



Papua New Guinea Institute of Medical Research

Partnership in Health Project  
Progress Report: Child Health  
(Reporting period: January – June 2016)

Goroka, September 2016

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## Authors

|                      |                        |  |
|----------------------|------------------------|--|
| Dr. Bang Nguyen Pham | Scientific Coordinator | <a href="mailto:bang.pham@pngimr.org.pg">bang.pham@pngimr.org.pg</a>         |
| Seri Maraga          | Scientific Officer     | <a href="mailto:serimaraga@gmail.com">serimaraga@gmail.com</a>               |
| Jacob Kumai          | Scientific Officer     | <a href="mailto:jaolbosaj1@gmail.com">jaolbosaj1@gmail.com</a>               |
| Lydia Kue            | Scientific Officer     | <a href="mailto:lydiackue@gmail.com">lydiackue@gmail.com</a>                 |
| Rebecca Emori        | Scientific Officer     | <a href="mailto:rebecca.emori@pngimr.org.pg">rebecca.emori@pngimr.org.pg</a> |
| Ronny Boli           | Scientific Officer     | <a href="mailto:ronnie.boli@pngimr.org.pg">ronnie.boli@pngimr.org.pg</a>     |
| Jonah Yvia           | Scientific Officer     | <a href="mailto:jonah.yvia@pngimr.org.pg">jonah.yvia@pngimr.org.pg</a>       |
| Nanim Ainui          | Scientific Officer     | <a href="mailto:nanim.ainui@pngimr.org.pg">nanim.ainui@pngimr.org.pg</a>     |
| Noel Berry           | Scientific Officer     | <a href="mailto:noel.berry@pngimr.org.pg">noel.berry@pngimr.org.pg</a>       |
| Tess Aga             | Scientific Officer     | <a href="mailto:tess.aga@pngimr.org.pg">tess.aga@pngimr.org.pg</a>           |
| Ronny Jorry          | Scientific Officer     | <a href="mailto:ronny.jorry@pngimr.org.pg">ronny.jorry@pngimr.org.pg</a>     |
| Vinson Silas         | Scientific Officer     | <a href="mailto:vinson.silas@pngimr.org.pg">vinson.silas@pngimr.org.pg</a>   |
| Billiam Degemba      | Scientific Officer     | <a href="mailto:billiam.degemba@gmail.com">billiam.degemba@gmail.com</a>     |
| Prof. Peter Siba     | PNG IMR Director       | <a href="mailto:peter.siba@pngimr.org.pg">peter.siba@pngimr.org.pg</a>       |

**List of iHDSS team**

| Team                    | Asaro/Goroka   | Hiri/POM   | Hides/Komo                         |
|-------------------------|--|--|------------------------------------|
| Data analysis           | Ronny Boli<br>Rebecca Emori  | Seri Maraga  | Vinson Silas                       |
| Data collection         | Nanim Brown<br>Noel Berry<br>Jacob Joseph<br>Alfred Alawaki  | Lydia Kue<br>Jacob Kumai<br>Campbell Asuak   | Billiam Degemba<br>Maryanne Hapolo |
| Clinical and Laboratory | Helen Kave<br>Jaukae Jaukae<br>Jonah Yvia<br>Lucy Endy   | Vicky Gabee<br>Doris Manong<br>Theonella Kware<br>Rosemary Simbil<br>Beverlyn Warigi | Emmanuel Hapolo                    |
| Data management         | Tess Aga,<br>Ronny Jorry<br>Susan Bebes<br>Collin Manase<br>Joanne Tibu<br>Morabi Joshua<br>Dorothy Leo<br>Freda Opngal<br>Rose Charles<br>Joyce Foski |  |                                    |
| Admin and Financial     | Maria Gipis<br>Kim Papaso<br>Lisa Kuvi<br>Nancy Iva<br>Masi Sima<br>Oro Topo   | Alexia Alois<br>George Aisa<br>Felix Ame*<br>Micheal Dandi**                         | James Samkui                       |

*Note: The list was updated as of 30th June 2016. \* contract finished in April 2016. \*\* Contract started in May 2016*

## **Independent scientific advisory board (ISAB)**

Maxine Whittaker, Professor and Dean

College of Public Health, Medical & Veterinary Sciences, James Cook University, Townsville

Marcel Tanner, Professor

Swiss Tropical & Public Health Institute (Swiss TPH)

Chair of INDEPTH Board

Burt Singer, Professor (Adjunct)

Emerging Pathogens Institute

University of Florida

## Acknowledgement

The authors would like to thank the respective community leaders, councillors and church leaders in each of the study sites for their support of the PiHP. A special thank you is extended to the community members who participated in the various studies presented in this report. Many thanks to the Provincial Health divisions in Central Province, Hela Province, Eastern Highland Province and Madang Province for their enthusiastic supports to the PiHP and approvals for our iHDSS team to access the health facilities and medical records. We are grateful to our partners: Salvation Army, ECPNG, Lutheran Health Service and Catholic Health Services for their support for our field work. We also thank the ISAB (Independent Scientific Advisory Board) and collaborators of the PiHP for their scientific guidance as well as the New Fields for their review and comment on the report. Lastly, we would like to acknowledge our donors, ExxonMobil PNG Ltd, for their great support to PNG IMR and the PiHP in particular.

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## Abbreviations

|        |   |
|--------|---|
| ACD    | Active Case Detection                                 |
| AIDS   | Acquired Immune Deficiency Syndrome                   |
| ANC    | Antenatal care  |
| BCG    | Bacillus Calmette-Guérin                              |
| BMI    | Body Mass Index                                       |
| CI     | Confidence Interval                                   |
| COPD   | Chronic Obstructive Pulmonary Disease                 |
| CPR    | Contraceptive Prevalent Rate                          |
| CU5MR  | Children Under 5 Morality Rate                        |
| CVD    | Cardiovascular Disease                                |
| DENV   | Dengue virus  |
| DOTS   | Directly Observed Therapy - Short Course              |
| DST    | Drug Sensitivity Test                                 |
| DTP    | Diphtheria, Tetanus and Pertussis                     |
| DWU    | Divine World University                               |
| EHP    | Eastern Highland Province                             |
| EM PNG | ExxonMobil PNG Ltd.                                   |
| EPI    | Expanded Program on Immunization                      |
| EPTB   | Extra Pulmonary Tuberculosis                          |
| GDP    | Gross Domestic Product                                |
| GIS    | Geographic Information System                         |
| GPS    | Global Positioning System                             |
| HepB   | Hepatitis B   |
| Hib    | Haemophilus influenza type B                          |
| HIV    | Human Immunodeficiency Virus                          |
| HP     | Hela Province   |
| IEC    | Information, education and communication              |
| iHDSS  | Integrated Health and Demographic Surveillance System |
| IMR    | Infant Mortality Rate                                 |
| IRB    | Internal Review Board                                 |

|         |  |
|---------|--|
| JCU     | James Cook University                          |
| LAM     | Lactational amenorrhoea method                 |
| LBW     | Low birth weight                               |
| LLG     | Local Level Government                         |
| LNG     | Liquefied Natural Gas                          |
| MARC    | Medical Advisory Research Committee            |
| MCH     | Maternal and Child Health                      |
| MDGs    | Millennium Development Goals                   |
| MDR     | Multi-drug resistant                           |
| MMR     | Maternal mortality rate                        |
| MTB     | Mycobacterium Tuberculosis                     |
| NCD     | Non-Communicable Diseases                      |
| NDoH    | National Department of Health                  |
| NMR     | Neonatal mortality rate                        |
| OPV     | Oral Polio Vaccine                             |
| ORS     | Oral rehydration salts                         |
| PCD     | Passive Case Detection                         |
| PhDU    | Population Health and Demography Unit          |
| PiHP    | Partnership in Health Project                  |
| PNG     | Papua New Guinea                               |
| PNG IMR | Papua New Guinea Institute of Medical Research |
| PNG LNG | Papua New Guinea Liquefied Natural Gas         |
| POM     | Port Moresby                                   |
| PTB     | Pulmonary Tuberculosis                         |
| SDG     | Sustainable Development Goals                  |
| SOP     | Standard Operating Procedures                  |
| STI     | Sexually Transmitted Infections                |
| TB      | Tuberculosis                                   |
| TBA     | Traditional Birth Attendant                    |
| UNs     | United Nations                                 |
| UQ      | The University of Queensland                   |

|      |                                   |
|------|-----------------------------------|
| VA   | Verbal Autopsy                    |
| VCT  | Voluntary counselling and testing |
| VDS  | Vaginal discharge syndrome        |
| WASH | Water, Sanitation and Hygiene     |
| WHO  | World Health Organisation         |

## Executive summary

As part of the Partnership in Health Project (PiHP), the PNG Institute of Medical Research (PNG IMR) develops and submits semi-annual progress reports. This September 2016 Report updates new data since the last submission in March 2016. The work presented in this report includes findings and results, covering the six month reporting period, from January to July 2016.

As an interim deliverable of the PiHP, the September 2016 Report assumes a basic understanding of the overall effort and does not fully reiterate well-known background information of either the PNG LNG Project or the PiHP. Whenever possible the focus is on new results developed since the last March 2016 Report. The PiHP is a longitudinal effort. Therefore, the presentation of certain types of time sequence information is critical.

Health and demographic indicators and socio-cultural determinants do not change rapidly. Rather, they evolve over a period of several years. This is the power of the integrated Health and Demographic Surveillance System (iHDSS) i.e. providing longitudinal data that reveals trends over time so that appropriate planning and allocation of resources and funding can be considered and implemented by government and concerned stakeholders, authorities and individuals.

The 2016 September Report focuses on child health, particularly children under five years of age (CU5). The iHDSS database has been updated with data of 6,540 CU5 in three surveillance sites: Hiri, Asaro and Hides. The report presents key population health indicators of CU5 as well as new morbidity surveillance data among the general population seeking healthcare services at the public health facilities in the surveillance sites.

This report presents major findings and observations interlinked within the 13 chapters. The findings are presented and compared across all iHDSS sites. Whenever possible, new findings and observations are emphasized in particular iHDSS sites. Below is the summary of methods, key findings and observations of the CU5 data.

**Children under-5 questionnaire**

The iHDSS database has been updated with CU5 data, which were collected over the reporting period using the newly designed Children Under 5 Questionnaire; This data collection tool consist of 7 data modules: (i) Household identification information, including GPS data; (ii) CU5 background information, including identification information; (iii) Breastfeeding; (iv) Dietary and food security; (v) Care of illness (Pneumonia and Diarrhoea); (vi) Malaria care and treatment; and (vii) Anthropometry. The CU5 data component was built up as an integral part of the iHDSS database and interlinked with other components such as Household data and Women aged 15-49 data.

**Trainings**

Training of trainers (ToT) and refresh training courses were continuously organised in the reporting period as part of national capacity building and sustainable development of the iHDSS. Eleven national scientific officers were trained for three days on the CU5 Questionnaire, including a field work session to pre-test and finalise the questionnaire. In turn, they conducted further refresher training for data reporters, who reside in the surveillance sites before the data collection was rolled out. Every surveillance site organised one refresher training for 2 days.

A five-day training workshop on data analysis and report writing was organised for 12 national scientific officers in early July 2016 to analyse the CU5 data and develop the 2016 September Report.

**Field work and data collection**

3,234 households (35% in urban and 65% in rural sector) and 2,843 CU5 (1,429 in Hiri, 1,006 in Asaro and 408 in Hides) were recorded in three surveillance sites over the reporting period. Parents/care givers of these children were invited to participate in face-to-face interviews about their child health status. 78.5% participated in the interviews. Hides reported the lowest participation rate at 56%.

The interview completion rate was 75% for all three sites, with the lowest completion rate in Hides (45%). Hides also reported the highest interview partially completed rate (9%) and interview refusal rate (3.7%). These findings again raise technical and logistics concerns regarding the surveillance activities in Hides because of the unstable situations mostly due to tribal fighting. Over the lifetime of the PiHP, there have been frequent logistical and security challenges in Hides.

### **Place of birth delivery**

With regard the place of birth delivery, 56% of CU5 were delivered at the tertiary and secondary healthcare levels (provincial or district hospitals), with 55% and 60% of CU5 reported in Hiri and Asaro, compared to only about 35% reported in Hides. The proportion of birth deliveries at the primary healthcare level (Community Health Centres/ Aid Post) was 22% in all three sites, 21% in Hiri, 22% in Asaro, and 29% in Hides. By contrast, home-based birth delivery was highest in Hides (35%), while 23% and 17% in Hiri and Asaro, respectively. These findings suggest that more effort is required to improve infrastructure for safe birth delivery in Hides.

### **Birth certificate, health record book and immunisation card**

About 18% of CU5 reported having a birth certificate across all three sites, with the highest proportion recorded in Hiri, 20.7%, followed by Asaro, 18.9%, and only 2.3% in Hides. Only 50% of CU5 across the three sites had health record books (50% in Hiri, 42% in Asaro, and 56% in Hides). Similarly, 50% of CU5 had physical immunisation record cards, 40% stated they had the card but could not produce it, while 7% had no card and small proportion of 3% did not respond to the question. Hiri children had the highest proportion of children with immunisation cards (60%), followed by Asaro (50) and Hides (45%). These documents are crucial for monitoring of the health and development of children. Parents/caregivers need to understand the importance of maintaining and securing the health card.

### **Birth weight**

It is important to measure the birth weight of newborn infants in order to understand the risks to both the newborn and mother if there is an under or overweight baby. More than 40% of

children, whose birth weights recorded in health record books or immunisation record cards, were within the normal range of 2,800 - 3,199 grams. 9% of newborn babies had birth weight less than 2,200 grams, with the highest proportion in Hides (11%) and the lowest proportion in Hiri (7%). By contrast, 5% of CU5 had birth weight of 4,000 grams or more, with the highest proportion of 7.5% also in Hides and the lowest proportion of 3.1% in Hiri. From these data it is clear that there is an underlying problem in Hides regarding education about appropriate foods and nutrition during the pregnancy.

### **Breastfeeding**

With regard to breastfeeding practice, virtually all babies (96%) were, to some degree, breastfed. However, the exclusive and predominant breastfeeding rates<sup>1</sup> among children aged 0-5 months were 60% and 65%, respectively. The highest exclusive breastfeeding rate was in Asaro (75%), followed by Hides (71%) and lowest in Hiri (43%). The median duration of exclusive and predominant breast feedings was only three months. Mothers are encouraged to continue breast feeding their babies until they reach two years old. The continuously breast feeding rate at one year was 95%. In general, breastfeeding practices of mothers are good; however, there is room for improvement.

### **Solid and semi-solid foods**

Children beyond six months of age need to continue with breastfeeding and be introduced to appropriate solid, semi-solid and soft foods. Only 60% of children aged 6-8 months had provided appropriate solid, semi solid and soft foods, with the highest rate in Asaro (75%) and Hiri (47%) (Hide data is not applicable as only response to the question). Only 30% of children aged 6-23 months across all three sites were given 3 meals or more per day. Asaro reported the highest proportion of children being given three meals for day (46%), Hides (42%), and Hiri

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<sup>1</sup> Exclusively breastfed refers to infants who received breast milk only (and possibly vitamins, mineral supplements, or medicine), but not anything else. Predominant breastfeeding means children receive breast milk and certain fluids (plain water and water-based drinks like sugar water, fruit juice, gripe water, oral rehydration solution, tea or herbal infusions), but did not receive anything else (in particular non-human milk and food based fluids).

(20%). This observation is interesting, but the current data don't provide detailed explanations for why Hiri mothers keep delaying introducing solid and semi solid foods. Hiri population has higher education and better access to food, so mothers should be introducing the solid and semi solid foods earlier if they are receiving the correct information and nutritional advices from health care workers.

Furthermore, 15% of children aged 0-23 months were bottle fed with Hiri reporting the highest figure at 20%.

For countries with national vitamin A supplementation programmes, the definition of the indicator is the percentage of children aged 6-59 months receiving at least one high dose vitamin A supplement in the last six months. Vitamin A supplementation was only 43% among children aged 6-11 months. These data suggest that education on Vitamin A supplement to children aged 6 months above are needed for mothers across all the surveillance sites.

### **Food security**

More than 50% of parents or caregivers reported experiencing food shortage in 12 months prior to the interview, with the highest incidence in Asaro (85%), followed by Hides (46%) and lowest in Hiri (35%). The majority of parents/ caregivers reported a lack of foods in the last 4-6 months. This finding could be associated with a serious drought that occurred in the second half of 2015, affecting agriculture crops throughout PNG, including the surveillance sites during early 2016. Further studies on food security and household coping strategies would be beneficial.

### **Immunisation and vaccination**

Immunisation and vaccination against common childhood diseases was examined among children aged 12-23 months because children are expected to have been fully vaccinated by the age of 24 months. About 45% received all vaccinations at any time, but only 33% received the vaccines before their first birthday. The coverage of all vaccinations was highest in Hiri (50%), followed by Asaro (35%) and lowest in Hides (20%). Specifically, it was 58% for BCG; 54% for Polio 1, 53% for Polio 2, and 49% for Polio 3; 56% for Pentavalent 1; 54% for Pentavalent 2 and 51% for Pentavalent 3; DPT 1: 55%, DPT 2: 53% and DPT 3: 50%. For Hepatitis B vaccine, the



coverage was 53% at birth; 55% for first dose, 53% for second dose and 49% for third dose. Measles vaccination was only 53%. This vaccination coverage was for all three sites. Immunization data do not allow conducting further analysis disaggregated by site.

The total tetanus protection among women aged 15-49 was 35% for three sites, but only 25% of them received the full two doses of tetanus vaccine for their last pregnancy, with the highest proportion in Asaro (39%), followed by Hiri (32%) and none in Hides (0%). With the observed low immunization and vaccination coverage (50%) for children age 12-23 months, outbreaks of common childhood communicable diseases could happen at any time. In fact, there have been a series of vaccine preventable disease outbreaks e.g. measles, that have occurred, particularly in the highlands of PNG in the last few years.

### **Diarrhoea**

Previous studies conducted by PNG IMR indicate diarrhoea is common in PNG and is one the top 3 causes of illness in Hides and Hiri. Diarrhoea, in a PNG context, is typically caused by (i) poor personal hygiene and sanitation associated with food preparation and by (ii) close contact with animals, particularly pigs and chickens, associated with access to and utilisation of safe water

13% of CU5 reported having an episode of diarrhoea in two weeks preceding the interviews, with the highest rate in Hides 33%, compared to 10% recorded in Hiri and Asaro. Diarrhoea was most prevalent among children aged 12-23 months, with 33% of the reported cases occurred in this age group. However, only 25% of children in all three sites were treated with Oral Rehydration Therapy (40% in Hiri, 7% in Asaro and 10% in Hides). About one third of children with a diarrhea episode were treated with medications, with the highest proportion reported in Hiri (55%), and lowest in Hides (15%). Among those who were treated with medications, 50% received oral antibiotics while 25% of received injectable antibiotics.

### **Pneumonia**

Respiratory infections and illnesses e.g. pneumonia is the number one cause of illness in the population in surveillance sites, particularly among children in Hiri and Hides sites. Historically,

Hides has always had an extremely high burden of respiratory illnesses. More than 18% of CU5 reported having cough in the past two weeks, with the highest rate in Hiri (35%), followed by Hides (25%) and Asaro (10%). Only 25% of parents/ caregivers of these children were able to recognise the two danger signs of pneumonia: (i) Breathing faster than usual with short and rapid breaths; and (ii) Difficulty in breathing in and/or out. Among 53 children with suspected pneumonia in the four sites, 45 sought for medical advice and 30 used the services at Community Health Centres. 44 children received medical treatment, of which, 30 received oral antibiotics; 27 received antibiotics injection; 12 received analgesics; 7 received other medicines; and none was treated with anti-malarial drug. It is apparent that more parental education sessions on recognising danger signs of pneumonia are needed.

## **Malaria**

Recent studies conducted in 2013-2014 by PNG IMR indicate that malaria is not a key febrile illness agent in Hiri, Hides and Asaro. These data, collected during Jan – July 2016, supports earlier PNG IMR study results. Only 3% of CU5 reported having fever in two weeks prior to the interview date, with the highest incidence in Hides (13%), but only 2% in the Hiri and Asaro. More than 50% of the sick children sought medical advice, of which, 40% were treated with medications and 10% had blood tests. Only 17 children were treated with anti-malarial drugs: four received treatment on the same day; eight on the next day; two after two days; one after one day; and one after 4 days. These data reaffirm the decline in malaria incidence among CU5. However, when indicated, the timely treatment with anti-malarial drugs can clearly be improved.

## **Morbidity at the primary healthcare level**

The quantity and quality of the morbidity data collected at the iHDSS surveillance sites indicates continuous improvement. This observation is reflected in the increased numbers of patients who visited community health centres within the three iHDSS surveillance sites during the reporting period for medical consultations and treatment of common diseases.

The clinic data reconfirms that respiratory diseases, including pneumonia, generated the heaviest morbidity burden at the primary healthcare level, i.e., 42% of the total caseload in Asaro, 47% in Hiri and 24% in Hides. Only five TB suspected cases were reported in health clinics at Asaro

and none were documented in Hides and Hiri during the reporting period. These data indicate that (i) suspected TB patients are visiting higher level health care facilities without visiting the local health clinics; (ii) suspected TB cases are being immediately referred to higher level care facilities for TB diagnosis and treatment without being recorded at community health care level, or (iii) there is an improvement in TB prevention strategies being implemented at the Hides and Hiri. Further analysis is required to determine the reasons for the marked reduction in new TB case diagnoses.

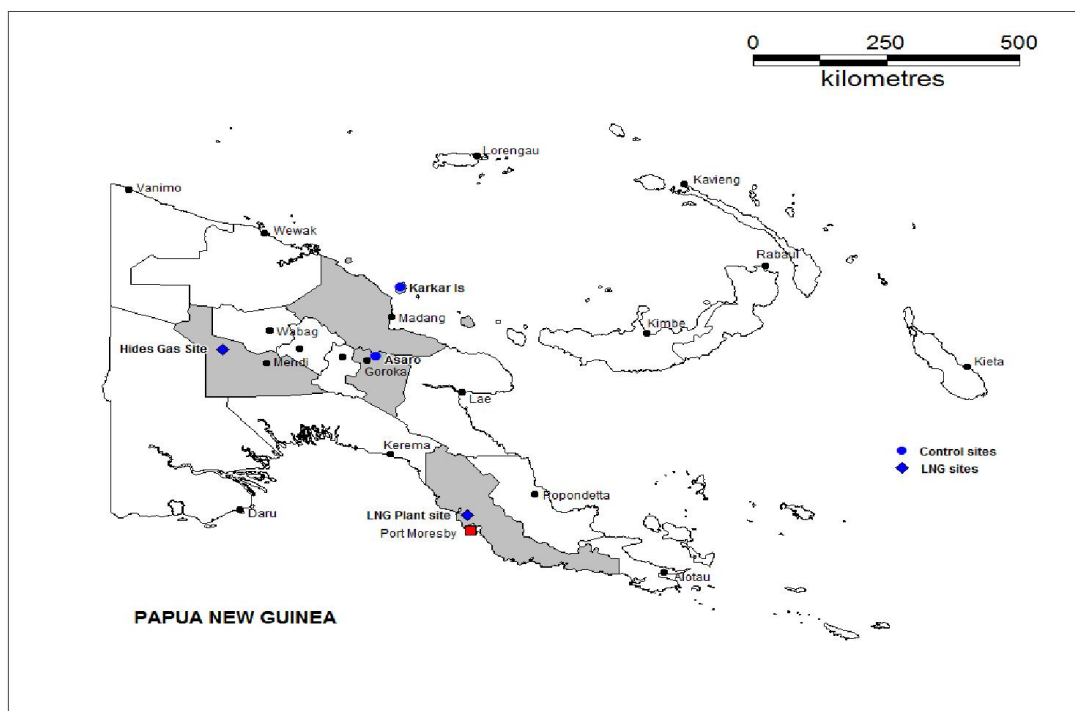
Consistent with previous reports, small numbers of malaria suspected cases were documented over the reporting period i.e. 16 cases in Hides and 39 in Hiri. Asaro reported 479 suspected cases but they were clinical diagnosis or symptoms and not confirmed by a Rapid Diagnostic blood Test. Accurate diagnosis for TB and malaria and other vector borne illnesses is critical for health reporting purposes and ensuring patients receive the correct care and treatment for an illness. Continued close monitoring of TB and malaria at the primary healthcare level is an essential component of the iHDSS process. Support systems must be provided to community health centres so that accurate diagnoses can be made.

## 1. CHAPTER 1 INTRODUCTION

Papua New Guinea Institute of Medical Research (PNG IMR) has established and operated an *integrated Health and Demographic Surveillance System* (iHDSS) under the Partnership in Health Programme (PiHP) since 2011. The programme is financially supported by PNG ExxonMobil's Liquefied Natural Gas Project (LNG Project), with technical assistance from the University of Queensland, and recently the James Cook University, Australia. The iHDSS database is updated twice a year with new information on health and demographic changes in life-cycle events such as birth, education, employment, marriage, migration, and death of the surveillance population.

This report provides up-to-date information on health and demographic of the surveillance population, with a focus on children under 5 years of age living in the three out of four surveillance sites over the reporting period of January - July 2016.

### The iHDSS sites



**Figure 1-1 PNG IMR's iHDSS sites: Asaro vs. Hides and Karkar vs. Hiri sites, 2016**

Figure 1-1 shows the four iHDSS sites, including Asaro, Hiri, Hides and Karkar. These sites were selected based on thorough discussions and consultations with key national and international stakeholders and previous PNG IMR experience in the surveillance of communicable diseases. These sites are matched in pairs of intervention-comparison sites, i.e., Hides vs. Asaro and Hiri vs. Karkar. Asaro and Hides sites are mountainous areas while Hiri and Karkar sites are both coastal areas. The intervention sites are places where the LNG Project had active construction and current ongoing production. The iHDSS is designed to provide longitudinal monitoring so that potential impacts, positive and/or negative can be captured in a timely manner.

### Asaro

The Asaro iHDSS was re-established by the PiHP in 2011 and is located approximately 40-45km northeast of Goroka. Asaro is primarily a farming and agricultural production area with a total population of approximately ten thousand (10,000). Coffee is the main cash crop. Major languages spoken by people living in Asaro are *Tokples*, *Gahuku*, *Siane* and *Dano/Tokano*, apart from *Pidgin* that is also regularly spoken. There are four health facilities where local people can access to basic health services i.e. *Goroka Provincial Hospital*, *Asaro health clinic*, *Urioka health clinic* and *Tafeto health clinic*. Asaro has more than 10 public and private schools where local children attend at the primary and secondary educational levels. During the reporting period, 25 data reporters worked at the Asaro site.

### Hides

Hides iHDSS is an identified impact site for the PiHP. The Hides iHDSS is located in the Hela Province and has a total population of approximately 13,000. Geographically, the Hides iHDSS site is very remote and difficult to access. Tribal cultural norms and practices are an integral part of the local people's lives and have created a complex society. People live in clans and sub-clans, and maintain a traditional tribal lifestyle. Most of the houses are built using bush materials and there are very few semi-permanent buildings. The main *Tokples* language spoken is *Huli*, which is also the common name given to people from that region. Other languages include *Pidgin* and a small number of English speakers. Hides iHDSS site is also home to the Komo Airfield, which

was a major PNG LNG logistical hub during construction and continues to be for PNG LNG Production. The two main health facilities are Mananda Health Centre and Para Clinic, both of which are run by the Evangelical Church of PNG (EC-PNG). There are elementary and primary schools, but no evidence of a functioning high school for the area.

Based on discussions between ExxonMobil and PNG IMR and with agreement from the external Independent Science Advisory Board (ISAB), during the post-construction period, only Division 3 of Hides (known as *Gigiria*) is under active iHDSS surveillance. The other two divisions, Haliago (division 1), and *Hibiria* (division 2) are not actively covered by the Hides iHDSS. This decision was primarily based on changes in work activities in the Hides areas i.e. Komo airport construction ending combined with logistics, safety, security and financial considerations. During the construction period, in/out migration was carefully monitored and these reports have previously been presented in earlier PNG IMR reports. As previously noted, during construction in-migration was documented; however, post construction the population is beginning to re-equilibrate i.e. an out migration of job-seeking young men. Only data of Division 3 is presented in this report.

## Hiri

The Hiri iHDSS is located approximately 30-40 km west of Port Moresby, the National Capital of PNG. The iHDSS covers four coastal villages i.e. *Porebada*, *Boera*, *Papa* and *Lealea* with a total population of approximately 12,000. Most inhabitants are either *Motu* or *Koitabu* speakers. Hiri iHDSS can be reached by road in less than one hour from Port Moresby.

## Karkar

Karkar district is a volcanic island located 30km off of the PNG coast in the Bismarck Sea and is part of Madang Province. The iHDSS covers a population of approximately 18,500 (the total population of Karkar is about 60,000). The island's soil is known for its fertility and the large plantations produce the island's main exports of cocoa and coconut and provide a large amount of the local employment opportunities. Inhabitants of the island come from one of two language groups: *Waskia* in the North half of the island and *Taskia* in the South. Most inhabitants are either Lutheran or Catholic.

One main road follows the coast of the island and provides access to the three available health facilities. Gaubin Hospital is the largest of the facilities and is a Lutheran run institution. Karkar has been unaffected by the extensive and intensive mining activity that has occurred in Madang; hence, Karkar is considered as an appropriate location for comparison with the coastal villages in Hiri.

According to the Funding Agreement between PNG IMR and ExxonMobil PNG Ltd for the implementation of the PiHP 2016 Annual Work Plan, Karkar is no longer covered by the surveillance system. The surveillance data of Karkar is therefore, not included in this Report.

## 2. CHAPTER 2 METHOD AND MATERIALS

This Chapter provides details of the data collection tools, data collection methods, data entry and management processes as well as quality assurance/quality check (QA/QC) procedures which are currently applied to the data collection, data processing and data analysis across the iHDSS sites.

### Quality assurance and quality control measures of the PNG IMR's iHDSS

Figure 2-1 describes the QA/QC procedures currently applied to the data collection, recording and processing of the iHDSS. This QA/QC procedure is divided into three stages, corresponding to three steps of data processing process:

- (i) Data collection;
- (ii) Data entry and management;
- (iii) Data cleaning and generation.

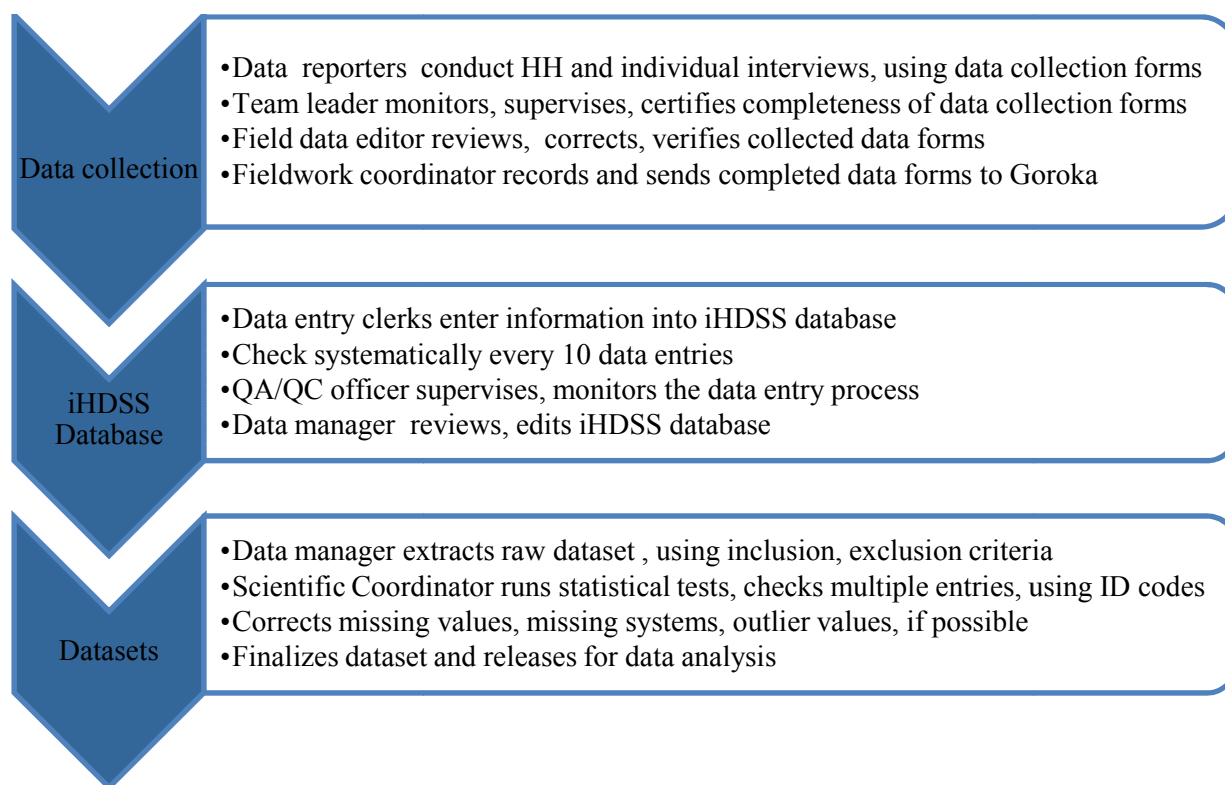


Figure 2-1 QA/QC measures of the PNG IMR's iHDSS, 2016



**Data collection**

Data collectors visited the HH and conducted individual interviews with parents or care givers of CU5, using the CU5 Questionnaire. Every ten data collectors have one team leader, who monitors and supervises the data collection process. Each iHDSS site has one or two fieldwork data editors who are responsible for review of the collected information and make corrections if needed. All the data forms were quality checked by data editors, who were also field-based.

A fieldwork coordinator oversees the efforts to ensure activities are planned and implemented in a coordinated manner so that deadlines are met. The fieldwork coordinator verifies the data collection forms before sending them all to site manager for endorsement. Identified mistakes were double-checked with the fieldwork coordinators for clarifications and corrections.

**Data entry and management**

According to the new QA/QC procedures, data entry work was shifted from the data manager, who is based at the iHDSS sites, to the data management team, based in the PNG IMR main office in Goroka. This change was made in order to standardize data entry processes and thereby improve the overall quality of the iHDSS database.

Data entry clerks are assigned as focal point for each iHDSS site. He/she is responsible for entering the information of his/ her iHDSS site into the database. Data entry clerks have systematically checked every batch of 10 entries. The data management team has a QA/QC officer who supervises and monitors the data entry processes and provides technical assistance to the data entry clerks. About ten percent of the total responses were randomly cross-checked by the QA/QC officer as the second round of quality control of the overall data processing process.

Database manager is responsible for developing data entry template on the basis of MySQL process maker. The database manager maintains and edits the iHDSS database to make sure all the data modules of HH data components are linked via the HH unique ID code. The data manager generates the HH dataset by extracting data from the database. Raw datasets are sent the study design team for data analysis.

