



## Women's asset ownership and children's nutritional status: Evidence from Papua New Guinea



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### ABSTRACT

This study examines how women's asset ownership is associated with children's nutritional status in Papua New Guinea, a country with some of the most severe child malnutrition in the world. The 2009–2010 Household Income and Expenditure Survey is employed, but restricted to children under the age of 72 months living with married mothers, leaving a final analytic sample of 1651. Asset ownership is expected to strengthen mothers' income-generating capacity and their bargaining power within the home, which increases investments in children's health. Women's ownership of fishing and agricultural equipment (important for meeting subsistence needs and for generating cash earnings) appears to be driving most of the results. OLS regression results point to beneficial effects of maternal asset ownership for children's height-for-age, weight-for-height, and weight-for-age Z-scores, and results from detailed quantile regressions indicate that these effects occur at various parts of the distribution, especially for children's WAZ scores.

### 1. Introduction

Improving women's control over assets can augment women's economic security and bargaining power, which in turn may have powerful consequences for the health and well-being of their children. Women's control over financial resources can affect the health of their children through multiple channels, including their ability to purchase goods and services that improve children's health and nutritional status. In addition to improving women's income-generating capacities, asset ownership can also strengthen their control over resources within the household. There is an established literature on bargaining in the context of households where even if the budget of the household remains constant, women's asset ownership may strengthen their negotiating power in household decision-making by improving their fallback position, which in turn can change intra-household spending patterns (Agarwal, 1994; Pitt et al., 2006; Deere and Twyman, 2012). Although improvements in household assets can benefit all members, resources concentrated in the hands of women can contribute to higher spending on children's health and nutrition compared to resources concentrated in the hands of men (Lundberg and Pollak, 1993).

Strengthening women's formal ownership of assets can increase the availability of collateral to obtain loans, which in turn can provide women the financial means to invest in entrepreneurial activities and increase household expenditures. In the case of land, formal, registered

land rights can affect women's agricultural productivity and earnings power through increased security of land tenure. Women's land ownership, alone or jointly, and access to productive agricultural assets can also increase their bargaining power within the home, as evidenced by findings for India (Garikipati, 2009), Nepal (Mishra and Sam, 2016), Peru (Wiig, 2013), and Ethiopia (Muchomba, 2017). The benefits can also occur outside of the household, such as when land ownership empowers women to reduce their reliance on survival sex as a source of income (Muchomba et al., 2014).

Several influential studies have shown that additional income controlled by mothers leads to greater household expenditures on inputs into child well-being including food, education, and health services (McElroy, 1990; Thomas, 1997; Quisumbing and Maluccio, 2003; Doss, 2006; Kumar and Quisumbing, 2012). However, there are very few studies that trace the direct effects of women's asset ownership on children's health, mostly because there is so little sex-disaggregated data on asset ownership. Two exceptions are Allendorf (2007), which finds that women in Nepal who own land are less likely to have underweight children, and Menon et al. (2014), which finds that land registration in women's names in Vietnam is associated with several health and educational benefits for children, including a lower incidence of illness, increased health insurance coverage, higher school enrollment, and a reallocation of household expenditures toward food and away from alcohol and tobacco.

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Our study helps to fill this knowledge gap by examining the link between women's asset ownership and children's nutritional status in Papua New Guinea, a country with some of the highest rates of child stunting and wasting in the world (World Health Organization, 2017). At the national level, 48 percent of young children are stunted, 11 percent are wasted, and 27 percent are underweight, with higher rates in rural areas as compared to urban areas. These high rates have persisted for decades, and the lack of improvement is at odds with global trends (Saweri, 2003; Hou, 2016). Moreover, Papua New Guinea is one of the world's most rural countries, with one of the most isolated populations. The majority (86 percent) of Papua New Guinea's households still live in the rural sector, and four out of five people live in rugged or coastal terrain without access to roads and public transportation (World Bank, 2013). Malnutrition is thought to be the leading cause of death amongst children and has been perhaps overlooked in the fight to control other causes of death (Aipit et al., 2014). While several earlier studies have shown that measures of women's empowerment have beneficial effects for children's nutritional status in Papua New Guinea (e.g. Gibson, 1999; Gibson and Rozelle, 2004; and Imai and Eklund, 2008), none have examined women's asset ownership.

Our analysis utilizes data from Papua New Guinea's 2009–2010 Household Income and Expenditure Survey (HIES), a rich household-level dataset with detailed information on human capital indicators, socioeconomic status, and children's anthropometric measures. The HIES also contains gender-disaggregated information on asset ownership, which is unusual among household surveys for developing countries. The availability of this data, combined with the high incidence of children's malnutrition, makes Papua New Guinea a highly relevant and important case study for examining how women's asset ownership is associated with child health. The data are used to examine the determinants of children's nutritional status, as measured by height-for-age (HAZ scores), weight-for-height (WHZ scores) and weight-for-age Z-scores (WAZ scores). At the lower tail of the distribution, each of these measures are indicators of nutritional deprivation: children whose height-for-age is more than two standard deviations below the median of the international reference population for children of the same gender are considered stunted; children whose weight-for-height is more than two standard deviations below the median of the reference population are wasted; and children whose weight-for-age is more than two standard deviations below the median of the reference population are underweight. The analysis is based on both ordinary least squares regressions and detailed quantile regressions that control for a complete set of proximate determinants of child health. We also perform a battery of specification tests to determine more precisely the mechanism through which women's asset ownership is linked to children's nutritional status.

