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Women's empowerment and child nutrition in the Asia – Pacific region

Evidence from Papua New Guinea, Sri Lanka, and Timor-Leste

Jessica Leight
Rishabh Mukerjee
Peggy Kala

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ABSTRACT

Adverse nutritional outcomes for children under five remain a significant challenge around the world, and there is growing evidence that women's empowerment is associated with better children's nutritional outcomes. In this paper, we analyze the association between women's empowerment and the probability of stunting, wasting, underweight status, and achieving dietary diversity for children under five using a cross-country sample of Demographic and Health Survey data from three countries in the Asia – Pacific region: Papua New Guinea, Sri Lanka, and Timor-Leste. We construct the Survey-based Women's Empowerment (SWPER) index as well as a slightly modified SWPER index using women's reported experience of intimate partner violence (IPV) rather than attitudes toward domestic violence (employed in the original index). Our findings suggest that women's empowerment as captured by the SWPER index is associated with a reduced incidence of stunting, wasting and underweight status and a higher probability that children achieve MDD, though this relationship is only weakly observed in Timor-Leste. In general, the index estimated using experience of IPV shows a clearer association with nutritional outcomes, vis-a-vis the index estimated using attitudes toward IPV.

1. INTRODUCTION

Adverse nutritional outcomes for children under five remain a significant challenge around the world: an estimated 150 million children are stunted, wasted, or underweight as of 2024 (UNICEF, 2025). Poor nutritional outcomes in childhood are associated with a range of adverse effects in adulthood including lower educational attainment, worse health, and lower socioeconomic status (Dewey and Begum, 2011; Hoddinott et al., 2013; Victora et al., 2008).

Enhanced women's empowerment can lead to better nutritional outcomes among children, a pattern that is observed across a large literature using multiple measures of empowerment (Aboagye et al., 2024; Baye et al., 2024; Cunningham et al., 2015; Malapit and Quisumbing, 2015; Na et al., 2015; Onah, 2021; Santoso et al., 2019). Conversely, experience of intimate partner violence by women is associated with more adverse nutritional outcomes among their children (Gao et al., 2025). Women who are empowered are more likely to use optimal feeding practices around breastfeeding and subsequent provision of complementary and nutritious foods (Shroff et al., 2011; Smith et al., 2003); they also generally exhibit greater control over financial resources, including food purchases (Begin et al., 1999; Schmeer, 2005).

However, the majority of the existing evidence around empowerment and nutritional outcomes is drawn from sub-Saharan Africa and South Asia. There is very limited evidence from the Pacific, despite the fact that recent data suggests two countries in the region (Papua New Guinea and Timor-Leste) are characterized by some of the highest stunting rates in the world: Papua New Guinea at 50% exhibits the third highest stunting rate in the world, and Timor-Leste at 47% is the sixth highest (World Bank, 2025). These rates have remained nearly stagnant over the last decade (Wand et al., 2025). In addition, the incidence of intimate partner violence in the Pacific region (suggestive of pronounced disempowerment of women along at least some dimensions) is also among the highest rates observed worldwide (Sardinha et al., 2022). One previous study shows that higher asset ownership among women in Papua New Guinea is associated with higher height-for-age among children (van der Meulen Rodgers and Kassens, 2018), and another recent study finds that women who are more empowered in Timor-Leste as measured using the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI) are characterized by higher diet diversity for themselves and their children (Bonis-Profumo et al., 2021). However, these patterns have not been analyzed in recent Demographic and Health Survey data collected in either country.

