

Child growth & development in rural Papua New Guinea: Insights from new anthropometric data

Harry Gimiseve and Rishabh Mukerjee

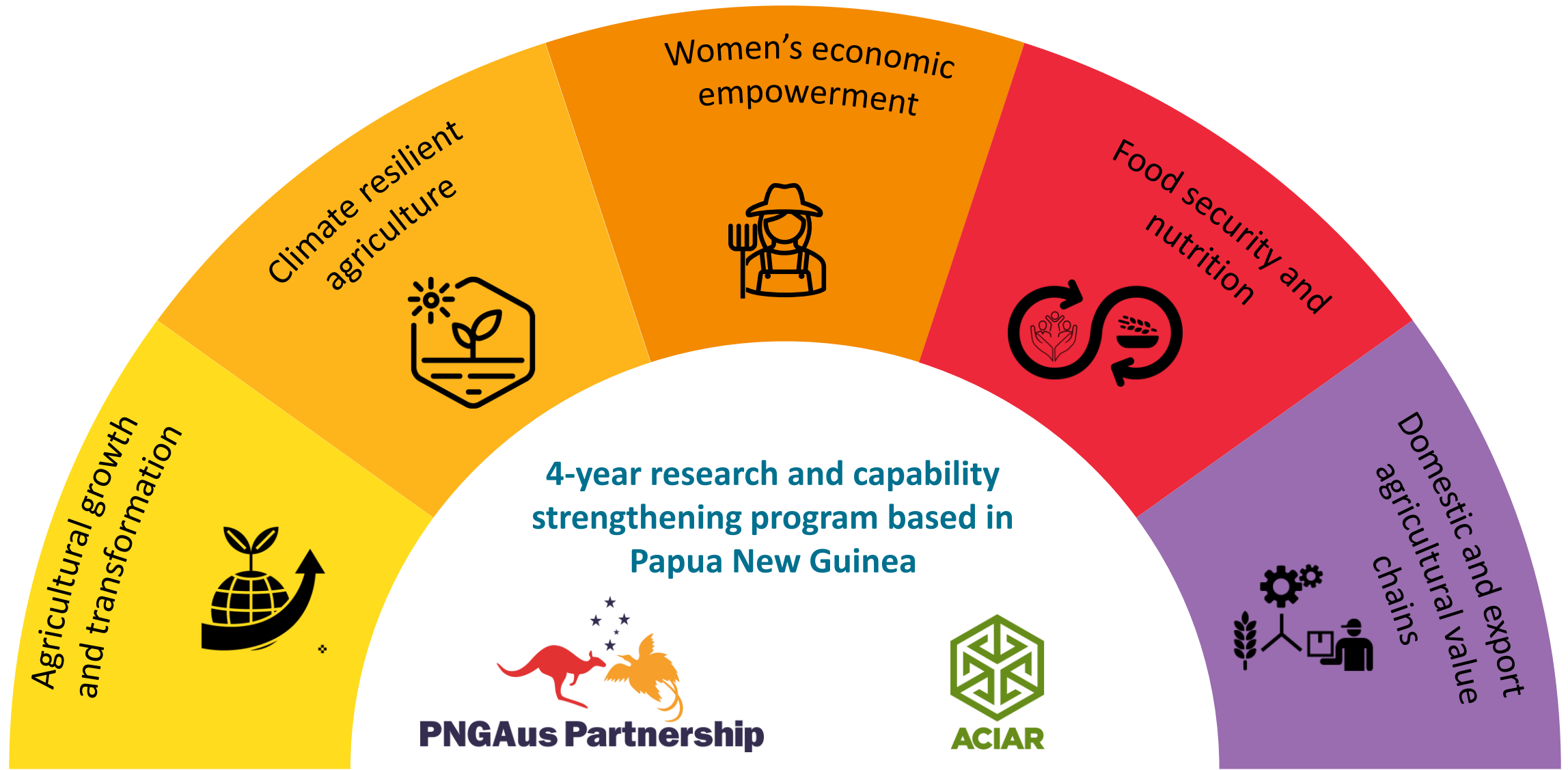
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Port Moresby, Papua New Guinea