## 2. Data and methodology

The empirical analysis uses Papua New Guinea's 2009–2010 Household Income and Expenditure Survey (HIES). This large nationally-representative survey was conducted by the National Statistical Office of Papua New Guinea. Because the data are collected by the government and are available for public use, the authors did not need to seek ethical approval from their respective universities to use this data. The cleaned HIES consists of 4081 households and 22,718 individuals. Our sample consists of children under 72 months of age (the maximum age for which the HIES has anthropometric information for children), for a total of 3381 children. Because we are interested in how women's asset ownership influences their bargaining power within the household, we restricted the sample to children of mothers who are currently married. Similarly, because four of the six assets covered by the survey questionnaire are mostly relevant for farming and fishing communities, we further restrict the sample to children living in rural areas, leaving an analytic sample of 1651 children. Sensitivity tests are performed that compare the main results to those using the full sample of 3381

**Table 1**  
Sample means: Children under 72 months of age (In percent unless otherwise indicated; standard deviations in parentheses).

	All Children		Children of Married Mothers in Rural Areas	
	Mean	SD	Mean	SD
<i>Dependent variables</i>				
Height-for-age z-score	-1.719	(1.667)	-1.796	(1.655)
Weight-for-height z-score	-0.130	(1.864)	-0.140	(1.891)
Weight-for-age z score	-0.998	(1.642)	-1.057	(1.656)
Stunted	0.481	(0.500)	0.503	(0.500)
Wasted	0.111	(0.314)	0.111	(0.314)
Underweight	0.270	(0.444)	0.284	(0.451)
<i>Mother has ownership of asset</i>				
Livestock	0.225	(0.418)	0.257	(0.437)
Poultry	0.130	(0.336)	0.144	(0.351)
Agricultural equipment	0.358	(0.479)	0.376	(0.485)
Fishing equipment	0.151	(0.359)	0.169	(0.375)
House	0.249	(0.433)	0.255	(0.436)
Furniture	0.270	(0.444)	0.250	(0.433)
<i>Child characteristics</i>				
Boy	0.523	(0.500)	0.525	(0.500)
Birth order	2.864	(1.478)	2.863	(1.462)
Age < 12 months	0.176	(0.381)	0.178	(0.382)
Age 12–23 months	0.170	(0.375)	0.170	(0.375)
Age 24–35 months	0.198	(0.399)	0.193	(0.395)
Age 36–47 months	0.167	(0.373)	0.164	(0.370)
Age 48–59 months	0.159	(0.365)	0.159	(0.366)
Age 60–71 months	0.131	(0.338)	0.137	(0.344)
<i>Mother's characteristics</i>				
Mother is married	0.908	(0.289)	1.000	(0.000)
<i>Mother's education</i>				
Less than primary school	0.422	(0.494)	0.436	(0.496)
Primary school	0.365	(0.481)	0.389	(0.488)
Secondary school	0.153	(0.360)	0.142	(0.349)
Tertiary school	0.060	(0.238)	0.033	(0.179)
Mother smokes	0.197	(0.398)	0.207	(0.405)
Index for decision-making power	0.048	(0.923)	0.007	(0.999)
Index for justifiable wife-beating	0.065	(0.985)	0.037	(0.992)
<i>Father's characteristics</i>				
<i>Father's education</i>				
Less than primary school	0.334	(0.472)	0.312	(0.464)
Primary school	0.329	(0.470)	0.376	(0.485)
Secondary school	0.194	(0.396)	0.194	(0.396)
Tertiary school	0.143	(0.350)	0.117	(0.322)
Father smokes	0.554	(0.497)	0.609	(0.488)
<i>Household characteristics</i>				
Bottom expenditure quintile	0.206	(0.404)	0.226	(0.418)
2nd expenditure quintile	0.210	(0.407)	0.232	(0.422)
3rd expenditure quintile	0.188	(0.391)	0.200	(0.400)
4th expenditure quintile	0.194	(0.395)	0.196	(0.397)
Top expenditure quintile	0.203	(0.402)	0.145	(0.353)
Number of working-age adults	3.158	(1.725)	3.021	(1.532)
Number of children (age < 15)	3.346	(1.599)	3.348	(1.562)
Number of elderly (age > 65)	0.092	(0.323)	0.091	(0.326)
Access to tap water	0.226	(0.419)	0.160	(0.367)
Improved toilet	0.099	(0.298)	0.037	(0.190)
Live in urban area	0.121	(0.327)	0.000	(0.000)
<i>Geographic region</i>				
Southern	0.204	(0.403)	0.170	(0.376)
Highlands	0.334	(0.472)	0.362	(0.481)
Momase	0.319	(0.466)	0.317	(0.466)
Islands	0.143	(0.350)	0.150	(0.358)
Sample size	3381		1651	

**Note:** Weighted to national level with HIES sample weights. Mother's asset ownership is when the mother is one of up to five owners within a household of a particular asset category.

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