged 0-24 months

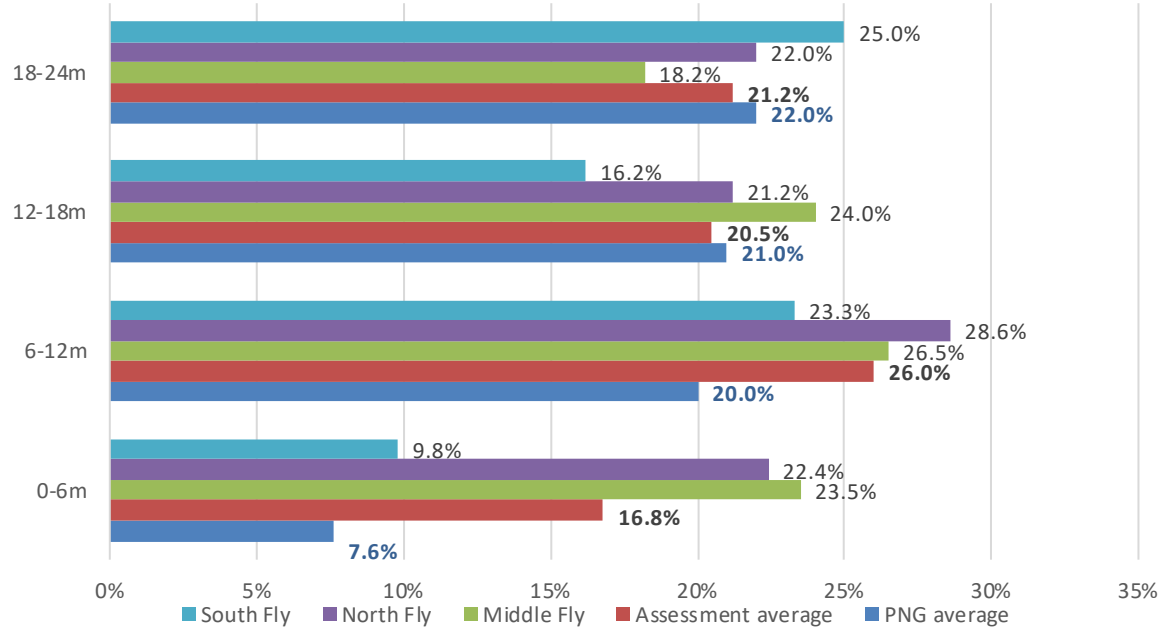
Diarrhoea is one of the major contributors to deaths among children under age 5 in Papua New Guinea. In the 2016-18 PNG DHS, mothers reported that 14% of children under age 5 had a diarrhoeal episode in the 2 weeks before the survey. Treatment was sought from a health facility or health provider for 38% of children with diarrhoea.

In this assessment, mothers were asked if their child had symptoms of diarrhoea over the last two weeks prior to the assessment. These include frequent (more than three loose watery stools per day) and abdominal pain and cramps. ***Overall, 158 (20.9%) children were reported to have presented these symptoms. The number of children that presented diarrhoea peaked to 26.0% (n=50) among the 6-12 months age group, being lowest (16.8%) among the 0-6 months age group.*** This coincides with finding in the PNG DHS 2016- 2018 which also showed an increase in reported cases of diarrhoea by age group. It is possible that practices such as exclusive breastfeeding and introduction of complementary feeding at around 5 months of age, for the average children assessed, contributed to the increase in diarrhoea prevalence alongside higher exposure to pathogens (water and food borne) as well as the poorer hygiene practices that the older children are exposed to.

However, the prevalence of diarrhoea among 0-23.99 months age group in this assessment is significantly higher compared to the prevalence of 8.9% among children under 5 reported for Western Province in the PNG DHS report 2016-18.

The highest prevalence of diarrhoea was found in Middle Fly and North Fly districts where 23.5% (n=66 and n=47) children presented symptoms, while South Fly district had the lowest average prevalence at 16.3% (n=36). Despite this, the lowest prevalence in South Fly district is still significantly higher than the reported at provincial level (8.9% across all age groups) and even at national level (14%) through all age groups except in the 0-6 months old children in South Fly district.

