

## **Synopsis: Papua New Guinea Household Survey on Food Systems (2018): Initial Findings**

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IFPRI was granted funding by the Australian Department of Foreign Affairs and Trade (DFAT) in 2018 to work with World Vision in Papua New Guinea to examine food system resilience in four rural areas where World Vision is launching new projects. From May to July 2018, IFPRI implemented a rural household survey to investigate the food systems of rural households and whether they assure sufficient food to meet the nutritional needs of household members. The survey was carried out in East Sepik (Maprik), Sandaun/West Sepik (Nuku), and Madang (Middle Ramu) provinces and the Autonomous Region of Bougainville (ARoB - Buin area of Southern Bougainville).

This research note provides a description of the survey sample and implementation and reports on initial findings from analysis of the survey data. Our aim is to use this research and evidence to spur a policy dialogue on promoting increased agricultural productivity, enhanced food security, and improved nutrition policies in PNG. Initial survey results show that most of the food consumed by rural households in the sample is produced from households' own farms, indicating that consumption is closely linked with overall agricultural productivity. Classifying the survey sample by poor and non-poor households, we find that the poor households are not consuming the recommended daily calorie levels, considered necessary for a healthy and productive life. The survey data also suggest that child stunting (29 percent) and wasting (7 percent) are relatively high in the surveyed areas.

### **SURVEY SAMPLE AND IMPLEMENTATION**

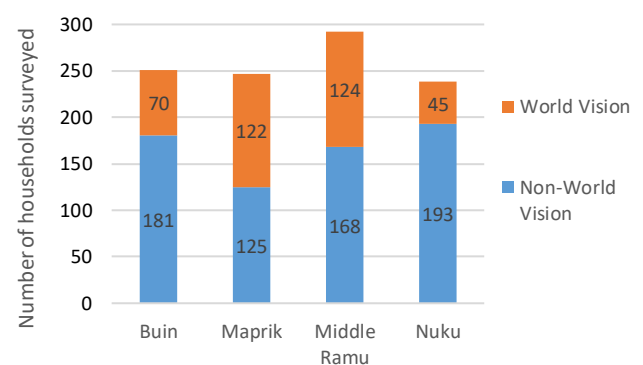
Prior to designing the survey instrument, IFPRI undertook a scoping study (largely comprised of community focus groups and market visits within rural areas) of the provinces and districts to be included in the household survey.<sup>1</sup> We observed little variability in livelihood activities, production systems, or food systems within the communities visited in each of the survey areas. This lack of apparent variance within communities presented a challenge for planning a representative household survey to examine food systems that, by design, will have sample households clustered at community level.

Given this apparently low variance in key variables within communities, but greater variance across communities, the survey sample was designed to be as spatially extensive as possible. Keeping in mind that mobility in PNG is logistically difficult, potentially unsafe, and time consuming, we randomly selected communities (as survey clusters) based on a distance/time-of-travel measurement (using GIS analysis that considered road and walking times) from World Vision program communities. To avoid possible influence from the presence of nearby World Vision (WV) programs on the non-World Vision sample communities, only villages at least 1 hour and at most 4 hours from a WV project community were included in the non-World Vision sample.

In order to provide baseline information to WV programs in the nearby communities, the survey sample was split to enumerate a selection of program communities as

well as communities outside of the WV programs within each province. Within each sample area (district), communities were split into WV and non-WV communities, and a total of 20 communities were randomly selected based on the 1- to 4-hour travel time restriction.<sup>2</sup> Within each community, 15 households were randomly selected for enumeration. In total 1,026 households were interviewed across the 4 survey areas (Figure 1).

**Figure 1: Household survey sample by region**



The household survey aimed to improve understanding of food production systems and resilience in rural areas of PNG. Thus, the survey included modules on agricultural production, labor profiles, consumption and expenditure, assets, economic shocks, household dietary diversity, and anthropometry. Community questionnaires were administered to better understand access to goods and services, commodity prices, climate shocks, and crop seasonality.