International Food Policy Research Institute (IFPRI) in PNG

PNG Agriculture, Food, and Nutrition Policy Support Program



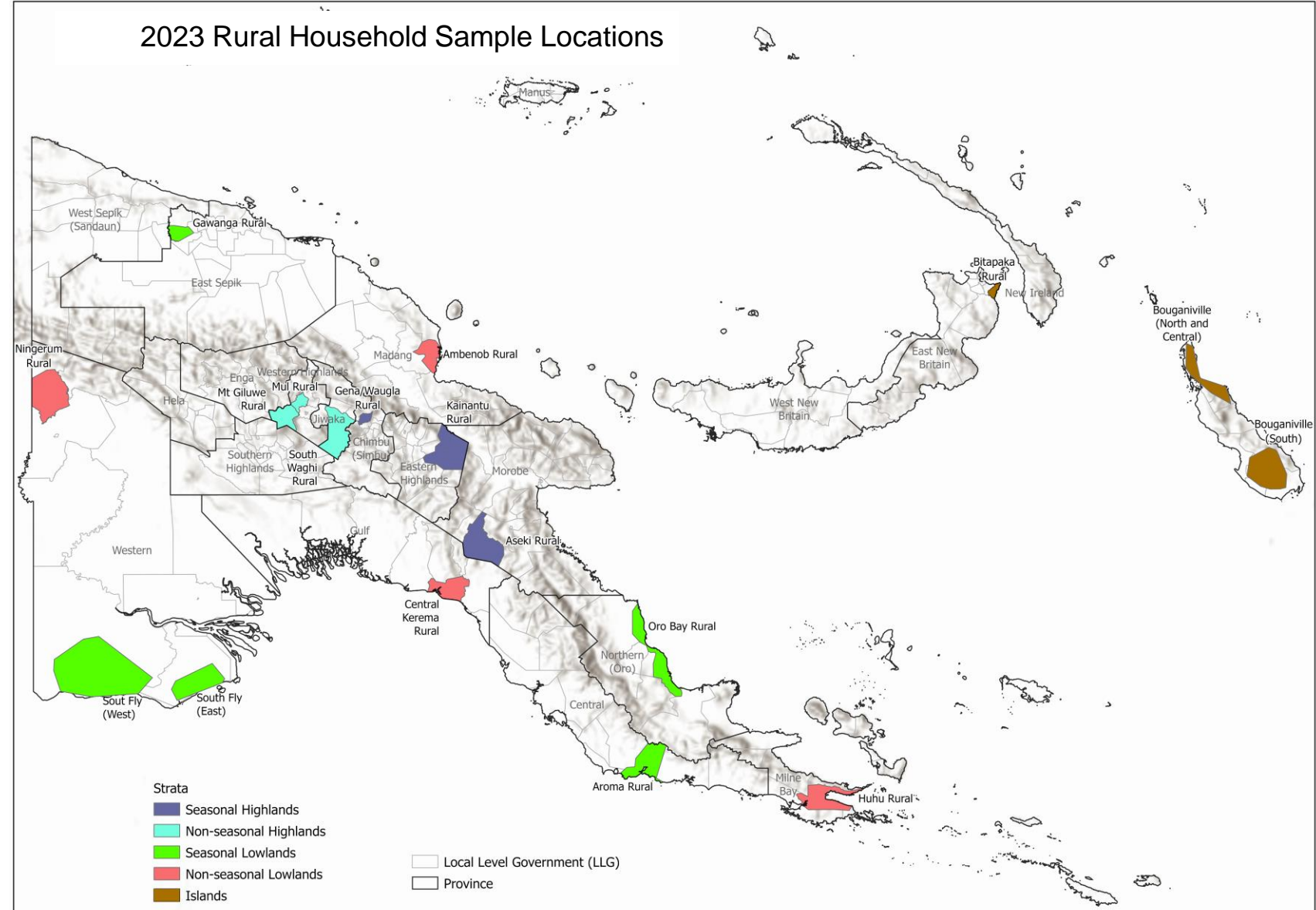
Research motivated by need for updated child health data

- Sporadic data on prevalence of child malnutrition
 - 2010-11: High malnutrition rates, even in relatively wealthy households (Hou 2015)
 - 2016-18: Demographic and Health Survey (DHS) didn't publish stunting results due to data inconsistency
 - 2018: PNG Survey of Food Systems (IFPRI) – small sample size (4 lowland areas) found high stunting rates in rural areas
- We use the socioeconomic and anthropometric data from the 2023 PNG Rural Household Survey
 - Evaluate rural stunting rates
 - Identify correlates of height-for-age Z scores (stunting indicator is an HAZ score of less than -2 standard deviation from the international growth standard (WHO))



PNG Rural Household Survey 2023 – Survey sample

- 2,699 households
 - In 270 villages
 - Across 14 provinces
 - Located throughout 5 agro-ecological zones
- LLG's as sentinel sites: randomly selected within criteria bounds
 - 15 randomly selected communities
 - 10 randomly selected households
- **Important: this is not a representative survey sample**



Indicators of child growth and nutritional status

- We compare the size of children in our survey areas to global body size standards based on how children grow under optimal conditions
- The World Health Organization developed these standards by studying children across the world
- Create a score for each child based on standard deviations from the global average