Figure 7.6: Diarrhoea prevalence by age group, distrrict and PNG average



There were no statistically significant differences when comparing under-nutrition prevalence with the children that had diarrhoea over the two-week period prior to the assessment. Out of the 198 children who were underweight, only 22 (11.1%) reported having diarrhoea compared to 93 who were underweight but had presented no symptoms over the 2 weeks prior to the assessment. For those children that were stunted (n=176) only 19 (10.8%) reported diarrhoea over the last 2 weeks and among acutely malnourished children (n=148), 26 children (17.6%) had diarrhoea.

There were no statistical correlations between households that had children with diarrhoea and the type of toilet facility that they used or hand washing practice when comparing use of soap vs. use of only water with o soap. Households with TB positive cases had a higher number of children reporting diarrhoea over the last 2 weeks compared to households with no TB positive cases (p=0.047).

There was no data collected during this assessment on the type of foods or liquids provided to the child with diarrhoea or information on care seeking behaviour by the caregivers (health facility or home remedies and use of oral rehydration salts).

7.5 Household access and use of improved water, sanitation, and hygiene (WASH) facilities.

7.5.1 Water access: The assessment found that overall, the main source of water was tank water (40.0%, n=351), however water sources varied significantly from one district to the next. For example, in ***South Fly, besides tank water, another important source of drinking water was piped water which was only accessible to 8% of the surveyed households in North Fly and only 1% of households in Middle Fly.*** For North and Middle Fly districts, the other important sources of water besides tank water were reported to be dug holes (approximately a quarter of households surveyed). It is also important to note that in North Fly, 1 in 5 households reported using surface water (from ponds, streams, rivers) as their main source of drinking water. Furthermore, many of the households reported getting their water from one main source but often complementing the water they get with other alternative sources which are used when the main source dries up or is contaminated.

As dug holes are located close to households, but not always clean, the water from these sources is used for cooking and washing while the tank water is usually reserved for drinking. In South Fly, more residents have accessible piped water, so a third of all households assessed were using this water source for cooking and washing, additionally to drinking.

Almost half of the households assessed reported shortages of water in their main drinking water sources in the last month. The district most affected by water shortages was South Fly (54.1%) and the least affected was North Fly (35.3% of households reported water shortages). Water shortages are associated with dry seasons and land disputes that lead to closure or inaccessibility of the main water source and damaged pipes and tanks for water storage. The way water shortages are mitigated are through digging new water sources (holes, wells), using surface water that is available and alternating different water sources to cover the shortages.

Although almost half of the households (48.2%, n=365) report treating their drinking water, water treatment does not seem to be constant and storing treated water and keeping it clean is still a challenge for many households. The main way to treat water is boiling it, straining water through a cloth or letting it stand for the sediments to settle.

7.5.2 Sanitation: As with water sources, sanitation access, in terms of toilet facilities available, vary greatly from one community to the next. ***The main type of toilet across the three districts was pit latrines. Almost a quarter of respondents have no toilet and practice open defecation.*** In South Fly district, open defecation is practiced by almost half of all households. From the few (n=51) flush and pour flush toilets that were found, almost half of these were in North Fly and the other half in South Fly. As described in the diarrhoea prevalence section above, the type of toilet that assessment respondents owned had no correlation with the number of diarrhoeal cases reported among children. Similarly, toilet type was not statistically associated to stunting, underweight or acute malnutrition prevalence.

7.5.3 Hand washing practice: Although reported hand washing practice was high (88% when asked if the caregiver had washed their hands before eating and 87% of caregivers reported washing hands before feeding their child), in practice, hand washing is probably significantly lower than reported. ***Only a little over half of households had a hand washing facility with water and soap and one in five households assessed had no hand washing facility or soap at all.*** The low access to soap and hand washing facilities reported make the 88% hand washing practice stated highly unlikely.