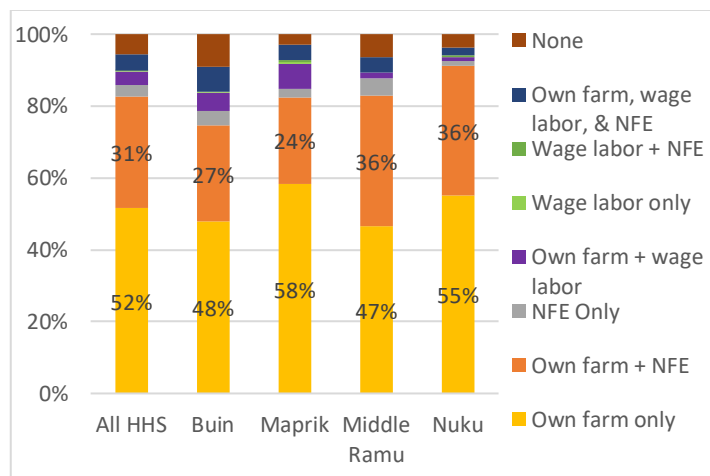
<sup>1</sup> The sample for each province spans 2-3 districts, with a majority of sample communities located in the district where World Vision is currently implementing programs. The results discussed here are identified by the district with the greatest number of total community/household observations.

<sup>2</sup> Total communities surveyed varied from 16 to 20 communities per district, due to logistic and security issues that occurred during enumeration.

## LABOR USE AND FOOD PRODUCTION

Most of the rural households surveyed practice subsistence agriculture and have limited access to outside sources of income. The data suggest limited engagement in off-farm wage labor (less than 5 percent of surveyed households reported engaging in wage labor). On average, 85 percent of the surveyed households obtained income solely from farming and/or non-farm enterprises (NFE) (i.e., own a business selling handicrafts, agricultural by-products such as local liquor or biscuits, or services such as transport, mechanics, or construction). Non-farm enterprises represent an important component of overall income generation among surveyed households—on average, 31 percent of households engage in a mix of own-farm agricultural work and non-farm enterprise work. In Middle Ramu, the most remote site in our sample, households depend more heavily on non-farm enterprise activities; 41 percent of surveyed households reported owning a non-farm enterprise. In the overall sample, however, more than 50 percent of surveyed households worked solely on their own farm for subsistence production.

**Figure 2: Labor portfolios by district**



Consistent with the high share of household labor devoted to farming, nearly 70 percent of the total value of food consumed is own-produced in surveyed households (Table 1). The overall share of own-produced food is greatest in the Middle Ramu district where, on average, 86 percent of the value of food consumed is own produced, highlighting the risk that a weather shock (drought) could have substantial impact on overall food security in these communities. Travel to the Middle Ramu district from a landing outside the nearest city, Madang, takes 6-8 hours by outboard motor boat. Conversely, households in the relatively well-connected Buin district in the Autonomous Region of Bougainville (ARoB) depend more heavily on purchased items (which represent 48 percent of the value of total food consumed), suggesting that any disruptions in import flows or markets could pose risks to household food security in Buin.

Roots and tubers are the dominant crops cultivated by surveyed households. More than 70 percent of households in all regions produce yams and more than 60 percent produce sweet potatoes. Some variation exists across regions.

ARoB produces less Chinese taro and taro than East and West Sepik, but produces more cassava than the three mainland provinces. Given the predominance of own-farm produce in household consumption, root and tuber crops are the major source of calories of most of the households surveyed.

**Table 1: Source of food, by expenditure category (% of value of total food consumed)**

District	Own produced	Purchased	Gift	FAFH
Buin	48%	48%	2%	2%
Maprik	71%	27%	2%	0%
Middle Ramu	86%	11%	3%	0%
Nuku	71%	27%	2%	1%
<b>All households</b>	<b>69%</b>	<b>28%</b>	<b>2%</b>	<b>1%</b>

\*Note: FAFH = food away from home (spending on meals or foods eaten by household members outside the home).