## **Data cleaning**

The scientific coordinator performs the final check of the HH dataset which includes a variety of statistical tests and assessment of missing values. The internal consistency within the dataset was also cross-checked and corrected. Outlier values were recorded for further examination in order to identify their potential contribution to a change in the results. The final dataset was then released to the study design team for data analysis and report writing.

## **Children under 5 Questionnaire**

Data used in this report are mainly from the CU5 health data of the iHDSS database, which were collected over the reporting period of January – June 2016, using the CU5 Questionnaire. This questionnaire is designed for collecting socio-economic and demographic characteristics and health data of CU5, who live in the iHDSS sites to capture major changes at the household and individual levels over the reporting period.

The Children U5 Questionnaire comprises seven data modules:

- Household identification information, including geographic positioning system (GPS);
- Children under 5 Background;
- Breastfeeding;
- Dietary and food security;
- Care of illness (Pneumonia and Diarrhoea);
- Malaria; and
- Anthropometry.

This individual questionnaire has been developed and adapted from available data collection tools currently in use across the INDEPTH Network's country members as well as other international organisations such as the UNICEF Multi-indicator Cluster Survey (MICS).

## **Training and field test**

A training of the trainers (TOT) workshop was conducted by the scientific coordinator for core staff of PiHP including site managers, fieldwork coordinators, and scientific officers of the four

iHDSS sites in December 2015. The training focused on the design of the CU5 Questionnaire. The training included sections on pre-test and post-test of the questionnaire with local people. A post-training evaluation was also conducted with a standard evaluation tool for a training course, adopted from the University of Queensland. The final CU5 Questionnaire was translated into *Tok-Pisin* by national scientific officers to facilitate the interviews with local people.

The TOT training was then followed up by refresher training in January 2016. These sessions were conducted by site managers in collaboration with the fieldwork coordinators and provide in depth knowledge of the questionnaire as well as the necessary skills for conducting interviews with parents or child care takers at the household level.

### Field work and data collection

Field work and data collection were conducted over the period January – April 2016, using the CU5 Questionnaire. Data reporters are based in the villages and visited households regularly and conduct interviews with parents or child care-takers under the supervision of Team Leaders in accordance with the field work plan developed by the Fieldwork Coordinators.

A total of 2,843 CU5 were approached for interviews, of which 2,232 children were given consent to participate in the study, accounting for 78.5% of the total CU5 in the three surveillance sites. Hence, the non-participation rate was high, at 21.5% (Table 2-1).

**Table 2-1 Parents/ child care givers of CU5 approached for interviews, iHDSS, 2016**

| Approached for interview |   | iHDSS site |       |       |           |
|--------------------------|---|------------|-------|-------|-----------|
|                          |   | Hiri       | Asaro | Hides | All sites |
| Yes                      | N | 1118       | 886   | 228   | 2232      |
|                          | % | 78.2       | 88.1  | 55.9  | 78.5      |
| No                       | N | 311        | 120   | 180   | 611       |
|                          | % | 21.8       | 11.9  | 44.1  | 21.5      |
| Total                    | N | 1429       | 1006  | 408   | 2843      |
|                          | % | 100.0      | 100.0 | 100.0 | 100.0     |

There were 1,429 and 1,006 CU5 living in Hiri and Asaro, respectively. Of which, 1,118 CU5 in Hiri and 886 CU5 in Asaro were interviewed, accounting for 78.2% and 88.1% of the total children. The non-participation rates of these sites were 21.8 and 11.9%, respectively.

As shown in the above Table, there were 228 CU5 out of 408 CU5 in Hides site who were interviewed, leaving the highest non-participation rate, at 44.1%, two to three times higher than Asaro and Hiri. Further details are presented in the following Tables.

**Table 2-2 Month of interviews of care takers of CU5, PNG IMR's iHDSS, 2016**

|          |   | iHDSS site |       |       |          |
|----------|---|------------|-------|-------|----------|
|          |   | Hiri       | Asaro | Hides | All site |
| January  | N | 562        | 348   | 2     | 912      |
|          | % | 39.3       | 34.6  | 0.5   | 32.1     |
| February | N | 863        | 210   | 402   | 1475     |
|          | % | 60.4       | 20.9  | 98.5  | 51.9     |
| March    | N | 0          | 38    | 0     | 38       |
|          | % | 0.0        | 3.8   | 0.0   | 1.3      |
| April    | N | 3          | 223   | 0     | 226      |
|          | % | 0.2        | 22.2  | 0.0   | 7.9      |
| May      | N | 0          | 177   | 3     | 180      |
|          | % | 0.0        | 17.6  | 0.7   | 6.3      |
| Missing  | N | 1          | 10    | 1     | 12       |
|          | % | 0.1        | 1.0   | 0.2   | 0.4      |
| Total    | N | 1429       | 1006  | 408   | 2843     |
|          | % | 100.0      | 100.0 | 100.0 | 100.0    |

There were 1,429 and 1,006 CU5 living in Hiri and Asaro, respectively. Of which, 1,118 CU5 in Hiri and 886 CU5 in Asaro were interviewed, accounting for 78.2% and 88.1% of the total children. The non-participation rates of these sites were 21.8 and 11.9%, respectively.

As shown in the above Table, there were 228 CU5 out of 408 CU5 in Hides site who were interviewed, leaving the highest non-participation rate, at 44.1%, two to three times higher than Asaro and Hiri. Further details are presented in the following Tables.

Table 2-2 shows that most of all the interviews in Hiri were conducted in January- February. However, it took longer time for the Asaro team to collect the data i.e. from January to May.

By contrast, most of all interviews in Hides (98.2%) were conducted only in February, when two female staff were mobilised from Hiri to Hides to assist the Hides team with their data collection. The low coverage of CU5 in Hides was documented and the Hides team was requested to revisit households, which had previously refused to participate in the visits. However, it was reported that many of these households had moved out of the site due to the security situation related to tribal fights and had not yet returned over the reporting period. Hence, the Hides team could not conduct more interviews.

**Table 2-3 Outcome of interviews with care takers of CU5 by iHDSS site, 2016**

| Outcome of interviews  |   | Hiri  | Asaro | Hides | All sites |
|------------------------|---|-------|-------|-------|-----------|
| Completed              | N | 1115  | 840   | 186   | 2141      |
|                        | % | 78.0  | 83.5  | 45.6  | 75.3      |
| Partially completed    | N | 0     | 2     | 38    | 40        |
|                        | % | 0.0   | 0.2   | 9.3   | 1.4       |
| Refused to participate | N | 16    | 22    | 15    | 53        |
|                        | % | 1.1   | 2.2   | 3.7   | 1.9       |
| Not at home            | N | 88    | 65    | 169   | 153       |
|                        | % | 6.2   | 6.5   | 41.4  | 5.4       |
| Incapacitated          | N | 2     | 0     | 0     | 2         |
|                        | % | 0.1   | 0.0   | 0.0   | 0.1       |
| Other                  | N | 208   | 77    | 0     | 454       |
|                        | % | 14.6  | 7.7   | 0.0   | 16.0      |
| Total                  | N | 1429  | 1006  | 408   | 2843      |
|                        | % | 100.0 | 100.0 | 100.0 | 100.0     |

Table 2-3 shows the outcome of interviews with parents or care takers of CU5. More than 2141 out of 2843 interviews (75.3%) were completed, with the highest proportion in Asaro, 83.5%, followed by Hiri, 78%. The lowest proportion of completed interviews was observed in Hides, only 45.6%. It was noted that 41.4% of CU5 in Hides was reported as ‘Not at home’ because entire households of these children were reported having moved out of the site prior to the revisits of the data collection team. Hence, the refusal rate for Hides CU5 actually present was only 3.7%.

### Data entry and management

CU5 data collection forms were sent to the PNG IMR main office in Goroka for entering into the iHDSS database using a standard data entry template which was developed by the data manager on the MySQL/Process Maker. The data quality control officer monitored the data entry progress and provided technical assistance to data entry clerks as required. The distribution of data entries as shown in Table 2-4 is relatively equal by entry clerk, from 10% to 15% of the total data forms.

**Table 2-4 Distribution of data entries by data entry clerk, PNG IMR's iHDSS, 2016**

| Data entry clerk #  |   | Hiri  | Asaro | Hides | All sites |
|---------------------|---|-------|-------|-------|-----------|
| Data entry clerk #1 | N | 136   | 144   | 84    | 364       |
|                     | % | 9.5   | 14.3  | 20.6  | 12.8      |
| Data entry clerk #2 | N | 238   | 50    | 47    | 335       |
|                     | % | 16.7  | 5.0   | 11.5  | 11.8      |
| Data entry clerk #3 | N | 208   | 164   | 51    | 423       |
|                     | % | 14.6  | 16.3  | 12.5  | 14.9      |
| Data entry clerk #4 | N | 230   | 103   | 62    | 395       |
|                     | % | 16.1  | 10.2  | 15.2  | 13.9      |
| Data entry clerk #5 | N | 199   | 156   | 30    | 385       |
|                     | % | 13.9  | 15.5  | 7.4   | 13.5      |
| Data entry clerk #6 | N | 87    | 219   | 1     | 307       |
|                     | % | 6.1   | 21.8  | 0.2   | 10.8      |
| Data entry clerk #7 | N | 141   | 74    | 100   | 315       |
|                     | % | 9.9   | 7.4   | 24.5  | 11.1      |
| Data entry clerk #8 | N | 190   | 96    | 33    | 319       |
|                     | % | 13.3  | 9.5   | 8.1   | 11.2      |
| Total               | N | 1429  | 1006  | 408   | 2843      |
|                     | % | 100.0 | 100.0 | 100.0 | 100.0     |

Table 2-5 shows the month, when data were entered into the database. Hiri data entry was completed in two months: March and April, but it took three months, from April-June to complete the data entry of Asaro. By contrast, data entry clerks spent only one month (April) entering most of the Hides data forms.

**Table 2-5 Month of data entries by iHDSS site, PNG IMR's iHDSS, 2016**

| Month of data entry |   | Hiri   | Asaro  | Hides  | All sites |
|---------------------|---|--------|--------|--------|-----------|
| March               | N | 929    | 0      | 17     | 946       |
|                     | % | 65.0%  | 0.0%   | 4.2%   | 33.3%     |
| April               | N | 498    | 595    | 390    | 1483      |
|                     | % | 34.8%  | 59.1%  | 95.6%  | 52.2%     |
| May                 | N | 2      | 180    | 1      | 183       |
|                     | % | 0.1%   | 17.9%  | 0.2%   | 6.4%      |
| June                | N | 0      | 231    | 0      | 231       |
|                     | % | 0.0%   | 23.0%  | 0.0%   | 8.1%      |
| Total               | N | 1429   | 1006   | 408    | 2843      |
|                     | % | 100.0% | 100.0% | 100.0% | 100.0%    |

### Assessment of the data quality

Age is one of the most important variables for cross-table data analysis of the surveillance population. There were 684 'missing values', accounted for 24% of the total of 2,848 CU5 living in the three surveillance sites.

Table 2-6 shows the distribution of age in month of a total of 2,164 children recorded in the iHDSS database. This figure includes a number of children aged 5 years old or from 60 to 71 months. The children in this age group are excluded in the data analysis.

## Data analysis and report writing

A five-day training workshop on data analysis and report writing was held by the scientific coordinator in the last week of June 2016 for a core group of national scientific officers to develop the September 2016 Report. The database manager edited the database and extracted raw datasets for each surveillance site in the excel spread sheet format, using scripts. These datasets were converted from excel spread sheet into the Statistical Package for Social Studies (SPSS) and merged together into one dataset of all three sites for use in the training and subsequent data analysis. This process generated the tables and graphs for this report.

Anthropometry data component was not included in the data analysis for this report due to quality issues regarding the consistency in using of length measurement units while collecting and recording data in the field.

**Table 2-6 Distribution of age (in month) of CU5 by iHDSS site, PNG IMR's iHDSS, 2016**

| Age in month |   | iHDSS site |       |       | Total |
|--------------|---|------------|-------|-------|-------|
|              |   | Hiri       | Asaro | Hides |       |
| 0            | N | 4          | 4     | 1     | 9     |
|              | % | .4%        | .5%   | .5%   | .4%   |
| 1            | N | 4          | 6     | 0     | 10    |
|              | % | .4%        | .7%   | 0.0%  | .5%   |
| 2            | N | 0          | 3     | 1     | 4     |
|              | % | 0.0%       | .4%   | .5%   | .2%   |
| 3            | N | 3          | 6     | 0     | 9     |
|              | % | .3%        | .7%   | 0.0%  | .4%   |
| 4            | N | 1          | 7     | 3     | 11    |
|              | % | .1%        | .8%   | 1.4%  | .5%   |
| 5            | N | 2          | 2     | 2     | 6     |
|              | % | .2%        | .2%   | .9%   | .3%   |
| 6            | N | 3          | 4     | 0     | 7     |
|              | % | .3%        | .5%   | 0.0%  | .3%   |
| 7            | N | 3          | 7     | 1     | 11    |
|              | % | .3%        | .8%   | .5%   | .5%   |
| 8            | N | 5          | 6     | 1     | 12    |
|              | % | .4%        | .7%   | .5%   | .6%   |
| 9            | N | 7          | 4     | 2     | 13    |
|              | % | .6%        | .5%   | .9%   | .6%   |
| 10           | N | 6          | 7     | 2     | 15    |
|              | % | .5%        | .8%   | .9%   | .7%   |
| 11           | N | 7          | 3     | 2     | 12    |
|              | % | .6%        | .4%   | .9%   | .6%   |
| 12           | N | 30         | 28    | 6     | 64    |
|              | % | 2.7%       | 3.4%  | 2.8%  | 3.0%  |
| 13           | N | 22         | 12    | 4     | 38    |



|    |   |      |      |      |      |
|----|---|------|------|------|------|
|    | % | 2.0% | 1.5% | 1.9% | 1.8% |
| 14 | N | 22   | 12   | 2    | 36   |
|    | % | 2.0% | 1.5% | .9%  | 1.7% |
| 15 | N | 16   | 7    | 1    | 24   |
|    | % | 1.4% | .8%  | .5%  | 1.1% |
| 16 | N | 10   | 9    | 2    | 21   |
|    | % | .9%  | 1.1% | .9%  | 1.0% |
| 17 | N | 20   | 9    | 3    | 32   |
|    | % | 1.8% | 1.1% | 1.4% | 1.5% |
| 18 | N | 20   | 2    | 6    | 28   |
|    | % | 1.8% | .2%  | 2.8% | 1.3% |
| 19 | N | 24   | 6    | 2    | 32   |
|    | % | 2.1% | .7%  | .9%  | 1.5% |
| 20 | N | 34   | 4    | 3    | 41   |
|    | % | 3.0% | .5%  | 1.4% | 1.9% |
| 21 | N | 24   | 5    | 0    | 29   |
|    | % | 2.1% | .6%  | 0.0% | 1.3% |
| 22 | N | 34   | 8    | 2    | 44   |
|    | % | 3.0% | 1.0% | .9%  | 2.0% |
| 23 | N | 17   | 6    | 3    | 26   |
|    | % | 1.5% | .7%  | 1.4% | 1.2% |
| 24 | N | 23   | 25   | 4    | 52   |
|    | % | 2.0% | 3.0% | 1.9% | 2.4% |
| 25 | N | 17   | 23   | 3    | 43   |
|    | % | 1.5% | 2.8% | 1.4% | 2.0% |
| 26 | N | 21   | 16   | 2    | 39   |
|    | % | 1.9% | 1.9% | .9%  | 1.8% |
| 27 | N | 22   | 14   | 2    | 38   |
|    | % | 2.0% | 1.7% | .9%  | 1.8% |
| 28 | N | 18   | 7    | 3    | 28   |
|    | % | 1.6% | .8%  | 1.4% | 1.3% |
| 29 | N | 24   | 12   | 2    | 38   |
|    | % | 2.1% | 1.5% | .9%  | 1.8% |
| 30 | N | 27   | 16   | 6    | 49   |
|    | % | 2.4% | 1.9% | 2.8% | 2.3% |
| 31 | N | 24   | 22   | 4    | 50   |
|    | % | 2.1% | 2.7% | 1.9% | 2.3% |
| 32 | N | 23   | 15   | 9    | 47   |
|    | % | 2.0% | 1.8% | 4.2% | 2.2% |
| 33 | N | 17   | 14   | 4    | 35   |
|    | % | 1.5% | 1.7% | 1.9% | 1.6% |
| 34 | N | 17   | 11   | 3    | 31   |
|    | % | 1.5% | 1.3% | 1.4% | 1.4% |
| 35 | N | 27   | 14   | 11   | 52   |
|    | % | 2.4% | 1.7% | 5.2% | 2.4% |
| 36 | N | 29   | 32   | 4    | 65   |
|    | % | 2.6% | 3.9% | 1.9% | 3.0% |
| 37 | N | 20   | 8    | 4    | 32   |
|    | % | 1.8% | 1.0% | 1.9% | 1.5% |
| 38 | N | 20   | 10   | 2    | 32   |
|    | % | 1.8% | 1.2% | .9%  | 1.5% |
| 39 | N | 22   | 21   | 2    | 45   |
|    | % | 2.0% | 2.5% | .9%  | 2.1% |
| 40 | N | 20   | 10   | 5    | 35   |

|    |   |      |      |      |      |
|----|---|------|------|------|------|
|    | % | 1.8% | 1.2% | 2.3% | 1.6% |
| 41 | N | 24   | 17   | 3    | 44   |
|    | % | 2.1% | 2.1% | 1.4% | 2.0% |
| 42 | N | 22   | 8    | 4    | 34   |
|    | % | 2.0% | 1.0% | 1.9% | 1.6% |
| 43 | N | 20   | 15   | 3    | 38   |
|    | % | 1.8% | 1.8% | 1.4% | 1.8% |
| 44 | N | 19   | 15   | 2    | 36   |
|    | % | 1.7% | 1.8% | .9%  | 1.7% |
| 45 | N | 33   | 17   | 4    | 54   |
|    | % | 2.9% | 2.1% | 1.9% | 2.5% |
| 46 | N | 25   | 14   | 8    | 47   |
|    | % | 2.2% | 1.7% | 3.8% | 2.2% |
| 47 | N | 25   | 16   | 4    | 45   |
|    | % | 2.2% | 1.9% | 1.9% | 2.1% |
| 48 | N | 27   | 32   | 14   | 73   |
|    | % | 2.4% | 3.9% | 6.6% | 3.4% |
| 49 | N | 19   | 15   | 8    | 42   |
|    | % | 1.7% | 1.8% | 3.8% | 1.9% |
| 50 | N | 10   | 17   | 3    | 30   |
|    | % | .9%  | 2.1% | 1.4% | 1.4% |
| 51 | N | 13   | 9    | 7    | 29   |
|    | % | 1.2% | 1.1% | 3.3% | 1.3% |
| 52 | N | 22   | 12   | 4    | 38   |
|    | % | 2.0% | 1.5% | 1.9% | 1.8% |
| 53 | N | 20   | 15   | 4    | 39   |
|    | % | 1.8% | 1.8% | 1.9% | 1.8% |
| 54 | N | 21   | 9    | 2    | 32   |
|    | % | 1.9% | 1.1% | .9%  | 1.5% |
| 55 | N | 23   | 10   | 1    | 34   |
|    | % | 2.0% | 1.2% | .5%  | 1.6% |
| 56 | N | 30   | 18   | 0    | 48   |
|    | % | 2.7% | 2.2% | 0.0% | 2.2% |
| 57 | N | 26   | 19   | 1    | 46   |
|    | % | 2.3% | 2.3% | .5%  | 2.1% |
| 58 | N | 27   | 23   | 7    | 57   |
|    | % | 2.4% | 2.8% | 3.3% | 2.6% |
| 59 | N | 20   | 24   | 8    | 52   |
|    | % | 1.8% | 2.9% | 3.8% | 2.4% |
| 60 | N | 5    | 14   | 0    | 19   |
|    | % | .4%  | 1.7% | 0.0% | .9%  |
| 61 | N | 4    | 13   | 3    | 20   |
|    | % | .4%  | 1.6% | 1.4% | .9%  |
| 62 | N | 0    | 7    | 0    | 7    |
|    | % | 0.0% | .8%  | 0.0% | .3%  |
| 63 | N | 0    | 7    | 0    | 7    |
|    | % | 0.0% | .8%  | 0.0% | .3%  |
| 64 | N | 0    | 2    | 0    | 2    |
|    | % | 0.0% | .2%  | 0.0% | .1%  |
| 65 | N | 0    | 3    | 0    | 3    |
|    | % | 0.0% | .4%  | 0.0% | .1%  |
| 66 | N | 0    | 1    | 0    | 1    |
|    | % | 0.0% | .1%  | 0.0% | .0%  |
| 67 | N | 0    | 5    | 2    | 7    |

|       |   |        |        |        |        |
|-------|---|--------|--------|--------|--------|
|       | % | 0.0%   | .6%    | .9%    | .3%    |
| 68    | N | 0      | 4      | 0      | 4      |
|       | % | 0.0%   | .5%    | 0.0%   | .2%    |
| 69    | N | 0      | 3      | 0      | 3      |
|       | % | 0.0%   | .4%    | 0.0%   | .1%    |
| 70    | N | 0      | 16     | 1      | 17     |
|       | % | 0.0%   | 1.9%   | .5%    | .8%    |
| 71    | N | 0      | 10     | 1      | 11     |
|       | % | 0.0%   | 1.2%   | .5%    | .5%    |
| Total | N | 1124   | 827    | 213    | 2164   |
|       | % | 100.0% | 100.0% | 100.0% | 100.0% |

### 3. CHAPTER 3 DEMOGRAPHIC CHARACTERISTICS OF CHILDREN UNDER 5 YEARS OF AGE

#### Abstract

This Chapter reports key findings and observations on demographic characteristics of children under 5 (CU5) living in three iHDSS sites, namely Asaro, Hiri, and Hides. The total of 2,843 CU5 were recorded in the iHDSS database by the end of May 2016. The data analysis focuses on key demographic characteristics of this population.

The record shows that the entire population of CU5 from Hides and Hiri are located in the rural areas of Papua New Guinea while Asaro reported 35.1% from urban settings and 64.9% from rural settings.

Hiri and Asaro reported more than half of their CU5 population i.e. 54.9% and 60.8% respectively, who were delivered in provincial or district hospitals, while Hides recorded 35.8%. Interestingly, Hides recorded a higher proportion of 35.1% of CU5 who were delivered at home compared to Hiri and Asaro which have 23.1% and 17.0% respectively.

#### Distribution of children under five

**Table 3-1 Household and CU5 distribution by iHDSS site, PNG IMR's iHDSS, 2016**

| iHDSS sites |   | Number of dwellings | Number of CU5 |
|-------------|---|---------------------|---------------|
| Asaro       | N | 1559                | 1006          |
|             | % | 48.2%               | 35.4%         |
| Hides       | N | 460                 | 408           |
|             | % | 14.2%               | 14.4%         |
| Hiri        | N | 1215                | 1429          |
|             | % | 37.6%               | 50.3%         |
| All Sites   | N | 3,234               | 2,843         |
|             | % | 100.0%              | 100.0%        |

**Error! Reference source not found.** shows the overall distribution of the CU5 population and households by the iHDSS sites as of June 2016. A total of **3,234** dwellings were included in the GPS database, with the total of **2,843** of CU5 recorded in the three surveillance sites over the reporting period. The data analysis reveals that Hiri recorded the highest number of CU5 (1,429) and accounted for 50.3% of the total CU5 records in the system. Hiri was followed by Asaro with 1,006 CU5 recorded in the site, accounting for 35.4% of the total. Hides recorded the lowest number of 408 (14.4%). In 2016, data collection for CU5 was conducted in Division 3 for Hides only and no data were collected for Karkar since it was removed from the iHDSS.

### Demographic characteristics of children under 5

**Error! Reference source not found.** shows the main demographic characteristics of CU5 across the three surveillance sites. The data show that the entire population of CU5 from Hiri and Hides are from the rural setting (Hiri is more likely peri-urban area, but it was classified under rural in this analysis). Asaro reported 353 children from urban areas, accounting for 35.1% of the CU5 for this site or 12.4% of the entire CU5 population across all 3 sites.

For all 3 sites, 32.3% of the CU5 were born in 2012, 29.0% in 2013 and 26.8% in 2014. By contrast, 10.7% was born in 2015. For the year 2016, a very small proportion (1.1%) of children was recorded because the data collection was done only in January and February of 2016.

The data indicate that 5.5% of CU5 was in the age groups of 0-5 months and 6-11 months. Most of the children (90%) belonged to the age group of 12-59 months. Small proportions were reported at 60-71 months, accounting for only 4.7%.

The sex ratio was 110.4 boys per 100 girls across the three sites. Overall national PNG (2011 Census) sex ratio is 108. The sex ratio of CU5 of boys to girls was slightly high in Asaro (113.7) and relatively low in Hides (97.3). These findings could be biased due to small numbers of CU5 recorded in these two sites. Only a small proportion of parents – care givers reported as ‘don't know’ about the sex of their children, i.e. less than 0.3% for all sites.

**Table 3-2 Demographic characteristics of CU5, PNG IMR's iHDSS, 2016**

|                         |            |   | Hiri      | Asaro     | Hides    | All sites |
|-------------------------|------------|---|-----------|-----------|----------|-----------|
| Rural-Urban sector      | Urban area | N | 0         | 353       | 0        | 353       |
|                         |            | % | 0.0%      | 35.1%     | 0.0%     | 12.4%     |
|                         | Rural area | N | 1429      | 653       | 408      | 2490      |
|                         |            | % | 100.0%    | 64.9%     | 100.0%   | 87.6%     |
|                         | Total      | N | 1,429     | 1,006     | 408      | 2,843     |
|                         |            | % | 100.0%    | 100.0%    | 100.0%   | 100.0%    |
| Year of birth           | 2012       | N | 279       | 212       | 53       | 544       |
|                         |            | % | 31.6%     | 33.3%     | 31.9%    | 32.3%     |
|                         | 2013       | N | 264       | 171       | 54       | 489       |
|                         |            | % | 29.9%     | 26.9%     | 32.5%    | 29.0%     |
|                         | 2014       | N | 267       | 145       | 40       | 452       |
|                         |            | % | 30.3%     | 22.8%     | 24.1%    | 26.8%     |
|                         | 2015       | N | 71        | 90        | 19       | 180       |
|                         |            | % | 8.0%      | 14.2%     | 11.4%    | 10.7%     |
|                         | 2016       | N | 1         | 18        | 0        | 19        |
|                         |            | % | 0.1%      | 2.8%      | 0.0%     | 1.1%      |
|                         | Total      | N | 882       | 636       | 166      | 1,684     |
|                         |            | % | 100.0%    | 100.0%    | 100.0%   | 100.0%    |
| Age completed in months | 0-5        | N | 14        | 28        | 7        | 49        |
|                         |            | % | 1.2%      | 3.4%      | 3.3%     | 2.3%      |
|                         | 6-11       | N | 31        | 31        | 8        | 70        |
|                         |            | % | 2.8%      | 3.7%      | 3.8%     | 3.2%      |
|                         | 12-23      | N | 273       | 108       | 34       | 415       |
|                         |            | % | 24.3%     | 13.1%     | 16.0%    | 19.2%     |
|                         | 24-35      | N | 260       | 189       | 53       | 502       |
|                         |            | % | 23.1%     | 22.9%     | 24.9%    | 23.2%     |
|                         | 36-47      | N | 279       | 183       | 45       | 507       |
|                         |            | % | 24.8%     | 22.1%     | 21.1%    | 23.4%     |
|                         | 48-59      | N | 258       | 203       | 59       | 520       |
|                         |            | % | 23.0%     | 24.5%     | 27.7%    | 24.0%     |
|                         | 60-71      | N | 9         | 85        | 7        | 101       |
|                         |            | % | 0.8%      | 10.3%     | 3.3%     | 4.7%      |
|                         | Total      | N | 1,124     | 827       | 213      | 2,164     |
|                         |            | % | 100.0%    | 100.0%    | 100.0%   | 100.0%    |
| Sex                     | Male       | N | 588       | 448       | 110      | 1146      |
|                         |            | % | 52.4%     | 53.0%     | 49.3%    | 52.3%     |
|                         | Female     | N | 531       | 394       | 113      | 1038      |
|                         |            | % | 47.3%     | 46.6%     | 50.7%    | 47.4%     |
|                         | DK         | N | 4         | 3         | 0        | 7         |
|                         |            | % | 0.4%      | 0.4%      | 0.0%     | 0.3%      |
|                         | Total      | N | 1,123     | 845       | 223      | 2,191     |
|                         |            | % | 100.0%    | 100.0%    | 100.0%   | 100.0%    |
| Sex ratio (M:F)         |            |   | 110.7:100 | 113.7:100 | 97.3:100 | 110.4:100 |

## Place of birth and availability of birth certificate

**Table 3-3 Place of delivery and birth certificate of CU5, PNG IMR's iHDSS, 2016**

|                   |                               |   | Hiri   | Asaro  | Hides  | All sites |
|-------------------|-------------------------------|---|--------|--------|--------|-----------|
| Place of delivery | Provincial/ district hospital | N | 323    | 436    | 54     | 813       |
|                   |                               | % | 54.9%  | 60.8%  | 35.8%  | 55.8%     |
|                   | CHC / aid post                | N | 127    | 156    | 44     | 327       |
|                   |                               | % | 21.6%  | 21.8%  | 29.1%  | 22.5%     |
|                   | Home                          | N | 136    | 122    | 53     | 311       |
|                   |                               | % | 23.1%  | 17.0%  | 35.1%  | 21.4%     |
|                   | Elsewhere                     | N | 2      | 3      | 0      | 5         |
|                   |                               | % | 0.3%   | 0.4%   | 0.0%   | 0.3%      |
|                   | Total                         | N | 588    | 717    | 151    | 1,456     |
|                   |                               | % | 100.0% | 100.0% | 100.0% | 100.0%    |
| Birth certificate | Yes                           | N | 233    | 157    | 5      | 395       |
|                   |                               | % | 20.7%  | 18.9%  | 2.3%   | 18.2%     |
|                   | No                            | N | 890    | 675    | 211    | 1776      |
|                   |                               | % | 79.3%  | 81.1%  | 97.7%  | 81.8%     |
|                   | Total                         | N | 1,123  | 832    | 216    | 2,171     |
|                   |                               | % | 100.0% | 100.0% | 100.0% | 100.0%    |

Table 3-3 shows the place of birth delivery and proportion of CU5 with birth certificate in the iHDSS sites. A total of 1,456 CU5 responded to the question on place of birth delivery and 2,171 CU5 responded to the question of whether they have a birth certificate.

The data show that Hiri and Asaro reported more than half of CU5, 54.9% and 60.8% respectively were born at provincial or district hospitals, compared to only 35.8% recorded in Hides. The proportion of children being born at Community Health Centres and Aid Post were 22.5% for all three sites, similar in Hiri and Asaro, 21.6% and 21.8% respectively, but higher in Hides, 29.1%. In contrast, Hides recorded a higher proportion (35.1%) of CU5 who were born at home compared to 23.1% and 17.0% reported in Hiri and Asaro respectively. A very small proportion of CU5 (less than 0.4%) reported being born 'elsewhere' across the three sites.

Across all sites, only 18.2% of CU5 reported having a birth certificate. The highest proportion of having a birth certificate was recorded in Hiri, (20.7%), followed by Asaro, (18.9%) and Hides, (2.3%). These data are lower than the figures reported previously in the PiHP March 2015 Report, using the data from the Household Update Book (HUB). This point will be further analysed in the Discussion Chapter.

**Table 3-4 Birth weight of CU5, PNG IMR's iHDSS, 2016**

|                        |                     |   | Hiri   | Asaro  | Hides  | All sites |
|------------------------|---------------------|---|--------|--------|--------|-----------|
| Birth weight           | <1499               | N | 1      | 6      | 1      | 8         |
|                        |                     | % | 0.2%   | 1.0%   | 1.9%   | 0.7%      |
|                        | 1500-1799           | N | 0      | 3      | 0      | 3         |
|                        |                     | % | 0.0%   | 0.5%   | 0.0%   | 0.3%      |
|                        | 1800-2199           | N | 34     | 55     | 5      | 94        |
|                        |                     | % | 6.6%   | 9.4%   | 9.4%   | 8.1%      |
|                        | 2200-2799           | N | 76     | 110    | 7      | 193       |
|                        |                     | % | 14.7%  | 18.8%  | 13.2%  | 16.7%     |
|                        | 2800-3199           | N | 240    | 211    | 23     | 474       |
|                        |                     | % | 46.4%  | 36.1%  | 43.4%  | 41.0%     |
|                        | 3200-3599           | N | 132    | 89     | 11     | 232       |
|                        |                     | % | 25.5%  | 15.2%  | 20.8%  | 20.1%     |
|                        | 3600-3999           | N | 18     | 71     | 2      | 91        |
|                        |                     | % | 3.5%   | 12.1%  | 3.8%   | 7.9%      |
|                        | >4000               | N | 16     | 40     | 4      | 60        |
|                        |                     | % | 3.1%   | 6.8%   | 7.5%   | 5.2%      |
|                        | Total               | N | 517    | 585    | 53     | 1,155     |
|                        |                     | % | 100.0% | 100.0% | 100.0% | 100.0%    |
| Source of birth weight | Health record book  | N | 287    | 300    | 49     | 636       |
|                        |                     | % | 48.8%  | 41.7%  | 56.3%  | 45.6%     |
|                        | Hospital book       | N | 2      | 94     | 0      | 96        |
|                        |                     | % | 0.3%   | 13.1%  | 0.0%   | 6.9%      |
|                        | Care giver's recall | N | 268    | 206    | 12     | 486       |
|                        |                     | % | 45.6%  | 28.6%  | 13.8%  | 34.8%     |
|                        | DK                  | N | 31     | 120    | 26     | 177       |
|                        |                     | % | 5.3%   | 16.7%  | 29.9%  | 12.7%     |
|                        | Total               | N | 588    | 720    | 87     | 1,395     |
|                        |                     | % | 100.0% | 100.0% | 100.0% | 100.0%    |

Table 3-4 shows birth weight and the source of birth weight data of CU5 in the iHDSS sites. Birth weight data were recorded for 1,155 CU5 and sources of data on birth weight were reported by 1,395 CU5. The data show that 41.0% had birth weight between 2,800 to 3,199



grams in all 3 sites. 9.1% of CU5 reported less than 2,200 grams at birth, with the highest proportion (11.3%) in Hides and the lowest proportion (6.8%) recorded in Hiri. By contrast, 5.2% of CU5 were 4,000 grams or more at birth across the three sites. Again, the highest proportion (7.5%) was recorded in Hides and the lowest proportion (3.1%) was found in Hiri.