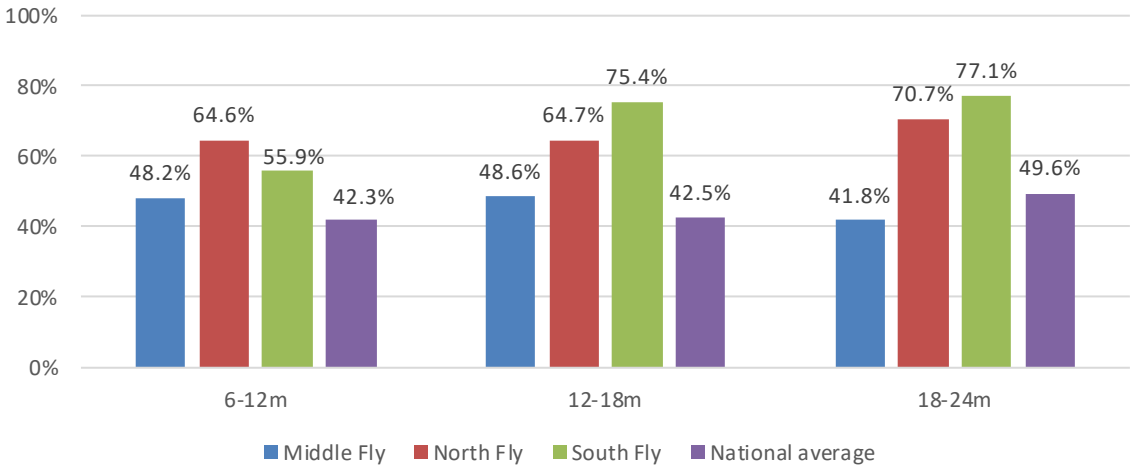
7.6 Coverage of vitamin A supplementation received during the last 6 months among the infants and young children.

Micronutrient deficiency is a major contributor to childhood morbidity and mortality. Micronutrients are available in foods and can also be provided through direct supplementation. The information collected on food consumption among children age 6-23 months is useful in assessing the extent to which children are consuming food groups rich in two key micronutrients in their daily diet: iron and vitamin A. Iron consumption has been discussed in this section under IYCF practice. In the same section, Vitamin A consumption through different food groups (orange and yellow vegetables and fruits, green leaves, and some flesh foods) has been discussed. Vitamin A supports 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. VAD also increases the severity of infections such as measles and diarrhoeal disease and slows recovery from illness.[16]

A total of 49.5% of children 6 to 23.99 months had received at least a dose of Vitamin A. In all cases, except for children 18-24 months in Middle Fly district, Vitamin A supplementation was higher compared to the national average of children who had received at least one dose of Vitamin A as reported by the DHS 2016-18. Vitamin A consumption increases with age, reaching approximately ¾ of all children surveyed in the 18–24-month age group in South and North Fly districts.

Figure 7.7: Vitamin A supplementation by age group, district and comparison to national average



When investigating Vitamin A supplementation by gender, among the older age group (12- 24 months) girls had received slightly more Vitamin A supplementation (62%, n=98) compared to boys (59%, n=99), but not statistically significant. On the other hand, more boys than girls had received Vitamin A supplementation in the younger age groups (47% vs. 35.5%), this difference was statistically significant (p=0.005). It is important to note that up to a third of children in the age group 0-6 months reported receiving Vitamin A supplementation despite protocols indicating this supplement should be provided to children 6 month and older.

8. Conclusion and Recommendations

The aim of this study is to provide WVPNG and WVA with a set of findings and results which will provide an evidence and technical knowledge base to develop and adapt programmatic interventions that focus on better nutritional care to improve infant and young children's overall nutritional health.

Longer term and alongside other WVPNG supported investments being implemented in Western Province, there is also significant potential and impetus to design nutritious interventions that will improve caregiver and household nutritional health, first for the youngest family members, while at the same time improving household food availability and consumption (through nutrition education and home food production) across Western Province. This new activity surrounding nutrition improvement will aim to spawn initiatives that can improve some health service delivery issues, thereby

[16] Papua New Guinea Demographic Health Survey 2016-18

improving nutritional health and strengthening the health care systems in these ways, and perhaps ultimately lead to interventions to improve the nutritional care for Western Province TB cases and their families.