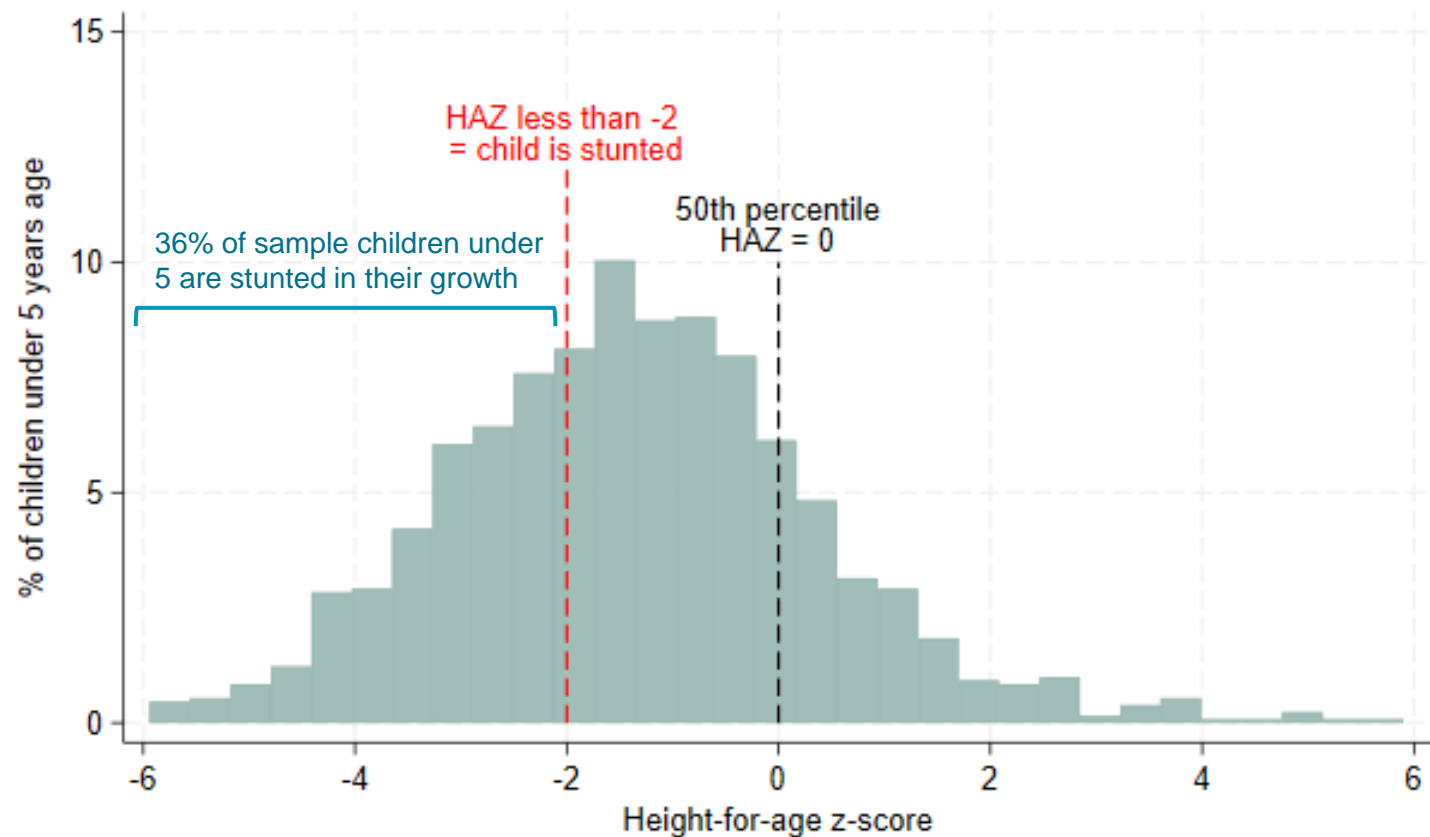
Standardized measurement	Used to estimate	What does it mean?
Height-for-age z-score (HAZ)	Stunting	HAZ < - 2 Children are too short for their age

Why do we care about stunting?

Stunting is not just about shortness – it represents an extreme deviation from expected growth.

- A **stunted start in life** predicts a host of other harmful outcomes throughout the life cycle, including reduced cognitive development, school achievement, and economic productivity
 - **Stunting can have inter-generational effects** – mothers who were malnourished or stunted as children often have difficult births and babies who are too small
 - **Stunting highlights a deficient environment for kids' growth**, for example:
 - Food/nutrient availability
 - Inappropriate child feeding or care practices
 - Repeated infections or illness

Height-for-age z-scores (HAZ) in the PNG Rural Household Survey 2023 sample



Source: 2023 PNG Rural Household Survey

- 36% of the children under 5 in the survey sample are stunted in their growth
- A negative height-for-age value (HAZ) indicates that a child is shorter than the WHO growth standard.
- A child is considered stunted if they have an extreme deviation from the WHO growth standard (-2 standard deviations)
 - The median HAZ score for the survey sample is below the WHO growth standard (black line), but **not** below -2 standard deviations of the standard (red line).
 - Thus, median HAZ score in the sample is **not** stunted (because they are above -2 standard deviations threshold)
- While some argue that the WHO growth standard is not appropriate for PNG, it is important to note that we are evaluating extreme deviations (when looking at stunting rates) from this standard, and this type of growth faltering is a major concern.

What factors are associated with child growth in our survey areas?

- **Use regression analysis to isolate specific factors that are correlated with child HAZ scores**
 - We control for socio-economic characteristics (e.g. education level), environment (e.g. access to clean water and toilet infrastructure), mother's traits (e.g., height and age), and other variables.
- **Present 2 separate regression results:**
 - Not include mother's height as a control variable
 - Include mother's height as a control variable
 - Ongoing debate on whether the WHO growth standard is appropriate for PNG, however, remember we are looking at extreme deviations.
 - Reduces total sample because need matched mother / child anthropometric data

What factors are associated with child growth (HAZ)?

Statistically Significant Regression Variables

Mother's height (cm)

Highest education level in household (grade completed)

Child age (months)

Child is female (1/0)

Born less than 24 months after older sibling (1/0)

Calorie intake (quintiles 1-5)

Uses treated water for drinking (1/0)

Access to improved toilet (1/0)

Difficulty in measuring child (1/0)

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Controlling for:

- Mother's age
- Location strata (fixed effects)
- Household size
- Household experienced tribal dispute
- Household experienced drought in the last 5 years
- Household experienced flood in last 5 years
- Adult respondent washed hands yesterday
- Child washed hands yesterday
- Drinking water treatment
- Household owns mosquito net
- Travel time to nearest market

What factors are associated with child growth (HAZ)?