To have better understanding of the reliability of data on birth weight, the source of data was investigated among 1,395 respondents. The records showed that higher proportion of their CU5 population recorded birth weight in their health record books, 48.8% in Hiri, 41.7% in Asaro, and 56.3% in Hides. Child care giver's recall on birth weight was 34.8% across all three sites, but more popular in Hiri (45.6%) than other sites, 28.6% in Asaro and 13.8% in Hides. By contrast, 12.7% of respondents did not know the source of data on birth weight, with the highest proportion of responses as 'don't know' observed in Hides (29.9%), followed by Asaro (16.7%) and lowest in Hiri (5.3%).

#### 4. CHAPTER 4 BREASTFEEDING AND NUTRITION

##### Abstract

This chapter presents a summary of key findings from the breastfeeding and nutritional status of children under five years old from the Module on Breastfeeding. A total of 2,063 CU5 living in three iHDSS sites: Hiri, Asaro and Hides were included in this data analysis.

The percentage of children ever breastfed was high, 96%, with similar levels observed in urban and rural areas, in the three surveillance sites, between male and female children, and across age groups. 26% of the children were currently breastfed.

Exclusive breastfeeding rate among children aged 0-5 months was at 61%, with the highest rate among children aged 2-3 months (84%). Predominant breastfeeding rate among children in this age group was 65.3%, with a higher rate in urban area (87%) than in rural area (54%). The predominant breastfeeding rate was highest in Asaro (75%), followed by Hides (71%) and lowest in Hiri (43%).

The continued breastfeeding rates at 1 year and at 2 years were very high, 96.6% and 97%, respectively. Similar proportions were observed between urban and rural areas, across surveillance sites or between the two sexes. The duration of exclusive breastfeeding was the same with predominant breastfeeding, which were measured by the median and mean, at 3 months and 2.8 months, respectively.

Age-appropriate breastfeeding was measured among children aged 0-23 months. For children aged 0-5 months, only 5% was reported as being breastfed appropriately, with the highest rate in Asaro (9%), followed by Hides (8%) and lowest in Hiri (2%).

Appropriate introduction of solid, semi-solid and soft foods to children aged 6-8 months was 60%, 75% in urban area and 54% in rural area, with the higher rate in Asaro, 75% compared to Hiri 47%. The minimum meal frequency among children aged 6-23 months - 3 meals with solid, semi-solid and soft foods or more per day plus breastfeeding - was only 29.9%.

The Millennium Development Goal is to reduce by half the proportion of people who suffer from hunger between 1990 and 2015. A reduction in the prevalence of malnutrition will also assist in the goal to reduce child mortality.

## Breastfeeding

It is recommended that breastfeeding be initiated within one hour of birth. WHO and UNICEF have the following feeding recommendations:

- Exclusive breastfeeding for the first six months;
- Continued breastfeeding for two years or more;
- Safe, appropriate and adequate complementary foods beginning at 6 months;
- Frequency of complementary feeding: two times per day for 6-8 month olds; three times per day for 9-11 month olds.

Indicators related to recommended child feeding practices are as follows:

- Early initiation of breastfeeding (within one hour of birth);
- Exclusive breastfeeding rate (< 6 months)<sup>2</sup>;
- Predominant breastfeeding rate (< 6 months)<sup>3</sup>;
- Continued breastfeeding rate (at 1 year and at 2 years);
- Duration of breastfeeding;
- Age-appropriate breastfeeding (0-23 months);
- Introduction of solid, semi-solid and soft foods (6-8 months);
- Minimum meal frequency (6-23 months);
- Milk feeding frequency for non-breastfeeding children (6-23 months);
- Bottle feeding (0-23 months).

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<sup>2</sup> Exclusively breastfed refers to infants who received breast milk only (and possibly vitamins, mineral supplements, or medicine), but not anything else.

<sup>3</sup> Received breast milk and certain fluids (plain water and water-based drinks like sugar water, fruit juice, gripe water, oral rehydration solution, tea or herbal infusions), but did not receive anything else (in particular non-human milk and food based fluids).

Table 4-1 presents the breast feeding practice of mother/child care takers of 2,063 CU5 living in the three surveillance sites over the reporting period. The percentage of children ever breastfed was high, 96%, with similar levels observed in urban and rural areas. No significant difference was observed across the three surveillance sites, between male and female children, and across age groups (around 96%). No disparity was noticed across any background variable.

26% of the CU5 were currently breastfed, with higher proportion in urban area (39%) and lower in rural area (24%). However, there was no difference between male and female children, 25% and 26%, respectively. More than 90% of children in the age group of 0-11 months was currently breastfed, compared to 63% of children aged 12-23 months and 25% of those aged 24-35 months. Only 6% and 2% of children in the age groups of 36-47 and 48-59 months were still breast fed.

**Table 4-1 Percentage of breastfeeding practice among CU5, PNG IMR's iHDSS, 2016**

|            |        | No. of CU5 | Ever been breastfed |       | Currently being breastfed |       |
|------------|--------|------------|---------------------|-------|---------------------------|-------|
|            |        |            | N                   | %     | N                         | %     |
| Sector     | Urban  | 261        | 246                 | 94.3% | 103                       | 39.5% |
|            | Rural  | 1802       | 1739                | 96.5% | 435                       | 24.1% |
|            | Total  | 2063       | 1985                | 96.2% | 538                       | 26.1% |
| iHDSS site | Hiri   | 1115       | 1072                | 96.1% | 253                       | 22.7% |
|            | Asaro  | 742        | 710                 | 95.7% | 239                       | 32.2% |
|            | Hides  | 206        | 203                 | 98.5% | 46                        | 22.3% |
|            | Total  | 2063       | 1985                | 96.2% | 538                       | 26.0% |
| Sex        | Male   | 1078       | 1037                | 96.2% | 277                       | 25.7% |
|            | Female | 975        | 938                 | 96.2% | 257                       | 26.4% |
|            | Total  | 2053       | 1975                | 96.2% | 534                       | 26.0% |
| Age group  | 0-11   | 119        | 117                 | 98.3% | 108                       | 90.8% |
|            | 12-23  | 415        | 401                 | 96.6% | 263                       | 63.4% |
|            | 24-35  | 502        | 487                 | 97.0% | 127                       | 25.3% |
|            | 36-47  | 507        | 490                 | 96.6% | 30                        | 5.9%  |
|            | 48-59  | 520        | 490                 | 94.2% | 10                        | 1.9%  |
|            | Total  | 2063       | 1985                | 96.2% | 538                       | 26.1% |

**Table 4-2 Mother's breastfeeding practices by age group of CU5, PNG IMR's iHDSS, 2016**

|        |        | Children aged 0-5 months |                         |       | Children aged 12-23 months |  |       | Children aged 24-35 months |  |       |
|--------|--------|--------------------------|-------------------------|-------|----------------------------|--|-------|----------------------------|--|-------|
|        |        | No. of children          | Predominantly breastfed |       | No. of children            | Continued breastfeeding at 1 years old |       | No. of children            | Continued breastfeeding at 2 years old |       |
|        |        |                          | N                       | %     |                            | N                                      | %     |                            | N                                      | %     |
| Sector | Urban  | 16                       | 14                      | 87.5% | 63                         | 61                                     | 96.8% | 64                         | 60                                     | 93.8% |
|        | Rural  | 33                       | 18                      | 54.5% | 352                        | 340                                    | 96.6% | 438                        | 427                                    | 97.5% |
|        | Total  | 49                       | 32                      | 65.3% | 415                        | 401                                    | 96.6% | 502                        | 487                                    | 97.0% |
| iHDSS  | Hiri   | 14                       | 6                       | 42.9% | 273                        | 262                                    | 96.0% | 260                        | 254                                    | 97.7% |
|        | Asaro  | 28                       | 21                      | 75.0% | 108                        | 106                                    | 98.1% | 189                        | 181                                    | 95.8% |
|        | Hides  | 7                        | 5                       | 71.4% | 34                         | 33                                     | 97.1% | 53                         | 52                                     | 98.1% |
|        | Total  | 49                       | 32                      | 65.3% | 415                        | 401                                    | 96.6% | 502                        | 487                                    | 97.0% |
| Sex    | Male   | 29                       | 20                      | 69.0% | 213                        | 206                                    | 96.7% | 262                        | 253                                    | 96.6% |
|        | Female | 20                       | 12                      | 60.0% | 201                        | 197                                    | 98.0% | 236                        | 230                                    | 97.5% |
|        | Total  | 49                       | 32                      | 65.3% | 415                        | 401                                    | 96.6% | 498                        | 483                                    | 97.0% |

Table 4-2 illustrates mothers/care givers breastfeeding practices by age groups of children under 5 years old. There were 49 children aged less than 6 months and 65.3% of them were predominantly breastfed. The proportion of children aged 0-5 months, who were predominantly breastfed was higher in urban area (87%) than in rural area (54%). The predominant breastfeeding rate was highest in Asaro (75%), followed by Hides (71%) and lowest in Hiri (43%). The rate was also higher among male children than female children, 69% and 60%, respectively.

By the age of 12-23 months, 401 out of 414 children (96.6%) were continued to be breastfed, with similar proportions observed between urban and rural areas. No significant difference was seen across surveillance sites or between the two sexes.

By the age of 24-35 months, 97% of the children were still breastfed by mothers/care givers, but the proportion was slightly higher among rural children than urban children, 97% compared to

93%. Differences in breastfeeding between girls and boys are minimal, however, considerable variations are observed by sites.

### Breastfeeding pattern

Table 4-3 shows the detailed patterns of breastfeeding practices among mothers/care givers of children aged 0-23 months by the age of the children. Exclusive breastfeeding refers to infants, who received breast milk only, and possibly vitamins, mineral supplements, or medicine, but not anything else. Exclusively breastfed was measured among children aged 0-5 months at 61% (30 out of 49 children), with the highest rate among children aged 2-3 months (84%) and lowest among children aged 0-1 months (42.1%). By the end of the age of five months, the percentage of children exclusively breastfed was at 64.7%.

Only 17 children (3.2%) were reported to have breastfeeding, together with vitamin, mineral supplements. All were 8 months or above. The majority of children (80%) were breastfed and given plain water. The proportion of these children increased in accordance with the age groups i.e. it was at 15% among children aged 2-3 months, but increased to 95% of children aged 18-19 months.

Children who received breast milk and plain water only are referred as full breastfeeding or exclusive breastfeeding. Only 29% of children received full breastfeeding at the first six months. The full breastfeeding rate increased by age groups, from 15% in the age group of 2-3 months to 94% in the age group of 20-21 months, and 85% in age group of 22-23 months. Among newborns less than two months of age, almost a half are breastfed and fed with plain water (47.4%).

The proportion of children who were fed with mother's breast milk and infant formula was very low (4.7%) among all children aged 0-23 months. The small proportion was also observed for children, who were mother breastfed, and together with ORESOL (1.7%) or with yogurt (1.5%).

The supplementation of breast milk with other liquids and solid/semi-solid foods begins at very early age of children, from 0-1 months old, with 36% were reported having given these foods.

Table 4-3 Feeding patterns among children aged 0-23 months, PNG IMR's iHDSS, 2016

| Age in month | No. of children aged 0-23 months |   | Exclusively breastfed | Breastfed and vitamins, mineral supplements | Breastfed and plain water | Breastfed and Infant formula | Breastfed and Other milk | Breastfed and Fruit juice, juice drinks | Breastfed and Soup, greens, meat water | Breastfed and Oresol | Breastfed and Other liquids, tea, coke | Breastfed and Yogurt | Breastfed and Rice porridge, noodles | Breastfed and Solid, semi solid foods | Never breastfed |
|--------------|----------------------------------|---|-----------------------|---|---------------------------|------------------------------|--------------------------|---|--|----------------------|--|----------------------|--------------------------------------|---------------------------------------|-----------------|
| 0-1          | 19                               | N | 8                     | 0   | 9                         | 3                            | 2                        | 5                                       | 4                                      | 0                    | 6                                      | 0                    | 5                                    | 7                                     | 1               |
|              |                                  | % | 42.1                  | 0.0   | 47.4                      | 15.8                         | 10.5                     | 26.3                                    | 21.1                                   | 0.0                  | 31.6                                   | 0.0                  | 26.3                                 | 36.8                                  | 5.3             |
| 2-3          | 13                               | N | 11                    | 0   | 2                         | 0                            | 0                        | 1                                       | 1                                      | 0                    | 0                                      | 0                    | 1                                    | 1                                     | 0               |
|              |                                  | % | 84.6                  | 0.0   | 15.4                      | 0.0                          | 0.0                      | 7.7                                     | 7.7                                    | 0.0                  | 0.0                                    | 0.0                  | 7.7                                  | 7.7                                   | 0.0             |
| 4-5          | 17                               | N | 11                    | 0   | 5                         | 0                            | 0                        | 0                                       | 0                                      | 0                    | 1                                      | 0                    | 2                                    | 2                                     | 0               |
|              |                                  | % | 64.7                  | 0.0   | 29.4                      | 0.0                          | 0.0                      | 0.0                                     | 0.0                                    | 0.0                  | 5.9                                    | 0.0                  | 11.8                                 | 11.8                                  | 0.0             |
| 6-7          | 18                               | N |                       | 0   | 12                        | 0                            | 2                        | 1                                       | 3                                      | 0                    | 2                                      | 0                    | 3                                    | 12                                    | 0               |
|              |                                  | % |                       | 0.0   | 66.7                      | 0.0                          | 11.1                     | 5.6                                     | 16.7                                   | 0.0                  | 11.1                                   | 0.0                  | 16.7                                 | 66.7                                  | 0.0             |
| 8-9          | 25                               | N |                       | 1   | 19                        | 1                            | 3                        | 8                                       | 6                                      | 1                    | 9                                      | 0                    | 8                                    | 13                                    | 0               |
|              |                                  | % |                       | 4.0   | 76.0                      | 4.0                          | 12.0                     | 32.0                                    | 24.0                                   | 4.0                  | 36.0                                   | 0.0                  | 32.0                                 | 52.0                                  | 0.0             |
| 10-11        | 27                               | N |                       | 1   | 21                        | 2                            | 2                        | 10                                      | 12                                     | 0                    | 10                                     | 0                    | 9                                    | 15                                    | 1               |
|              |                                  | % |                       | 3.7   | 77.8                      | 7.4                          | 7.4                      | 37.0                                    | 44.4                                   | 0.0                  | 37.0                                   | 0.0                  | 33.3                                 | 55.6                                  | 3.7             |
| 12-13        | 102                              | N |                       | 3   | 82                        | 1                            | 9                        | 29                                      | 40                                     | 0                    | 59                                     | 2                    | 49                                   | 54                                    | 3               |
|              |                                  | % |                       | 2.9   | 80.4                      | 1.0                          | 8.8                      | 28.4                                    | 39.2                                   | 0.0                  | 57.8                                   | 2.0                  | 48.0                                 | 52.9                                  | 2.9             |
| 14-15        | 60                               | N |                       | 2   | 50                        | 2                            | 12                       | 33                                      | 25                                     | 0                    | 37                                     | 1                    | 31                                   | 36                                    | 1               |
|              |                                  | % |                       | 3.3   | 83.3                      | 3.3                          | 20.0                     | 55.0                                    | 41.7                                   | 0.0                  | 61.7                                   | 1.7                  | 51.7                                 | 60.0                                  | 1.7             |
| 16-17        | 53                               | N |                       | 4   | 42                        | 5                            | 9                        | 20                                      | 25                                     | 1                    | 31                                     | 2                    | 26                                   | 21                                    | 3               |
|              |                                  | % |                       | 7.5   | 79.2                      | 9.4                          | 17.0                     | 37.7                                    | 47.2                                   | 1.9                  | 58.5                                   | 3.8                  | 49.1                                 | 39.6                                  | 5.7             |
| 18-19        | 60                               | N |                       | 1   | 57                        | 5                            | 11                       | 31                                      | 23                                     | 0                    | 49                                     | 2                    | 33                                   | 27                                    | 1               |
|              |                                  | % |                       | 1.7   | 95.0                      | 8.3                          | 18.3                     | 51.7                                    | 38.3                                   | 0.0                  | 81.7                                   | 3.3                  | 55.0                                 | 45.0                                  | 1.7             |
| 20-21        | 70                               | N |                       | 4   | 66                        | 4                            | 9                        | 41                                      | 22                                     | 4                    | 59                                     | 0                    | 43                                   | 23                                    | 1               |
|              |                                  | % |                       | 5.7   | 94.3                      | 5.7                          | 12.9                     | 58.6                                    | 31.4                                   | 5.7                  | 84.3                                   | 0.0                  | 61.4                                 | 32.9                                  | 1.4             |
| 22-23        | 70                               | N |                       | 1   | 60                        | 2                            | 12                       | 38                                      | 15                                     | 2                    | 52                                     | 1                    | 44                                   | 30                                    | 5               |
|              |                                  | % |                       | 1.4   | 85.7                      | 2.9                          | 17.1                     | 54.3                                    | 21.4                                   | 2.9                  | 74.3                                   | 1.4                  | 62.9                                 | 42.9                                  | 7.1             |
| Total        | 534                              | N | 30                    | 17  | 426                       | 25                           | 71                       | 237                                     | 207                                    | 9                    | 315                                    | 8                    | 254                                  | 241                                   | 16              |
|              |                                  | % | 61.2                  | 3.2   | 79.8                      | 4.7                          | 13.3                     | 44.4                                    | 38.8                                   | 1.7                  | 59.0                                   | 1.5                  | 47.6                                 | 45.1                                  | 3.0             |



## Duration of breastfeeding

**Table 4-4 Median and mean of the duration of any breastfeeding, exclusive breastfeeding, and predominant breastfeeding among children aged 0-35 months, PNG IMR's iHDSS, 2016**

| No. of children<br>aged 0-35 months    |       |      | Exclusively<br>breastfeeding | Predominantly<br>breastfeeding | Any<br>breastfeeding |       |       |
|--|-------|------|------------------------------|--------------------------------|----------------------|-------|-------|
| Sector                                 | Urban | 162  | N                            | 10                             | 14                   | 156   |       |
|  |       |      | %                            | 6.2%                           | 8.6%                 | 96.3% |       |
|  | Rural | 874  | N                            | 16                             | 18                   | 849   |       |
|  |       |      | %                            | 1.8%                           | 2.1%                 | 97.1% |       |
|  | Total | 1036 | N                            | 26                             | 32                   | 1005  |       |
|  |       | %    | 2.5%                         | 3.1%                           | 97.0%                |       |       |
| iHDSS<br>sites                         | Hiri  | 578  | N                            | 6                              | 6                    | 559   |       |
|  |       |      | %                            | 1.0%                           | 1.0%                 | 96.7% |       |
|  | Asaro | 356  | N                            | 16                             | 21                   | 346   |       |
|  |       |      | %                            | 4.5%                           | 5.9%                 | 97.2% |       |
|  | Hides | 102  | N                            | 4                              | 5                    | 100   |       |
|  |       |      | %                            | 3.9%                           | 4.9%                 | 98.0% |       |
|  | Total | 1036 | N                            | 26                             | 32                   | 1005  |       |
|  |       |      | %                            | 2.5%                           | 3.1%                 | 97.0% |       |
|  | Sex   | Male | 541                          | N                              | 16                   | 20    | 525   |
|  |       |      |                              | %                              | 3.0%                 | 3.7%  | 97.0% |
| Female                                 |       | 489  | N                            | 10                             | 12                   | 474   |       |
|  |       |      | %                            | 2.0%                           | 2.5%                 | 96.9% |       |
| Total                                  |       | 1030 | N                            | 26                             | 32                   | 999   |       |
|  |       |      | %                            | 2.5%                           | 3.1%                 | 97.2% |       |
| Median of<br>breastfeeding<br>duration |       |      | 3.0                          | 3.0                            | 23.0                 |       |       |
| Mean of<br>breastfeeding<br>duration   |       |      | 2.8                          | 2.8                            | 21.8                 |       |       |

Table 4-4 shows the median and mean of the duration of breastfeeding among children aged 0-35 months by selected background characteristics. For exclusive breastfeeding, only 2.5% of children aged 0-35 months reported so, with higher proportion observed in urban area (6%) than rural area (1.8%). Asaro reported higher exclusive breastfeeding rate (4.5%), followed by Hides (3.9%) and lowest in Hiri (1%). Male and female children were exclusively breastfed with the similar rate (3% and 2%). The median duration of exclusive breastfeeding was three months and the mean was of 2.8 months.

Predominant breastfeeding rate was slightly higher than exclusive breastfeeding at 3% for all surveillance sites but median and mean of duration were the same.

With regard to any breastfeeding among children aged 0-35 months, most of all children were reported breastfed (97%) with similar proportion recorded in urban and rural sector, across surveillance sites, and sex of children. The median duration was 23 months and the mean was 21.8 months for any breastfeeding.

### Age-appropriate breastfeeding

Another indicator to monitor the breastfeeding practice among mother/care takers is the age-appropriate breastfeeding rate among children aged 0-23 months. Different criteria for adequate feeding are used depending on the age of the child. For infants aged 0-5 months, exclusive breastfeeding is considered as adequate feeding, while infants aged 6-23 months are considered to be adequately fed if they are receiving breast milk and additional foods such as solid, semi-solid or soft food.

Table 4-5 provides information about age-appropriate breastfeeding among mother/care givers by rural-urban sector, surveillance sites and sex of the children for two separate groups of 0-5 and 6-23 months.

For children in age group of 0-5 months, 5% was reported as being breastfed appropriately, with 10% reported in urban area compared to 3.8% in rural sector. The appropriate breastfeeding rate was reported highest in Asaro (9%), followed by Hides (8%) and lowest in Hiri (2%). Male

children were more likely to be fed appropriately than females, 5.7% compared to 4%, but the difference is not significant.

**Table 4-5 Age-appropriate breastfeeding among children aged 0-23 months, PNG IMR's iHDSS, 2016**

|        |        | No. of children aged 0-23 months | Exclusively breastfed among children 0-5 months |       | Breastfed and solid, semi-solid, foods among children aged 6-23 months |       | Appropriately breastfed among children aged 0-23 months |       |
|--------|--------|----------------------------------|---|-------|--|-------|---|-------|
|        |        |                                  | N   | %     | N  | %     | N   | %     |
| Sector | Urban  | 96                               | 10  | 10.4% | 60   | 62.5% | 70  | 72.9% |
|        | Rural  | 422                              | 16  | 3.8%  | 177  | 41.9% | 193   | 45.7% |
|        | Total  | 518                              | 26  | 5.1%  | 237  | 45.8% | 263   | 50.8% |
| iHDSS  | Hiri   | 318                              | 6   | 1.9%  | 107  | 33.6% | 113   | 35.5% |
|        | Asaro  | 167                              | 16  | 9.6%  | 99   | 59.3% | 115   | 68.9% |
|        | Hides  | 49                               | 4   | 8.2%  | 31   | 63.3% | 35  | 71.4% |
|        | Total  | 534                              | 26  | 4.9%  | 237  | 44.4% | 263   | 49.3% |
| Sex    | Male   | 279                              | 16  | 5.7%  | 128  | 45.9% | 144   | 51.6% |
|        | Female | 253                              | 10  | 4.0%  | 108  | 42.7% | 118   | 46.6% |
|        | Total  | 532                              | 26  | 4.9%  | 236  | 44.4% | 262   | 49.2% |

Appropriate breastfeeding rate among children aged 6-23 months was reported at 45%, with 63% in urban area and 42% in rural area. Hides reported the highest rate, 63%, followed by Asaro, 59% and lowest in Hiri 33%. Again male children were more likely than females to be fed appropriately, 45% compared to 43% respectively, but the difference is not significant.

Taking the two age groups together, age-appropriate feeding of children below 24 months was around 50%. The widest range is observed across regions, with the Hides site indicating the highest percentage appropriately fed (71.4%) and the lowest (35.5%) in the Hiri site. This observation will be further analysed in the discussion chapter.

## Introduction of solid, semi-solid or soft foods

The introduction of solid and semi-solid foods or soft foods to children should be commencing at the sixth month onward to 8 months. Further analysis was conducted among children in this age group to provide better understanding of breastfeeding and food feeding among PNG parents and care givers.

**Table 4-6 Infants aged 6-8 months who currently breastfed and received solid, semi-solid foods, PNG IMR's iHDSS, 2016**

|        | No. of children<br>aged 6-8 months | Currently breastfed |        | Currently fed with solid<br>or semi-solid foods |        | Breastfed and fed with<br>solid, semisolid foods |        |
|--------|------------------------------------|---------------------|--------|---|--------|--|--------|
|        |                                    | N                   | %      | N   | %      | N  | %      |
| Urban  | 8                                  | 8                   | 100.0% | 6   | 75.0%  | 6  | 75.0%  |
| Rural  | 22                                 | 20                  | 90.9%  | 12  | 54.5%  | 11   | 50.0%  |
| Total  | 30                                 | 28                  | 93.3%  | 18  | 60.0%  | 17   | 56.7%  |
| Hiri   | 17                                 | 11                  | 64.7%  | 8   | 47.1%  | 7  | 41.2%  |
| Asaro  | 12                                 | 16                  | 133.3% | 9   | 75.0%  | 9  | 75.0%  |
| Hides  | 1                                  | 1                   | 100.0% | 1   | 100.0% | 1  | 100.0% |
| Total  | 30                                 | 28                  | 93.3%  | 18  | 60.0%  | 17   | 56.7%  |
| Male   | 17                                 | 17                  | 100.0% | 8   | 47.1%  | 8  | 47.1%  |
| Female | 12                                 | 10                  | 83.3%  | 9   | 75.0%  | 8  | 66.7%  |
| DK     | 1                                  | 1                   | 100.0% | 1   | 100.0% | 1  | 100.0% |
| Total  | 30                                 | 28                  | 93.3%  | 18  | 60.0%  | 17   | 56.7%  |

Table 4-6 shows 93% of children aged 6-8 months currently breastfed, 60% was given solid and semi solid foods and 56.7% of them were currently breastfed and given solid, semi-solid foods. The appropriate introduction of solid and semi-solid foods to children aged 6-8 months was higher in urban area, 75% than rural area, 54%, with the higher rate in Asaro, 75% compared to Hiri 47% (only one child reported in Hides). Female children were more likely than male ones to be fed properly with solid and semi-solid foods at the age of 6-8 months, 75% compared to 47%, respectively. The shift in gender disparity will be discussed in the Discussion Chapter.

## Meal frequency

Breastfed children between 6-8 months old should commence two or more meals of solid, semi-solid or soft foods per day, and three or more meals if they are 9-23 months of age. For children 6-23 months and older who are not breastfed, four or more meals of solid, semi-solid or soft foods or milk feeds are needed. Among currently breastfeeding children aged 6-8 months, minimum meal frequency is defined as children who also received solid, semi-solid or soft foods 2 times or more. Among currently breastfeeding children aged 9-23 months, receipt of solid, semi-solid or soft foods at least 3 times constitutes minimum meal frequency. For non-breastfeeding children aged 6-23 months, minimum meal frequency is defined as children receiving solid, semi-solid or soft foods, and milk feeds, at least 4 times during the previous day.

**Table 4-7 Frequency of meals among children aged 6-23 months who received solid, semi-solid, or soft foods during the previous day, PNG IMR's iHDSS, 2016**

|        |        | No. of children aged 6-23 months | Currently breastfeeding plus receiving solid, semi-solid and soft foods for three (3) times or more |       | Currently not breastfeeding, but receiving solid, semisolid and soft foods or milk feeds four (4) times or more |      |
|--------|--------|----------------------------------|---|-------|---|------|
|        |        | N                                | N   | %     | N   | %    |
| Sector | Urban  | 82                               | 42  | 51.2% | 1   | 1.2% |
|        | Rural  | 403                              | 103   | 25.6% | 7   | 1.7% |
|        | Total  | 485                              | 145   | 29.9% | 8   | 1.6% |
| iHDSS  | Hiri   | 304                              | 62  | 20.4% | 4   | 1.3% |
|        | Asaro  | 139                              | 65  | 46.8% | 4   | 2.9% |
|        | Hides  | 42                               | 18  | 42.9% | 0   | 0.0% |
|        | Total  | 485                              | 145   | 29.9% | 8   | 1.6% |
| Sex    | Male   | 250                              | 74  | 29.6% | 5   | 2.0% |
|        | Female | 233                              | 70  | 30.0% | 3   | 1.3% |
|        | Total  | 483                              | 144   | 29.8% | 8   | 1.7% |

Table 4-7 shows that among 485 children aged 6-23 months, 145 children were currently breastfed plus received solid, semi-solid and soft foods 3 times or more per day, accounted for 29.9% of the children in this age group. This proportion of urban was doubled than rural area,

51% compared to 25%, respectively. Asaro recorded the highest proportion (46%), then Hides, (42%) and Hiri (20%). The proportion was similar between male and female children.

Among children who are currently not breastfed, only 8 children (1.6%) received solid, semi-solid and soft foods or milk feeds for 4 times or more per day.

## Bottle feeding

**Table 4-8 Bottle feeding with a nipple among children aged 0-23 months during the previous day, PNG IMR's iHDSS, 2016**

|                    |        | N  | %     |
|--------------------|--------|----|-------|
| Sector             | Urban  | 14 | 14.3% |
|                    | Rural  | 63 | 14.4% |
|                    | Total  | 77 | 14.4% |
| iHDSS              | Hiri   | 59 | 18.6% |
|                    | Asaro  | 15 | 9.0%  |
|                    | Hides  | 3  | 6.1%  |
|                    | Total  | 77 | 14.4% |
| Sex                | Male   | 41 | 14.7% |
|                    | Female | 36 | 14.2% |
|                    | Total  | 77 | 14.4% |
| Age group in month | 0-5    | 6  | 12.2% |
|                    | 6-11   | 9  | 12.9% |
|                    | 12-23  | 62 | 14.9% |
|                    | Total  | 77 | 14.4% |

Table 4-8 shows that bottle-feeding was low in PNG. 14.4% of children aged 0-23 months were fed using a bottle with a nipple. Hiri in particular has the highest number of children being bottle fed across the three iHDSS sites i.e. 18.6%. Bottle feeding is more common among children aged 12-23 months which constitutes 14.9%.

## Vitamin A Supplementation

The 1990 World Summit for Children set the goal of virtual elimination of vitamin A deficiency and its consequences, including blindness, by the year 2000. This goal was also endorsed at the

Policy Conference on Ending Hidden Hunger in 1991, the 1992 International Conference on Nutrition, and the UN General Assembly's Special Session on Children in 2002. The critical role of vitamin A for child health and immune function also makes control of deficiency a primary component of child survival efforts and therefore critical to the achievement of the fourth Millennium Development Goal: a two-thirds reduction in CU5 mortality by the year 2015.

For countries with vitamin A deficiency problems, current international recommendations call for high-dose vitamin A supplementation every four to six months, targeted to all children between the ages of 6-59 months living in affected areas. Providing young children with two high-dose vitamin A capsules a year is a safe, cost-effective, efficient strategy for eliminating vitamin A deficiency and improving child survival. Giving vitamin A to new mothers who are breastfeeding helps protect their children during the first months of life and helps to replenish the mother's stores of vitamin A, which are depleted during pregnancy and lactation. The definition of the indicator is the percentage of children aged 6-59 months receiving at least one high dose vitamin A supplement in the last six months.

In the year 2002, PNG Government approved the Vitamin A Supplementation as part of postnatal care program. Based on UNICEF/WHO guidelines, the National Department of Health recommends that children aged 6-11 months be given one high dose Vitamin A capsule per year and children aged 12-59 months be given another vitamin A capsule (for every 6 months). Vitamin A supplementation is integrated with immunization services and is given when the child has contact with these services after six months of age. It is also recommended that mothers take a vitamin A supplement within eight weeks of giving birth due to increased Vitamin A requirements during pregnancy and lactation.

**Table 4-9 Vitamin A supplementation among CU5, PNG IMR's iHDSS, 2016**

|              |        | Child health book/ immunization card |       | Mother/ care taker's recall |       |
|--------------|--------|--------------------------------------|-------|-----------------------------|-------|
|              |        | N                                    | %     | N                           | %     |
| Sector       | Urban  | 127                                  | 51.8% | 135                         | 55.1% |
|              | Rural  | 848                                  | 47.9% | 554                         | 31.3% |
|              | Total  | 975                                  | 48.4% | 689                         | 34.2% |
| iHDSS        | Hiri   | 563                                  | 51.1% | 243                         | 22.1% |
| Site         | Asaro  | 327                                  | 45.8% | 372                         | 52.1% |
|              | Hides  | 85                                   | 42.7% | 74                          | 37.2% |
|              | Total  | 975                                  | 48.4% | 689                         | 34.2% |
| Sex          | Male   | 508                                  | 48.4% | 374                         | 35.7% |
|              | Female | 463                                  | 48.5% | 312                         | 32.7% |
|              | Total  | 974                                  | 48.6% | 686                         | 34.2% |
| Age in month | 0-11   | 30                                   | 42.9% | 37                          | 52.9% |
|              | 12-23  | 214                                  | 51.6% | 191                         | 46.0% |
|              | 24-35  | 243                                  | 48.4% | 175                         | 34.9% |
|              | 36-47  | 223                                  | 44.0% | 150                         | 29.6% |
|              | 48-59  | 214                                  | 41.2% | 136                         | 26.2% |
|              | Total  | 924                                  | 45.9% | 689                         | 34.2% |

Table 4-9 shows percentage of children aged 6-59 months who received a high dose Vitamin A supplement within six months prior to the data collection. Vitamin A supplementation coverage is lower in the highlands surveillance sites than in the coastal surveillance site. While there are not much different by sex, there is an important difference noticeable between the two sector as the urban area has a high number of children getting vitamin A supplement (51.8%) than the rural areas (47.9%) as recorded in their health record book.

The age pattern of Vitamin A supplementation shows that the highest proportions (51.6%) of children who receive the vitamin supplement are aged 12-23 months. Only 42.9% of children within 6-11 months received the first dose. The least age group of children who receive dose of vitamin A supplement is children between 48-59 months.



## 5. CHAPTER 5 DIETARY AND FOOD SECURITY

### Abstract

This Chapter presents findings on dietary and food security situation across the three surveillance sites. Data for 2,003 children aged 6-59 months were analysed for dietary intakes. 84% were fed with root vegetables. 76.7% fed with green vegetables, with Asaro and Hides, 94% and 91%, respectively, compared to 62% in Hiri. The majority of children (76%) were given fresh fruits, with Asaro at 93%, followed by Hiri, 71% and lowest in Hides, 41%. 84% of children were most likely fed with fresh meat, fish, chicken and pork with children at Hiri at 92% and Hides 89%, compared to 69% in Asaro. Tinned meat, fish, chicken and pork was reported by 91% of children and Hiri reported the highest proportion (94%). The proportion of children who were fed with dried food cooked at home was 69% compared to 49% being fed with foods bought from shop.