8.1 Conclusion

This assessment has provided considerable insights into the nutritional and health status of the target population. Some of the highlights revealed in this study include finding a surprisingly high number of wasted children among the target population, many of which require immediate attention. Unexpectedly, stunting prevalence was significantly lower compared to the national average. It is unclear as to why this is the case, and more investigation is required to clarify these findings.

Although exclusive breastfeeding prevalence is slightly higher than the national average, colostrum feeding is only practiced by a third of caregivers. Children miss out on essential and optimal nutrition when not given colostrum. This is a practice that needs to be promoted as it requires no cost and has been shown, together with exclusive breastfeeding, to contribute to the reducing child mortality up to 19%[17]. Although caregiver knowledge on appropriate feeding practices is acceptable (higher in North and South Fly districts), there is a clear lack of practice, with solid foods being introduced on average at 4 months. Additionally, there are several cultural beliefs on which foods should be consumed by children and pregnant women that limit accessibility to essential nutrient intake, particularly protein and iron rich foods. Increased access to nutrition information and awareness is required to encourage behaviour change.

The coverage of Vitamin A supplementation among children was, in general, higher than the national average among all age groups. Unfortunately, de-worming and vaccination coverage were not assessed, but the adequate Vitamin A coverage among children under 5 years could be a reflection of accessibility to health care despite not being clear if this access is through caregivers and children accessing fixed health facilities or health care provision through intermittent mobile clinics. The children that had received Vitamin A supplementation from their local health facilities were found to be less wasted and underweight, possibly due to having more access to health facilities (care seeking behaviour), taking this opportunity to also follow up with growth monitoring.

Health facility delivery was high (72%) and more than half of those assessed had gone to 4 or more antenatal care visits during their last pregnancy. Access to health facilities is the main barrier to institutional delivery. Health facility delivery reduces the risk of complications and mortality for pregnant women and their newborns, additionally it also promotes good newborn feeding behaviours as new mothers and their newborns are under the care and advice of the health staff in the centre.

Minimum Dietary Diversity (MDD), defined by a child that consumed five or more of the 8 WHO core food groups the day prior to the survey, was very low, more than three times lower than the 33% reported in the DHS for the Southern Region of PNG. However, as stated in the limitations section and through the results section, the food recalls to build this indicator were based on monthly recalls of daily consumption, and not 24-hour food recalls as per the WHO guidelines, allowing for possible bias. Nevertheless, food diversity is scarce, and variance between districts and food diversity and quantity is highly dependent on access at the time of the assessment. It is known that seasonal availability of some food influences quality and quantity of food groups consumed. Sago is by far the food most consumed, while fish is an important source of protein in South and Middle Fly districts.

[17] G. L. Darmstadt, Z. A. Bhutta, S. Cousens et al., "Evidence-based, cost-effective interventions: how many newborn babies can we save?" *The Lancet*, vol. 365, no. 9463, pp. 977–988, 2005. https://www.sciencedirect.com/science/article/abs/pii/S0140673605710886

Among those children not meeting MDD, a large group was not consuming widely available foods such as Vitamin A rich fruits and vegetables. Among caregivers, the general belief is that food diversification is good for infants if done progressively, however food types seem to be somewhat limited to what is traditionally grown in the area, with no knowledge on how to produce other types of vegetables and fruit to contribute to increased diversification, and through this, access other essential micro-nutrients that many of the staple root crops and sago do not have. Similarly, there is access to poultry in most communities, but consumption of eggs is very low among children and caregivers reflecting the need to increase awareness on food nutritional value and organised farming techniques which can also double up as income generating activities.

The number of children that met Minimum Meal Frequency (MMF) consumption (defined as the consumption of two or more meals in children 6- 8.99 months old, 3 or more meals in breastfed children aged 9-23.99 months old, or four meals in non-breastfeed children of the same age) was similar to the Southern Regional of PNG average reported in the DHS. It is unclear as to why the meal frequency decreased with age, possibly as children grow older, they eat with the family during mealtimes and most of the households surveyed eat only 2 main meals a day. Despite this, there was no statistical correlation between the MMF, and under-nutrition prevalence found. A current belief among respondents was that the child's stomach is small so they do not need to eat often during the day, or they will get sick.