The objective of this paper is to use the Survey-based Women's emPowERment index[1] to analyze the effects of women's empowerment on child nutritional outcomes in a three-country sample, employing the most recent Demographic and Health Survey data from Papua New Guinea, Timor-Leste, and Sri Lanka. The SWPER index was developed to assess women's empowerment using readily available cross-country survey data, and was initially developed in the context of sub-Saharan Africa (Ewerling et al., 2017), though it was subsequently adapted for use in other low-

[1] Capitalization is intentional, following the conventions used by the researchers who developed the index.

income country contexts (Ewerling et al., 2020a). However, it has not been analyzed in the context of Papua New Guinea or Sri Lanka.[2]

2. DATA AND EMPIRICAL STRATEGY

2.1 Demographic and Health Survey

In order to investigate the relationship between women's empowerment and child's nutritional status, we use data from the most recent Demographic and Health Surveys (DHS) conducted in Papua New Guinea (PNG, 2016–2018), Sri Lanka (2016), and Timor-Leste (2016). The DHS is a series of large-scale surveys that collect data around maternal and child health outcomes, previously funded by USAID. While the full DHS sample included women aged 15–49 years across the three countries[3], for this analysis we consider only those who reported to be married or were living with a partner. Hence, our total sample includes: 9,943 women in PNG, 17,170 in Sri Lanka, and 7,628 in Timor-Leste. Among them the number of women surveyed with a child under five for whom height-for-age was measured was 2,163 in PNG, 5,038 in Sri Lanka, and 3,967 in Timor-Leste.[4]

2.2 Survey-based Women's Empowerment Index

The Survey-based Women's emPowERment[5] (SWPER) index was created as a standardized, survey-based measure of women's empowerment to enable cross-national and regional comparisons across low- and middle-income countries in which DHS data has been collected (Ewerling et al., 2020a), building on an earlier index that was specific to sub-Saharan Africa (Ewerling et al., 2017). The index encompasses three domains—attitudes toward violence, social independence, and decision-making power—that each reflect a distinct aspect of empowerment, following the conceptual framework of Miedema et al. 2018. The domain capturing attitudes toward violence is constructed using respondents' views on whether wife-beating is ever justified; the social independence domain is constructed using indicators including women's education, access to information, timing of first childbirth and cohabitation, and educational and age gaps between spouses; and the decision-making domain is constructed using variables capturing women's participation in household decisions.

Following the methods described in Ewerling et al. (2017) and Ewerling et al. (2020), we construct the index using 14 DHS variables and perform principal component analysis on the combined dataset. The empowerment scores for each of the three domains are expressed in standard deviations with negative values denoting disempowerment, and higher positive scores indicating increasing levels of empowerment.

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[2] Data from Timor-Leste was analyzed in Ewerling et al. (2020), but data from the Papua New Guinea DHS was not included, presumably because that data had not yet been published. The Sri Lanka DHS data is not publicly posted, but was made available to this research team for the purposes of this analysis.
[3] 15,198 women in PNG, 18,302 in Sri Lanka, and 12,607 in Timor-Leste
[4] Sample sizes vary for the empirical analyses depending on the empowerment variables used, as described in more detail below.
[5] Capitalization is intentional, following the conventions used by the researchers who developed the index.

In this analysis, we use both the original SWPER index as well as a modified SWPER index where we replace the "attitudes toward violence" domain with "women's experience of violence". To construct the latter, we use data on women's experience of intimate partner violence (IPV) during the last 12 months. The reason for this is that the DHS as administered in Sri Lanka in the target year does not include any questions around attitudes toward domestic violence, while questions around experience of IPV were included. Moreover, the Sri Lanka DHS does not include data regarding the age at first birth. Thus, generating the modified SWPER allows us to conduct a three-country analysis, using 11 DHS variables. We also generate the original SWPER and conduct a two-country analysis drawing on data from PNG and Timor-Leste only.

Table 1 summarizes the coding system employed for each domain. The methodology differs from the methodology employed in other papers in this literature only for domain 1B (experience of violence), while for domain 1A (attitudes toward violence) and the other two domains (social independence and decision-making), the methodology is unchanged.