Data of 2,003 children were analysed on sugar and soft-drink consumption per day in a typical week. 75% consumed 0-4 teaspoons of sugar added to the drinks per day, with 97% in urban area and 72% in rural area. This dietary intakes was more popular in the highlands i.e. 96% in Asaro and 89% in Hides compared to 60% in Hiri. With regard the consumption of soft drinks, 44% of children reported consuming less than 250ml of soft-drinks per week, but lower in urban children, 26% and higher in rural children 47%. 59% for Hiri and 60% for Hides consume less than 250ml of soft drink each week compared to 17% for Asaro.

1,769 respondents to the questions on food security, of which 1,096 participants (54%), reported having experience of food shortage in their villages, highest in Asaro (85%), followed by Hides (46%) and lowest in Hiri (35%). Further analysis showed the majority (65%) reported the food shortage happened 4-6 months prior to the interview time, particularly high in Hiri site, 87%. 41% in Hiri respondents reported food shortage occurring once every year and 64% of respondents in Hides reported it very month.

## Dietary intake

To understand the diet of CU5, parents/ caregivers were asked questions on how many days in the typical week they feed their children with different types of food. As children aged 0-5 months are supposed to be exclusively breast fed, the data analysis was conducted only with children aged 6-59 months. There were 2,003 children, aged 6-59 months who caregivers/parents responded to regarding the questions on dietary intake. Table 5-1 shows the dietary intake of children in a typical week.

With regard root vegetables such as kaukau, taro, yam, potatoes, 84.6% of children were fed these root vegetables. Urban children were more likely than rural children (91.8% and 83.6%) to be fed with root vegetables. Most of all children in Asaro (95.1%) and Hides (95.5) were reported being fed with this diet, higher than those in Hiri (75.8%). This diet was the same (85%) between male and female children. It was clear that this diet increased by the age groups of children: 48.6% in the age group 6-11 months, 74.2% in age group 12-23 months, 86.4% in age group 24-35 months, 88.4% in age group 36-47 months, and 92.1% in the age group 49-59 months.

For the dietary intake on green vegetables like aibika and beans, the majority of children (76.7%) reported being fed these vegetables, with a higher proportion in urban children (88.2%) than in rural ones (75%). Again the proportion of children being fed with green vegetables was higher in Asaro and Hides, 94% and 91%, respectively, compared to 62% in Hiri. There was no significant difference between male and female children being fed with this diet, 78% and 75%, respectively. The proportion of children being fed with green vegetables also increased corresponding with the age groups i.e. 35% in age group 6-11 months, 56% in age group 12-23 months, 81% in age group 24-35 months and 88% in age group 48-59 months.

The majority of children (76%) were given fresh fruits such as pawpaw, orange, mango and avocado, particularly in urban area (92%) compared to 74% in rural area. Asaro reported the highest proportion of children being fed with fruit (93%), followed by Hiri (71%) and lowest in Hides, 41%. The same proportion of male and female children reported being given this diet,

77% and 74%, respectively. Fresh fruits were also given more to children with higher age i.e. 45% in age group 6-11 months and 79% in age group 48-59 months.

84% of children were fed with fresh meat, fish, chicken and pork. There was no difference between urban and rural children for this diet, 82% and 84%, respectively. Children in Hiri and Hides were more likely fed with fresh meat, 92% and 89%, compared to Asaro, 69%. Similar proportions of male and female children (84%) were fed with this food. However, older children were more likely to be given fresh meat than the younger age group e.g. the proportion of children being fed with fresh meat increased from 45% in age group 6-11 months to 77% in age group 12-23 months, and 88% in age group 48-59 months.

Similar to fresh meat, tinned meat, fish, chicken and pork diet, was observed with more than 91% of children reported receiving these foods, 88% for urban children and 91% for rural children. Hiri reported the highest proportion of children on this diet (94%), followed by Asaro (89%) and Hides (85%). There was no different between male and female children, 91% being fed with this food, but the difference was significant between the children in age group 6-11 months (38%) and those in age group 12-23 months (86%).

The data showed that the proportion of children who were fed dried foods cooked at home such as flour, rice, vegetable, meat, 69% was significantly higher compared to those children fed with foods bought from a shop including balls, chips, lamb flaps 49%. Children in urban area were more likely than those in rural area to be fed with dried foods, cooked at home, 74% compared to 69% respectively, or purchased from shop, 63% in urban area compared to 47% in rural area. Hiri reported highest proportion of being fed with fried foods cooked at home (83%), but lowest proportion of being fed with dried foods purchased from shop.

By contrast, children in Hides were fed less with home-cooked dried foods cooked but more with purchased fried foods, 17% and 51%, respectively. Asaro children were fed with more or less the same with home-cooked foods compared to purchased-dried foods, 64% and 68%. There was no difference in the dried food diet reported for male and female children, with about 70% and 69% of them were reported fed with this food. Children were more likely to be fed with home-made dried foods than purchased-fried food across all age groups e.g. for the children in age group 6-

11 months, 18% of them were fed with home-made dried foods, compared to 14% of purchased-fried foods.

48% of children were fed with maggie or stock cube put directly on the food. This figure was similar between urban and rural children. However, the proportion was highest in Asaro (57%) followed by Hiri (46%) and lowest in Hides (27%). No difference in this diet between male and female children, 48% and 49%, but this diet increased across age groups, 10% among children aged 6-11 months to 59% among those aged 48-59 months.

Salt was put directly on the food of 64% of children, with Hides reporting using salt for only 33%.. Male and female children had a similar proportion using salt at about 64%. However, salt was likely to be added onto food for older children e.g. it increased from 15% of children aged 6-11 month to 65% of those aged 24-35 months and 80% of 48-59 months.

**Table 5-1 Dietary intake of children aged 6-59 months in a typical week, PNG IMR's iHDSS, 2016**

|           |        | No. children 6-59 months | Fed with root vegetables: kaukau, taro, yam, or potatoes |      | Fed with greens vegetables: aibika, beans |      | Fed with fresh fruits: pawpaw, orange, mango, avocado |       | Fed with fresh meat, fish, chicken or pork |      | Fed with tinned meat, fish, chicken, pork |      | Fed with dried foods: flour, rice, vegetables, meat cooked at home |      | Fed with fried food: balls, chips, lamb flaps purchased from shop |      | Fed with maggie or stock cube put directly on food |      | Fed with salt put directly on food |      |
|-----------|--------|--------------------------|--|------|---|------|---|-------|--|------|---|------|--|------|---|------|--|------|------------------------------------|------|
|           |        | N                        | N  | %    | N   | %    | N   | %     | N  | %    | N   | %    | N  | %    | N   | %    | N  | %    | N                                  | %    |
| Sector    | Urban  | 245                      | 225  | 91.8 | 216                                       | 88.2 | 225   | 91.8  | 202  | 82.4 | 216                                       | 88.2 | 182  | 74.3 | 156   | 63.7 | 121  | 49.4 | 126                                | 51.4 |
|           | Rural  | 1758                     | 1469   | 83.6 | 1320                                      | 75.1 | 1302  | 74.1  | 1482                                       | 84.3 | 1619                                      | 92.1 | 1219   | 69.3 | 838   | 47.7 | 855  | 48.6 | 1166                               | 66.3 |
|           | Total  | 2003                     | 1694   | 84.6 | 1536                                      | 76.7 | 1527  | 76.2  | 1684                                       | 84.1 | 1835                                      | 91.6 | 1401   | 69.9 | 994   | 49.6 | 976  | 48.7 | 1292                               | 64.5 |
| iHDSS     | Hiri   | 1094                     | 829  | 75.8 | 682                                       | 62.3 | 782   | 71.5  | 1011                                       | 92.4 | 1028                                      | 94.0 | 908  | 83.0 | 405   | 37.0 | 511  | 46.7 | 748                                | 68.4 |
|           | Asaro  | 711                      | 676  | 95.1 | 673                                       | 94.7 | 663   | 93.2  | 496  | 69.8 | 638                                       | 89.7 | 459  | 64.6 | 487   | 68.5 | 411  | 57.8 | 478                                | 67.2 |
|           | Hides  | 198                      | 189  | 95.5 | 181                                       | 91.4 | 82  | 41.4  | 177  | 89.4 | 169                                       | 85.4 | 34   | 17.2 | 102   | 51.5 | 54   | 27.3 | 66                                 | 33.3 |
|           | Total  | 2003                     | 1694   | 84.6 | 1536                                      | 76.7 | 1527  | 76.2  | 1684                                       | 84.1 | 1835                                      | 91.6 | 1401   | 69.9 | 994   | 49.6 | 976  | 48.7 | 1292                               | 64.5 |
| Sex       | Male   | 1045                     | 893  | 85.5 | 817                                       | 78.2 | 811   | 77.6  | 881  | 84.3 | 957                                       | 91.6 | 738  | 70.6 | 517   | 49.5 | 513  | 49.1 | 676                                | 64.7 |
|           | Female | 948                      | 792  | 83.5 | 710                                       | 74.9 | 708   | 74.7  | 796  | 84.0 | 869                                       | 91.7 | 655  | 69.1 | 472   | 49.8 | 458  | 48.3 | 611                                | 64.5 |
|           | DK     | 5                        | 4  | 80.0 | 4   | 80.0 | 5   | 100.0 | 3  | 60.0 | 4   | 80.0 | 4  | 80.0 | 3   | 60.0 | 3  | 60.0 | 4                                  | 80.0 |
|           | Total  | 1998                     | 1689   | 84.5 | 1531                                      | 76.6 | 1524  | 76.3  | 1680                                       | 84.1 | 1830                                      | 91.6 | 1397   | 69.9 | 992   | 49.6 | 974  | 48.7 | 1291                               | 64.6 |
| Age group | 6-11   | 70                       | 34   | 48.6 | 25  | 35.7 | 32  | 45.7  | 24   | 34.3 | 27  | 38.6 | 13   | 18.6 | 10  | 14.3 | 7  | 10.0 | 11                                 | 15.7 |
|           | 12-23  | 411                      | 305  | 74.2 | 232                                       | 56.4 | 299   | 72.7  | 318  | 77.4 | 354                                       | 86.1 | 233  | 56.7 | 118   | 28.7 | 134  | 32.6 | 171                                | 41.6 |
|           | 24-35  | 501                      | 433  | 86.4 | 407                                       | 81.2 | 389   | 77.6  | 443  | 88.4 | 470                                       | 93.8 | 380  | 75.8 | 267   | 53.3 | 245  | 48.9 | 326                                | 65.1 |
|           | 36-47  | 502                      | 444  | 88.4 | 413                                       | 82.3 | 393   | 78.3  | 440  | 87.6 | 486                                       | 96.8 | 389  | 77.5 | 287   | 57.2 | 283  | 56.4 | 367                                | 73.1 |
|           | 48-59  | 519                      | 478  | 92.1 | 459                                       | 88.4 | 414   | 79.8  | 459  | 88.4 | 498                                       | 96.0 | 386  | 74.4 | 312   | 60.1 | 307  | 59.2 | 417                                | 80.3 |
|           | Total  | 2003                     | 1694   | 84.6 | 1536                                      | 76.7 | 1527  | 76.2  | 1684                                       | 84.1 | 1835                                      | 91.6 | 1401   | 69.9 | 994   | 49.6 | 976  | 48.7 | 1292                               | 64.5 |

## Sugar and soft-drink

**Table 5-2 Sugar and soft-drink consumption among children aged 6-59 months per day in a typical week, PNG IMR, 2016**

|                 |        | No.<br>children<br>6-59<br>months | Number of teaspoon of sugar added to the drinks |       |                  |       |                    |       |                    |      |                  |      | Volume of soft-drink given to child per day |       |          |       |            |       |                |      |             |   |
|-----------------|--------|-----------------------------------|---|-------|------------------|-------|--------------------|-------|--------------------|------|------------------|------|---|-------|----------|-------|------------|-------|----------------|------|-------------|---|
|                 |        |                                   | 0-4 teaspoons                                   |       | 5-9<br>teaspoons |       | 10-14<br>teaspoons |       | 15-19<br>teaspoons |      | 20+<br>teaspoons |      | None  |       | 1-250 ml |       | 251-500 ml |       | 501-1000<br>ml |      | 1001+<br>ml |   |
|                 |        | N                                 | N   | %     | N                | %     | N                  | %     | N                  | %    | N                | %    | N   | %     | N        | %     | N          | %     | N              | %    | N           | % |
| Sector          | Urban  | 245                               | 239   | 97.6% | 5                | 2.0%  | 0                  | 0.0%  | 0                  | 0.0% | 0                | 0.0% | 94  | 38.4% | 65       | 26.5% | 65         | 26.5% | 4              | 1.6% | 0           | 0 |
|                 | Rural  | 1758                              | 1281  | 72.9% | 335              | 19.1% | 121                | 6.9%  | 11                 | 0.6% | 3                | 0.2% | 464   | 26.4% | 826      | 47.0% | 347        | 19.7% | 6              | 0.3% | 0           | 0 |
|                 | Total  | 2003                              | 1520  | 75.9% | 340              | 17.0% | 121                | 6.0%  | 11                 | 0.5% | 3                | 0.1% | 558   | 27.9% | 891      | 44.5% | 412        | 20.6% | 10             | 0.5% | 0           | 0 |
| iHDSS           | Hiri   | 1094                              | 658   | 60.1% | 302              | 27.6% | 120                | 11.0% | 11                 | 1.0% | 1                | 0.1% | 87  | 8.0%  | 648      | 59.2% | 252        | 23.0% | 5              | 0.5% | 0           | 0 |
|                 | Asaro  | 711                               | 685   | 96.3% | 21               | 3.0%  | 0                  | 0.0%  | 0                  | 0.0% | 2                | 0.3% | 417   | 58.6% | 124      | 17.4% | 140        | 19.7% | 4              | 0.6% | 0           | 0 |
|                 | Hides  | 198                               | 177   | 89.4% | 17               | 8.6%  | 1                  | 0.5%  | 0                  | 0.0% | 0                | 0.0% | 54  | 27.3% | 119      | 60.1% | 20         | 10.1% | 1              | 0.5% | 0           | 0 |
|                 | Total  | 2003                              | 1520  | 75.9% | 340              | 17.0% | 121                | 6.0%  | 11                 | 0.5% | 3                | 0.1% | 558   | 27.9% | 891      | 44.5% | 412        | 20.6% | 10             | 0.5% | 0           | 0 |
| Sex             | Male   | 1045                              | 789   | 75.5% | 180              | 17.2% | 62                 | 5.9%  | 6                  | 0.6% | 2                | 0.2% | 296   | 28.3% | 450      | 43.1% | 225        | 21.5% | 2              | 0.2% | 0           | 0 |
|                 | Female | 948                               | 723   | 76.3% | 159              | 16.8% | 58                 | 6.1%  | 5                  | 0.5% | 1                | 0.1% | 257   | 27.1% | 438      | 46.2% | 185        | 19.5% | 8              | 0.8% | 0           | 0 |
|                 | DK     | 5                                 | 4   | 80.0% | 1                | 20.0% | 0                  | 0.0%  | 0                  | 0.0% | 0                | 0.0% | 3   | 60.0% | 1        | 20.0% | 1          | 20.0% | 0              | 0.0% | 0           | 0 |
|                 | Total  | 1998                              | 1516  | 75.9% | 340              | 17.0% | 120                | 6.0%  | 11                 | 0.6% | 3                | 0.2% | 556   | 27.8% | 889      | 44.5% | 411        | 20.6% | 10             | 0.5% | 0           | 0 |
| Age in<br>month | 0-11   | 70                                | 66  | 94.3% | 3                | 4.3%  | 0                  | 0.0%  | 1                  | 1.4% | 0                | 0.0% | 53  | 75.7% | 12       | 17.1% | 0          | 0.0%  | 0              | 0.0% | 0           | 0 |
|                 | 12-23  | 411                               | 324   | 78.8% | 59               | 14.4% | 26                 | 6.3%  | 0                  | 0.0% | 0                | 0.0% | 127   | 30.9% | 203      | 49.4% | 36         | 8.8%  | 1              | 0.2% | 0           | 0 |
|                 | 24-35  | 501                               | 380   | 75.8% | 81               | 16.2% | 36                 | 7.2%  | 1                  | 0.2% | 2                | 0.4% | 135   | 26.9% | 235      | 46.9% | 95         | 19.0% | 4              | 0.8% | 0           | 0 |
|                 | 36-47  | 502                               | 362   | 72.1% | 99               | 19.7% | 32                 | 6.4%  | 7                  | 1.4% | 0                | 0.0% | 119   | 23.7% | 236      | 47.0% | 120        | 23.9% | 3              | 0.6% | 0           | 0 |
|                 | 48-59  | 519                               | 388   | 74.8% | 98               | 18.9% | 27                 | 5.2%  | 2                  | 0.4% | 1                | 0.2% | 124   | 23.9% | 205      | 39.5% | 161        | 31.0% | 2              | 0.4% | 0           | 0 |
|                 | Total  | 2003                              | 1520  | 75.9% | 340              | 17.0% | 121                | 6.0%  | 11                 | 0.5% | 3                | 0.1% | 558   | 27.9% | 891      | 44.5% | 412        | 20.6% | 10             | 0.5% | 0           | 0 |

Table 5-2 shows the sugar and soft-drink consumption among children aged 6-59 months per day in a typical week. Data for 2,003 children were analysed. The results indicated that 75% of children consumed 0-4 teaspoons of sugar added to the drinks per day, with 97% reported in urban areas and 72% reported in rural areas. This amount of sugar consumption was more popular in the highlands i.e. 96% in Asaro and 89% in Hides compared to 60% in Hiri. Similar proportions were reported between male and female children (75%), meaning there was no difference between the two groups.

17% of children reported consuming 5-9 teaspoons of sugar, most of these children were rural base (19%) compared to only 2% is urban. This amount of sugar consumption was highest in Hiri, 27% compared to 8% in Hides and 3% in Asaro. Again there was no difference between the two sexes in this diet intake, at 17% and 16%, respectively. However this diet appeared more popular among older children i.e. it increased from 4% among children in age group 0-11 months to 14% in age group 12-23 months and, 18% in age group 48-59 months.

Small proportion of children reported consuming 10-14 teaspoons of sugar (6%) and very few consumed 15-19 teaspoons or more per day.

With regard the consumption of soft drinks among children aged 6-59 months, the data was analysed for five levels of consumption: None, 1-250 ml, 251-500 ml, 501-1000 ml, and 1001+ ml per day.

27% reported not consuming any, 38% in urban and 26% in rural. The proportion of children reported no soft drink was highest in Asaro (58%), followed by Hides (27%) and lowest in Hiri (8%). Again, no difference was observed between male and female children. 75% of children in age group of 0-11 months reported no soft drink.

44% of children reported consuming less than 250ml of soft-drinks per day, with urban children at 26% and rural children at 47%. Children in Hiri and Hides consumed soft drinks much greater (59% and 60%), compared to Asaro (17%). There were no differences between male and female child groups for this diet. It was obvious that soft drinks become more popular among older

children i.e. it increased from 17% among children in age group of 0-11 months to 49% in age group of 12-23 months.

About 20% of children in the surveillance sites reported consuming 251-500ml soft drinks per day in a typical week, with the highest proportion in Hiri (23%), followed by Asaro (19%) and Hides (10%).

Few children reported consuming 501-1000 ml per day.

No child was reported having consumed greater than 1000ml of soft drinks per day.

## Food shortage

**Table 5-3 Food shortage experienced in the last 12 months, PNG IMR's iHDSS, 2016**

|                    |           |   | Food shortage experienced |       |       |         | Total  |
|--------------------|-----------|---|---------------------------|-------|-------|---------|--------|
|                    |           |   | Yes                       | No    | DK    | Missing |        |
| Urban-rural sector | Urban     | N | 192                       | 53    | 0     | 0       | 245    |
|                    |           | % | 78.4%                     | 21.6% | 0.0%  | 0.0%    | 100.0% |
|                    | Rural     | N | 904                       | 473   | 387   | 5       | 1769   |
|                    |           | % | 51.1%                     | 26.7% | 21.9% | .3%     | 100.0% |
|                    | Total     | N | 1096                      | 526   | 387   | 5       | 2014   |
|                    |           | % | 54.4%                     | 26.1% | 19.2% | .2%     | 100.0% |
| iHDSS site         | Hiri      | N | 392                       | 414   | 293   | 2       | 1101   |
|                    |           | % | 35.6%                     | 37.6% | 26.6% | .2%     | 100.0% |
|                    | Asaro     | N | 611                       | 101   | 0     | 2       | 714    |
|                    |           | % | 85.6%                     | 14.1% | 0.0%  | .3%     | 100.0% |
|                    | Hides     | N | 93                        | 11    | 94    | 1       | 199    |
|                    |           | % | 46.7%                     | 5.5%  | 47.2% | .5%     | 100.0% |
|                    | All sites | N | 1096                      | 526   | 387   | 5       | 2014   |
|                    |           | % | 54.4%                     | 26.1% | 19.2% | .2%     | 100.0% |

Parents/child care givers were asked if there was any time when people in the villages did not have enough food to eat in the past 12 months. Table 5-3 shows the result of a total of 1,769 respondents to this question, of which 1,096 participants (54%) reported having experienced food shortage in their villages. Urban parents/child caregiver reported higher proportion (78%)



than rural ones (51%), meaning urban households were more suffered from the draught than the rural households. This could be because rural households could have stronger social supports, based on their family networks that could have helped them to be more resilient and better cope with the food shortage situation. The food shortage in the last 12 months was reported highest in Asaro (85%), followed by Hides (46%) and lowest in Hiri (35%). It is also noted that 19% of respondents replied as ‘don’t know’ to the question.

**Table 5-4 How many month ago did the last food shortage happen, PNG IMR’s iHDSS, 2016**

|                       |              |   | 1-3 months<br>ago | 4-6 months<br>ago | 7-9 months<br>ago | 10-12<br>months ago | DK   | Total |
|-----------------------|--------------|---|-------------------|-------------------|-------------------|---------------------|------|-------|
| Urban-rural<br>sector | Urban        | N | 16                | 132               | 21                | 0                   | 0    | 169   |
|                       |              | % | 9.5%              | 78.1%             | 12.4%             | 0.0%                | 0.0  | 100.0 |
|                       | Rural        | N | 61                | 573               | 237               | 34                  | 2    | 907   |
|                       |              | % | 6.7%              | 63.2%             | 26.1%             | 3.7%                | .2%  | 100.0 |
|                       | Total        | N | 77                | 705               | 258               | 34                  | 2    | 1076  |
|                       |              | % | 7.2%              | 65.5%             | 24.0%             | 3.2%                | .2%  | 100.0 |
| iHDSS site            | Hiri         | N | 19                | 347               | 16                | 11                  | 2    | 395   |
|                       |              | % | 4.8%              | 87.8%             | 4.1%              | 2.8%                | .5%  | 100.0 |
|                       | Asaro        | N | 58                | 317               | 195               | 19                  | 0    | 589   |
|                       |              | % | 9.8%              | 53.8%             | 33.1%             | 3.2%                | 0.0% | 100.0 |
|                       | Hides        | N | 0                 | 41                | 47                | 4                   | 0    | 92    |
|                       |              | % | 0.0%              | 44.6%             | 51.1%             | 4.3%                | 0.0% | 100.0 |
|                       | All<br>sites | N | 77                | 705               | 258               | 34                  | 2    | 1076  |
|                       |              | % | 7.2%              | 65.5%             | 24.0%             | 3.2%                | .2%  | 100.0 |

Parents/child care givers who reported shortage of food in the last 12 months were asked when they experienced the food shortage i.e. when the food shortage happened and how often it happened.

Table 5-4 shows 1076 out of 1096 participants responded to this question. The majority (65%) reported the food shortage happened 4-6 months prior to the interview time and it was particularly high in urban area, 78%, and especially in Hiri site, 87%. By contrast, Hides reported the food shortage over the periods of 4-6 months ago (44%) and 7-9 months ago (51%). These

observations of food security could be linked with the serious drought that occurred in PNG in 2015. The possibility will be further analysed in the Discussion Chapter.

**Table 5-5 Frequency of food shortage occurred in villages in the last 2 years, PNG IMR's iHDSS, 2016**

|                    |           |   | How often food shortage happened? |                    |                  |            | Total  |
|--------------------|-----------|---|-----------------------------------|--------------------|------------------|------------|--------|
|                    |           |   | Every month                       | Every three months | Every six months | Every year |        |
| Urban-rural sector | Urban     | N | 0                                 | 9                  | 12               | 170        | 191    |
|                    |           | % | 0.0%                              | 4.7%               | 6.3%             | 89.0%      | 100.0% |
|                    | Rural     | N | 42                                | 81                 | 357              | 391        | 871    |
|                    |           | % | 4.8%                              | 9.3%               | 41.0%            | 44.9%      | 100.0% |
| Total              | Total     | N | 42                                | 90                 | 369              | 561        | 1062   |
|                    |           | % | 4.0%                              | 8.5%               | 34.7%            | 52.8%      | 100.0% |
| iHDSS site         | Hiri      | N | 0                                 | 17                 | 214              | 162        | 393    |
|                    |           | % | 0.0%                              | 4.3%               | 54.5%            | 41.2%      | 100.0% |
|                    | Asaro     | N | 2                                 | 72                 | 153              | 380        | 607    |
|                    |           | % | .3%                               | 11.9%              | 25.2%            | 62.6%      | 100.0% |
|                    | Hides     | N | 40                                | 1                  | 2                | 19         | 62     |
|                    |           | % | 64.5%                             | 1.6%               | 3.2%             | 30.6%      | 100.0% |
| Total              | All sites | N | 42                                | 90                 | 369              | 561        | 1062   |
|                    |           | % | 4.0%                              | 8.5%               | 34.7%            | 52.8%      | 100.0% |

Table 5-5 shows the frequency of food shortages in the last 2 years. 1,062 participants responded to this question. As showed in Table 5-5, the result indicated that 52% of respondents reported food shortage occurring once every year. The highest reported level was in the urban area, where 89% of respondents reported this experience. For rural areas, 41% reported food shortage every six months and 44% reported once every year. Similar frequencies were also observed among Hiri respondents with 54% reported food shortage every six months and 41% reported this once every year.

By contrast, 62% of Asaro respondents reported food shortage once every year and 64% of respondents in Hides reported it every month. This data indicates food shortage in Hides is a more common problem than Hiri and Asaro.

## 6. CHAPTER 6 IMMUNISATION AND VACCINATION

### Abstract

Immunizing children is the most cost effective and safest intervention for preventable and life threatening diseases. This chapter presents vaccination coverage against common childhood diseases among a total of 2,181 CU5 in three surveillance sites: Hiri (1123), Asaro (835) and Hides (223).

The findings showed that 54% of children had immunisation cards, 38% reported having cards, but could not show them to the data collectors, and 7% had no card. There was no significant difference in availability of immunization record cards/ health record books between urban and rural children, or between male and female children.

Hiri recorded the highest proportions in possession of immunisation card, 58%, followed by Asaro, 52% and Hides, 44%. Hides recorded the highest proportion of children with no immunisation card, 13% and 42% of parents/care takers in Hides could not produce the card. The availability of immunisation cards declined in accordance with the age group of children, with the highest proportion in age group 0-11 months (73%) and lowest in the age group of 48-59 months (49%).

Analysis of vaccination coverage among 415 children aged 12-23 months, who had immunisation cards / health record books showed that 45% of these children received all types of vaccinations at any time before the interviews, but only 36% received all vaccinations before their first birthday. Hiri received the highest proportion of all vaccinations at any time (52%), followed by Asaro (36%) and lowest in Hides (23%). Still 14% of children aged 12-23 months did not received any vaccination with the highest proportion found in Hides, 23%, followed by Asaro 15% and lowest in Hiri 12%. These data indicate that there is poor vaccinations coverage for children across the three surveillance sites, with the most vulnerable and exposed to vaccine preventable disease outbreaks in Hides, followed by Asaro and Hiri.

## Immunization

The Millennium Development Goal (MDG) 4 is to reduce child mortality by two thirds between 1990 and 2015. Immunization plays a key part in this goal. It has saved the lives of millions of children in the three decades since the launch of the Expanded Programme on Immunization (EPI) in 1974. Worldwide there are still 27 million children overlooked by routine immunization and as a result, vaccine-preventable diseases cause more than two million deaths every year. One of the World Fit for Children goals is to ensure full immunization of children under 1 year of age at 90 per cent nationally, with at least 80 per cent coverage in every district or equivalent administrative unit.

According to the PNG National Department of Health (NDoH) guidelines, a child should receive a BCG vaccination at birth to protect against tuberculosis; a birth dose of hepatitis B vaccine, three doses of DPT to protect against diphtheria, pertussis, and tetanus; three doses of Hepatitis B vaccine; three doses of polio vaccine, and a measles vaccination by the age of 12 months. The new Pentavalent vaccine, which combines DPT (Diphtheria + Pertussis + Tetanus), and Hepatitis B, and Hib (Haemophilus influenza type B) antigens was introduced in PNG in January 2009. Administered in three doses, the Pentavalent vaccine replaced the previously separate DPT and Hepatitis B vaccines and provides protection to a child from 5 life-threatening diseases – Diphtheria, Pertussis, Tetanus, Hepatitis B and Haemophilus influenza type B.

In PNG, a child is considered to be fully immunized if he/she receives seven antigens, notably BCG, DPT (1–3), Polio (1–3), measles and Hepatitis B (1–3). Hepatitis B at birth is not included in the full immunization indicator. In this report, mothers/child care givers were asked to provide vaccination cards for CU5, from which interviewers copied vaccination information onto the CU5 Questionnaire, however in the absence of available or completed immunization record, vaccination information was collected based on the mother's/caregiver's recall. The questionnaire was customized to allow the registration of immunizations for children who received single as well as those who received combined vaccines.

## Availability of vaccination record

**Table 6-1 Availability of immunisation cards among CU5, PNG IMR's iHDSS, 2016**

|               |         |   | Card seen  | Card not seen | No Card  | Total      |
|---------------|---------|---|------------|---------------|----------|------------|
| Sector        | Urban   | N | 168        | 122           | 11       | 301        |
|               |         | % | 55.8%      | 40.5%         | 3.6%     | 100.0%     |
|               | Rural   | N | 1022       | 712           | 146      | 1880       |
|               |         | % | 54.3%      | 37.8%         | 7.7%     | 100.0%     |
|               | Total   | N | 1190       | 834           | 157      | 2181       |
|               |         | % | 54.5%      | 38.2%         | 7.2%     | 100.0%     |
| iHDSS Site    | Hiri    | N | 652        | 437           | 34       | 1123       |
|               |         | % | 58.0%      | 38.9%         | 3.0%     | 100.0%     |
|               | Asaro   | N | 439        | 303           | 93       | 835        |
|               |         | % | 52.5%      | 36.2%         | 11.1%    | 100.0%     |
|               | Hides   | N | 99         | 94            | 30       | 223        |
|               |         | % | 44.3%      | 42.1%         | 13.4%    | 100.0%     |
|               | Total   | N | 1190       | 834           | 157      | 2181       |
|               |         | % | 54.5%      | 38.2%         | 7.2%     | 100.0%     |
| Sex           | Male    | N | 632        | 423           | 82       | 1137       |
|               |         | % | 55.5%      | 37.2%         | 7.2%     | 100.0%     |
|               | Female  | N | 554        | 403           | 74       | 1031       |
|               |         | % | 53.7%      | 39.0%         | 7.1%     | 100.0%     |
|               | Missing | N | 3          | 4             | 0        | 7          |
|               |         | % | 42.8%      | 57.1%         | 0.0%     | 100.0%     |
|               | Total   | N | 1189       | 830           | 156      | 2175       |
|               |         | % | 54.6%      | 38.1%         | 7.1%     | 100.0%     |
| Age in Months | 0-11    | N | 87         | 24            | 8        | 119        |
|               |         | % | 73.1%      | 20.1%         | 6.7%     | 100.0%     |
|               | 12 -23  | N | <b>251</b> | <b>155</b>    | <b>9</b> | <b>415</b> |
|               |         | % | 60.4%      | 37.3%         | 2.1%     | 100.0%     |
|               | 24-35   | N | 273        | 198           | 27       | 498        |
|               |         | % | 54.8%      | 39.7%         | 5.4%     | 100.0%     |
|               | 36-47   | N | 262        | 206           | 38       | 506        |
|               |         | % | 51.7%      | 40.7%         | 7.5%     | 100.0%     |
|               | 48-59   | N | 259        | 207           | 53       | 519        |
|               |         | % | 49.9%      | 39.8%         | 10.2%    | 100.0%     |
|               | Total   | N | 1132       | 790           | 135      | 2057       |
|               |         | % | 55.0%      | 38.4%         | 6.5%     | 100.0%     |

Keeping proper vaccination record is an inexpensive yet a very effective way for systematically recording vaccines received by a child. The availability of health records can enhance health professionals' ability to make clinical decisions, empower parents/caregivers in the health care of their children such as developmental milestones, and growth from birth through 5 years old,

and support public health monitoring. Mothers/caregivers of the children who participated in the survey were asked whether they have the health record card/s for their children.

Table 6-1 shows the availability of vaccination cards among a total of 2181 CU5 by sector, surveillance site, sex of the child, and age group (in months). The data analysis showed that the proportion of immunization cards, seen by the interviewers was 54%, but varied slightly across urban and rural sector with little to no significance, 55% and 54%, respectively. The highest proportion of vaccination cards observed was in Hiri (58%), followed by Asaro (52%) and lowest in Hides (44%). There was no significant difference between male and female children in showing the immunization cards. However, there is a clear trend that the proportion of parents/child caregivers who could show the immunization cards to interviewers declined across the child age groups i.e. from 73% among children aged 0-11 months, to 60% in age group of 12-23 months, 54% in age group of 24-35 months, 51% in age group of 36-47 and 49% in age group 48-59.

By contrast, the proportion of parents/care givers who reported having immunization cards, but could not show it was 38%, with the highest rate in Hides, 42%, followed by Hiri, 38% and lowest in Asaro, 36%. Again, there was no significant difference in this figure across sex of the child, but it clearly increased from the lowest age group 0-11 months (20%) to the highest age group of 48-59 (39%). There was strong evidence that many of children had been given immunization cards, but parents/caregivers might have lost it, which is an indicative of poor vaccination record keeping in households. It raises a question on how to advise or help parents/caregivers to keep and maintain immunization card/health record books properly and keep them secure in a conflict situation so that it can be referred to when needed.

It was noted that 7% of children had neither immunization card nor health record book. This proportion was 3% in urban area, but higher in rural area (7.7%). Hides reported the highest proportion of no immunization card, 13%, followed by Asaro (11%) and lowest in Hiri (3%). There was no difference between male and female children in this regard and it seemed that no immunization card proportion was similar across all age groups of children.