Another indicator this study measured was the Minimum Acceptable Diet (MAD) prevalence. This is a composite indicator made up of those children meeting the "Minimum Dietary Diversity" and those also meeting Minimum Meal Frequency. The small number of children meeting Minimum Dietary Diversity (MDD) was reflected in the low percentage (<5%) of children meeting the MAD parameters. These results reinforce the need to focus on promoting food diversification to ensure children are receiving all the nutrients for optimal growth.

Although generally food security is considered high in PNG[18], given most people in the country who live in rural areas have access to land and can grow their own food, this does not seem to be the case in many of the communities assessed in Western Province. On the 12 months food security recall, 32% of households reported not eating for a day or more over the last 12 months, this is a serious cause of concern, particularly the detrimental impact this can have in the development of infant and young children. Although no statistically significant relation was found between food security and under-nutrition prevalence, food security is one of the primary concerns that community members mentioned during the assessment, as most are subsistence farmers and have no or very limited savings. The impact that climate change has on agriculture (drought, flooding) results in food security uncertainty, this is the case for some of the communities living alongside the Fly River with limited access to arable land. Additionally, the lack, or very limited cash income that most of the households' face would not allow the large majority of those assessed to access sufficient food provision for an extended amount of time (more than 3 months at most) if crops were to fail.

Although disease prevention practices (hand washing, sanitation use and waste disposal) were reported and known by many community members, the lack of practice of these was evident and reflected in the health status of children. The prevalence of diarrhoea (24%) was higher in the assessed area compared to the national average of 14%. The assessment did not collect information on the care

[18] An overview of food security in Papua New Guinea. Available at : https://www.researchgate.net/publication/323004673_An_overview_of_food_security_in_Papua_New_Guinea

seeking and treatment practices of children presenting symptoms of diarrhoea. Diarrhoea prevalence increased with age, possibly due to the introduction of foods and the poor hygiene practice in both food preparation and hand washing.

Water access and sources varied between the districts. A large proportion of households in South Fly had access to piped water while the other districts depended on rainwater tanks and boreholes or wells as their main water sources. Difficulty accessing potable water sources and water shortages promote the spread of disease, increasing under-nutrition prevalence due to infection and delays in normal child development. Similarly, the high rates of open defecation found, particularly in South Fly district, where almost half of the population assessed practiced open defecation, can lead to increased infection rates. Hand washing practice was found to be very poor, and although most caregivers said they washed their hands with soap and water before eating, after defecating and before feeding their children, the assessment found that only half of the households surveyed had a designated place for hand washing where soap was available.

Based on these assessment findings, several recommendations are presented in section 8.2 of this report.

8.2 Recommendations

8.2.1 Nutrition

Finding: *Inadequate or insufficient Infant and young child feeding practices*
Recommendations:

- ✓ Promotion at community and health centre level of colostrum feeding for newborns.
- ✓ Promotion through increased awareness among community members to increase and consolidate adequate nutritional behaviour and enhance positive nutritional practices, particularly for infant and young child feeding, pregnant and lactating women, and adolescents.
- ✓ Education and involvement of influential community leaders is essential in long term sustainability to support changes in nutritional behaviours. These include necessary changes to traditional and cultural beliefs limiting access to essential foods, many considered as "taboo foods", such as those foods rich in proteins (meats and eggs) which are not given to pregnant and young children. This includes the empowerment of women's groups to support each other in the practice of healthy nutritional behaviours and participation in cooking groups.

Finding: *Imperative need to address the high prevalence of wasting (Weight for Height Z-score <2 SD) among the children assessed.*
Recommendations:

- ✓ Short term: Advocate to establish a process of community level/aid post under-nutrition identification using simple Middle Upper Arm Circumference (MUAC) strips.
- ✓ Long term: Establish alongside provincial government, a referral system to access treatment for severely wasted children in equipped centres with trained personnel to treat severe acute malnutrition (SAM).