## PER CAPITA EXPENDITURE AND POVERTY

To explore variation in expenditure and food intake by income (proxied by total consumption and expenditures) among surveyed households, we classify households by poor and non-poor. We use a spatially-adjusted poverty line of 1,511 *kina* per capita per year in 2018, accounting for regional differences in prices and food consumption. Total household expenditure was calculated by summing reported weekly household food consumption, monthly and annual non-food expenditures, and food gifts received. We find that approximately 52 percent of surveyed households have total expenditures below the poverty line (Table 2).

However, a large share of the surveyed households is close to the poverty line. For example, if the poverty line were 10 percent higher, an additional 6 percent of the household sample would be considered poor.

**Table 2: Percent of survey households below poverty line\***

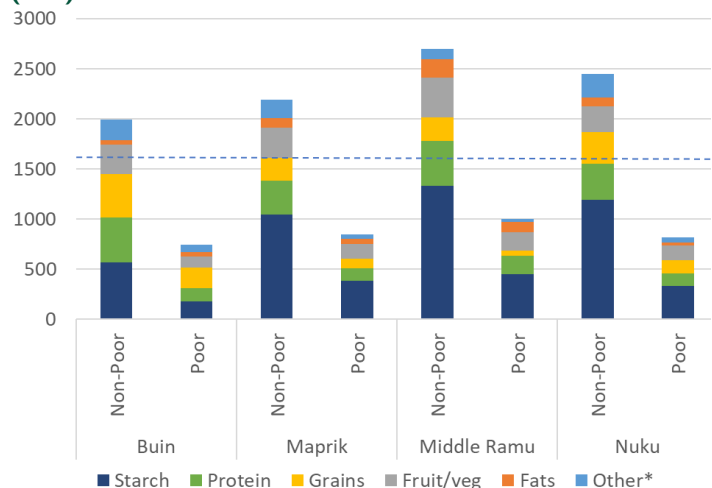
	Buin	Maprik	Middle Ramu	Nuku	Total
Poverty line	54.2	50.0	51.3	53.8	52.2
Poverty line (+ 10%)	60.6	54.3	58.7	59.0	58.1
Poverty line (- 10%)	48.0	44.7	42.4	49.7	45.9

\*Note: The spatially-adjusted poverty line is set at 4.14 *kina* per person per day after accounting for regional differences in food baskets and prices.

Comparing total annual per capita food expenditure by poor and non-poor individuals, we find that non-poor individuals are consuming a food-value equivalent that is much higher than the poverty line, while poor individuals are consuming substantially less than the poverty line in all survey areas (Figure 3). Diet composition among the poor and non-poor is similar. Both groups rely on starches (roots, tubers and sago) to meet daily caloric need; starch-based foods account for a similar share of foods consumed for poor and non-poor households in all survey areas. In Buin, poor households' largest expenditure share is for grain-based foods such as rice, pasta (2-minute noodles), and flour,

likely reflecting ARoB's dependence on purchased food items.

**Figure 3: Annual food expenditure by food group per person (kina)**



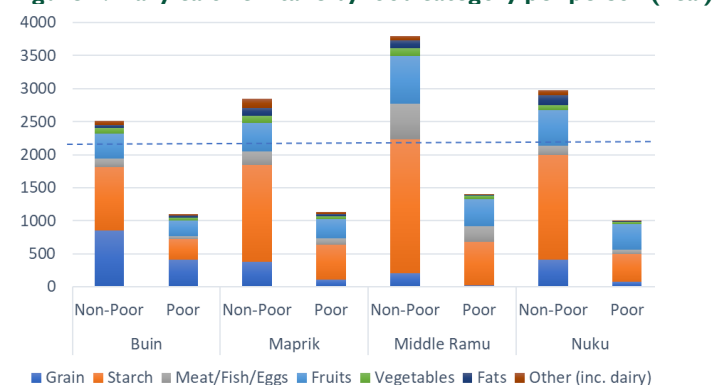
\*Note: Dotted line shows the poverty line at 1,551 kina/person/year. "Other" includes alcohol, food away from home, and dairy products. Weighted values.