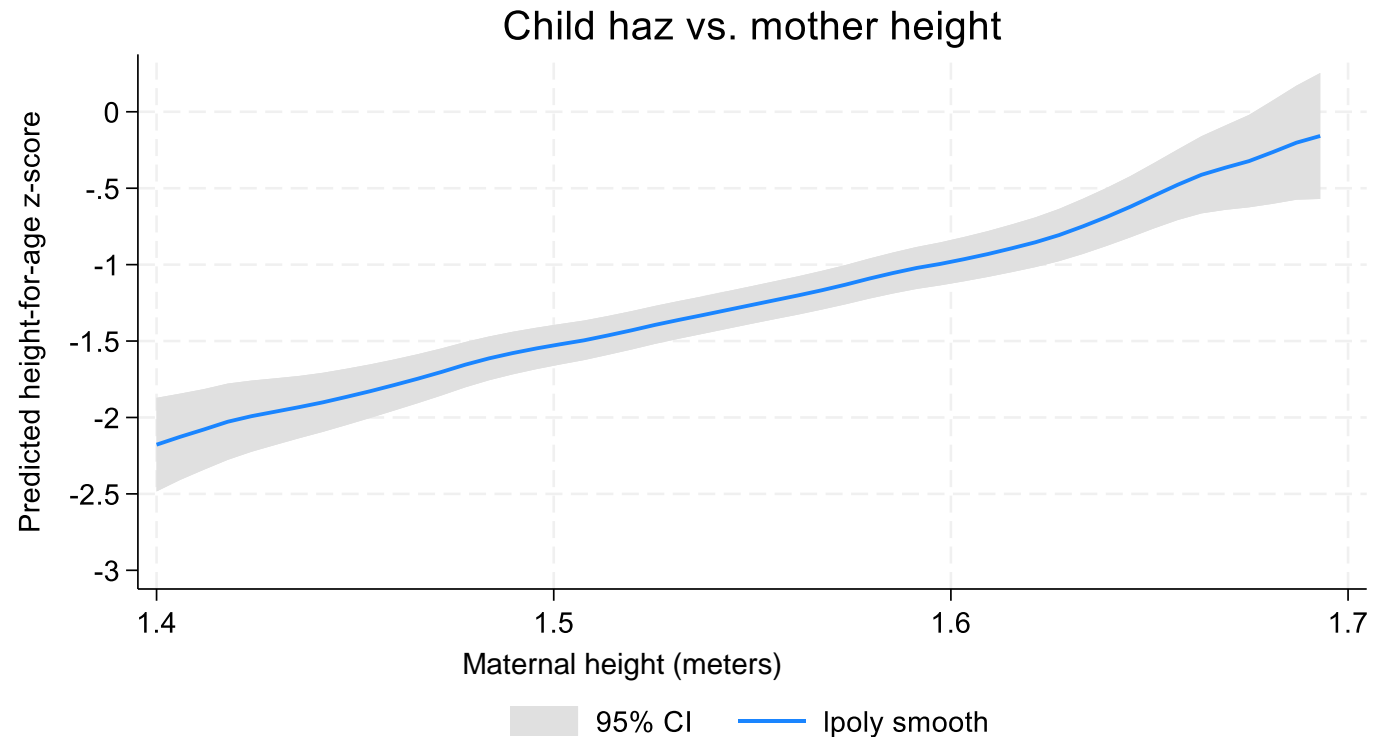
Statistically Significant Regression Variables	Don't include mother's height	Include mother's height
Mother's height (cm)	Not included	+0.0600***
Highest education level in household		
Child age (in months)		
Child is female (1/0)		
Born less than 24 months after older sibling (1/0)		
Calorie intake (quintiles 1-5)		
Uses treated water for drinking (1/0)		
Access to improved toilet (1/0)		
Difficulty in measuring child (1/0)		
*** p<0.01, ** p<0.05, * p<0.1	N = 1159	N = 958

Interpreting regression coefficients:

- +/- signs tell us how HAZ and the likelihood of stunting are related to a particular variable
- Significance level tells us how confident we are in the association
 - More stars = more confident
- Each centimeter increase in mother's height is associated with a positive .06 increase in HAZ score
- Taller mothers are associated with children who are less likely to be too short for their age

Maternal health is important for optimal child growth

- The biological mother's height is correlated with child HAZ score
- This result suggests several insights:
 - Genetics are important
 - However, previous studies have also demonstrated intergenerational effects of inadequate growth (Khatun 2019, Martorell 2012)
 - Stunted mothers have more difficulty in pregnancy and labor, and are correlated with a greater probability of having stunted children



Source: 2023 PNG Rural Household Survey

What factors are associated with child growth (HAZ)?