### Vaccination coverage

**Table 6-2 Vaccinations among children in aged 12-23 months, who were immunized at any time vs. before 1st birthday, data from Immunisation card, PNG IMR's iHDSS, 2016**

| Immunization                             | At any time before interview |        | Before 1 <sup>st</sup> birthday |        |
|--|------------------------------|--------|---------------------------------|--------|
|  | N                            | %      | N                               | %      |
| BCG                                      | 241                          | 58.1%  | 239                             | 57.6%  |
| Polio 1                                  | 228                          | 54.9%  | 224                             | 54.0%  |
| Polio 2                                  | 220                          | 53.0%  | 212                             | 51.1%  |
| Polio 3                                  | 204                          | 49.2%  | 198                             | 47.7%  |
| Pentavalent1                             | 235                          | 56.6%  | 230                             | 55.4%  |
| Pentavalent2                             | 227                          | 54.7%  | 217                             | 52.3%  |
| Pentavalent3                             | 212                          | 51.1%  | 200                             | 48.2%  |
| DPT1                                     | 230                          | 55.4%  | 226                             | 54.5%  |
| DPT2                                     | 221                          | 53.3%  | 212                             | 51.1%  |
| DPT3                                     | 209                          | 50.4%  | 200                             | 48.2%  |
| HepB at birth                            | 220                          | 53.0%  | 213                             | 51.3%  |
| HepB1                                    | 230                          | 55.4%  | 225                             | 54.2%  |
| HepB2                                    | 222                          | 53.5%  | 211                             | 50.8%  |
| HepB3                                    | 207                          | 49.9%  | 201                             | 48.4%  |
| Measles                                  | 220                          | 53.0%  | 201                             | 48.4%  |
| Children received all vaccinations above | 190                          | 45.8%  | 151                             | 36.4%  |
| Children received any vaccinations above | 59                           | 14.2%  | 98                              | 23.6%  |
| Total children aged 12-23 months         | 415                          | 100.0% | 415                             | 100.0% |

Further analysis of immunization coverage was conducted in the age group of 12-23 months because these children are old enough to be fully vaccinated according to the national guideline. The denominator for the table is comprised of 415 children of this age group, of whom, 251 children had immunization/health record cards (as shown in Table 6-1). Parents or caretakers of these children were asked to show his/her health card for each of the vaccinations: BCG, Polio, Pentavalent, DPT, Hepatitis B and Measles and Vitamin A. The iHDSS data collectors checked the immunization card/health record book for each child how many times the child had been vaccinated, the date (day, month and year) of each vaccination. The information was clarified with parents/caregivers before they were written down onto the data collection form by the data

collectors. The data were analysed for two separate groups of children: (i) children who were vaccinated at any time before the interview; and (ii) children who were vaccinated before their first birthday according to the immunization card/health record book. This analysis shows whether or not children were vaccinated within a timely manner corresponding to WHO vaccination guidelines. The timing when a child is vaccinated is an important factor reflecting the effectiveness and quality of an immunization programme. Children who are vaccinated at the right time with the WHO recommended vaccines before the child's first birth day have a better immunization and more efficacy response to vaccinated diseases.

Results are shown in Table 6-2. Among children, who received immunization and vaccine at any time before the interview, the vaccination coverage was 58% for BCG; 54% for Polio 1, but declined to 53% for Polio 2, and 49% for Polio 3. Similar decline was for Pentavalent: 56% for Pentavalent 1 and declined to 54% for Pentavalent 2 and 51% for Pentavalent 3; DPT 1 was 55%, DPT 2: 53% and DPT 3: 50%; Only 53% of these children were given Hepatitis B vaccine at birth, increased to 55% for first dose, then declined to 53% for second dose and 49% for third dose. Finally, measles vaccination coverage was only 53%.

Overall, 45% children aged 12-23 months received all types of vaccines against most common diseases among children (from BCG to Measles) at any time before the interview. Therefore, it is believed those children are protected from the most common childhood diseases. On the other hand, still 14% of children in this category did not complete vaccinations, or missed out on vaccinations or failed to complete doses of vaccinations according to the PNG immunization schedules.

For children aged 12-23 months, who were given vaccines before their 1<sup>st</sup> birthday, the data showed that the vaccine coverage by the 1<sup>st</sup> birth day was lower than the vaccine coverage at any time across all types of vaccines. For example, measles vaccine coverage before 1<sup>st</sup> birth day was only 48% compared to 53% of vaccination at any time. Only 36% of children were given all vaccines and 23% was given some vaccines before their first birth day.



**Table 6-3 Vaccinations among children aged 12–23 months against childhood diseases at any time before the interview, data from mother/ caregiver recall, PNG IMR's iHDSS, 2016**

| Immunization                             | At any time before the survey |       |
|--|-------------------------------|-------|
|  | N                             | %     |
| BCG                                      | 156                           | 37.6  |
| Polio 1                                  | 38                            | 9.2   |
| Polio 2                                  | 20                            | 4.8   |
| Polio 3                                  | 92                            | 22.2  |
| Pentavalent1                             | 20                            | 4.8   |
| Pentavalent2                             | 25                            | 6.0   |
| Pentavalent3                             | 102                           | 24.6  |
| DPT1                                     | 23                            | 5.5   |
| DPT2                                     | 17                            | 4.1   |
| DPT3                                     | 87                            | 21.0  |
| HepB0 (at birth)                         | 71                            | 17.1  |
| HepB1                                    | 86                            | 20.7  |
| HepB2                                    | 19                            | 4.6   |
| HepB3                                    | 11                            | 2.7   |
| Measles                                  | 138                           | 33.3  |
| Children received all vaccinations above | 57                            | 13.7  |
| Children received any vaccinations above | 163                           | 47.0  |
| Total children aged 12-23 months         | 415                           | 100.0 |

For children without immunization cards, parents/care takers of children aged 12-23 months were asked questions whether or not the child was vaccinated against most common childhood diseases. Questions are asked in a simple way so that interviewer can link the question to each type of different vaccines. For example, BCG vaccination is identified as an injection in the upper arm and that leaves a scar; Polio vaccine as asked as ‘vaccination drops in the mouth; Pentavalent (DPT-VGB-Hib) vaccination was defined as an injection in the thigh or buttock or called as ‘Five in One’ vaccine. If the response is ‘Yes’ then parents/care takers were asked for ‘how many times’ the child had been given such vaccination. It is noted that the number of time a child had received a vaccine means the number of doses of that vaccine are given to the child.

Because this information was collected from the recall of parents/ care givers of the child, it is unrealistic to obtain reliable information on the time of vaccination. Therefore data on vaccination before the first birth day was not collected nor analysed.

Table 6-3 shows the number of children aged 12-23 months who were immunized against childhood diseases at any time before the interview according to the mother's/caregiver's recalls. The data showed that 37% of children received BCG vaccinations. However, Polio vaccination was low at only 9% for Polio 1, but 22% for Polio 3. Similarly, 24% reported having received Pentavalent 3, 21% received DPT 3. HepB 0 was reported at 17% and HepB 1 at 20%. Measles vaccine was reported by only 33% of parents/ caregivers. Overall, only 13% of parents/care givers recalled that their children had received all types of vaccines (BCG to Measles) while 47% of them recalled their children received some of these vaccines.

Data from immunisation cards/health record books was compared and vaccination coverage was observed to be under reported by the parents/care givers. The vaccine coverage data from the mother's/caregiver's recall were interpreted cautiously. This is because some mothers were semi illiterate and forgot past vaccination events/activities performed on their children. For example, some mothers/caregivers misunderstood vaccines given to their children as medications for treatment of diseases such as malaria or pneumonia.

To better understand the vaccination coverage at the locality, immunisation data were further analysed, disaggregated by site and sex of the child regardless of the time when the child received vaccinations up to the date of the interview. Data used from the immunisation cards/health record books of 415 children as it was more reliable than the parents/care takers' recalls.

### **Vaccination coverage by iHDSS site and sex of the child**

Table 6-4 shows vaccination coverage rates among children aged 12–23 months in three surveillance sites. The data of 415 children, including 273 in Hiri, 108 in Asaro and 34 in Hides, who received vaccinations at anytime up to the date of the interview and provided immunization cards/health record books to the interviewers. The data analysis showed that the vaccination coverage was likely highest in Hiri, followed by Asaro, and lowest in Hides across all types of

vaccines against common childhood diseases. For example, BCG vaccination coverage was 59% for all sites, but highest (63%) in Hiri, followed by Asaro (51%) and lowest in Hides (47%). This trend was also observed in all other vaccination types.

**Table 6-4 Vaccination coverage among children aged 12–23 months by iHDSS sites according to immunization cards/ health record books, PNG IMR's iHDSS, 2016**

| Immunization                | Hiri |        | Asaro |        | Hides |        | All sites |        |
|-----------------------------|------|--------|-------|--------|-------|--------|-----------|--------|
|                             | N    | %      | N     | %      | N     | %      | N         | %      |
| BCG                         | 173  | 63.4%  | 56    | 51.9%  | 16    | 47.1%  | 245       | 59.0%  |
| Polio 1                     | 174  | 63.7%  | 48    | 44.4%  | 12    | 35.3%  | 234       | 56.4%  |
| Polio 2                     | 167  | 61.2%  | 46    | 42.6%  | 11    | 32.4%  | 224       | 54.0%  |
| Polio 3                     | 158  | 57.9%  | 44    | 40.7%  | 9     | 26.5%  | 211       | 50.8%  |
| Pentavalent1                | 174  | 63.7%  | 49    | 45.4%  | 15    | 44.1%  | 238       | 57.3%  |
| Pentavalent2                | 169  | 61.9%  | 47    | 43.5%  | 14    | 41.2%  | 230       | 55.4%  |
| Pentavalent3                | 160  | 58.6%  | 45    | 41.7%  | 12    | 35.3%  | 217       | 52.3%  |
| DPT1                        | 174  | 63.7%  | 47    | 43.5%  | 14    | 41.2%  | 235       | 56.6%  |
| DPT2                        | 169  | 61.9%  | 44    | 40.7%  | 13    | 38.2%  | 226       | 54.5%  |
| DPT3                        | 160  | 58.6%  | 44    | 40.7%  | 11    | 32.4%  | 214       | 51.6%  |
| HepB at birth               | 165  | 60.4%  | 53    | 49.1%  | 10    | 29.4%  | 228       | 54.9%  |
| HepB1                       | 174  | 63.7%  | 46    | 42.6%  | 14    | 41.2%  | 234       | 56.4%  |
| HepB2                       | 168  | 61.5%  | 44    | 40.7%  | 13    | 38.2%  | 225       | 54.2%  |
| HepB3                       | 160  | 58.6%  | 42    | 38.9%  | 11    | 32.4%  | 213       | 51.3%  |
| Measles                     | 161  | 59.0%  | 49    | 45.4%  | 15    | 44.1%  | 225       | 54.2%  |
| All vaccinations            | 143  | 52.4%  | 39    | 36.1%  | 8     | 23.5%  | 190       | 45.8%  |
| No vaccinations             | 34   | 12.5%  | 17    | 15.7%  | 8     | 23.5%  | 59        | 14.2%  |
| Total children 12-23 months | 273  | 100.0% | 108   | 100.0% | 34    | 100.0% | 415       | 100.0% |

The proportion of children received all vaccinations was 45% for all three sites, but highest in Hiri (52%) followed by Asaro (36%) and lowest in Hides (23%). There was still 14% of children reported having no vaccination at all, with the highest proportion in Hides (23%) followed by Asaro (15%) and lowest in Hiri (12%).

**Table 6-5 Vaccinations coverage among children aged 12–23 months by sex of the child according to mothers/ care givers' recalls, PNG IMR's iHDSS, 2016**

| Immunization                | Male |        | Female |        | Both sexes |        |
|-----------------------------|------|--------|--------|--------|------------|--------|
|                             | N    | %      | N      | %      | N          | %      |
| BCG                         | 74   | 34.7%  | 82     | 40.6%  | 156        | 37.6%  |
| Polio 1                     | 21   | 9.9%   | 17     | 8.4%   | 38         | 9.2%   |
| Polio 2                     | 10   | 4.7%   | 10     | 5.0%   | 20         | 4.8%   |
| Polio 3                     | 38   | 17.8%  | 54     | 26.7%  | 92         | 22.2%  |
| Pentavalent1                | 12   | 5.6%   | 8      | 4.0%   | 20         | 4.8%   |
| Pentavalent2                | 15   | 7.0%   | 10     | 5.0%   | 25         | 6.0%   |
| Pentavalent3                | 45   | 21.1%  | 57     | 28.2%  | 102        | 24.6%  |
| DPT1                        | 13   | 6.1%   | 10     | 5.0%   | 23         | 5.5%   |
| DPT2                        | 10   | 4.7%   | 7      | 3.5%   | 17         | 4.1%   |
| DPT3                        | 38   | 17.8%  | 49     | 24.3%  | 87         | 21.0%  |
| HepB at birth               | 30   | 14.1%  | 41     | 20.3%  | 71         | 17.1%  |
| HepB1                       | 36   | 16.9%  | 50     | 24.8%  | 86         | 20.7%  |
| HepB2                       | 11   | 5.2%   | 8      | 4.0%   | 19         | 4.6%   |
| HepB3                       | 7    | 3.3%   | 4      | 2.0%   | 11         | 2.7%   |
| Measles                     | 66   | 31.0%  | 72     | 35.6%  | 138        | 33.3%  |
| All vaccinations            | 76   | 35.7%  | 85     | 42.1%  | 161        | 38.8%  |
| No vaccinations             | 9    | 4.2%   | 7      | 3.5%   | 16         | 3.9%   |
| Children DK                 | 1    | 0.5%   | 2      | 1.0%   | 3          | 0.7%   |
| Total children 12-23 months | 213  | 100.0% | 202    | 100.0% | 415        | 100.0% |

Table 6-5 shows the vaccination coverage among children aged 12-23 months against common childhood diseases by sex of the child. Mothers or caregivers of children who had no clinic card or health record book were further asked to recall if their child was immunized in the recent past. Data of 415 children including 213 males and 202 females were taken into the analysis.

Female children were better immunized against the common childhood diseases, according to the parents/ child caregivers. For instance, the BCG coverage was 34% for male, but 40% for female children. Polio3 was 17% and 26% among male and female children, respectively. The trend of

higher vaccination coverage in females than in male children was also observed in other vaccines such as Polio3, Pentavalent3, DPT3, HepB at birth and Measles vaccines. Hence, the proportion of children who were immunized against all vaccinations was also higher among females than males, 41% and 35%, respectively. This sex disparity in vaccination coverage needs to be further investigate to identify the underlying cause of this observation.

### Neonatal tetanus protection among women aged 15-49 years

A goal of the “A World Fit for Children” agenda is to eliminate maternal and neonatal tetanus by 2005. The Millennium Development Goal 5 is to reduce by three quarters the maternal mortality ratio, with one of strategies being to eliminate maternal tetanus by reducing the incidence of neonatal tetanus to less than 1 case per 1,000 live births.

Prevention of maternal and neonatal tetanus requires:

- Women receive at least two doses of tetanus vaccine in the last pregnancy;

However, if women have not received two doses of the vaccine during the pregnancy, they (and their newborn) are also considered to be protected, if the following conditions are met:

- Received at least two doses of tetanus toxoid vaccine, the last within the past three years;
- Received at least three doses, the last within the past five years;
- Received at least four doses, the last within the past ten years;
- Received at least five doses during lifetime.

The data used for the analysis of neonatal tetanus protection among women of reproductive age, 15-49 was available from the Women of Reproductive Age, 15-49 data component of the iHDSS database. This data was collected during July 2015 – December 2015.

**Table 6-6 Neonatal tetanus protection among Women 15-49, who gave a live birth in the last two years, PNG IMR's iHDSS, 2016**

|                     | Number of women gave birth in the last 2 years | Women received at least two doses during last pregnancy | Women, who did not receive two or more doses during the last pregnancy, but received the vaccine in one of following situations: |  |  |     |     |     | Total of women protected from tetanus |
|---------------------|--|---|--|--|--|-----|-----|-----|---------------------------------------|
|                     |  |   | Received at least two doses with the last one within the past three years  | Received at least three doses with the last one within the past five years | Received at least four doses with the last one within the past ten years |     |     |     |                                       |
|                     | N  | N %   | N %  | N %  | N %  | N % | N % | N % |                                       |
| Hiri                | 587  | 189 32.2%   | 33 5.6%  | 6 1.0%   | 2 0.3%   |     |     |     | 230 39.2%                             |
| Asaro               | 326  | 127 39.0%   | 16 4.9%  | 8 2.5%   | 5 1.5%   |     |     |     | 156 47.9%                             |
| Karkar              | 296  | 79 26.7%  | 25 8.4%  | 19 6.4%  | 13 4.4%  |     |     |     | 136 45.9%                             |
| Hides               | 225  | 0 0.0%  | 1 0.4%   | 0 0.0%   | 0 0.0%   |     |     |     | 1 0.4%                                |
| Total               | 1434   | 395 27.5%   | 75 5.2%  | 33 2.3%  | 20 1.4%  |     |     |     | 523 36.5%                             |
| No schooling        | 292  | 39 13.4%  | 5 1.7%   | 5 1.7%   | 1 0.3%   |     |     |     | 50 17.1%                              |
| Preschool           | 17   | 5 29.4%   | 0 0.0%   | 0 0.0%   | 0 0.0%   |     |     |     | 5 29.4%                               |
| Elementary          | 28   | 7 25.0%   | 0 0.0%   | 0 0.0%   | 0 0.0%   |     |     |     | 7 25.0%                               |
| Primary             | 620  | 180 29.0%   | 37 6.0%  | 17 2.7%  | 15 2.4%  |     |     |     | 249 40.2%                             |
| Lower Secondary     | 388  | 129 33.2%   | 25 6.4%  | 9 2.3%   | 3 0.8%   |     |     |     | 166 42.8%                             |
| Upper Secondary     | 61   | 23 37.7%  | 5 8.2%   | 1 1.6%   | 0 0.0%   |     |     |     | 29 47.5%                              |
| Vocational training | 10   | 7 70.0%   | 1 10.0%  | 0 0.0%   | 0 0.0%   |     |     |     | 8 80.0%                               |
| College/University  | 17   | 5 29.4%   | 2 11.8%  | 1 5.9%   | 1 5.9%   |     |     |     | 9 52.9%                               |
| Total               | 1433   | 395 27.6%   | 75 5.2%  | 33 2.3%  | 20 1.4%  |     |     |     | 523 36.5%                             |

Table 6-6 shows the tetanus protection status of 1,434 women aged 15-49 who have had a live birth within the last two years by surveillance site and women's education level. The data shows that 27% of these women received at least two doses of Tetanus vaccine in the last pregnancy, with the highest proportion in Asaro (39%), followed by Hiri (32%) and Karkar (26%) and none in Hides (0%). The Tetanus vaccination coverage in the last pregnancy were likely to increase with the women's education level i.e. it was only 13% among women without schooling, but increased to 29% among women with primary education, 33% among women with lower secondary school and 37% in those with upper secondary education.

Among women who did not receive any tetanus vaccination or only one dose in the last pregnancy, further data analysis was conducted to understand the tetanus vaccination in the past.

The data showed that 5.2% of these women were vaccinated with at least two doses in the past three years (5.6% in Hiri, 4.9% in Asaro, 8.4% in Karkar and 0.4% in Hides), 2.3% was vaccinated in the past 5 years and 1.4% in the past ten years, totaling up 36.5% of women of reproductive age 15-49 being protected from tetanus. The highest proportion of women with tetanus protection was observed in Asaro (47.9%), followed by Karkar (45.9%), and Hiri (39%). Only one woman in Hides reported having received sufficient vaccination in the past ten years to protect her against tetanus infection.

The widest gap in tetanus protection is a function of the women's educational level. The likelihood of being protected against tetanus increased from 17% among women with no education to 52% among those with at tertiary education. There is about 30% points different between women with upper secondary education and those with no education (47% and 17%).

## 7. CHAPTER 7: DIARRHOEA CARE AND TREATMENT

### Abstract

This Chapter reports key findings and observations on treatment and management of diarrhoea among children under 5 years of age who had an episode in 2 weeks prior to the interview date. The chapter presents key indicators such as incidence of diarrhoea, oral rehydration therapy (ORT), home management of diarrhoea, including drinks and foods practices of parents/ care givers, and treatment with medication including oral and injection therapies. The data analyses showed the differences of diarrhea management between rural and urban sectors, surveillance sites including Hiri, Asaro and Hides, sex and age of the children.

Data shows 268 out of 2061 CU5 (13.0%) reported having a diarrhoea episode in the last two weeks. The incidence reported highest in the Hides (32%), compared to 10.9% observed in both Hiri and Asaro, and among children aged 12-23 months (17%) and 24-35 months (14%).

56.3% of children, who had diarrhoea were continued feeding with the same amount or more foods. This practice was more common among urban parents/caregivers at 83%, compared to rural ones at 54%. 51% and 62% of parents/caregivers in Asaro and Hides reported doing so, compared to 40% in Hiri.

26% of children with diarrhoea were treated with Oral Rehydration Therapy (ORT), with 3% of children were given ORESOL and 23% received pre-packaged ORS fluid. Pre-packaged ORS fluid was reported more popular in rural area (24%) than urban area (6%), particularly Hiri 40% compared to the highlands, only 7% in Asaro and 10% in Hides.

71% of children received home management using home-made fluids for diarrhoea symptoms during the last diarrhoea episode, including: 9.9% was given rice porridge soup; 28% was given lemon, orange; and coconut juice; 22% was given vegetable and meat soup; and 21% was given boiled water.



## Oral rehydration treatment

Diarrhoea is the second leading cause of death among CU5 worldwide. Most diarrhoea-related deaths in children are due to dehydration from loss of large quantities of water and electrolytes from the body in liquid stools. Management of diarrhoea - either through oral rehydration salts (ORS) or a recommended home fluid (RHF) - can prevent many of these deaths. Preventing dehydration and malnutrition by increasing fluid intake and continuing to feed the child are also important strategies for managing diarrhoea.

An objective of the 'A World Fit for Children' agenda set out a goal to reduce by one half the deaths due to diarrhoea among CU5 by 2010 compared to 2000. The MDG also targeted to reduce by two thirds the mortality rate among CU5 by 2015 compared to 1990. In addition, the 'A World Fit for Children' called for a reduction in the incidence of diarrhoea by 25%.

The four indicators to monitor the progress of diarrhoea management are:

- Prevalence of diarrhoea
- Oral rehydration therapy (ORT)
- ORT with continued feeding
- Home management of diarrhoea

In the CU5 Questionnaire, mothers (or caregivers) were asked to report whether their child had diarrhoea in the two weeks prior to the interviews. If so, the mother was asked a series of questions about what and how much the child was given to drink and eat during the episode and whether this was more or less than usual. This information was used to calculate the indicators of diarrhoea management among CU5. Data of 2,061 CU5 were analysed.

## Diarrhoea incidence in the last two weeks

**Table 7-1 Children aged 0-59 months with diarrhoea in the last two weeks, PNG IMR's iHDSS, 2016**

|              |            | Yes |      | No   |       | Don't Know |     | Total |       |
|--------------|------------|-----|------|------|-------|------------|-----|-------|-------|
|              |            | N   | %    | N    | %     | N          | %   | N     | %     |
| Sector       | Urban      | 20  | 7.7  | 241  | 92.3  | 0          | 0.0 | 261   | 100.0 |
|              | Rural      | 248 | 13.8 | 1548 | 86.0  | 4          | .2  | 1800  | 100.0 |
|              | Total      | 268 | 13.0 | 1789 | 86.8  | 4          | .2  | 2061  | 100.0 |
| iHDSS        | Hiri       | 121 | 10.9 | 991  | 89.0  | 1          | .1  | 1113  | 100.0 |
|              | Asaro      | 81  | 10.9 | 658  | 88.7  | 3          | .4  | 742   | 100.0 |
|              | Hides      | 66  | 32.0 | 140  | 68.0  | 0          | 0.0 | 206   | 100.0 |
|              | Total      | 268 | 13.0 | 1789 | 86.8  | 4          | .2  | 2061  | 100.0 |
| Sex          | Male       | 142 | 13.2 | 936  | 86.8  | 0          | 0.0 | 1078  | 100.0 |
|              | Female     | 124 | 12.7 | 845  | 86.8  | 4          | .4  | 973   | 100.0 |
|              | Don't Know | 0   | 0.0  | 5    | 100.0 | 0          | 0.0 | 5     | 100.0 |
|              | Total      | 266 | 12.9 | 1786 | 86.9  | 4          | .2  | 2056  | 100.0 |
| Age in month | 0-11       | 15  | 12.6 | 104  | 87.4  | 0          | 0.0 | 119   | 100.0 |
|              | 12-23      | 71  | 17.1 | 342  | 82.4  | 2          | .5  | 415   | 100.0 |
|              | 24-35      | 73  | 14.6 | 427  | 85.2  | 1          | .2  | 501   | 100.0 |
|              | 36-47      | 61  | 12.0 | 445  | 87.8  | 1          | .2  | 507   | 100.0 |
|              | 48-59      | 48  | 9.2  | 471  | 90.8  | 0          | 0.0 | 519   | 100.0 |
|              | Total      | 268 | 13.0 | 1789 | 86.8  | 4          | .2  | 2061  | 100.0 |

Table 7-1 shows that there were 268 out of 2061, accounted for 13.0% of children under age 5 reported having a diarrhoea episode in the two weeks preceding the interview date, with higher incidence reported in rural area than in urban area, 13.8% and 7.7%, respectively. Diarrhoea prevalence varies across surveillance sites with the incidence reported highest at 32% in the Hides site, compared to 10.9% observed in both Hiri and Asaro sites. Although there was no significant difference between male and female children having diarrhoea in the past two weeks, the highest incidence occurred in the infancy period, i.e. children aged 12-23 months (17%) and 24-35 months (14%). The younger the child, the more likely it is to suffer from diarrhoea. Indeed, the incidence of diarrhoea decreases as age increases, from 12.6% among children aged 0-11 months to 9.2% for children aged 48-59 months.

## Drinking and eating practices during the last diarrhoea episode

**Table 7-2 Amount of drinks given to children aged 0-59 months during the last diarrhoea episode in the last two weeks, compared to usual, PNG IMR's iHDSS, 2016**

|              |        | Much less |      | Somewhat less |      | About the same |      | More than |      | Nothing to drink |     | Don't Known |     | Total |       |
|--------------|--------|-----------|------|---------------|------|----------------|------|-----------|------|------------------|-----|-------------|-----|-------|-------|
|              |        | N         | %    | N             | %    | N              | %    | N         | %    | N                | %   | N           | %   | N     | %     |
| Sector       | Urban  | 1         | 5.6  | 1             | 5.6  | 11             | 61.1 | 5         | 27.8 | 0                | 0.0 | 0           | 0.0 | 18    | 100.0 |
|              | Rural  | 46        | 18.5 | 30            | 12.1 | 119            | 48.0 | 50        | 20.2 | 2                | .8  | 1           | .4  | 248   | 100.0 |
|              | Total  | 47        | 17.7 | 31            | 11.7 | 130            | 48.9 | 55        | 20.7 | 2                | .8  | 1           | .4  | 266   | 100.0 |
| iHDSS        | Hiri   | 34        | 28.3 | 17            | 14.2 | 52             | 43.3 | 17        | 14.2 | 0                | 0.0 | 0           | 0.0 | 120   | 100.0 |
|              | Asaro  | 10        | 12.5 | 9             | 11.3 | 38             | 47.5 | 21        | 26.3 | 2                | 2.5 | 0           | 0.0 | 80    | 100.0 |
|              | Hides  | 3         | 4.5  | 5             | 7.6  | 40             | 60.6 | 17        | 25.8 | 0                | 0.0 | 1           | 1.5 | 66    | 100.0 |
|              | Total  | 47        | 17.7 | 31            | 11.7 | 130            | 48.9 | 55        | 20.7 | 2                | .8  | 1           | .4  | 266   | 100.0 |
| Sex          | Male   | 27        | 19.1 | 10            | 7.1  | 70             | 49.6 | 33        | 23.4 | 1                | .7  | 0           | 0.0 | 141   | 100.0 |
|              | Female | 20        | 16.3 | 20            | 16.3 | 59             | 48.0 | 22        | 17.9 | 1                | .8  | 1           | .8  | 123   | 100.0 |
|              | Total  | 47        | 17.8 | 30            | 11.4 | 129            | 48.9 | 55        | 20.8 | 2                | .8  | 1           | .4  | 264   | 100.0 |
| Age in month | 0-11   | 2         | 13.3 | 0             | 0.0  | 8              | 53.3 | 4         | 26.7 | 0                | 0.0 | 1           | 6.7 | 15    | 100.0 |
|              | 12-23  | 13        | 18.3 | 10            | 14.1 | 34             | 47.9 | 14        | 19.7 | 0                | 0.0 | 0           | 0.0 | 71    | 100.0 |
|              | 24-35  | 11        | 15.5 | 7             | 9.9  | 41             | 57.7 | 12        | 16.9 | 0                | 0.0 | 0           | 0.0 | 71    | 100.0 |
|              | 36-47  | 12        | 19.4 | 5             | 8.1  | 29             | 46.8 | 14        | 22.6 | 2                | 3.2 | 0           | 0.0 | 62    | 100.0 |
|              | 48-59  | 9         | 19.1 | 9             | 19.1 | 18             | 38.3 | 11        | 23.4 | 0                | 0.0 | 0           | 0.0 | 47    | 100.0 |
|              | Total  | 47        | 17.7 | 31            | 11.7 | 130            | 48.9 | 55        | 20.7 | 2                | .8  | 1           | .4  | 266   | 100.0 |

Table 7-2 shows the practices of 266 parents/child care givers, whose children had a diarrhoea episode in the last two weeks on giving drinks to their children. 17% of parents/ child caregivers reported gave their children much less amount compared to usual, particularly those in rural areas 18% compared to 5% in urban area. About a half of them (48.9%) reported giving the same amount of drinks to their children. And 20% of children were given more than the usual amount to drink. Urban parents/caregivers were more likely than rural ones to give the same or more amount of drinks to their children. However, the proportion of parents/caregivers giving their children the same amount of drinks during the last diarrhoea episode was reported highest in Hides (60%), followed by Asaro (47%) and lowest in Hiri (43%). Although no significant difference observed between two groups of parents/caregivers who had male and female

children, the data showed that more than half of parents/care givers gave the same amount of drinks to younger children. For example, 53% of parents/caregivers of children aged 0-11 months reported giving the same amount of drinks, compared to 38% of those in the age group of 48-59 months.

**Table 7-3 Amount of foods given to children aged 0-59 month during the diarrhoea episode occurred in the last two weeks, compared to usual, PNG IMR's iHDSS, 2016**

|                    |        | Much less |      | Somewhat less |      | About the same |      | More |      | Stopped feeding |   | Don't Know |      | Total |       |
|--------------------|--------|-----------|------|---------------|------|----------------|------|------|------|-----------------|---|------------|------|-------|-------|
|                    |        | N         | %    | N             | %    | N              | %    | N    | %    | N               | % | N          | %    | N     | %     |
| Sector             | Urban  | 2         | 11.1 | 1             | 5.6  | 12             | 66.7 | 3    | 16.7 | 0               | 0 | 0          | 0.0  | 18    | 100.0 |
|                    | Rural  | 59        | 23.9 | 50            | 20.2 | 118            | 47.8 | 16   | 6.5  | 0               | 0 | 4          | 1.6  | 247   | 100.0 |
|                    | Total  | 61        | 23.0 | 51            | 19.2 | 130            | 49.1 | 19   | 7.2  | 0               | 0 | 4          | 1.5  | 265   | 100.0 |
| iHDSS              | Hiri   | 48        | 40.3 | 22            | 18.5 | 48             | 40.3 | 0    | 0.0  | 0               | 0 | 1          | .8   | 119   | 100.0 |
|                    | Asaro  | 7         | 8.8  | 15            | 18.8 | 41             | 51.3 | 16   | 20.0 | 0               | 0 | 1          | 1.3  | 80    | 100.0 |
|                    | Hides  | 6         | 9.1  | 14            | 21.2 | 41             | 62.1 | 3    | 4.5  | 0               | 0 | 2          | 3.0  | 66    | 100.0 |
|                    | Total  | 61        | 23.0 | 51            | 19.2 | 130            | 49.1 | 19   | 7.2  | 0               | 0 | 4          | 1.5  | 265   | 100.0 |
| Sex                | Male   | 32        | 22.7 | 22            | 15.6 | 74             | 52.5 | 10   | 7.1  | 0               | 0 | 3          | 2.1  | 141   | 100.0 |
|                    | Female | 29        | 23.8 | 28            | 23.0 | 55             | 45.1 | 9    | 7.4  | 0               | 0 | 1          | .8   | 122   | 100.0 |
|                    | Total  | 61        | 23.2 | 50            | 19.0 | 129            | 49.0 | 19   | 7.2  | 0               | 0 | 4          | 1.5  | 263   | 100.0 |
| Age group in month | 0-11   | 2         | 13.3 | 3             | 20.0 | 8              | 53.3 | 0    | 0.0  | 0               | 0 | 2          | 13.3 | 15    | 100.0 |
|                    | 12-23  | 22        | 31.0 | 14            | 19.7 | 34             | 47.9 | 1    | 1.4  | 0               | 0 | 0          | 0.0  | 71    | 100.0 |
|                    | 24-35  | 10        | 14.1 | 13            | 18.3 | 41             | 57.7 | 7    | 9.9  | 0               | 0 | 0          | 0.0  | 71    | 100.0 |
|                    | 36-47  | 14        | 22.6 | 15            | 24.2 | 25             | 40.3 | 7    | 11.3 | 0               | 0 | 1          | 1.6  | 62    | 100.0 |
|                    | 48-59  | 13        | 28.3 | 6             | 13.0 | 22             | 47.8 | 4    | 8.7  | 0               | 0 | 1          | 2.2  | 46    | 100.0 |
|                    | Total  | 61        | 23.0 | 51            | 19.2 | 130            | 49.1 | 19   | 7.2  | 0               | 0 | 4          | 1.5  | 265   | 100.0 |

Table 7-3 showed the practice on giving foods to children among 265 parents/caregivers, whose children had a diarrhoea episode in the last two weeks. 23% of children were given much less food and 19.2% were given somewhat less to eat than normal amount. 56.3% of children were given the same amount or more to eat (continued feeding). There are considerable differences in continued eating practices by rural-urban sector. Data showed that parents/caregiver in rural area were more likely than those in urban areas to give less amount foods than usual to their children

when they had diarrhoea, 43% compared to 16%, respectively. By contrast more urban parents/caregivers than rural ones reported giving to same amount of foods or even more foods to their children, 83% compared to 54%. These practices were more obvious in coastal region i.e. Hiri than the highlands region i.e. Asaro and Hides. For example, 40% of Hiri parents/caregivers reported giving their children much less foods, compared to only 8% in Asaro and 9% in Hides. By contrast, 51% and 62% of parents/ caregivers in Asaro and Hides, compared to 40% in Hiri reported giving the same amount of foods. The proportion of parents/caregivers reported giving the same amount of foods to their children varied across age groups of children, but the data suggested that more parents/care givers of younger children than those of older children gave the same amount of foods to their children during the last diarrhoea episode.