### DIETARY DIVERSITY AND CALORIC INTAKE

The recommended daily calorie intake for an active individual varies based on gender and age, however, an average of about 2,250 kilocalories (kcal) per day is considered an indicator of sufficient consumption. The survey collected detailed information on weekly consumption of the survey households to calculate the average total daily calorie consumption by food group per person. The data suggest that, individuals in poor households are not consuming the recommended daily calories (Figure 4). On average, the poor are eating about 35 percent less calories than the recommended daily calorie intake. Conversely, non-poor individuals are consuming approximately 15 percent more calories on average than the suggested intake level.

Although poor individuals eat considerably less than non-poor individuals, the diet composition of the poor and non-poor is similar. Starch-based foods make up the bulk of calories consumed in all regions and across poor and non-poor households. Overall, individuals in poor households eat less grain-based food (with the exception of the Buin sample) given that these foods are usually purchased rather than produced on own-farms (except for East Sepik, where 21 percent of survey households reported growing rice).

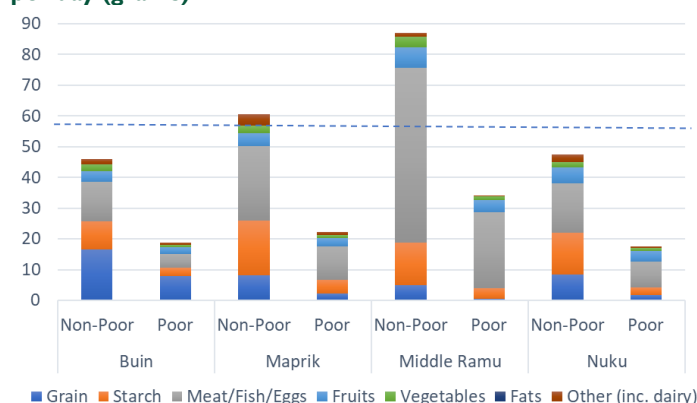
**Figure 4: Daily caloric intake by food category per person (kcal)**



\*Note: Dotted line shows the suggested daily caloric intake level of 2,250 calories / adult equivalent / day. "Other" excludes food away from home. Weighted values.

Although non-poor households are able to meet their recommended daily caloric intake, protein intake falls below recommended levels in both poor and non-poor households in Buin and Nuku (Figure 5). In Middle Ramu and Maprik, non-poor households are able to meet their protein requirements. The Middle Ramu survey sites are along the Ramu River, which supplies a large amount of fish to nearby villages, reflected in the high level of fish consumption among poor and non-poor survey households. Similarly, survey households in Maprik area have access to nearby rivers where fishing is common.

**Figure 5: Total protein consumption by food group per capita per day (grams)**



\*Note: Dotted line shows the suggested protein intake level of 58 grams/ adult equivalent/day (this is equivalent to 0.8 g/adult equivalent of an average adult of 72kgs). "Other" excludes food away from home. Weighted values.