Finding: *Minimum Dietary Diversity based on daily food intake was only met by a small percentage of children assessed.*
Recommendations:

- ✓ Alternative sources of proteins to meats such as legumes and eggs could supply and complement essential micro-nutrients in the diet of children and caregivers. These could be achieved through the establishment of i) Home or backyard gardens and training on agriculture techniques for project participants that have access to arable land in order to increase food diversification particularly legumes; ii) Chicken farming where possible, as sources of protein (eggs and meat); iii) Discussions should be held with UNICEF to explore the possibility of providing children who are moderately malnourished with micronutrient powders supervised by VHVs and TB DOTS treatment persons.

Findings: *Acceptable Minimum Meal Frequency (MMF) among children assessed, however the Minimum Acceptable Diet (MAD) is very low, influenced and reflecting the low Minimum Dietary Diversity found.*

Recommendations:

- ✓ Community awareness on the difference between meal frequency, quantity and quality is necessary for caregivers. Adequate portion sizes for age and meal consistency (particularly for the 6-9 months age group who are starting complementary feeding) are an important contributor to adequate child development.
- ✓ Engagement of community members on participatory cooking classes to understand the value of the different food groups, ways to prepare locally available foods and enrich staples by adding Vitamin A, iron rich and protein rich foods to make meals more nutritious.

Findings: *Household food security is of concern for most of the households surveyed given the high dependence on subsistence agriculture, limited arable land and the impact of climate change on food sources.*

Recommendations:

- ✓ Invest in exploring diversification of crops, particularly those that can be easily grown in the land available (generally wetlands) alongside promotion, cooking demonstrations and tasting of the new foods to evaluate community acceptance (for example addition of legumes to staples).
- ✓ Promote adequate food storage techniques so food sources are available for longer periods of time. This includes storage of grains in dry containers with tight lids to keep them dry and protect them fungi and rodents.
- ✓ Investigate the possibility of incorporating income generating activities which contribute towards cash income and savings to mitigate shocks in time of food insecurity.

8.2.2 Health and WASH

Finding: *High prevalence of diarrhoea among children compared to the national average, possibly associated to poor hygiene and sanitation practices observed.*

Recommendations:

- ✓ Increased support to practice hygiene and sanitation actions to reduce the transmission of water borne diseases. The assessment found that disease prevention knowledge was acceptable, however practice was poor (over-reported as observations showed poor practice).
- ✓ Engage the *Stop TB in Western Province* project with the current WASH programs (Water for Women and South Fly Resilience Programs) in Western Province to integrate actions towards improved hygiene and sanitation, including access to latrines and hand washing facilities.
- ✓ Diarrhoea treatment behaviour needs to be studied further (as specific data was not collected in this assessment) and treatment options such as oral rehydration salts (ORS) promoted and made available.

Findings: *Poor access and use of improved water, sanitation, and hygiene (WASH) facilities.*

Recommendations:

- ✓ Actions towards improved hygiene and sanitation should include increased support and actions on hand washing practice with soap, especially during key times such as after defecation, before eating, before feeding a child and after cleaning a child that has defecated.
- ✓ Efforts should be focused on discouraging the practice of open defecation by promoting improved sanitation access in conjunction with WASH projects.

Finding: *The high coverage of vitamin A supplementation to children found in this assessment means that there is a system in place (through health facilities and mobile clinics) to provide wide coverage of supplements and prevention methods.*

Recommendations:

- ✓ Vitamin A distribution through health facilities, mobile clinics and campaigns can be used as a platform to provide additional treatment such as de-worming and vaccination at the time the Vitamin A supplementation is provided.
- ✓ The supplementation of Vitamin A and de-worming treatments could be given to TB DOTS treatment supporters to provide in households that have children under 5 years and utilise Village Health Volunteers (if any) or TB treatment supporters in the community to provide these semi-annual and annual services to households that do not have TB patients.

9. Annexes

A. Survey forms

WV_FINAL Questionnaire_15.03.2

B. Study plan

WV IYCF Survey Proposal 09232019.d

C. Terms of reference for the study

Contract Agreement-STOP TB Nutrition As:

D. Data sets

Copy of Nutrition Survey responses-FUI

MDD- V2.xlsx

V02- Western NUtrition assessment

MDD V2.sav