### **Oral rehydration solutions and recommended home-made fluids**

Table 7-4 shows the data on 261 children aged 0-59 months, who had a diarrhoea episode in the past two weeks regarding their parents/caregivers' practices on treating with Oral Rehydration Solution (ORESOL) or recommended home-made fluids. Although only 3% of children were given ORESOL, 23% received pre-packaged ORS fluid, which is the rehydration treatment of choice for children with diarrhoea, appeared more popular in rural area (24%) than urban area (6%), particularly Hiri 40% compared to the highlands, only 7% in Asaro and 10% in Hides. There was no clear preference of this treatment by sex or age group of the child as the proportion of children being treated varied slightly between male and female children and across the age groups.

With regards the use of recommended homemade fluids among sick children, 9.9% was given rice porridge soup, 28% was given lemon, orange, and coconut juice; 22% was given vegetable and meat soup; 21% was given boiled water. These treatment options varied from site to others depends on the availability of different treatment. For example, rice porridge soup and fruit juice were most popular in Asaro (19% and 47%), while vegetable, meat soup and boiled water were common choices of parents/ caregivers in Hides (52% and 26%).

Pre-package ORS fluid was the rehydration treatment of choice given to male children (26% compared to 19% for females), vegetable and meat soup were preferable treatment of choice for girls (31% for female children versus 14% for male children).

Overall, the proportion of children, who had a diarrhoea episode in the last two weeks and were given any kind of rehydration treatment such as ORESOL or recommended home-made fluids, was 61%. This proportion was higher in urban children (76%) than rural area (60%).

**Table 7-4 Children aged 0-59 months treated with oral rehydration solutions or recommended homemade fluids during the last diarrhoea episode, PNG IMR's iHDSS, 2016**

|                 |        | No. of CU5<br>with diarrhea | Fluid from ORS packet or pre-<br>packaged ORS |     |                           |      | Recommended homemade fluids |      |                                 |      |                         |      |              |      | Any ORS or<br>recommended<br>homemade fluid |      |
|-----------------|--------|-----------------------------|---|-----|---------------------------|------|-----------------------------|------|---------------------------------|------|-------------------------|------|--------------|------|---|------|
|                 |        |                             | ORESOL  |     | Pre-packaged<br>ORS fluid |      | Rice porridge<br>soup       |      | Lemon, orange,<br>coconut juice |      | Vegetable,<br>meat soup |      | Boiled water |      |   |      |
|                 |        |                             | N   | %   | N                         | %    | N                           | %    | N                               | %    | N                       | %    | N            | %    | N   | %    |
| Sector          | Urban  | 17                          | 1   | 5.9 | 1                         | 5.9  | 6                           | 35.3 | 12                              | 70.6 | 3                       | 17.6 | 6            | 35.3 | 13  | 76.5 |
|                 | Rural  | 244                         | 8   | 3.3 | 60                        | 24.5 | 20                          | 8.2  | 63                              | 25.7 | 56                      | 22.9 | 50           | 20.7 | 148   | 60.7 |
|                 | Total  | 261                         | 9   | 3.4 | 61                        | 23.3 | 26                          | 9.9  | 75                              | 28.6 | 59                      | 22.5 | 56           | 21.6 | 161   | 61.7 |
| iHDSS           | Hiri   | 119                         | 2   | 1.7 | 48                        | 40.3 | 4                           | 3.4  | 21                              | 17.6 | 6                       | 5    | 17           | 14.4 | 64  | 53.8 |
|                 | Asaro  | 77                          | 7   | 9   | 6                         | 7.7  | 15                          | 19.2 | 37                              | 47.4 | 19                      | 24.4 | 22           | 28.9 | 52  | 67.5 |
|                 | Hides  | 65                          | 0   | 0   | 7                         | 10.8 | 7                           | 10.8 | 17                              | 26.2 | 34                      | 52.3 | 17           | 26.2 | 45  | 69.2 |
|                 | Total  | 261                         | 9   | 3.4 | 61                        | 23.3 | 26                          | 9.9  | 75                              | 28.6 | 59                      | 22.5 | 56           | 21.6 | 161   | 61.7 |
| Sex             | Male   | 138                         | 6   | 4.3 | 36                        | 26.1 | 15                          | 10.8 | 36                              | 26.1 | 20                      | 14.5 | 30           | 21.9 | 81  | 58.7 |
|                 | Female | 121                         | 3   | 2.5 | 24                        | 19.7 | 11                          | 9.1  | 39                              | 32.0 | 38                      | 31.1 | 26           | 21.7 | 80  | 66.1 |
|                 | Total  | 259                         | 9   | 3.5 | 60                        | 23.1 | 26                          | 10   | 75                              | 28.8 | 58                      | 22.3 | 56           | 21.8 | 161   | 62.2 |
| Age in<br>month | 0-11   | 14                          | 1   | 7.1 | 2                         | 14.3 | 0                           | 0    | 4                               | 28.6 | 4                       | 28.6 | 2            | 14.3 | 7   | 50.0 |
|                 | 12-23  | 70                          | 1   | 1.4 | 20                        | 28.6 | 5                           | 7.0  | 16                              | 22.9 | 14                      | 20.0 | 14           | 20.3 | 44  | 62.9 |
|                 | 24-35  | 70                          | 3   | 4.3 | 10                        | 14.3 | 8                           | 11.4 | 18                              | 25.7 | 15                      | 21.4 | 17           | 24.6 | 40  | 57.1 |
|                 | 36-47  | 61                          | 1   | 1.6 | 13                        | 21.0 | 6                           | 9.8  | 19                              | 30.6 | 13                      | 21.0 | 12           | 19.7 | 38  | 62.3 |
|                 | 48-59  | 46                          | 3   | 6.5 | 16                        | 34.8 | 7                           | 15.2 | 18                              | 39.1 | 13                      | 28.3 | 11           | 23.9 | 32  | 69.6 |
|                 | Total  | 261                         | 9   | 3.4 | 61                        | 23.3 | 26                          | 9.9  | 75                              | 28.6 | 59                      | 22.5 | 56           | 21.6 | 161   | 61.7 |

## Medication treatment

**Table 7-5 Children aged 0-59 months given medications during diarrhoea episode in the last two weeks, PNG IMR's iHDSS, 2016**

|                    |        |   | Yes   | No    | Total  |
|--------------------|--------|---|-------|-------|--------|
| Urban-rural sector | Urban  | N | 4     | 14    | 18     |
|                    |        | % | 22.2% | 77.8% | 100.0% |
|                    | Rural  | N | 84    | 162   | 246    |
|                    |        | % | 34.1% | 65.9% | 100.0% |
|                    | Total  | N | 88    | 176   | 264    |
|                    |        | % | 33.3% | 66.7% | 100.0% |
| iHDSS site         | Hiri   | N | 66    | 53    | 119    |
|                    |        | % | 55.5% | 44.5% | 100.0% |
|                    | Asaro  | N | 12    | 67    | 79     |
|                    |        | % | 15.2% | 84.8% | 100.0% |
|                    | Hides  | N | 10    | 56    | 66     |
|                    |        | % | 15.2% | 84.8% | 100.0% |
|                    | Total  | N | 88    | 176   | 264    |
|                    |        | % | 33.3% | 66.7% | 100.0% |
| Sex                | Male   | N | 52    | 89    | 141    |
|                    |        | % | 36.9% | 63.1% | 100.0% |
|                    | Female | N | 35    | 86    | 121    |
|                    |        | % | 28.9% | 71.1% | 100.0% |
|                    | Total  | N | 87    | 175   | 262    |
|                    |        | % | 33.2% | 66.8% | 100.0% |
| Age group          | 0-5    | N | 1     | 4     | 5      |
|                    |        | % | 20.0% | 80.0% | 100.0% |
|                    | 6-11   | N | 1     | 9     | 10     |
|                    |        | % | 10.0% | 90.0% | 100.0% |
|                    | 12-23  | N | 34    | 37    | 71     |
|                    |        | % | 47.9% | 52.1% | 100.0% |
|                    | 24-35  | N | 22    | 49    | 71     |
|                    |        | % | 31.0% | 69.0% | 100.0% |
|                    | 36-47  | N | 15    | 46    | 61     |
|                    |        | % | 24.6% | 75.4% | 100.0% |
|                    | 48-59  | N | 15    | 31    | 46     |
|                    |        | % | 32.6% | 67.4% | 100.0% |
|                    | Total  | N | 88    | 176   | 264    |
|                    |        | % | 33.3% | 66.7% | 100.0% |



Table 7-5 presents the data on medication treatments of 264 CU5 with a diarrhoea episode in the last two weeks. Overall, 88 children accounted for 33% of the sick children were treated with medications and still 66% did not receive any medication. Rural children had better access to medication than those in urban area, 34% compared to 22%, respectively. The proportion of children received medication was similar in Asaro and Hides, about 15%, but highest in Hiri, 55%. Male children were more likely than female ones to be treated with medication, 36% compared to 28%, respectively. Children in the age group of 12-23 months had the highest proportion of medication treatment, 47%, but lowest in the age group of 6-11 months, 10% was treated with medication in the last diarrhoea episode.

**Table 7-6 Children aged 0-59 months treated with pill or syrup during diarrhoea episode in the last two weeks, PNG IMR's iHDSS, 2016**

|             |        |    | No. of CU5<br>received<br>medication | Antibiotics |    | Anti-motility |   | Zinc |    | Unknown |  |
|-------------|--------|----|--------------------------------------|-------------|----|---------------|---|------|----|---------|--|
|             |        |    | N                                    | %           | N  | %             | N | %    | N  | %       |  |
| Urban-rural | Urban  | 4  | 2                                    | 50.0%       | 1  | 25.0%         | 0 | 0.0% | 2  | 50.0%   |  |
|             | Rural  | 84 | 45                                   | 53.6%       | 44 | 52.4%         | 5 | 6.0% | 8  | 9.5%    |  |
|             | Total  | 88 | 47                                   | 53.4%       | 45 | 51.1%         | 5 | 5.7% | 10 | 11.4%   |  |
| iHDSS site  | Hiri   | 66 | 36                                   | 54.5%       | 36 | 54.5%         | 5 | 7.6% | 4  | 6.1%    |  |
|             | Asaro  | 12 | 6                                    | 50.0%       | 1  | 8.3%          | 0 | 0.0% | 5  | 41.7%   |  |
|             | Hides  | 10 | 5                                    | 50.0%       | 8  | 80.0%         | 0 | 0.0% | 1  | 10.0%   |  |
|             | Total  | 88 | 47                                   | 53.4%       | 45 | 51.1%         | 5 | 5.7% | 10 | 11.4%   |  |
| Sex         | Male   | 52 | 28                                   | 53.8%       | 22 | 42.3%         | 4 | 7.7% | 6  | 11.5%   |  |
|             | Female | 35 | 18                                   | 51.4%       | 22 | 62.9%         | 1 | 2.9% | 4  | 11.4%   |  |
|             | Total  | 87 | 46                                   | 52.9%       | 44 | 50.6%         | 5 | 5.7% | 10 | 11.5%   |  |
| Age group   | 0-5    | 1  | 1                                    | 100.0%      | 0  | 0.0%          | 0 | 0.0% | 0  | 0.0%    |  |
|             | 6-11   | 1  | 1                                    | 100.0%      | 1  | 100.0%        | 0 | 0.0% | 0  | 0.0%    |  |
|             | 12-23  | 34 | 19                                   | 55.9%       | 18 | 52.9%         | 3 | 8.8% | 3  | 8.8%    |  |
|             | 24-35  | 22 | 10                                   | 45.5%       | 9  | 40.9%         | 1 | 4.5% | 3  | 13.6%   |  |
|             | 36-47  | 15 | 8                                    | 53.3%       | 8  | 53.3%         | 0 | 0.0% | 1  | 6.7%    |  |
|             | 48-59  | 15 | 8                                    | 53.3%       | 9  | 60.0%         | 1 | 6.7% | 3  | 20.0%   |  |
|             | Total  | 88 | 47                                   | 53.4%       | 45 | 51.1%         | 5 | 5.7% | 10 | 11.4%   |  |

Further analysis was conducted among 88 children who had been treated with medication for the diarrhoea episode in the last two weeks in order to provide a better understanding of what types of medication were given to these children.

In term of oral formula including pill and syrup, data in Table 7-6 showed more than 53% of these children were treated with antibiotics, with similar proportion in urban and rural areas 50% and 53%, respectively. Children in Hiri had slightly better access to antibiotics treatment than other two sites, 54% compared to 50%. There was no significant difference between male and female children or across age groups of children being treated with antibiotics, fluctuating around 53%. 51% of children were treated with anti-motility drug, only 5% of children received treatment with Zinc and 11% was treated with unknown medication.

**Table 7-7 Children aged 0-59 months treated with injection during diarrhoea episode in the last two weeks, PNG IMR's iHDSS, 2016**

|                    |        |    | Anti-biotic |        | Anti-motility |        | Non-antibiotic |      | Intra-venous |       | Unknown injection |      |
|--------------------|--------|----|-------------|--------|---------------|--------|----------------|------|--------------|-------|-------------------|------|
| No. of responses   |        |    | N           | %      | N             | %      | N              | %    | N            | %     | N                 | %    |
| Urban-rural sector | Urban  | 3  | 3           | 100.0% | 0             | 0.0%   | 0              | 0.0% | 0            | 0.0%  | 0                 | 0.0% |
|                    | Rural  | 82 | 19          | 23.2%  | 4             | 4.9%   | 0              | 0.0% | 1            | 1.2%  | 2                 | 2.4% |
|                    | Total  | 85 | 22          | 25.9%  | 4             | 4.7%   | 0              | 0.0% | 1            | 1.2%  | 2                 | 2.4% |
| iHDSS site         | Hiri   | 65 | 13          | 20.0%  | 3             | 4.6%   | 0              | 0.0% | 0            | 0.0%  | 2                 | 3.1% |
|                    | Asaro  | 10 | 8           | 80.0%  | 0             | 0.0%   | 0              | 0.0% | 0            | 0.0%  | 0                 | 0.0% |
|                    | Hides  | 10 | 1           | 10.0%  | 1             | 10.0%  | 0              | 0.0% | 1            | 10.0% | 0                 | 0.0% |
|                    | Total  | 85 | 22          | 25.9%  | 4             | 4.7%   | 0              | 0.0% | 1            | 1.2%  | 2                 | 2.4% |
| Sex                | Male   | 50 | 12          | 24.0%  | 4             | 8.0%   | 0              | 0.0% | 46           | 92.0% | 2                 | 4.0% |
|                    | Female | 34 | 9           | 26.5%  | 0             | 0.0%   | 0              | 0.0% | 33           | 97.1% | 0                 | 0.0% |
|                    | Total  | 84 | 21          | 25.0%  | 4             | 4.8%   | 0              | 0.0% | 79           | 94.0% | 2                 | 2.4% |
| Age group          | 0-11   | 1  | 0           | 0.0%   | 1             | 100.0% | 0              | 0.0% | 0            | 0.0%  | 0                 | 0.0% |
|                    | 12-23  | 34 | 10          | 29.4%  | 0             | 0.0%   | 0              | 0.0% | 0            | 0.0%  | 1                 | 2.9% |
|                    | 24-35  | 21 | 6           | 28.6%  | 2             | 9.5%   | 0              | 0.0% | 0            | 0.0%  | 0                 | 0.0% |
|                    | 36-47  | 15 | 2           | 13.3%  | 0             | 0.0%   | 0              | 0.0% | 0            | 0.0%  | 0                 | 0.0% |
|                    | 48-59  | 14 | 4           | 28.6%  | 1             | 7.1%   | 0              | 0.0% | 1            | 7.1%  | 1                 | 7.1% |
|                    | Total  | 85 | 22          | 25.9%  | 4             | 4.7%   | 0              | 0.0% | 1            | 1.2%  | 2                 | 2.4% |

Regarding the utilisation medication injection formula to treat the last episode of diarrhea in the last two weeks, data analysis as shown in Table 7-7 indicated that 22 out of 85 children were treated by

antibiotics, accounting for 25%. All children in urban areas were treated with antibiotics compared to only 23% in rural area. The use of antibiotic for treating diarrhea was recorded highest in Asaro site, 80%, followed by Hiri 20% and lowest in Hides 10%. The utilisation of antibiotics in treatment of diarrhea was similar between the two sexes (24-26%), but varied widely across age groups of children.

Less than 5% of children with diarrhea were treated with anti-motility and most was in Hiri site. No child was treated with non-antibiotic and very few (1%) was treated with intravenous antibiotics, while 2% was unknown type of medication.

## 8. CHAPTER 8 PNEUMONIA CARE AND TREATMENT

### Abstract

This chapter investigates pneumonia across the sites. Data on pneumonia, including the incidence, recognition of danger signs of pneumonia among parents/caregivers, care and treatment seeking behaviour of parents/child care givers, and medication treatment of suspected pneumonia children was analysed.

The data were collected by the PNG IMR's iHDSS among a total of 2,063 children under 5 years of age (CU5), currently living in the three surveillance sites over the reporting period of January – June 2016. A total of 376 children reported having cough in the past two weeks, of whom, 103 children were recognised by the parents/ caregivers as having two danger signs of pneumonia: (i) short and rapid breaths; and (ii) difficulty in breathing in and/or out. There were 33 children reported having a problem in chest and 18 children having both symptoms of problem in the chest and a blocked/runny nose, totalling 51 suspect pneumonia children.

Further data analysis was conducted with 45 children with suspected pneumonia, whose parents/ care givers responded to questions on pneumonia treatment behaviour. The result indicated that 8 children were treated at the tertiary healthcare level (central/ provincial hospitals), only 2 at secondary healthcare level (district hospitals), but 31 at the primary healthcare level (28 at community health centres and 3 by village health workers). Some children were also treated at the private health facilities i.e. six were treated at private hospital and one at a private pharmacy.

Data analysis of 51 children with suspected pneumonia showed that 44 children received some kind of treatment; 30 received antibiotics pill/syrup; 27 received antibiotics injection; 12 received analgesics and 7 received other medicines; none was treated with anti-malarial drugs.

Globally, pneumonia is the leading cause of mortality of children, particularly among CU5. Children with suspected pneumonia are those who had an illness with a cough accompanied by rapid or difficult breathing and whose symptoms were not due to a blocked nose. Pneumonia remains a significant health problem in developing countries and the use of antibiotics for children under age 5 with presumed pneumonia is a key intervention. One of the Child Health goals is to reduce by one third the deaths due to acute respiratory infections.

The indicators to monitor pneumonia among CU5 are:

- Prevalence of suspected pneumonia
- Care seeking for suspected pneumonia
- Antibiotic treatment for suspected pneumonia
- Knowledge of the danger signs of pneumonia

In the Western Pacific Region, Papua New Guinea's (PNG) Child morbidity and mortality rates remain high and are among the worst in the region. In fact, pneumonia is the leading cause of death and reason for hospitalisation in children. Furthermore, PNG's Childhood pneumonia fatality rate is up to 2.84%. According to the 2011-2020 National Health Plan, a priority of the PNG government, under Key Result Area 4 is to Improve Child Survival supported by Objective 4.2 that states: "Reduce case fatality rates of pneumonia in children through acceleration of roll-out of integrated management of childhood illnesses (IMCI) to all provinces". According to this, a key intervention is to ensure antibiotics are available every day, at every facility, in order to combat pneumonia in CU5. Commitments have been made; however, pneumonia continues to affect children in both urban and rural parts of the country.

### **Incidence and recognizing dangerous signs of pneumonia**

Table 8.1 shows incidence of cough among CU5, parents/care givers' recognised two dangerous signs of pneumonia (problem in chest and blocked/ runny nose) and the incidence of these symptoms as recognized by the parents/caregivers. These indicators are disaggregated by urban-rural sector, surveillance sites, sex of the child and age groups in month. Data of 2,063 CU5 were analysed.

A total of 376 out of 2,063 CU5 reported having an illness with cough in the past two weeks accounted for 18.2% of CU5. The incidence was doubled in urban area (32.6%) than the rural area (16.1%). The

incidence was highest in Hiri (36.1%), followed by Hides (25.9%) and lowest in Asaro (10%). There was no difference in the incidence of cough between male and female CU5, 18.5% compared to 17.8%, respectively. However, children in the age group of 6-11 months had the highest incidence (32.9%). The incidence was similar in the age groups of 0-5 months, 12-23 months and 24-35 months, fluctuating around 18-22%. Children in the age groups of 36-47 months and 48-59 months were less likely to have a cough, 13.4% and 15%, respectively.

The mother's or child caregiver's level of knowledge of pneumonia is an important determinant for the care-seeking behaviours by the mother or caregiver. The mother's or caregiver's knowledge of two danger signs of pneumonia was investigated, which are: (i) Children breathe faster than usual with short and rapid breaths; (ii) Children have difficulty in breathing in or out.

Overall, only 103 out of 376 parents/caregivers recognized these signs, including 23 in urban and 80 in rural areas, accounted for 27.4% of parents/caregivers whose children had a cough in the last two weeks. Urban and rural mothers/caregivers had the similar knowledge about these signs, 27.1% and 27.5%, respectively.

Further analysis of parents/caregiver knowledge of the two danger signs of pneumonia by surveillance sites showed that mothers/caregiver in Hides had the highest recognition, 32.5%, followed by Asaro, 30.6% and lowest in Hiri, only 9.5%. The knowledge of the two danger signs is high in the highlands region than the coastal region.

Comparing the two groups of parents/caregivers of male and female children regarding their knowledge of the two danger signs of pneumonia, there was no significant difference, between the two groups, 26.1% and 28.7%, respectively. However, the recognition of parents/caregiver increased by the age groups of their children, e.g. it increased from 11.1% among parents/ caregivers of children aged 0-5 months to 23.7% among those whose children aged 12-23 months, 31.4% in the age group 23-35 months, and reached 32.1% in the child age group 48-59 months. Parental/caregiver experience matters i.e. over time there is better adult recognition of the two danger signs of pneumonia.

Further analysis of the incidence of two common clinical symptoms of pneumonia: (i) problem in the chest; and (ii) blocked or runny nose was conducted. The data showed that 32% of CU5 had a chest problem, 52.4% had blocked/ runny nose, and 17.5% had both clinical symptoms.

Urban parents/ caregivers are more likely to report a chest problem than rural ones e.g. 47.8% compared to 27.5%, respectively. Asaro parents/caregivers were more likely to report chest problem than those in the other sites i.e. 41.2% compared to 27.4% in Hides and 28.6% in Hiri. The incidence of a chest problem was reported similar between the two groups of male and female children, 28.8% and 34%, respectively. However, a chest problem appeared more prevalent among young children, e.g. 50.0% in the age groups of 0-5 months and 12-23 months while around 25% in children aged 24 months or above.

Blocked and/or runny nose was the most common symptom reported by the parents/caregivers, with more than 52% of CU5 with pneumonia having it. Urban children were more likely to have this symptom than those in rural areas, 60.9% compared to 50%, respectively.

This symptom was reported most in Hiri (71.5%), followed by Hides (67.7%) and lowest in Asaro (20.6%). It was slightly higher in male children than their counterparts, 55.8% and 50.0%, respectively. This symptom was also common, with more than 50% for all age groups and the lowest incidence (22.7%) observed for the age group of 12-23 months.

Overall, 17.5% of children with pneumonia had both a problem in chest and a blocked/ runny nose, with higher proportion reported amongst rural children (20.0%) than urban children (8.7%). Asaro recorded the highest proportion of children having both symptoms, 29.4%, followed by Hiri, 14.3% and lowest in Hides, 11.3%. Male children were more likely than female children to have these symptoms, 19.2% and 16.0% respectively. However, these symptoms were only reported among children aged 12 months or higher while none was reported in age groups of 0-5 months and 6-11 months.

**Table 8-1 Children aged 0-59 months having illness with cough, suspected pneumonia and dangerous signs in the last two weeks, PNG IMR's iHDSS, 2016**

|                 |        | Children<br>aged 0-59<br>months | Children with<br>cough |       | Parents recognized<br>two dangerous signs |       | Children with<br>problem in chest |       | Children with<br>blocked / runny<br>nose |        | Children with<br>chest problem and<br>blocked / runny<br>nose |       |
|-----------------|--------|---------------------------------|------------------------|-------|---|-------|-----------------------------------|-------|--|--------|---|-------|
|                 |        | N                               | N                      | %     | N   | %     | N                                 | %     | N  | %      | N   | %     |
| Sector          | Urban  | 261                             | 85                     | 32.6% | 23  | 27.1% | 11                                | 47.8% | 14                                       | 60.9%  | 2   | 8.7%  |
|                 | Rural  | 1802                            | 291                    | 16.1% | 80  | 27.5% | 22                                | 27.5% | 40                                       | 50.0%  | 16  | 20.0% |
|                 | Total  | 2063                            | 376                    | 18.2% | 103                                       | 27.4% | 33                                | 32.0% | 54                                       | 52.4%  | 18  | 17.5% |
| iHDSS           | Asaro  | 1108                            | 111                    | 10.0% | 34  | 30.6% | 14                                | 41.2% | 7  | 20.6%  | 10  | 29.4% |
|                 | Hides  | 737                             | 191                    | 25.9% | 62  | 32.5% | 17                                | 27.4% | 42                                       | 67.7%  | 7   | 11.3% |
|                 | Hiri   | 205                             | 74                     | 36.1% | 7   | 9.5%  | 2                                 | 28.6% | 5  | 71.4%  | 1   | 14.3% |
|                 | Total  | 2050                            | 376                    | 18.3% | 103                                       | 27.4% | 33                                | 32.0% | 54                                       | 52.4%  | 18  | 17.5% |
| Sex             | Male   | 1078                            | 199                    | 18.5% | 52  | 26.1% | 15                                | 28.8% | 29                                       | 55.8%  | 10  | 19.2% |
|                 | Female | 975                             | 174                    | 17.8% | 50  | 28.7% | 17                                | 34.0% | 25                                       | 50.0%  | 8   | 16.0% |
|                 | Total  | 2053                            | 373                    | 18.2% | 102                                       | 27.3% | 32                                | 31.4% | 54                                       | 52.9%  | 18  | 17.6% |
| Age in<br>month | 0-5    | 49                              | 9                      | 18.4% | 1   | 11.1% | 0                                 | 0.0%  | 1  | 100.0% | 0   | 0.0%  |
|                 | 6-11   | 70                              | 23                     | 32.9% | 6   | 26.1% | 3                                 | 50.0% | 4  | 66.7%  | 0   | 0.0%  |
|                 | 12-23  | 415                             | 93                     | 22.4% | 22  | 23.7% | 11                                | 50.0% | 5  | 22.7%  | 3   | 13.6% |
|                 | 24-35  | 502                             | 105                    | 20.9% | 33  | 31.4% | 8                                 | 24.2% | 21                                       | 63.6%  | 7   | 21.2% |
|                 | 36-47  | 507                             | 68                     | 13.4% | 16  | 23.5% | 4                                 | 25.0% | 10                                       | 62.5%  | 2   | 12.5% |
|                 | 48-59  | 520                             | 78                     | 15.0% | 25  | 32.1% | 7                                 | 28.0% | 13                                       | 52.0%  | 6   | 24.0% |
|                 | Total  | 2063                            | 376                    | 18.2% | 103                                       | 27.4% | 33                                | 32.0% | 54                                       | 52.4%  | 18  | 17.5% |



**Treatment seeking behaviour of suspected pneumonia<sup>4</sup>****Table 8-2 Treatment seeking behaviour of suspected pneumonia in public health facilities among children aged 0-59 months in the last two weeks, PNG IMR's iHDSS, 2016**

|              |        | Suspected<br>Pneumonia | Central/ provincial<br>hospital |        | District hospital |       | Commune health<br>centre |       | Village health<br>worker |       | Other public |      |
|--------------|--------|------------------------|---------------------------------|--------|-------------------|-------|--------------------------|-------|--------------------------|-------|--------------|------|
|              |        | N                      | N                               | %      | N                 | %     | N                        | %     | N                        | %     | N            | %    |
| Sector       | Urban  | 11                     | 5                               | 45.5%  | 0                 | 0.0%  | 1                        | 9.1%  | 0                        | 0.0%  | 0            | 0.0% |
|              | Rural  | 34                     | 3                               | 8.8%   | 2                 | 5.9%  | 27                       | 79.4% | 3                        | 8.8%  | 1            | 2.9% |
|              | Total  | 45                     | 8                               | 17.8%  | 2                 | 4.4%  | 28                       | 62.2% | 3                        | 6.7%  | 1            | 2.2% |
| iHDSS        | Hiri   | 22                     | 5                               | 22.7%  | 1                 | 4.5%  | 19                       | 86.4% | 2                        | 9.1%  | 1            | 4.5% |
|              | Asaro  | 20                     | 0                               | 0.0%   | 1                 | 5.0%  | 7                        | 35.0% | 0                        | 0.0%  | 0            | 0.0% |
|              | Hides  | 3                      | 3                               | 100.0% | 0                 | 0.0%  | 2                        | 66.7% | 1                        | 33.3% | 0            | 0.0% |
|              | Total  | 45                     | 8                               | 17.8%  | 2                 | 4.4%  | 28                       | 62.2% | 3                        | 6.7%  | 1            | 2.2% |
| Sex          | Male   | 20                     | 3                               | 15.0%  | 1                 | 5.0%  | 8                        | 40.0% | 3                        | 15.0% | 1            | 5.0% |
|              | Female | 25                     | 5                               | 20.0%  | 0                 | 0.0%  | 20                       | 80.0% | 0                        | 0.0%  | 0            | 0.0% |
|              | Total  | 45                     | 8                               | 17.8%  | 1                 | 2.2%  | 28                       | 62.2% | 3                        | 6.7%  | 1            | 2.2% |
| Age<br>group | 0-11   | 4                      | 1                               | 25.0%  | 0                 | 0.0%  | 3                        | 75.0% | 0                        | 0.0%  | 0            | 0.0% |
|              | 12-23  | 13                     | 4                               | 30.8%  | 0                 | 0.0%  | 8                        | 61.5% | 1                        | 7.7%  | 0            | 0.0% |
|              | 24-35  | 10                     | 1                               | 10.0%  | 0                 | 0.0%  | 7                        | 70.0% | 0                        | 0.0%  | 0            | 0.0% |
|              | 36-47  | 6                      | 2                               | 33.3%  | 0                 | 0.0%  | 1                        | 16.7% | 0                        | 0.0%  | 0            | 0.0% |
|              | 48-59  | 12                     | 0                               | 0.0%   | 2                 | 16.7% | 9                        | 75.0% | 2                        | 16.7% | 1            | 8.3% |
|              | Total  | 45                     | 8                               | 17.8%  | 2                 | 4.4%  | 28                       | 62.2% | 3                        | 6.7%  | 1            | 2.2% |

<sup>4</sup> Suspected pneumonia is defined as children having either problem in chest or having both signs of chest problem and blocked/ runny nose, which are recognised by their parents/caregivers.

There were 53 CU5 being suspected with pneumonia, based on the two danger signs, recognised by their parents/ caregivers, including: (i) Children breathe faster than usual with short and rapid breaths; (ii) Children have difficulty in breathing in or out. The analysis concludes: 33 children having a chest problem; 18 children having a chest problem and a blocked/runny nose; and 2 children having a chest problem and other symptoms as shown in Table 8-1.

Further analysis of the treatment seeking behaviour by parents/caregivers of the 53 suspected pneumonia cases showed that only 45 cases (85%) sought for advice or medical treatment, and 8 cases did not.

Table 8-2 shows public health facilities where parents/ care givers seek for medical advice and treatment among 45 pneumonia suspected children aged 0-59 months. 17.8% of children sought for medical advice and treatment at a central/provincial hospital. It was obvious that children in urban areas were more likely than rural ones to use the health services at the tertiary healthcare level, 45.5% compared to 8.8%, respectively. All children with suspected pneumonia in Hides were treated at central/provincial hospitals, compared to 22.7% in Hiri and none in Asaro. There was no significant difference in care and treatment seeking behaviour of the parents/caregivers for their male and female children, who had pneumonia in the last two weeks at the tertiary healthcare level, 15.0% and 20.0%, respectively. Similar observations were also seen across all age groups of CU5.

Very few parents/caregivers (4.4%) looked for medical advice and treatment at district hospitals for children with pneumonia symptoms.

By contrast, the majority of parents/ caregivers (62.2%) used the service at Community Health Centres (CHC). This option was particularly popular in rural areas (79.4%). Parents/ caregivers in Hiri appeared most preferred CHC with 86.4% of suspected pneumonia cases sought for medical advice and treatment for suspected pneumonia while this proportion as 35.0% in Asaro and 66.7% in Hides. Parents/caregivers of suspected pneumonia female children were more likely than male ones, 80.0% compared to 40.0%, to seek for treatments at CHC. There was no significant difference across the age groups of children for this treatment option.

A small number of parents/care givers sought treatment of pneumonia by village health workers, 6.7%, and most likely in rural area, particularly in Hides. Very few of them looked for treatment at other public health facilities.

**Table 8-3 Treatment seeking behaviour of suspected pneumonia in private health facilities among children aged 0-59 months in the last two weeks, PNG IMR's iHDSS, 2016**

|              |        | Suspected<br>Pneumonia | Private hospital /<br>clinic |       | Private doctor |      | Private pharmacy |       |
|--------------|--------|------------------------|------------------------------|-------|----------------|------|------------------|-------|
|              |        | N                      | N                            | %     | N              | %    | N                | %     |
| Sector       | Urban  | 11                     | 5                            | 45.5% | 0              | 0.0% | 0                | 0.0%  |
|              | Rural  | 34                     | 1                            | 2.9%  | 0              | 0.0% | 1                | 2.9%  |
|              | Total  | 45                     | 6                            | 13.3% | 0              | 0.0% | 1                | 2.2%  |
| iHDSS        | Hiri   | 22                     | 1                            | 4.5%  | 0              | 0.0% | 0                | 0.0%  |
|              | Asaro  | 20                     | 5                            | 25.0% | 0              | 0.0% | 1                | 5.0%  |
|              | Hides  | 3                      | 0                            | 0.0%  | 0              | 0.0% | 0                | 0.0%  |
|              | Total  | 45                     | 6                            | 13.3% | 0              | 0.0% | 1                | 2.2%  |
| Sex          | Male   | 20                     | 6                            | 30.0% | 0              | 0.0% | 1                | 5.0%  |
|              | Female | 25                     | 0                            | 0.0%  | 0              | 0.0% | 0                | 0.0%  |
|              | Total  | 45                     | 6                            | 13.3% | 0              | 0.0% | 1                | 2.2%  |
| Age in month | 0-11   | 4                      | 0                            | 0.0%  | 0              | 0.0% | 0                | 0.0%  |
|              | 12-23  | 13                     | 1                            | 7.7%  | 0              | 0.0% | 0                | 0.0%  |
|              | 24-35  | 10                     | 3                            | 30.0% | 0              | 0.0% | 1                | 10.0% |
|              | 36-47  | 6                      | 2                            | 33.3% | 0              | 0.0% | 0                | 0.0%  |
|              | 48-59  | 12                     | 0                            | 0.0%  | 0              | 0.0% | 0                | 0.0%  |
|              | Total  | 45                     | 6                            | 13.3% | 0              | 0.0% | 1                | 2.2%  |

Table 8-3 reports the treatment seeking behaviour for suspected pneumonia among children aged 0-59 months in the private health facilities. Private hospitals were the choice of 45.5% of parents/caregivers in urban area, compared to only 2.9% of those in rural areas.