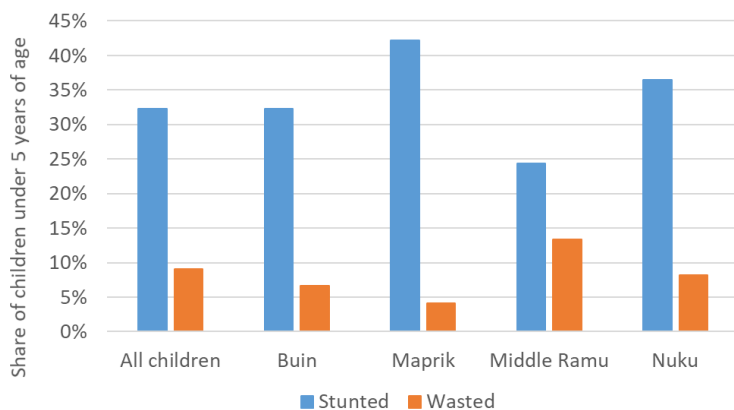
### STUNTING AND WASTING IN CHILDREN UNDER 5

In collaboration with UNICEF and the PNG Department of Health, the household survey collected anthropometry data (height and weight) from all children under the age of 5 in the survey households and compared these data with international growth reference curves. Stunting (low height-for-age) or shortness can reflect chronic undernutrition and/or past episodes of infection and sickness. Stunting leads to poor educational performance, lower labor productivity, and a greater risk for health problems throughout life. Wasting (low weight-for height) or thinness is an indicator of acute malnutrition that has led to a failure to gain weight or a loss of weight. If a child's height-for-age or weight-for-height score is below 2 standard deviations of the international growth reference curves, they are considered stunted or wasted, respectively.

Analysis of anthropometry data collected in the household survey suggests that, on average, approximately 32 percent of the children under 5 years old are stunted in their growth (Figure 6). Overall, approximately 9 percent of children under 5 years of age are wasted. However, regional/district rates of stunting and wasting vary. For example, the Maprik and Nuku districts have child stunting rates of over 35 percent.

Analysis from the Middle Ramu district suggests relatively lower stunting rates, but higher wasting rates. Given the remoteness of the survey households in Middle Ramu to key markets, it may be that climate and other shocks have a greater impact on overall food security compared to other regions. Further analysis could be undertaken to understand the determinants of stunting and wasting prevalence within each district/province.<sup>3</sup>

**Figure 6: Percent of children stunted and wasted under 5 years of age**



Another potential factor affecting overall child nutrition indicators is breastfeeding practices. The survey asked mothers of children under 2 years old about breastfeeding practices and found that 60 percent of infants between 0-6 months old were exclusively breastfed. Combining this observation with the water treatment practices discussed below suggests a potential need for increased extension on young-child feeding practices and food preparation. In order to evaluate potential linkages to overall anthropometric outcomes, the household survey also collected data on wa-

ter and sanitation practices (WASH) within surveyed households. The data suggest that 65 percent of surveyed households collect drinking water from unprotected or surface water sources. Only 24 percent of households reported treating their water before drinking, with solid settling the primary method for water treatment, which does not kill bacteria present in water. Further analysis could look at the relationship between WASH practices and child nutrition outcomes.

## CONCLUSIONS

The PNG Household Survey on Food Systems underlines the important linkages between agriculture and nutrition in rural areas of PNG. Most of the calories consumed in rural households in PNG are derived from household own-farm production, with a high reliance on root crops. On average, diets of poor households across all four survey sites are seriously deficient in calories; average protein consumption falls short of recommended amounts for all household groups with the exception of the sites where fish consumption is high. Stunting of children under 5 years of age remains high. These findings suggest that improving food security and nutrition outcomes will require a multisectoral approach that includes raising incomes, diversifying consumption, improving access to markets, and special attention to the nutritional needs of young children.

## REFERENCES

OECD/FAO (2015), OECD-FAO Agricultural Outlook, OECD Agriculture statistics (database).

National Statistical Office (NSO) of PNG. 2009-10, Household Income Expenditure Survey (HIES): Summary Tables.

<sup>3</sup> Previously collected data from the PNG nationally representative Household Income Expenditure Survey (HIES) conducted in 2010 reported that 48.2 percent of all children under 5 years old were stunted and 16.2 percent of children under 5 years old were wasted (HIES, 2009/10).