Statistically Significant Regression Variables	Don't include mother's height	Include mother's height
Mother's height (cm)	Not included	+0.0600***
Highest education level in household	+0.0485**	Not significant
Child age (in months)	-0.0281***	-0.0302***
Child is female (1/0)	+0.191***	Not significant
Born less than 24 months after older sibling (1/0)	-0.306**	-0.316**
Calorie intake (quintiles 1-5)	0.0942*	Not significant
Uses treated water for drinking (1/0)	+0.122	+0.230*
Access to improved toilet (1/0)	+0.184*	+0.185**
Difficulty in measuring child	-0.557***	-0.371**

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- Higher education completion by any member in the household is associated with a higher HAZ score, or children who are less likely to be too short for their age
- Ability to benefit from advice and programming on child health improves with increased education for mothers (Black et al. 2013)
 - Education doesn't remain significant when controlling for mother's height
- May be that mother's height is also correlated with socio-economic indicators (e.g., **access and completion of education**, calorie consumption, etc.)

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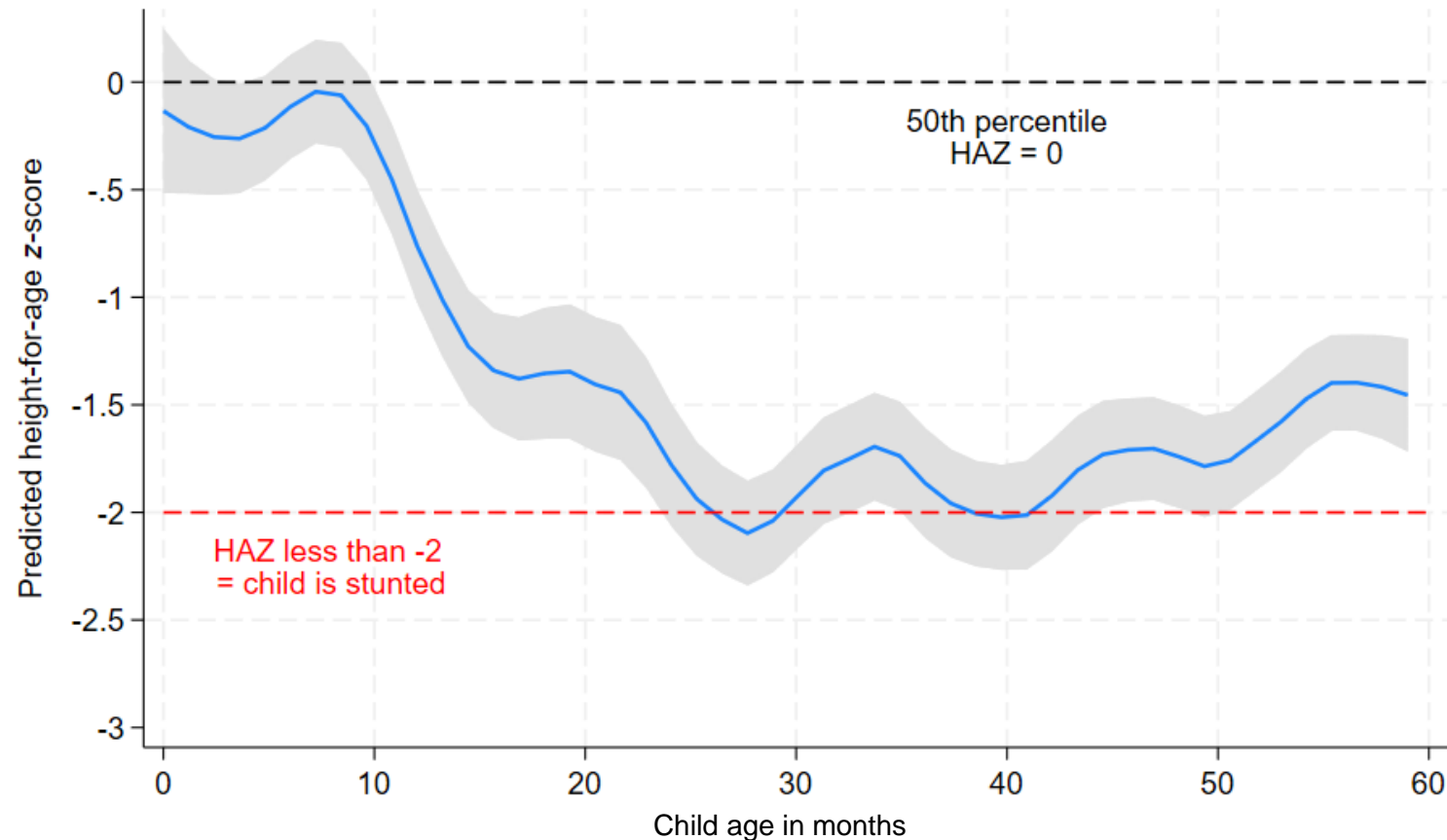
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Appropriate infant weaning and child food and drink preparation is important for healthy growth

- As a child ages, each month increase in age is associated with a further negative deviation from the international growth standard
- **As infants age, they are more likely to be short for their age** → growth faltering is particularly prevalent for children between 7 months to 2 years old.
- This holds true for both regressions, whether or not you control for biological mother's height

Height-for-age z-scores decline sharply between 7-24 months



Source: 2023 PNG Rural Household Survey

- On average, children are born within range of the international growth standard
- Sharp decline in child HAZ score from 7 months to about 2 years of age
- At around 6 months, children begin to transition from exclusive breastfeeding to weaning & feeding other liquids and family foods
 - Potentially introduce:
 - unsafe water or sanitary conditions,
 - insufficient quantity and quality of foods,
 - inadequate food preparation

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Birth spacing is important for healthy growth

- Children who were born less than 24 months after their immediate older sibling are more likely to be too short for their age

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- Again, may be that mother's height is also correlated with socio-economic indicators (e.g., access and completion of education, **calorie consumption**, etc.)
- When *not* controlling for mother's height, there is limited evidence that greater calorie consumption is correlated with increased height-for-age z score. (Greater calorie consumption per adult equivalent is associated with children who are less likely to be too short for their age)

What factors are associated with child growth (HAZ)?