Comparing the iHDSS sites, Asaro reported more parents/ caregivers seeking treatment at private hospitals, with 25%, compared to 4.5% in Hiri (4.5%), and 0% in Hides chose this option. Furthermore, male children (30.0%) were more likely than female one (0%) to be treated at private hospitals. There was no clear observation about difference across different age groups of children at this treatment option. Since the numbers of observations were small, these figures need be cautiously interpreted.

## Medical Treatment

**Table 8-4 Medication treatment of suspected pneumonia among children aged 0-59 months, PNG IMR's iHDSS, 2016**

|              |        | Suspected pneumonia |  | Given any medicine |        | Antibiotics pill/syrup |        | Antibiotics injection |       | Anti-malarial |      | Analgesics |       | Others |       |
|--------------|--------|---------------------|--|--------------------|--------|------------------------|--------|-----------------------|-------|---------------|------|------------|-------|--------|-------|
|              |        | N                   |  | N                  | %      | N                      | %      | N                     | %     | N             | %    | N          |       | N      | %     |
| Sector       | Urban  | 13                  |  | 11                 | 84.6%  | 8                      | 61.5%  | 7                     | 53.8% | 0             | 0.0% | 4          | 30.8% | 2      | 15.4% |
|              | Rural  | 38                  |  | 33                 | 86.8%  | 22                     | 57.9%  | 20                    | 52.6% | 0             | 0.0% | 8          | 21.1% | 5      | 13.2% |
|              | Total  | 51                  |  | 44                 | 86.3%  | 30                     | 58.8%  | 27                    | 52.9% | 0             | 0.0% | 12         | 23.5% | 7      | 13.7% |
| iHDSS        | Hiri   | 24                  |  | 22                 | 91.7%  | 15                     | 62.5%  | 13                    | 54.2% | 0             | 0.0% | 4          | 16.7% | 3      | 12.5% |
|              | Asaro  | 24                  |  | 20                 | 83.3%  | 14                     | 58.3%  | 13                    | 54.2% | 0             | 0.0% | 6          | 25.0% | 4      | 16.7% |
|              | Hides  | 3                   |  | 2                  | 66.7%  | 1                      | 33.3%  | 1                     | 33.3% | 0             | 0.0% | 2          | 66.7% | 0      | 0.0%  |
|              | Total  | 51                  |  | 44                 | 86.3%  | 30                     | 58.8%  | 27                    | 52.9% | 0             | 0.0% | 12         | 23.5% | 7      | 13.7% |
| Sex          | Male   | 26                  |  | 21                 | 80.8%  | 14                     | 53.8%  | 13                    | 50.0% | 0             | 0.0% | 5          | 19.2% | 1      | 3.8%  |
|              | Female | 25                  |  | 23                 | 92.0%  | 16                     | 64.0%  | 14                    | 56.0% | 0             | 0.0% | 7          | 28.0% | 6      | 24.0% |
|              | Total  | 51                  |  | 44                 | 86.3%  | 30                     | 58.8%  | 27                    | 52.9% | 0             | 0.0% | 12         | 23.5% | 7      | 13.7% |
| Age in month | 6-11   | 3                   |  | 3                  | 100.0% | 3                      | 100.0% | 2                     | 66.7% | 0             | 0.0% | 1          | 33.3% | 0      | 0.0%  |
|              | 12-23  | 14                  |  | 13                 | 92.9%  | 11                     | 78.6%  | 8                     | 57.1% | 0             | 0.0% | 4          | 28.6% | 3      | 21.4% |
|              | 24-35  | 15                  |  | 11                 | 73.3%  | 7                      | 46.7%  | 7                     | 46.7% | 0             | 0.0% | 1          | 6.7%  | 2      | 13.3% |
|              | 36-47  | 6                   |  | 5                  | 83.3%  | 2                      | 33.3%  | 4                     | 66.7% | 0             | 0.0% | 0          | 0.0%  | 1      | 16.7% |
|              | 48-59  | 13                  |  | 12                 | 92.3%  | 7                      | 53.8%  | 6                     | 46.2% | 0             | 0.0% | 6          | 46.2% | 1      | 7.7%  |
|              | Total  | 51                  |  | 44                 | 86.3%  | 30                     | 58.8%  | 27                    | 52.9% | 0             | 0.0% | 12         | 23.5% | 7      | 13.7% |

Table 8.4 presents medication treatment of presumed pneumonia among CU5 in the surveillance sites. A total of 51 suspected pneumonia cases were included in this analysis. It was reported that 44 children (86.3%) received medical treatment at a health facility. The proportion of treated children was similar between urban and rural areas, 84.6% and 86.8%. Hiri reported the highest proportion of pneumonia children treated, 91.7%, followed by Asaro, 83.3%, and lowest in Hides, 66.7%. The proportion of female children being treated was 92.9%, higher than male children, 80.8%. The treatment rate varied across age groups, lowest at age group of 24-35 month (73.3%) to the highest of 92.9% in the age group of 12-23 months.

Further analysis of medication treatment showed that 58.8% of pneumonia cases were treated with antibiotics (pill or syrup). Urban children reported higher proportion than rural ones, 61.5% compared to 57.9%. Children in Hiri reported the highest proportion of treatment rate (62.5%), followed by Asaro (58.3%) lowest in Hides (33.3%). Female children were more likely to receive treatment with antibiotics than males, 64.0% and 53.8%, respectively. This treatment was also more common among younger age of children, particularly 100.0% in the age group of 6-11 months, but only 53.3% in the age group of 48-59 months.

Antibiotics injection was also given to 52.9% of pneumonia suspected cases with similar proportion reported in urban and rural areas, 53.8% and 52.6%. Similarity was also observed in the two sites Hiri and Asaro, at 54.2%, while only 33.3% was reported in Hides. Again, female children were more likely than male children to be treated with antibiotics injection, 56% compared to 50.0%, respectively. Antibiotics injection was also more likely given to children at younger age i.e. 66.7% in the age group 6-11 months, and 57.1% in age group 12-23 months, and 46.2% in age group 48-59 months.

It is noticeable that no anti-malarial drug was given to these suspected pneumonia children.

Analgesics were also given to 23.5% of children with suspected pneumonia. Urban children were more likely to be given this medicine than the rural ones. 30.8% and 21.1%. This medicine was also given more to children at younger age groups.

13.7% of children were reported being treated with other medicines as well.

## 9. CHAPTER 9 MALARIA CARE AND TREATMENT

### Abstract

Globally, malaria is remained one of the leading causes of mortality and morbidity among children under 5 years old. Monitoring incidence, care and treatment of malaria in this population is therefore, among priorities of PNG. Accurate diagnosis and appropriate treatment of malaria will contribute to lowering the number of child deaths.

A total of 62 out of 2,063 CU5 (3%) reported as having a fever in two weeks prior to the interview date. The incidence was recorded highest in Hides (13%) and low (2%) in the Hiri and Asaro.

Among these children, 50% sought medical advice and 43% were taken to health facilities, 40% were treated with medications and 10% received blood for testing.

Only 17 children with fever were treated with anti-malarial drugs; 78% treated with antibiotics (oral and injection); 87% was treated with analgesics (paracetamol and aspirin). Amongst children treated with anti malarial drugs, four received treatment on the same day, eight on the next day, two after two days, one after one day and one after 4 days (one was missing data).

Malaria contributes to anaemia in children and is a common cause of school absenteeism. Preventive measures, especially the use of insecticide treated mosquito-nets (ITNs), can dramatically reduce malaria mortality rates among children. In areas where malaria is common, international recommendations suggest treating any fever in children as if it were malaria and immediately giving the child a full course of recommended anti-malarial tablets.

Children with severe malaria symptoms, such as fever or convulsions, should be taken to a health facility. Also, children recovering from malaria should be given extra liquids and food and, for younger children, should continue to be breastfed.

While PNG is considered a high malaria prevalence country, there has been a considerable achievement in malaria prevention. The National Malaria Control Programme aims to to reduce mortality and morbidity caused by malaria among the population, particularly CU5.

### Healthcare seeking for malaria

**Table 9-1 Children aged 0-59 months having illness with fever in the last two weeks and their healthcare seeking behaviour, PNG IMR's iHDSS, 2016**

|               |        | No. of<br>CU5 | Children with<br>fever |       | Blood taken |       | Seek advice |        | Taken to health<br>facilities |        | Given medicine |        |
|---------------|--------|---------------|------------------------|-------|-------------|-------|-------------|--------|-------------------------------|--------|----------------|--------|
|               |        | N             | N                      | %     | N           | %     | N           | %      | N                             | %      | N              | %      |
| Sector        | Urban  | 261           | 1                      | 0.4%  | 0           | 0.0%  | 1           | 100.0% | 1                             | 100.0% | 1              | 100.0% |
|               | Rural  | 1802          | 61                     | 3.4%  | 6           | 9.8%  | 30          | 49.2%  | 26                            | 42.6%  | 24             | 39.3%  |
|               | Total  | 2063          | 62                     | 3.0%  | 6           | 9.7%  | 31          | 50.0%  | 27                            | 43.5%  | 25             | 40.3%  |
| iHDSS<br>site | Hiri   | 1115          | 24                     | 2.2%  | 1           | 4.2%  | 16          | 66.7%  | 14                            | 58.3%  | 13             | 54.2%  |
|               | Asaro  | 742           | 10                     | 1.3%  | 4           | 40.0% | 8           | 80.0%  | 6                             | 60.0%  | 5              | 50.0%  |
|               | Hides  | 206           | 28                     | 13.6% | 1           | 3.6%  | 7           | 25.0%  | 7                             | 25.0%  | 7              | 25.0%  |
|               | Total  | 2063          | 62                     | 3.0%  | 6           | 9.7%  | 31          | 50.0%  | 27                            | 43.5%  | 25             | 40.3%  |
| Sex           | Male   | 1078          | 27                     | 2.5%  | 2           | 7.4%  | 11          | 40.7%  | 8                             | 29.6%  | 7              | 25.9%  |
|               | Female | 980           | 34                     | 3.5%  | 4           | 11.8% | 19          | 55.9%  | 18                            | 52.9%  | 17             | 50.0%  |
|               | Total  | 2063          | 61                     | 3.0%  | 6           | 9.8%  | 30          | 49.2%  | 26                            | 42.6%  | 24             | 39.3%  |
| Age<br>group  | 0-5    | 49            | 0                      | 0.0%  | 0           | 0.0%  | 0           | 0.0%   | 0                             | 0.0%   | 0              | 0.0%   |
|               | 6-11   | 70            | 1                      | 1.4%  | 0           | 0.0%  | 1           | 100.0% | 1                             | 100.0% | 1              | 100.0% |
|               | 12-23  | 415           | 17                     | 4.1%  | 1           | 5.9%  | 8           | 47.1%  | 7                             | 41.2%  | 7              | 41.2%  |
|               | 24-35  | 502           | 20                     | 4.0%  | 3           | 15.0% | 8           | 40.0%  | 8                             | 40.0%  | 6              | 30.0%  |
|               | 36-47  | 507           | 12                     | 2.4%  | 0           | 0.0%  | 5           | 41.7%  | 3                             | 25.0%  | 3              | 25.0%  |
|               | 48-59  | 520           | 12                     | 2.3%  | 2           | 16.7% | 9           | 75.0%  | 8                             | 66.7%  | 8              | 66.7%  |
|               | Total  | 2063          | 62                     | 3.0%  | 6           | 9.7%  | 31          | 50.0%  | 27                            | 43.5%  | 25             | 40.3%  |

Table 9-1 provides the population of children aged 0-59 months who had a fever, who had taken blood for testing of malaria, sought for medical advice, taken to health facilities and given medications. There were 62 out of 2,063 CU5 reported having an illness with fever in the last two weeks, accounted for 3% of the total children. Most sick children were in the rural areas, with the highest proportion reported in Hides, 13%. There was a very low proportion in Hiri and Asaro (less than 2%). The proportion of children with fever in the last two weeks was similar between male and female, and across all age groups.

Among 62 children with fever, 6 had a finger or heel blood sampling, accounted for 9.7%, with the highest proportion in Asaro (40%), in the age group of 24-35 months (15%) and 48-59 months (16%). 50% of children were sought for medical advice or treatment, with the highest proportion found in Asaro (80%), followed by Hiri 66%, and lowest in Hides (25%). Female children were more likely than male counterparts to seek for medical advice, 55% compared to 40%. 27 out of 62 children with fever were taken to health facilities (43%) with the highest proportion reported in Asaro (60%) and Hiri (58%) and lowest in Hides (25%). Female children were more likely than male ones to be taken to health facilities, 52% compared 29%.

25 children were given medicine for treatment of fever, accounted for 40% of the sick children. The highest proportion was reported in Hiri, 54%, followed by Asaro 50% and lowest in Hides 25%. Again, more female children were given medication treatment than male ones. The treatment rate varied widely across age groups.



## Treatment of children with anti-malarial drugs

**Table 9-2 Treatment with anti-malarial drugs at health facility among children aged 0-59 months with fever in the last two weeks, PNG IMR's iHDSS, 2016**

|               |        | No. of CU5<br>with fever<br>treated with<br>medicine | Chloroquine | Quinine<br>sulfate | Artemisinin<br>Combination<br>Therapy (ACT) | Quinine<br>dihydrochlorate | Dihydroartemisinin<br>-Piperaquine | Artesunate | Primaquine | Total treated<br>anti-malarial |
|---------------|--------|--|-------------|--------------------|---|----------------------------|------------------------------------|------------|------------|--------------------------------|
| Sector        | Urban  | 12   | 2           | 1                  | 1   | 0                          | 0                                  | 0          | 0          | 4                              |
|               | Rural  | 52   | 2           | 3                  | 0   | 1                          | 0                                  | 1          | 6          | 13                             |
|               | Total  | 64   | 4           | 4                  | 1   | 1                          | 0                                  | 1          | 6          | 17                             |
| iHDSS<br>site | Hiri   | 34   | 1           | 0                  | 0   | 0                          | 0                                  | 1          | 1          | 3                              |
|               | Asaro  | 19   | 3           | 4                  | 1   | 1                          | 0                                  | 0          | 5          | 14                             |
|               | Hides  | 11   | 0           | 0                  | 0   | 0                          | 0                                  | 0          | 0          | 0                              |
|               | Total  | 64   | 4           | 4                  | 1   | 1                          | 0                                  | 1          | 6          | 17                             |
| Sex           | Male   | 27   | 2           | 1                  | 1   | 1                          | 0                                  | 1          | 3          | 9                              |
|               | Female | 36   | 2           | 3                  | 0   | 0                          | 0                                  | 0          | 3          | 8                              |
|               | Total  | 63   | 4           | 4                  | 1   | 1                          | 0                                  | 1          | 6          | 17                             |
| Age<br>group  | 0-5    | 3  | 0           | 0                  | 0   | 0                          | 0                                  | 0          | 0          | 0                              |
|               | 6-11   | 2  | 0           | 0                  | 0   | 0                          | 0                                  | 1          | 0          | 1                              |
|               | 12-23  | 19   | 0           | 0                  | 0   | 0                          | 0                                  | 0          | 1          | 1                              |
|               | 24-35  | 21   | 1           | 2                  | 1   | 0                          | 0                                  | 0          | 3          | 7                              |
|               | 36-47  | 5  | 2           | 0                  | 0   | 0                          | 0                                  | 0          | 0          | 2                              |
|               | 48-59  | 14   | 1           | 2                  | 0   | 1                          | 0                                  | 0          | 2          | 6                              |
|               | Total  | 64   | 4           | 4                  | 1   | 1                          | 0                                  | 1          | 6          | 17                             |

A total of 64 CU5, who had a fever in the last two weeks, were reported receiving some medications at a health facility. Table 9-2 showed that 17 children received treatment of anti-malaria drugs as follows: four of Chloroquine; six of Primaquine; four of Quinine sulphate, one of Artemisinin Combination Therapy (ACT), one of Quinine dihydrochlorate, and one of Artesunate and none of Dihydroartemisinin-Piperaquine.

**Table 9-3 Treatment with antibiotics and analgesics at health facility among children aged 0-59 months with fever in the last two weeks, PNG IMR's iHDSS, 2016**

|              |        | CU5<br>with<br>fever<br>treated<br>with<br>medicin<br>e | Antibiotics  |      |           |      | Analgesics                                |       |         |      |           |   | Other |      |
|--------------|--------|---|--------------|------|-----------|------|---|-------|---------|------|-----------|---|-------|------|
|              |        |   | Pill / Syrup |      | Injection |      | Paracetamol/<br>Panadol/<br>Acetaminophen |       | Aspirin |      | Ibuprofen |   |       |      |
|              |        |   | N            | %    | N         | %    | N   | %     | N       | %    | N         | % | N     | %    |
| Sector       | Urban  | 12  | 9            | 75.0 | 8         | 66.7 | 9   | 75.0  | 1       | 8.3  | -         | - | 4     | 33.3 |
|              | Rural  | 52  | 8            | 15.4 | 25        | 48.1 | 44  | 84.6  | 2       | 3.8  | -         | - | 5     | 9.6  |
|              | Total  | 64  | 17           | 26.6 | 33        | 51.6 | 53  | 82.8  | 3       | 4.7  | -         | - | 9     | 14.1 |
| iHDSS        | Hiri   | 34  | 5            | 14.7 | 19        | 55.9 | 29  | 85.3  | 1       | 2.9  | -         | - | 4     | 11.8 |
|              | Asaro  | 19  | 10           | 52.6 | 11        | 57.9 | 14  | 73.7  | 2       | 10.0 | -         | - | 4     | 21.1 |
|              | Hides  | 11  | 2            | 18.2 | 3         | 27.3 | 10  | 90.9  | 0       | 0.0  | -         | - | 1     | 9.1  |
|              | Total  | 64  | 17           | 26.6 | 33        | 51.6 | 53  | 82.8  | 3       | 4.7  | -         | - | 9     | 14.1 |
| Sex          | Male   | 27  | 9            | 33.3 | 15        | 55.6 | 22  | 81.5  | 3       | 11.1 | -         | - | 4     | 14.8 |
|              | Female | 36  | 7            | 19.4 | 17        | 47.2 | 30  | 83.3  | 0       | 0.0  | -         | - | 5     | 13.9 |
|              | Total  | 63  | 16           | 25.4 | 32        | 50.8 | 52  | 82.5  | 3       | 4.8  | -         | - | 9     | 14.3 |
| Age<br>group | 0-11   | 5   | 0            | 0.0  | 2         | 40.0 | 5   | 100.0 | 0       | 0.0  | -         | - | -     | -    |
|              | 12-23  | 19  | 6            | 31.6 | 9         | 47.4 | 16  | 84.2  | 0       | 0.0  | -         | - | 4     | 21.1 |
|              | 24-35  | 21  | 9            | 42.9 | 11        | 52.4 | 17  | 81.0  | 0       | 0.0  | -         | - | 3     | 14.3 |
|              | 36-47  | 5   | 0            | 0.0  | 1         | 20.0 | 3   | 60.0  | 1       | 20.0 | -         | - | -     | -    |
|              | 48-59  | 14  | 2            | 14.3 | 10        | 71.4 | 12  | 85.7  | 2       | 14.3 | -         | - | 2     | 14.3 |
|              | Total  | 64  | 17           | 26.6 | 33        | 51.6 | 53  | 82.8  | 3       | 4.7  | -         | - | 9     | 14.1 |

Further analysis was conducted on types of antibiotics and analgesics were given to 64 CU5, who had a fever in the last two weeks. The results as shown in Table 9-3 indicated that 26% of these children were treated with oral antibiotics (pill or syrup) and 51% was treated with injection antibiotics. Urban children had better access to antibiotics treatment than rural children, 75% compared to 15% for oral antibiotics, and 66% compared to 48% for injection antibiotics, respectively. Asaro site reported highest proportion of children were treated with antibiotics, both oral and injection, 52% and 57%, followed by Hiri, 14% and 55%, and

lowest in Hides, 18% and 27%. Male children were more likely than female children to be treated with antibiotics, 33% compared to 19% for oral antibiotics, and 55% compared to 47% for injection antibiotics, respectively. Treatment with antibiotics was observed highest among children in the age group of 24-35 months, 42% for oral and 52% for injection antibiotics. It was followed by children aged 12-23 months with the proportions being treated with oral and injection antibiotics were 31% and 47%, respectively.

The majority of CU5 with a fever was treated with analgesics and more than 82% was treated with paracetamol or panadol or acetaminophen. The proportion of children being treated with these medicines varied slightly between urban-rural areas (75% vs. 84%), surveillance sites (85 in Hiri, 73% in Asaro and 90% in Hides) and sex of the child (81% in males and 83% in females). Younger children were more likely to be treated by analgesics e.g. the proportion of children was treated with this medicine as 100% in the age group of 0-11 months, declined to 84% in the age group of 12-23 months, 60% in the age group of 36-47 months.

**Table 9-4 First treatment with anti-malarial drugs among children aged 0-59 months, who had a fever in the last two weeks, PNG IMR's iHDSS, 2016**

|               |        | The same<br>day | Next<br>day | Two days<br>after | Three days<br>after | Four days<br>after | Total |
|---------------|--------|-----------------|-------------|-------------------|---------------------|--------------------|-------|
| UF8           | Urban  | 0               | 4           | 0                 | 0                   | 0                  | 4     |
|               | Rural  | 4               | 4           | 2                 | 1                   | 1                  | 12    |
|               | Total  | 4               | 8           | 2                 | 1                   | 1                  | 16    |
| iHDSS<br>site | Hiri   | 4               | 3           | 0                 | 0                   | 0                  | 7     |
|               | Asaro  | 0               | 5           | 1                 | 0                   | 1                  | 7     |
|               | Hides  | 0               | 0           | 1                 | 1                   | 0                  | 2     |
|               | Total  | 4               | 8           | 2                 | 1                   | 1                  | 16    |
| Sex           | Male   | 1               | 6           | 1                 | 0                   | 1                  | 9     |
|               | Female | 3               | 2           | 1                 | 1                   | 0                  | 7     |
|               | Total  | 4               | 8           | 2                 | 1                   | 1                  | 16    |
| Age<br>group  | 6-11   | 0               | 1           | 0                 | 0                   | 0                  | 1     |
|               | 12-23  | 3               | 1           | 0                 | 0                   | 0                  | 4     |
|               | 24-35  | 0               | 2           | 1                 | 0                   | 0                  | 3     |
|               | 36-47  | 1               | 1           | 0                 | 0                   | 0                  | 2     |
|               | 48-59  | 0               | 1           | 1                 | 0                   | 1                  | 3     |
|               | 60-71  | 0               | 2           | 0                 | 1                   | 0                  | 3     |
|               | Total  | 4               | 8           | 2                 | 1                   | 1                  | 16    |

Table 9-4 provides data on further analysis of the time of being treated with anti-malarial drugs among 16 children, aged 0-59 months, had a fever in the last 2 weeks and were treated with anti-malaria drugs. Only four children were treated on the same day, all in Hiri; eight on the next day, two after two days, one after three days and one after four days. No one was treated after five days or more.

## 10. CHAPTER 10 MORBIDITY SURVEILLANCE

### Abstract

This chapter provides information on morbidity cases presented to health facilities in the three surveillance sites: Hiri, Asaro and Hides in the reporting period January- June 2016.

At each site, health clinics are staffed by research nurses and HEO, who collect morbidity data while also providing primary health care services such as immunization, antenatal services, patient examination, disease diagnosis and treatment.

The main findings of the data revealed that there was an increase in the total number of caseload records in the surveillance sites, particularly in Hiri and Asaro clinics. However, clinics in Hides recorded lower number of caseloads than that reported in the previous reporting period.

Respiratory tract infections continue to contribute to the heaviest caseloads across the three surveillance sites, accounting for 44.4% in Asaro, 26.6% in Hides, and 49.3% in Hiri. Skin infections and diarrhoeal diseases are the next most important contributors to the observed burden of disease.

Significantly, Asaro health clinics reported 5 TB cases while Hiri and Hides did not record any TB. This finding could reflect that TB patients bypassed the primary healthcare level. Both malaria and STI illnesses recorded lower figures in all the sites. This observation is consistent with the previous reports and indicates that the likely burden of malaria is relatively low.

### Asaro

There were increases in the numbers of immunization records and accidents/injury cases in both Asaro and Tafeto health centres, compared to data reported in the last report. As shown in Table 10-1, Tafeto health centre does not provide family planning services, but recorded a higher number of antenatal visits (n=422) during the reporting period, which is higher than

the previous reporting period (n=325). This figure is based on the regular antenatal visits to the health centre, rather than data from special antenatal awareness/campaign.

**Table 10-1 Cases load and provision of health services in Asaro iHDSS, January-June, 2016**

|                      | Asaro  | NGUC* | Tafeto | Total  |
|----------------------|--------|-------|--------|--------|
| Case Load            | 12,565 | 868   | 2,960  | 16,393 |
| Antenatal Visits     | 1,010  | 15    | 422    | 1,447  |
| Family Planning      | 668    | 137   | 0      | 805    |
| Immunisation         | 1,599  | 412   | 1,620  | 3,631  |
| Accidents & Injuries | 257    | 37    | 195    | 489    |

*\*NGUC (North Goroka Urban Clinic) was included as one of the Morbidity surveillance clinics in March 2016*

The North Goroka Urban clinic is one of the two clinics in Goroka town serving the urban population, apart from the Eastern Highlands Provincial Hospital (EHPH), which serves the whole of Eastern Highlands Province. The NGUC was included in Asaro surveillance site in early 2016 to collect morbidity data of the urban population, which was commenced in March 2016. Over the three month period from March to June, 868 cases were recorded in this clinic. This figure was higher than expected. Due to the major construction work at the EHPH currently underway, patients with minor illnesses were sent or referred to the two urban clinics while EHPH dealt with serious cases, requiring specialist cares. The NGUC recorded the lowest number of antenatal care (n=15) as most of the pregnant women were referred to the EHPH, which had a separate antenatal clinic.

**Table 10-2 Morbidity records in Health Centres in Asaro iHDSS, January-June, 2016**

|                      | Asaro  |      | NGUC  |      | Tafeto |      | Total  |      |
|----------------------|--------|------|-------|------|--------|------|--------|------|
|                      | N      | %    | N     | %    | N      | %    | N      | %    |
| TB                   | 3      | 0.03 | 0     | 0    | 2      | 0    | 5      | 0.03 |
| STIs                 | 481    | 4.1  | 38    | 3.1  | 124    | 7.7  | 643    | 4.4  |
| Skin infections      | 1,359  | 11.4 | 162   | 13.3 | 44     | 2.7  | 1,565  | 10.7 |
| Respiratory diseases | 5,256  | 44.4 | 390   | 31.9 | 612    | 38.0 | 6,258  | 42.6 |
| Diarrhoea            | 526    | 4.4  | 184   | 15.1 | 311    | 19.3 | 1,021  | 7.0  |
| Malaria (clinical)   | 437    | 3.7  | 36    | 3.0  | 6      | 0.4  | 479    | 3.3  |
| Other infections     | 3,790  | 32.0 | 412   | 33.7 | 513    | 31.8 | 4,715  | 32.1 |
| Total                | 11,852 | 100  | 1,222 | 100  | 1,612  | 100  | 14,686 | 100  |

*\*NGUC (North Goroka Urban Clinic) was included as one of the Morbidity surveillance clinics in March 2016*

Table 10-2 shows the percentage of various diseases recorded in three health centres in Asaro site in the reporting period. The data showed the highest proportion of respiratory diseases, 44.4% in Asaro, 38% in Tafeto and 31.9% in North Goroka clinics. Respiratory diseases in Asaro health centre increased by three folds (n=5,256) when compared to the data reported in the last report (n=1,706). The second and third most common diseases recorded in Asaro health centre were skin infections (11.4%) and diarrhoeal diseases (4.4%), followed by STI (4.1%). Tafeto recorded diarrhoeal diseases (19.3%) as the second highest morbidity, followed by STI (7.7%), while NGUC recorded diarrhoea (15.1%) and skin infections (13.3%) as the second and third highest cases respectively.

Overall, the number of diseases reported in this report was higher in the two health clinics- Asaro and Tafeto, when compared to the last report. Asaro health centre reported the highest number of malaria suspected cases (n=437); however most of the cases were not confirmed by tests such as blood slides and rapid diagnostic tests. It is noted that there were very high number of cases recorded under ‘other infections’ in all the three health clinics. This was expected because it included a combination of several other diseases such as eye infections, ear infections, dental cases and malnutrition among others. Respiratory diseases, skin infections and diarrhoeal diseases continues to have high rates in this reporting period, therefore prevention programme measures needs to be considered to reduce these diseases.

## Hides

**Error! Reference source not found.** shows the caseload recorded in Para and Manada Health Clinics in the Hides iHDSS site. Para clinic is the only operating clinic within Hides iHDSS catchment area. Mananda health centre is outside of the iHDSS surveillance area, but the only referral health facilities in Komo district, including patients from Para clinic.

Para clinic recorded 1,215 caseloads while Manada recorded 3,805 in this reporting period. These figures are much lower than what was reported in the 2016 March Report, which recorded 5,593 caseloads in Para and 5,713 in Mananda.

**Table 10-3: Case load recorded at health clinics in Hides iHDSS, January-June, 2016**

|                     | Para  | Manada | Total |
|---------------------|-------|--------|-------|
| Case load           | 1,215 | 3,805  | 5,020 |
| Antenatal           | NA    | NA     | NA    |
| Family Planning     | NA    | NA     | NA    |
| Immunisation        | NA    | NA     | NA    |
| Accident & Injuries | 103   | 163    | 266   |

Antenatal, Family Planning, and Immunization data for both clinics was not available by the time the report was drafted and will be updated in the next report. A significant number of the morbidity cases was for accident and injuries with 266 total reported cases; signifying as one of the main causes of hospital visitations during the reporting period.

**Table 10-4 Morbidity records in Health Centres, Hides iHDSS, January-June, 2016**

|                      | Para Clinic |      | Mananda H/C |      | Total |      |
|----------------------|-------------|------|-------------|------|-------|------|
|                      | N           | %    | N           | %    | N     | %    |
| TB                   | 0           | 0    | 0           | 0    | 0     | 0    |
| STIs                 | 196         | 10.7 | 217         | 7.2  | 413   | 8.5  |
| Skin infections      | 216         | 11.8 | 431         | 14.2 | 647   | 13.3 |
| Respiratory diseases | 487         | 26.6 | 716         | 23.7 | 1,203 | 24.8 |
| Diarrhoea            | 313         | 17.1 | 615         | 20.3 | 928   | 19.1 |
| Malaria (clinical)   | 2           | 0.1  | 14          | 0.5  | 16    | 0.3  |
| Other infections     | 616         | 33.7 | 1,032       | 34.1 | 1,648 | 34.0 |
| Total                | 1,830       | 100% | 3,025       | 100  | 4,855 | 100% |

**Error! Reference source not found.** shows the morbidity records in Para and Manada clinics. Respiratory diseases accounted for the largest proportion in Para clinic in the last report, followed by diarrhoea and skin disease. This trend did not change in this reporting period compared with the previous reporting period, with respiratory diseases, diarrhoeal diseases and skin infections still maintaining the three leading causes of health clinic visitation with percentage ranging from 26.6%, 17.1% and 11.8% respectively. A significant portion of the morbidity cases was for sexually transmitted infections (STI) with 196 (10.7%) reported.



Similarly, the three leading causes of hospital visitation in Mananda health centre were respiratory, diarrhoeal and skin infections, followed by STI and malaria. As expected, the morbidity cases for “other infections” were accounted for more than 34% of all caseloads recorded in both health facilities as it covered all other infectious diseases. There were no records of TB cases in both health facilities in the reporting period.

## Hiri

**Table 10-5 Case load at health clinics, Hiri iHDSS, January-June, 2016**

|                     | Papa  | Boera | Porebada | Total |
|---------------------|-------|-------|----------|-------|
| Case Load           | 4,490 | 973   | 2,770    | 8,233 |
| Antenatal Visits    | 356   | -     | 200      | 556   |
| Family Planning     | 70    | 35    | 92       | 197   |
| Immunization        | 1,430 | 80    | 934      | 2,444 |
| Accidents/ Injuries | 92    | 16    | 60       | 168   |

**Error! Reference source not found.** shows the caseloads recorded in three health centres: Papa, Boera and Porebada in Hiri iHDSS site in the reporting period. It is noticeable that all the health clinics relatively recorded higher numbers of caseloads than the last report. Papa and Porebada continue to have a greater case load than Boera. Papa has highest number of immunisation and antenatal visits, followed by Porebada. Boera recorded lower numbers of cases for family planning, antenatal care, immunization services and accidents/ injuries than the other two centres.

**Table 10-6 Morbidity records in Health Centres, Hiri iHDSS, January-June, 2016**

|                       | Papa  |      | Boera |      | Porebada |      | Total |      |
|-----------------------|-------|------|-------|------|----------|------|-------|------|
|                       | N     | %    | N     | %    | N        | %    | N     | %    |
| TB                    | 0     | 0    | 0     | 0    | 0        | 0    | 0     | 0    |
| STIs                  | 10    | 0.2  | 7     | 0.7  | 5        | 0.2  | 22    | 0.3  |
| Skin infections       | 525   | 11.7 | 148   | 15.2 | 488      | 17.6 | 1,161 | 14.1 |
| Respirations Diseases | 2,219 | 49.3 | 345   | 35.5 | 1,314    | 47.5 | 3,878 | 47.1 |
| Diarrhoea             | 369   | 8.2  | 135   | 13.9 | 202      | 7.3  | 706   | 8.6  |
| Malaria (clinical)    | 9     | 0.2  | 6     | 0.6  | 24       | 0.9  | 39    | 0.5  |

|                  |       |      |     |      |       |      |       |      |
|------------------|-------|------|-----|------|-------|------|-------|------|
| Other infections | 1,358 | 30.2 | 332 | 34.1 | 735   | 26.6 | 2,425 | 29.5 |
| Total            | 4,490 | 100  | 973 | 100  | 2,768 | 100  | 8,231 | 100  |

Table 10-6 shows the number and proportion of diseases recorded in the Hiri health clinics in the reporting period January–June 2016. The highest proportions of morbidity data were reported in Papa clinic, followed by Porebada and Boera clinics with figures ranging from 4,490, 2,768 and 973 respectively. Respiratory diseases made up the highest proportions in all the clinics with Papa, 49.3%, while Porebada and Boera accounted for 47.5% and 35.5% respectively. Skin infections and diarrhoeal diseases recorded the second and third leading causes of health clinic visitations in all the clinics.