Appropriate Water Sanitation and Hygiene (WASH) is an important investment to improving child growth outcomes

- Children who live in households that effectively treat their water before drinking are less likely to be too short for their age

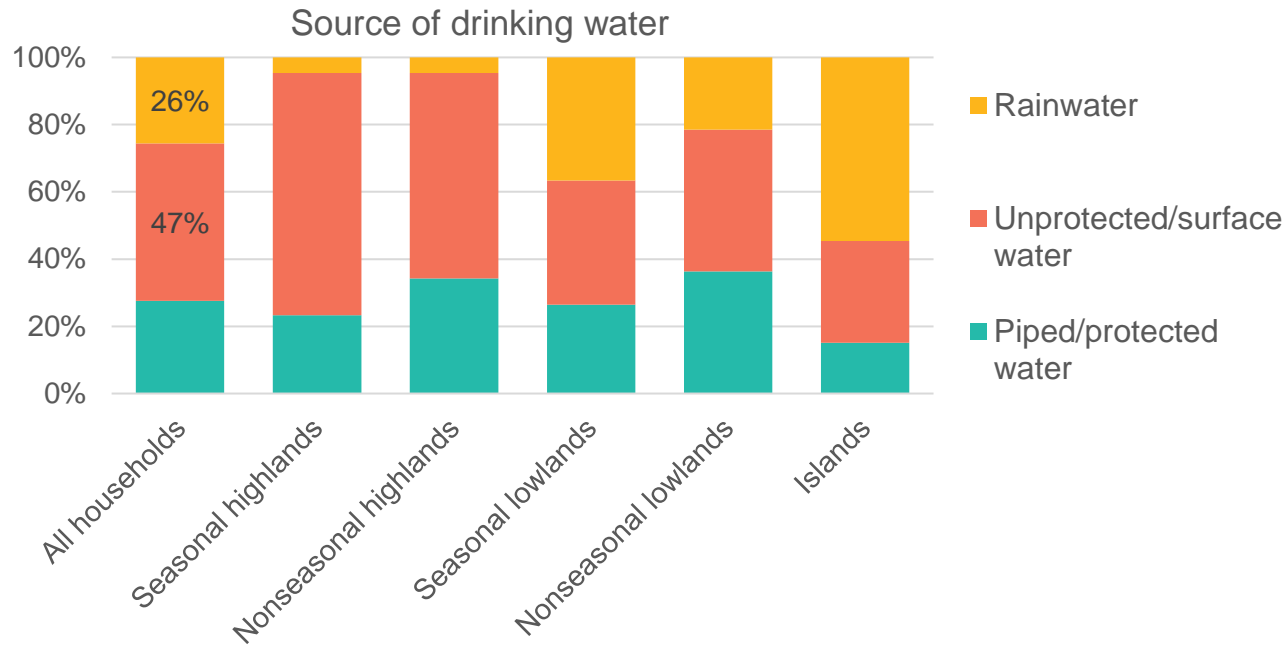
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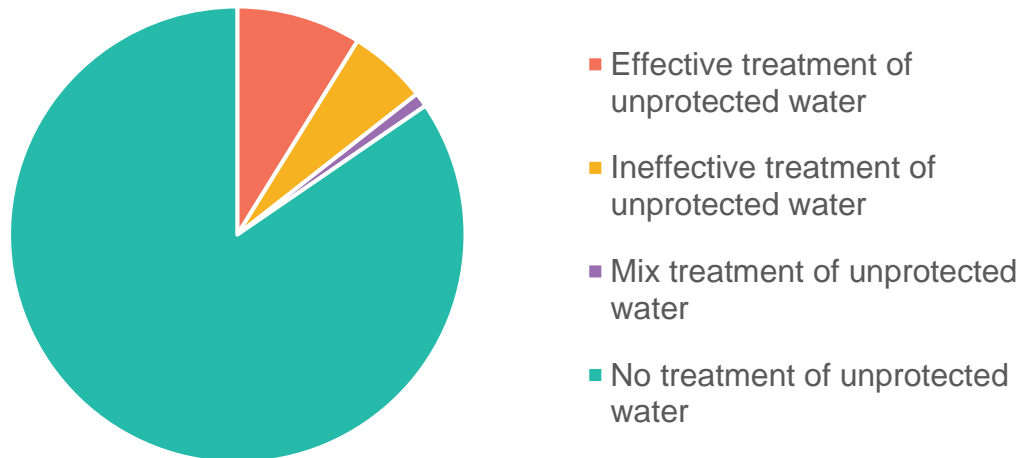
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Most households are using untreated water for drinking and food preparation



Share of households with unprotected water source



- 73% of households obtain their drinking water from unprotected sources
 - 47% unprotected / surface water
 - 26% rainwater

- Of those 73% of households that obtain water from an unprotected source, only 9% use an effective form of treating water (boiling or chlorine tablets)

- Untreated water can expose children to recurrent diseases which can impact ability to absorb nutrients from food

What factors are associated with child growth (HAZ)?

Appropriate Water Sanitation and Hygiene (WASH) is an important investment to improving child growth outcomes

- Children who live in households that have access to improved toilet infrastructure are less likely to be too short for their age

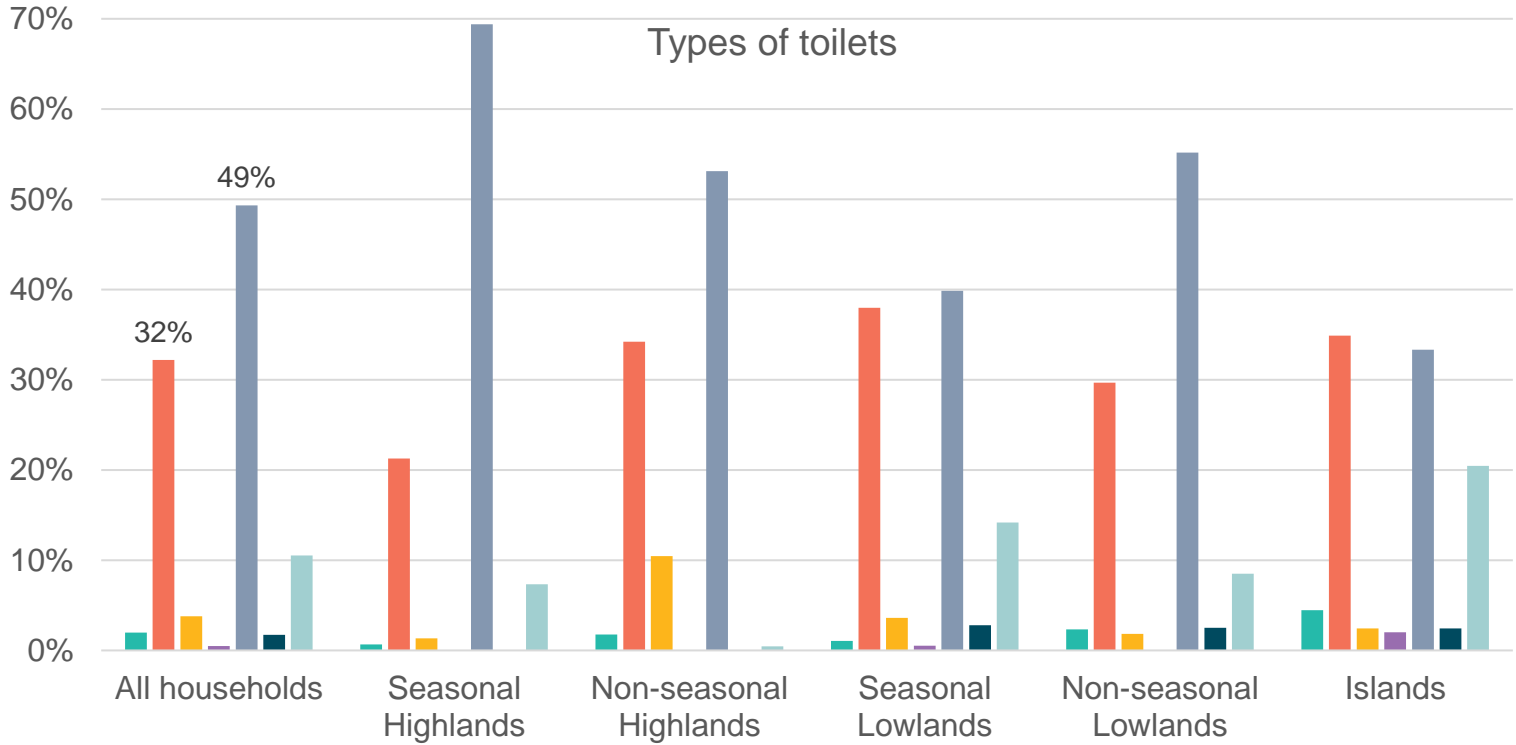
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Most households use unimproved toilets



- 38% of households had improved toilet types.
 - Flush/pour flush toilet
 - Pit latrine with cover
 - Ventilated improved toilet
 - Composting toilet

- Pit toilet or latrine with a cover is the most common improved toilet across the sample (32% of households)

- Most of the households in the surveyed regions use non-improved toilets

- Of these, pit toilet or latrine without a cover was the most common (49% of households)