**Table 10-7 POM Laboratory activities, Hiri iHDSS, 2016**

| Study             | Type of Test     | 2013 |   | 2014 |   | 2015 |   | 2016<br>(Jan-Jun) |    | 2016<br>(Aug-Oct) |    |
|-------------------|------------------|------|---|------|---|------|---|-------------------|----|-------------------|----|
|                   |                  | N    | % | N    | % | N    | % | N                 | %  | N                 | %  |
| NCD               | Lipids           | 293  |   | 303  |   | 47   |   | NA                | NA | NA                | NA |
|                   | HbA1c            | 305  |   | 430  |   | NA   |   | NA                | NA | NA                | NA |
| TB                | TB Microscopy    | 367  |   | 659  |   | 65   |   | NA                | NA | 22                |    |
|                   | Gene X-pert      | 175  |   | 748  |   | 39   |   | NA                | NA | Expired reagents  | NA |
| Healthy Pregnancy | C. Trachomatis   | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   |                  | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | N. Gonorrhoea    | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | T. Vaginalis     | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
| STI               | Syphilis         | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | RPR              | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | Anti TP syphilis | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | HSV              | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | HIV              | NA   |   | 54   |   | 43   |   | NA                | NA | NA                | NA |
|                   | HepB             | NA   |   | NA   |   | 99   |   | NA                | NA | NA                | NA |

The PNG IMR PiHP laboratory currently processes sputum samples that are collected from TB suspects who present to the three (3) health facilities in Porebada, Boera and Papa, where the health and demographic system surveillance study is currently being carried out. From the end of August 2016, 22 TB sputum samples have been processed.

The PNG IMR PiHP Lab assisted the Central Public Health (CPHL) TB unit by performing sputum microscopy for TB suspected patients who present to the three (3) health centres in Porebada, Boera and Papa/Lealea. In recognition of its participation as a TB microscopy

centre in National TB programme, two technicians were invited to attend the TB microscopy training in 2015 and 2016. As a result of their participation, the PiHP lab will be taking part in the national TB external quality assurance (TB EQA) programme that is facilitated by the CPHL TB unit. The PNG IMR PiHP lab will commence participation in TB EQA in the first quarter of 2017.

The PiHP Lab has the capacity to perform molecular work and different biochemistry parameters can be tested on the Vitros 350 analyser. The MGIT 960 culture machine can do TB culture and drug sensitivity testing (DST). This work can be done in the near future since there is a great need for TB culture and drug sensitive testing (DST) in PNG.

The PNG IMR PiHP lab has the state of the art equipment and therefore, that can be used for great research work and also as a teaching facility. Further collaboration with other partners or projects should be strengthened so the lab can be used to its full capacity and potential.

## 11. CHAPTER 11 DISCUSSION

This Chapter discusses major findings and observations presented in the previous chapters. The discussion will focus on comparisons of the findings across the three surveillance sites and triangulation with other data sources when the data are available.

### Data quality

The quality of the iHDSS surveillance data has further improved over this reporting period. The data collection process was completed in a timely manner with interviews of parents and care takers of CU5. Of which 2,232 parents/care givers agreed to participate in the interviews, accounted for 78.5% of the total CU5 living in the three surveillance sites.

All data collection forms underwent the data quality control process and all data entered into the central iHDSS database, located in the PNG IMR main office in Goroka.

The CU5 dataset was extracted from the database and used for training of the core group of national scientific officers. The data analysis and quality control process reconfirmed the improvement of the data quality of the iHDSS. This has been reflected in three aspects of the CU5 data.

As shown in Table 2-1, 408 parents and care givers were contacted in Hides for interview with only 228 parents and caregivers were available and agreed to participate. This accounted for 56% of the total CU5 in Hides, leaving 44% of non-participants. This high non-participation rate in Hides was because many of households had moved out of the site, mostly due to the tribal fighting and unrest in the surveillance sites over the reporting period.

Another technical issue, raised during the data collection in Hides was related to the CU5 questionnaire, which requires that interviewers have basic health and medical background, especially for the data module on immunisation and vaccination. As shown in Table 2-2, most of the data collection in Hides was conducted in February, when research nurses were mobilised from Hiri to Hides to assist the team with the data collection. Without such technical assistance from the Hiri team, the Hides data collection team would have been challenged to complete the work.

Despite these cultural and technical issues, the overall outcome of interviews with parents and caregivers of CU5 was encouraging, with the interview completion rate at 75% for all three sites. The highest completed interview rate was recorded in Asaro, 83%, followed by Hiri, 78% and lowest in Hides, 45%.

Age of children (in month) is one of the most important variables for cross-table and in-depth data analysis of the CU5 data. There were 684 ‘missing values’ on age information that accounted for 24% of the CU5 records. Many parents/care giver couldn’t remember the month and/ or year of birth of their children while the proportion of children with birth certificate was very low.

Sex distribution is another indicative of the data quality. Sex ratio of CU5 was balance at 110.4 boys per 100 girls for all three sites. However, it was slightly higher in Asaro, 113.7 and relatively low in Hides, 97.3 that could be due to smaller numbers of CU5 recorded in these two sites, compared to Hiri. Very few parents/care givers (less than 0.3%) reported as ‘don't know’ about the sex of their children in three surveillance sites.

### **Demographic characteristics of children under 5**

Total of 2,843 CU5 and 3,234 households were recorded in the iHDSS database by the end of May 2016, with 35% reported in the urban sector and 65% in the rural sector. Urban and rural population data was included in this data analysis for the first time during this reporting period, which has further enhanced the reporting capacity of the iHDSS.

Hiri recorded the highest number of CU5, 1,429 (50.3%), followed by Asaro with 1,006 CU5 (35.4%) and lowest in Hides children 408 (14.4%). Unlike the previous data collection round, the data collection of CU5 was only in three surveillance sites: Hiri, Asaro and Hides (division 3 only). No data collection was conducted in Karkar as the site was closed by the end of 2015.

### **Place of birth delivery of CU5**

A total of 1,456 parents/caregivers of CU5 responded to the question on place of birth delivery. Hiri and Asaro reported 55% and 60% of children were delivered at provincial or district hospitals, compared to 35% reported in Hides. The proportion of birth deliveries at Community Health Centres/Aid Post accounted for 22.5% of the total births in all three sites,

with similar proportions reported in Hiri and Asaro, 21.6% and 21.8%, respectively, but higher in Hides, 29.1%.

By contrast, Hides reported 35% of CU5 were delivered at home, compared to 23.1% and 17.0%, reported in Hiri and Asaro. It is noticeable that only 10% of women of reproductive age, 15-49 reported the last births delivery was at home in the last two years, according to the March 2016 Report. Comparing the two figures in Hides, it shows that the home birth delivery rate at home among CU5 (35%) was much higher than that of the last children born in the last two years (10%) as reported by the women of reproductive age 15-49 data. It suggests an increase of health facility-based birth delivery and a decrease of home-based birth delivery over the last 5 years in Hides. That is because the information on place of birth delivery of children born in the last two years is more up-to-date than the data of children under five years of age.

### Birth certificate

Among 2,171 parents/care givers of CU5 responded to the question of whether or not their children have a birth certificate, of which only 18% of them reported their children did have a birth certificate in all three sites. The majority (82%) of children didn't have ones. The highest proportion of CU5 with a birth certificate was recorded in Hiri, 20.7%, followed by Asaro, 18.9% and very low in Hides, only 2.3%. It suggests that most of PNG parents don't see the importance of birth certificate so they don't register their child's birth with the civil registry office, which is located in Port Moresby. The reasons for this low participation by parents to register children at birth is varied, but is largely suspected to be related to poor access to registration facilities in surveillance sites and lack of awareness and knowledge by parents how, where and why to register the birth of a newborn child. Further study on this issue is needed to identify problems and barriers.

It is noticeable that the proportion of CU5 with a birth certificate in Hides recorded in 2016 (2%) is much lower than that reported by the Household Update Book in 2015 (48%). That could be because the 2015 Household Update Book reported the data of the 'new' households, which just moved into the Hide site over the period June-December 2014, while the 2016 CU5 mainly report the data of 'old' households residing in the site over the period Jan-July 2016. As discussed above, many 'new' residents had moved out of the site due to the

unrest situation and most of left behind households were ‘old’ residents and recorded in the CU5 data.

### Birth weight

Birth weight data were analysed for 1,155 CU5. Approximately 50% were reported in Hiri, 40% in Asaro, and 56% in Hides had health record books, where the birth weights were recorded (in grams). The data show that more than 40% of children had birth weight in the normal range, between 2,800 to 3,199 grams for all three sites.

However, about 9% of CU5 reported less than 2,200 grams, with the highest proportion in Hides (11%) and the lowest proportion in Hiri (7%). By contrast, more than 5% of CU5 had birth weight of 4,000 grams or more in the three sites, again with the highest proportion recorded in Hides (7.5%) and the lowest proportion found in Hiri (3.1%). The data showed that both low birth weights and over birth weights were more prevalent in Hides than Hiri. Household socio-economic status and morbidity data could be an important determinant of the CU5's birth weight. Further analysis of the association between the household economic status and illness rates compared to child birth weight may be needed to clarify the observations as both underweight and overweight newborn babies at birth can be at risk of health complications.

### Breastfeeding

Breastfeeding for the first few years of life gives newborns the best chance of survival and improves their immune system, protecting children from infections and provides them an ideal source of nutrients, which is economical and safe. Breastfeeding is an important process in the management of lactation and the establishment of a physical and emotional relationship between the baby and the mother. However, many mothers stop breastfeeding too soon and are often pressured to switch to infant formula, which can contribute to slow growth and micronutrient malnutrition. Bottle feeding could be unsafe for children where clean water is not readily available in households.

Data of 2,063 CU5 in the three iHDSS sites were included in this data analysis. Overall, the proportion of children, who have ever breastfed, was encouraging, at 96%. Breastfeeding rate was even higher among children aged 0-35 months, at 97%. This level was observed similarly in both urban and rural areas, across surveillance sites, and between male and

female children. The median duration of breastfeeding was 23 months and the mean was 21.8 months.

However, exclusive breastfeeding, which is recommended for all children aged 0-5 months, was only above 60%. Similarly, predominant breastfeeding among children in age group of 0-5 months was just above 65%, with a higher rate in urban area than in rural area, 87% and 54%, respectively. The predominant breastfeeding rate was highest in Asaro (75%), followed by Hides (71%) and lowest in Hiri (43%). The median duration of exclusive and predominant breast feedings were only three months and the mean of duration was of 2.8 months. Further analysis showed most of all children (95%) were continuously breast fed at 1 year. The data suggest that while breastfeeding data is encouraging and common practice among PNG women, age-appropriate breastfeeding could be further improved.

### **Introduction of solid, semi-solid or soft foods**

Children's nutritional status is a reflection of their overall health. When children have access to an adequate and nutritional food supply, are not exposed to repeated illness, and are well cared for, they reach their growth potential and are considered well nourished. Malnutrition is associated with more than half of all child deaths worldwide. Undernourished children are more likely to die from common childhood ailments and for those who survive, to have recurring sicknesses and poor growth.

Adequate complementary feeding of children from six months to two years of age is particularly important for growth and development and the prevention of under-nutrition. Continued breastfeeding beyond six months should be accompanied by consumption of nutritionally adequate, safe and appropriate complementary foods that help meet nutritional requirements when breast milk is no longer sufficient.

The appropriate introduction of solid, semi-solid and soft foods to children aged 6-8 months was only 60%, with 20% higher in urban area than rural area (75% and 55%). The higher rate in Asaro, 75% compared to Hiri 47% (only one child reported in Hides).

Only around 30% of children aged 6-23 months were given minimum 3 meals per day with solid, semi-solid and soft foods, plus breastfeeding. The data for urban was double than rural



area, 50% and 25%, respectively. Asaro recorded the highest proportion, 46%, than Hides, 42% and the lowest was Hiri, 20%.

The data suggests that PNG parents and care takers need to be better educated on how to breastfeed and when to introduce solid and semi-solid foods appropriate to their children according to their age. Hides women in particular is where additional education is required.

### **Bottle feeding**

About 15% of children aged 0-23 months were fed, using a bottle with a nipple and most common in the age group of 12-23 months. Hiri reported the highest proportion of nearly 20% of bottle feeding among children aged 0-23 months. That could be because many mothers in this site participated in the labour force, work away from home and leave their children to baby sitters who often feed them with bottle. The continued bottle-feeding practice is a concern because of the possible contamination due to unsafe water and lack of hygiene in the preparation.

### **Vitamin A Supplementation**

Vitamin A is essential for eye health and proper functioning of the immune system. It is found in foods such as milk, liver, eggs, red and orange fruits, red palm oil and green leafy vegetables, although the amount of vitamin A readily available to the body from these sources varies widely. In developing countries, where vitamin A is largely consumed in the form of fruits and vegetables, daily per capita intake is often insufficient to meet dietary requirements. Inadequate intake levels of Vitamin A are further compromised by increased requirements for the vitamin as children grow or during periods of illness and infections. As a result, vitamin A deficiency is prevalent in the developing world and particularly in countries with the highest burden of children under-five deaths like PNG.

Vitamin A supplementation coverage was about 50%, slightly better in urban area, 52% compared to 48% in rural areas. More than half of children in the age group of 12-23 months receive the vitamin A supplement and 43% of children aged 6-11 months received the first dose. It suggests that more efforts should be paid to the Vitamin A Supplementation programme in PNG.

## Dietary

Dietary data of 2,003 children aged 6-59 months were analysed. Overall, the majority of children (more or less 80%) were fed with root vegetables, green vegetables, fresh fruits, and fresh meat, fish, chicken and pork. Feeding with tinned meat, fish, chicken and pork was reported by more than 90% of children. The proportion of children who were fed with dried food cooked at home was about 70% compared to 50% being fed with foods bought from a shop.

With regard the consumption of sugar and soft drinks, 75% consumed 0-4 teaspoons of sugar per day and 44% consumed 250ml of soft-drinks or less per day in a typical week. More children in Hiri and Hides consumed sugar and soft drink than those in Asaro. Data suggest the availability of cash could affect the dietary intake of sugar and soft drinks among children in these two sites.

## Food security

Among 1,096 parents/ care givers responded to the questions of food security with more than half reported having experience of food shortage in the last 12 months, with the highest incidence in Asaro (85%), followed by Hides (46%) and lowest in Hiri (35%). The majority of respondents (65%) reported the food shortage in 4-6 months prior to the interview, meaning in the second half of 2015. This issue was particularly common in Hiri with about 90% of respondents reported so. This food shortage could have been associated with the serious drought throughout PNG in the dry season of 2015. It is noticeable that about 65% of respondents in Hides reported food shortage occurring every month. Further data analysis needs to be undertaken to provide better understanding of food security in PNG and how it affects population health, especially nutrition status of CU5.

## Availability of immunisation card

Data of 2,181 CU5 were examined and result indicated that more than 50% had immunisation cards; nearly 40% reported having cards, but could not show; and 7% had no card at all. Hiri recorded the highest proportion in possession of an immunisation card, about 60%, followed by Asaro, about 50% and lowest in Hides, about 45%. This data indicates that parents/care

givers require education and awareness to keep secure and maintain their children's immunisation card/health record book.

### Vaccination coverage

Of 415 children aged 12-23 months, who had immunisation records recorded in immunisation cards or health record books, only 45% of these children received all types of vaccinations at any time, and only one third received all vaccinations before their first birthday. Hiri reported the highest proportion that received all vaccinations at any time (more than 50%), followed by Asaro (around 35%) and lowest in Hides (only about 20%). Still about 15% of children aged 12-23 months did not received any vaccination, with the highest proportion found in Hides, nearly 25%, followed by Asaro 15% and lowest in Hiri, 12%.

Among children, who received any vaccination at any time before the interview, the vaccination coverage was 58% for BCG; 54% for Polio 1, 53% for Polio 2, and 49% for Polio 3; 56% for Pentavalent 1; 54% for Pentavalent 2 and 51% for Pentavalent 3; DPT 1: 55%, DPT 2: 53% and DPT 3: 50%; Only 53% of these children were given Hepatitis B vaccine at birth; 55% for first dose, 53% for second dose and 49% for third dose. Finally, measles vaccination coverage was only 53%.

The vaccination coverage was highest in Hiri, followed by Asaro, and lowest in Hides across all types of vaccines against common childhood diseases. For example, BCG vaccination coverage was 63% in Hiri, followed by Asaro (51%) and lowest in Hides (47%). This trend was also observed consistent in all other types of vaccinations.

The possible explanation for the low vaccination coverage in the highlands region might be due to either no proper recording of the dates and other information into the record cards by the clinic staff or might be due to the mothers deliberately not taking the children to the clinic for immunization or poor availability of vaccines in remote clinics. It is obvious that the coastal region has better availability and access to health services and immunization in particular, as well as other infrastructure such as good road network. More awareness on children immunization needs to be conducted, especially in Hides and Asaro as it seems most people do not know the importance of immunizing children against common illnesses.

Vaccination coverage data was more reliable when immunisation cards/health record books were available for review, but under reported by the parents/care givers' recalls, requiring data interpretation with caution. This is because some mothers easily forget past immunisation/vaccination activities performed on their children. Some mothers/caregivers misunderstood vaccines given to their children as medications for treatment of common diseases such as malaria or pneumonia.

### **Neonatal tetanus protection**

The data suggest much more efforts is required to be made to integrate the tetanus vaccination service into the antenatal care. Data of 1,434 women aged 15-49 who gave live birth within the last two years in the surveillance sites were analysed for neonatal tetanus protection. The result showed that more than 25% of these women received two doses of tetanus vaccine or more in the last pregnancy, with the highest proportion in Asaro (39%), followed by Hiri (32%) and none in Hides (0%).

Further data analysis was conducted to understand the tetanus vaccination history among women, who did not receive two doses of the vaccine in the last pregnancy. The results showed that just above 5% were vaccinated with at least two doses in the past three years; 2% was vaccinated at least three doses in the past 5 years and 1.4% vaccinated with at least four doses in the past ten years (no one was vaccinated at least five doses during their life time). That made the total tetanus protection of around 35% among women of reproductive age 15-49. The total tetanus protection was observed highest in Asaro (about 50%), followed by Hiri (about 40%). Data for Hides was not adequate for data analysis as only one woman responded to the question on tetanus history.

### **Diarrhoea incidence and treatment**

13% of CU5 reported having a diarrhoea episode in previous two weeks preceding the interviews. The incidence was reported highest in Hides (33%), compared to 10% observed in both Hiri and Asaro. It is most prevalent among children in the age groups of 12-23 months and 24-35 months (about 33%).

More than 50% of children with diarrhoea were continuously fed with the same amount of foods or more. This practice was reported by more than 50% of parents/caregivers in Asaro and more than 60% in Hides, compared to 40% in Hiri.

However, only 26% of children was treated for diarrhoea with Oral Rehydration Therapy (ORT) (3% were given ORESOL and 23% received pre-packaged ORS fluid). Pre-packaged ORS fluid was more popular in Hiri (40%), compared to only 7% in Asaro and 10% in Hides.

More than 70% of children with diarrhea were provided recommended home-made fluids, including about 10% of rice porridge soup, about 30% of lemon, orange, and coconut juice, 20% of vegetable and meat soup and 10% of boiled water.

About one third of sick children were treated with medications and the highest proportion reported in Hiri (55%), and lowest in Hides, just about 15%. Among children that had access to medication, more than 50% were treated with oral antibiotics and 25% treated with injection antibiotics. Asaro site reported highest antibiotics treatment rate, 80%, followed by Hiri 20% and lowest in Hides, 10%.

### **Pneumonia incidence and treatment**

Data collected confirms that the burden of pneumonia among CU5 in PNG is an issue. More than 18% of CU5 reported having cough in the past two weeks, with the highest incidence in Hiri (more than 35%), followed by Hides (25%) and lowest in Asaro (10%). Children in the age group of 6-11 months had the highest incidence (around 33%).

Recognition by parents/caregivers of the two danger signs of pneumonia: (i) children breathe faster than usual with short and rapid breaths and (ii) children have difficulty in breathing in and/or out were just above 25%. Mothers/caregiver in Hides had the highest recognition, about 33%, followed by Asaro, 30% and lowest in Hiri, below 10%. More education on awareness of the two danger signs of pneumonia is needed so that parents/care givers will be able to recognize early and properly report the danger signs to health workers.

Chest problems were reported by more than 40% of parents/caregivers in Asaro, and nearly 30% in Hiri and more than 25% in Hides. On the other hand, more than 50% of parents/caregivers reported a blocked and/or runny nose, with the most common in Hiri (more than 70%), followed by Hides (more than 65%), but low in Asaro (just 20%). Nearly 30% of children in Asaro reported having both symptoms, but less than 15% in Hiri and above 10% in Hides.

Among 53 children with suspected pneumonia, 45 (85%) were sought for advice or medical treatment. Less than 5% of parents/caregivers sought for medical advice and treatment at district hospitals, but more than 60% used the services at Community Health Centre. Parents/caregivers in Hiri preferred Community Health Centres with nearly all suspected pneumonia cases sought for medical advice and treatment at Community Health Centres, compared to only 35% in Asaro and about 65% in Hides.

Of the 44 children who received some kinds of medical treatment, 30 received oral antibiotics (pill/syrup); 27 received antibiotics injection; 12 received analgesics and 7 received other medicines; none was treated with anti-malarial drugs.

### **Malaria incidence and treatment**

The data reconfirm the low incidence of malaria among CU5 in the surveillance sites. However, timely treatment of malaria suspected cases with anti-malarial drugs was still a concern as some delays in the treatment was observed. This data supports the need for improved diagnosis for malaria at clinics is vital to ensure proper treatment is provided to CU5 in a timely manner. Proper diagnosis results in correct and timely treatment.

Only 3% (62 out of 2,063 CU5) reported having a fever in two weeks prior to the interview date. The incidence was highest in Hides (13%) but low (2%) in the Hiri and Asaro. More than 50% of these children sought medical advice and 43% were actually taken to health facilities. Of which, 40% were treated with medications and 10% were taken blood for testing. It is noticeable that only 17 children, who were suspected with malaria, were treated with anti-malarial drugs, but many of them were treated with antibiotics (oral and injection) or analgesics (paracetamol and aspirin). Amongst children treated with anti malarial drugs, four received treatment on the same day, eight on the next day, two after two days, one after one day and one after 4 days.

### **Morbidity surveillance**

The caseloads recorded in Asaro and Tafeto health centres in Asaro site for this reporting period were two times more than that of the last period as in 2016 March Report. Asaro health centre has better access than Tafeto as it is located along the main national highway.

This means more people prefer going to Asaro health centre to seek healthcare services than Tafeto health centre, which is located further inland.

By contrast, Boera clinic in Hiri site reported a lower record than the previous reporting period. The most likely reason was the unavailability of clinic staff at the Boera clinic, resulting in limited services provided at Boera. It was likely that patients in the Boera catchment area visited health services at Papa and Porebada clinics. Since the Boera clinic is a government run clinic, it is recommended that the PNG government be notified of the observations within the iHDSS for this clinic and request support to keep the Boera clinic open for the community.

Respiratory diseases and infections were again reported as the heaviest burdens of morbidity presented at the primary healthcare facilities in the surveillance sites, accounted for 42% of the total caseloads in Asaro, 47% in Hiri and 24% in Hides.

There were only five TB suspected cases reported in Asaro, but none recorded in Hides and Hiri over the reporting period. The explanation could be suspected TB cases in Hides were referred to Tari Hospital and those in Hiri passed by the primary health care facilities to hospitals in Port Moresby where testing and treatment services for TB are available.

Like the previous reports, small numbers of malaria suspected cases were reported in the reporting period, except for Asaro site, where 479 cases were reported, of which 437 from Asaro clinic (only 16 cases in Hides, and 39 in Hiri). However, these cases were not confirmed by the blood Rapid Diagnostic Test.

The malaria data needs to be interpreted cautiously. The malaria data is “suspected” cases only and based on clinical symptoms without proper diagnostic testing. There is a culture of over diagnosis of malaria in PNG, but when suspected cases are conducted rapid diagnostic blood tests, the confirmation of malaria is a minimum. A qualified laboratory services for malaria blood testing are available and offered by the PiHP technicians, who are properly trained in conducting the test and reading malaria blood slides.

## 12. CHAPTER 12 CONCLUSION AND RECOMMENDATION

The 2016 September PiHP Report was undertaken in the three surveillance sites: Hiri, Asaro and Hides over the reporting period January – June 2016. This report included some iHDSS system improvements and restructuring. This included strengthening the new QA/QC measures of the iHDSS, from study design to data collection, database management and data analysis and data dissemination.

The iHDSS database was further updated with CU5 data, which was collected using the newly designed Children Under 5 Questionnaire, including 7 data modules on: (i) Household identification information, including GPS data; (ii) CU5 background information, including identification information; (iii) Breastfeeding; (iv) Dietary and food security; (v) Care of illness (Pneumonia and Diarrhoea); (vi) Malaria care and treatment; and (vii) Anthropometry. The CU5 data component has been built up as an integral part of the iHDSS database and linked with previously installed components such as Household data and Women 15-49 data.

Training of trainers (ToT) and refresh training courses were continuously organised as part of capacity building and sustainable development of the iHDSS. Twelve national scientific officers were trained on the new CU5 Questionnaire, including a field work session to pre-test and finalise the questionnaire, and additional training for all data reporters, who reside in the surveillance sites before the data collection was rolled out.

Technical training on data analysis and report writing for national scientific officers was organised in early July 2016 to prepare and develop this report. As a result, research skills have been further improved among these researchers and are reflected in the timely submission and quality of the data collected within this 2016 September Report.

3,234 households (35% in urban and 65% in rural sector) and 2,843 parents/ care givers of CU5 residing in three surveillance sites (1,429 in Hiri, 1,006 in Asaro and 408 in Hides) were approached to invite for interviews about their child health status. A total of 2,232 parents/ care givers (78.5%) gave consent to participate in the interviews. Hides reported the lowest participation rate, 56% because more than 40% of households had moved out due to the unrest situations that occurred in the surveillance site over the reporting period.



Among parents/care givers, who were interviewed, the interview completion rate was 75% for all three sites, with the lowest completed rate in Hides (45%). Hides also reported the highest interview partially completed rate (9%) and interview refusal rate (3.7%). That raises technical and logistics concerns about the surveillance activities in Hides.

With regard the place of birth delivery, 56% of CU5 were delivered at the tertiary and secondary healthcare level (provincial or district hospitals), with 55% and 60% of CU5 reported in Hiri and Asaro, compared to only 35% reported in Hides. The proportion of birth deliveries at the primary healthcare level (Community Health Centre/Aid Post) was 22% in all three sites, (21% in Hiri, 22% in Asaro, and 29% in Hides). By contrast, home-based birth delivery was 35% in Hides, 23% and 17% in Hiri and Asaro, respectively.

About 18% of CU5 reported having a birth certificate in all three sites, with the highest proportion of birth certificates was recorded in Hiri, 20.7%, followed by Asaro, 18.9% and very low in Hides, only 2.3%.

Only above 50% of CU5 in three sites had health record books (50% in Hiri, 54% in Asaro, and 56% in Hides), where the birth weights were recorded. More than 40% of children had birth weight in the normal range of 2,800 - 3,199 grams. It was noticeable that 9% of newborn babies weighed less than 2,200 grams at birth, with the highest proportion in Hides (11%) and the lowest proportion in Hiri (7%). On the other hand, 5% of CU5 had the birth weight of 4,000 grams or more, with the highest proportion, 7.5% in Hides and the lowest proportion of 3.1% in Hiri.

With regard to breastfeeding practice, most of all CU5 (96%) have ever been breastfed. However, the exclusive and predominant breastfeeding rates among children aged 0-5 months was only 60% and 65%, respectively, with the highest rate in Asaro (75%), followed by Hides (71%) and lowest in Hiri (43%). The median durations of exclusive and predominant breast feedings were three months and the means was of 2.8 months. The continuously breast feeding rate at 1 year was 95%.

All the children beyond six months should be continued with breastfeeding and accompanied by consumption of appropriate complementary foods. The appropriate introduction of solid, semi-solid and soft foods to children aged 6-8 months was only 60%, with the highest rate (75%) in Asaro and 47% in Hiri. Only 30% of children aged 6-23 months were given 3 meals

or more per day with solid, semi-solid and soft foods. Asaro reported the highest proportion of 46%, then Hides 42% and the last was Hiri, 20%. It is also noted that 15% of children aged 0-23 months were fed with a bottle and Hiri reported the highest figure at 20%. Vitamin A supplementation was just 43% for children aged 6-11 months and about 50% among children in the age group of 12-23 months. For sugar and soft drinks consumption, 75% of children consumed 0-4 teaspoons of sugar per day and 44% drunk less than 250ml of soft-drinks per week.

With regard food security, more than 50% of parents/caregivers reported food shortage experience in the last 12 months, with the highest incidence in Asaro (85%), followed by Hides (46%) and lowest in Hiri (35%). 65% of them reported the food shortage occurred 4-6 months prior to the interview.

Just above 50% of CU5 had immunisation record cards, with nearly 40% reported having cards, but could not show it, and 7% had no card. Hiri children had the highest proportion of children with immunisation cards 60%, followed by Asaro 50%, and lowest in Hides 45%.

45% of children aged 12-23 months received all types of vaccinations against common childhood diseases at any time, but only 33% received all vaccines before their first birthday. The coverage of all vaccinations was highest in Hiri (50%), followed by Asaro (35%) and lowest in Hides (20%). It was 58% for BCG; 54% for Polio 1, 53% for Polio 2, and 49% for Polio 3; 56% for Pentavalent 1; 54% for Pentavalent 2 and 51% for Pentavalent 3; DPT 1: 55%, DPT 2: 53% and DPT 3: 50%. For the Hepatitis B vaccine, the coverage was 53% at birth; 55% for first dose, 53% for second dose and 49% for third dose. Measles vaccination was 53%. The total tetanus protection among women of reproductive age 15-49 was 35% for three sites, but only 25% of them received full two doses of tetanus vaccine in the last pregnancy, with the highest proportion in Asaro (39%), followed by Hiri (32%) and none in Hides (0%).

13% of CU5 had a diarrhoea episode in two weeks preceding the interviews, with the highest incidence in Hides 33%, compared to 10% in Hiri and Asaro. It is also most prevalent among children in the age groups of 12-23 months (33%). However, just 25% of them were treated with Oral Rehydration Therapy, with 40% in Hiri, 7% in Asaro and 10% in Hides, and 70% were provided the recommended home-made fluids (10% of rice porridge soup, 30% of lemon, orange, and coconut juice, 20% of vegetable and meat soup, and 10% of boiled

water). About one third of children with diarrhea were treated with medications, with the highest proportion reported in Hiri (55%), and lowest in Hides (15%). Among children were treated with medications, 50% received oral antibiotics and 25% of injection antibiotics.

More than 18% of CU5 reported having a cough in the past two weeks, with the highest incidence in Hiri (35%), followed by Hides (25%) and lowest in Asaro (10%). One third of children in the age group of 6-11 months had the issue, but only 25% of parents/ caregivers recognised the two danger signs of pneumonia (Breathing faster with short and rapid breaths; and difficulty in breathing in and/or out). Among 53 children with suspected pneumonia, 45 sought for medical advice and 30 used the health services at CHC. 44 children received medical treatment, of which, 30 received oral antibiotics; 27 received antibiotics injection; 12 received analgesics; 7 received other medicines; and none was treated with anti-malarial.

Only 3% of CU5 reported having fever in the two weeks prior to the interview date, with the highest incidence in Hides (13%) but very low in the Hiri and Asaro (2%). More than 50% of these children sought medical advice, of which, 40% were treated with medications and 10% had blood tests. Only 17 children were treated with anti-malarial drugs: four received treatment on the same day; eight on the next day; two after two days; one after one day; and one after 4 days.

The morbidity data reflected an increase in numbers of patients, who sought for medical consultations and treatments of common diseases at the primary health facilities in the three surveillance sites over the reporting period.

Respiratory diseases are still the heaviest burden of morbidities in the surveillance sites, accounting for 42% of the total caseloads in Asaro, 47% in Hiri and 24% in Hides. Although, only five TB suspected cases were reported in Asaro and none reported the other two sites Hides and Hiri, many of TB cases suspected could have passed by the primary health care facilities or referred to secondary or tertiary health care level, where testing and treatment services are available. Like the previous reports, small numbers of malaria suspected cases were reported, 16 cases in Hides and 39 in Hiri. Asaro reported 479 cases but they were not confirmed by Rapid Diagnostic Test. Close monitoring of TB and malaria at the primary healthcare level needs to be continued as part of the morbidity surveillance system.

### 13. REFERENCES

- [1] PNG Institute of Medical Research. Project Document of Partnership in Health Programme. Goroka: 2010
- [2] PNG Institute of Medical Research. Progress Report of Partnership in Health Project: September 2013. Goroka: 2013
- [3] PNG Institute of Medical Research. Progress Report of Partnership in Health Project: September 2014. Goroka: 2013
- [4] PNG Institute of Medical Research. Progress Report of Partnership in Health Project: September 2014. Goroka: 2014
- [5] PNG Institute of Medical Research. Validating the reliability of population data of Lealea village, Hiri iHDSS site - Partnership in Health Project: December 2014. Goroka: 2014
- [6] PNG Institute of Medical Research. Progress Report of Partnership in Health Project: Household Update. March 2015. Goroka: 2015
- [7] PNG Institute of Medical Research. Progress Report of Partnership in Health Project: Household Characteristics. September 2015. Goroka: 2015
- [8] PNG Institute of Medical Research. Progress Report of Partnership in Health Project: Women Health. March 2016. Goroka: 2016
- [9] INDEPTH. Integrated Health and Demographic Surveillance Systems. 2014. Available online: <http://www.indepth-network.org/index.php>. Access on 23 September 2016
- [10] Webster J, Theodoratou E, Nair H, Seong AC, Zgaga L, Huda T, Johnson HL, Madhi S, Rubens C, Zhang JSF, Arifeen SE, Krause R, Jacobs TA, Brooks AW, Campbell H, Rudan I. An evaluation of emerging vaccines for childhood pneumococcal pneumonia. BMC Public Health 2011; 11 (Suppl 3): S26
- [11] PNG Government. National Health Plan (Vol 2). Part A Policies and Strategies. Port Moresby. 2010

[12] Pomat W.S, Smith TA, Sanders RC, Witt CS, Montgomery J, Lehmann D, Alpers MP. Levels of anti-pneumococcal antibodies in young children in Papua New Guinea. *Epidemiol.Infect* 1993; 111:109-119

[13] Kim J, Kim JH, Cheong HK, Kim H, Honda Y, Ha M, Hasizume M, Kolam J, Inape K. Effect of climate factors on the childhood pneumonia in Papua New Guinea: A time-series analysis. *International Journal of Environment Research and Public Health* 2016; 13:213