Improved toilets

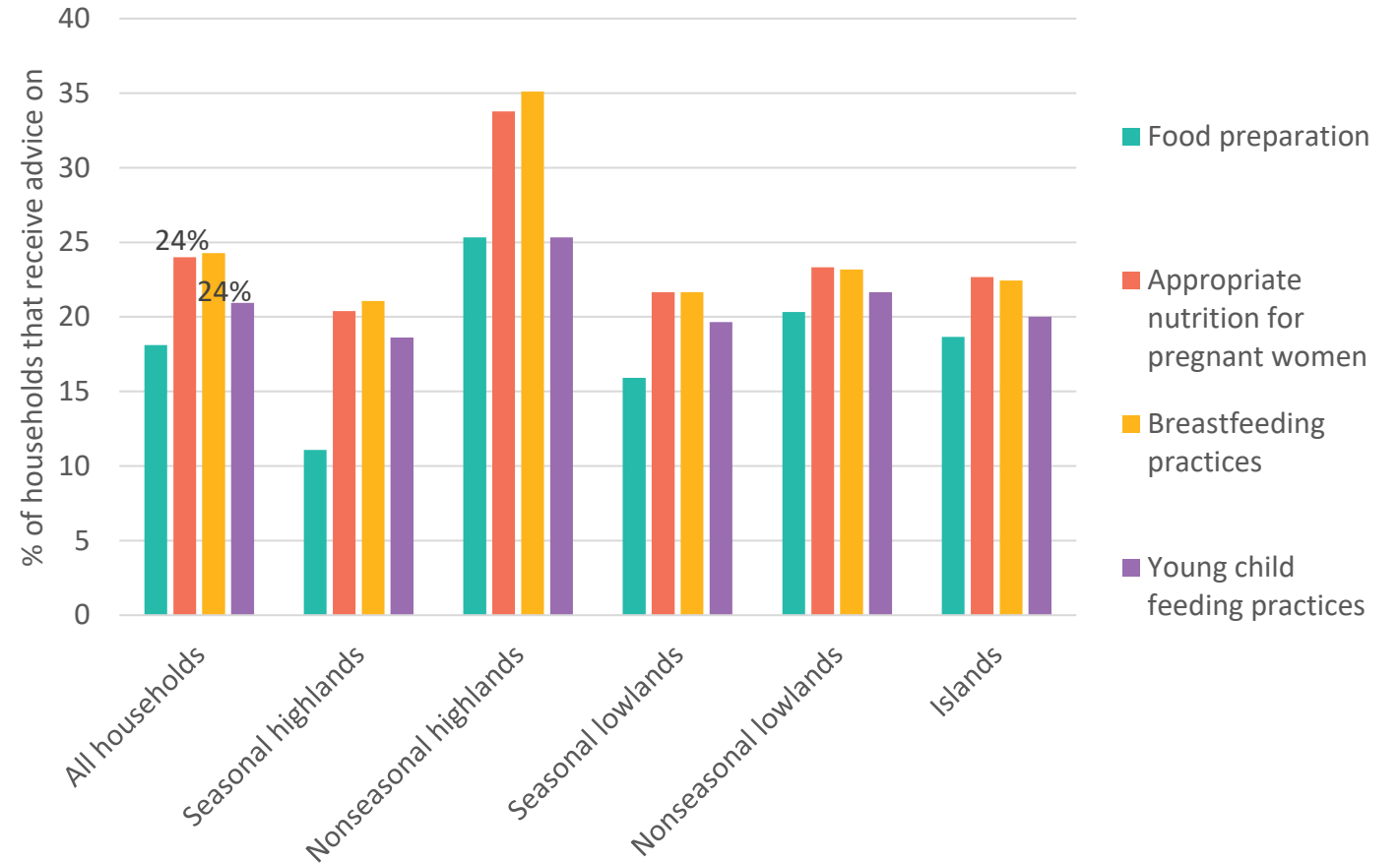
- Flush/ pour flush toilet
- Pit/ latrine with a cover
- Ventilated improved pit toilet (VIP)
- Composting toilet

Unimproved toilets

- Pit latrine without a cover
- Hanging toilet / closet over sea or water
- No toilet

Less than half of households have received advice on child and family health

- Households were asked about advice they received in the last two years
- Breastfeeding and appropriate nutrition for pregnant women are most common extension received across all survey areas
- Ability to benefit from advice and programming on child health improves with increased education for mothers (Black et al. 2013)



What can be done?

- **Educate and advocate for better women's health**
 - Nutrition and health of mothers is important even before the child is born
 - Need to recognize increased nutrient needs of adolescent girls and mothers
 - Help households plan how many children to have, and when
 - ***Involve fathers and men in these activities – women can't do it alone!***
- **Child health programming**
 - Promote best feeding practices – exclusive breastfeeding and not introducing foods too early
 - Provision of clean water/water treatment education & resources
- **Adjust governance structure to support food & nutrition goals**
 - Re-invest in nutrition specialists at the provincial or district level
 - Strengthen collaboration between agriculture and nutrition to improve diets and livelihoods

HEALTHY MOTHERS = HEALTHY CHILDREN = HEALTHY PNG



PAPUA NEW GUINEA FRESH FOOD PRICE MONITORING TOOL

MONITORING THE AGRI-FOOD SYSTEM IN PAPUA NEW GUINEA

The Papua New Guinea Agriculture, Food and Nutrition Policy Program (PNG-AFNP) is monitoring the agri-food sector in PNG through a variety of data collection activities and joint work with local institutions.



Agricultural transformation



Climate resilience



Enhancing value chains



Food security and nutrition



Women's empowerment



Thank you

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- **UNICEF** for providing the height boards and weight scales to the enumeration team to take measurements
- **Department of Health** and the **UPNG School of Medicine and Health Sciences** for leading the enumerator training on anthropometry measurements
- **Institute of National Affairs** and their enumerator team for their tireless effort in collecting this important data

Please visit the 2023 PNG Rural Household Survey graphing tool to view and investigate more disaggregated data and analysis: <https://png.ifpri.info/2024/07/25/2023-png-rural-household-survey-graphing-tool/>



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