Table 1: SWPER index components

Components	Coding Rule
Attitude towards violence (domain 1A)	
Beating justified if wife goes out without telling husband	1 = No ; -1 = Yes; 0 = Don't know
Beating justified if wife neglects the children	1 = No ; -1 = Yes; 0 = Don't know
Beating justified if wife argues with husband	1 = No ; -1 = Yes; 0 = Don't know
Beating justified if wife refuses sex	1 = No ; -1 = Yes; 0 = Don't know
Beating justified if wife burns the food	1 = No ; -1 = Yes; 0 = Don't know
Experience of violence (domain 1B)	
Ever experienced any physical violence	1 = No ; -1 = Yes; 0 = Don't know
Ever experienced any sexual violence	1 = No ; -1 = Yes; 0 = Don't know
Even experienced any emotional violence	1 = No ; -1 = Yes; 0 = Don't know
Social independence (domain 2)	
Frequency of reading newspaper	Not at all = 0; < once a week = 1; >= once a week = 2

Woman's education	Years
Education difference: woman's minus husband's years of education	Years
Age difference: women minus husband's age	Years
Age at first cohabitation	Years
Age at first birth*	Years

Decision-making (domain 3)	
Decides own health care	1 = joint / respondent alone / respondent and other person; -1 = Husband or other alone
Decisions on large household purchases	1 = joint / respondent alone / respondent and other person; -1 = Husband or other alone
Decision on visits to family	1 = joint / respondent alone / respondent and other person; -1 = Husband or other alone

Note: The Sri Lanka DHS does not contain information on age at first birth, therefore we do not include this variable while developing the modified SWPER index. Additionally, for those women in PNG and Timor-Leste who had not given birth at the time of the survey, we use the single hotdeck imputation method to impute their age at first birth by clustering women based on their age at first cohabitation.

2.3 Definitions of key variables

The primary dependent variables for this analysis are binary variables capturing children's anthropometric outcomes, for which we use standard WHO binary variables, and a binary variable equal to one if a child achieves minimum dietary diversity. Children are classified as stunted if they are characterized by a height-for-age z-score more than two standard deviations below the reference mean; wasted if their weight-for-height z-score is more than two standard deviations below the reference mean; and underweight if their weight-for-age z-score is more than two standard deviations below the reference mean (Group and de Onis, 2006). A child is identified as achieving minimum diet diversity if s/he consumed foods from at least five out of a possible eight food groups over the past 24 hours, following a standard definition; MDD is reported and measured only for children between the ages of 6 and 23 months.

The primary independent variables are the three domains of the SWPER modified index and the SWPER index, as described above. The analysis also includes a number of additional covariates: binary variables for a female child, residence in rural households, currently breastfeeding, access to mosquito nets, and a female household head. We also include continuous variables for the

age of the child in months, and the number of household members. A set of categorical variables are also included for wealth quantiles based on a DHS wealth index constructed using principal component analysis of ownership of valuable household assets.

2.4 Empirical specification

The empirical specification can be written as follows, where Y_{irc} is the outcome variable of children's anthropometric status for child i in region r in country c. X_{irc} is the vector of control variables described above, and ε_{irc} is the error term.

$$Y_{irc} = \beta\ SWPER_{irc} + X_{irc} + \varepsilon_{irc}$$

All analysis is conducted in Stata version 18. We use descriptive analysis to characterize the study sample and estimate logit regressions to assess the associations between various domains of empowerment and child nutritional outcomes.

3. RESULTS

3.1 Descriptive statistics

We first characterize the sample, including the sample size and key descriptive characteristics. The sample size for the modified SWPER index (using experience of violence as one domain) is also affected by the reduced sample size for questions posed around experience of violence: in PNG and Timor-Leste, these questions are posed only to a subsample of women as they are not administered to women in households in which a survey is administered to the male spouse. (In Sri Lanka, there was no male survey administered as part of this DHS round and thus the questions around experience of violence were posed to all women.) Accordingly, the relevant sample of women who have data available for all SWPER questions, as well as a child under five with height measured, is limited to 1590 women in PNG and 1945 women in Timor-Leste, but 5038 women in Sri Lanka. For the original SWPER index (using attitudes toward violence as one domain), the sample is larger in PNG (2163 women) and Timor-Leste (3967 women), but this index cannot be constructed for Sri Lanka.

Table 2: Descriptive Statistics

	Pooled					PNG				
Variable	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N
Woman's education (years completed)	8.20	4.43	0	21	34,741	5.74	4.19	0	21	9,943
Husband's education	8.20	4.52	0	21	32,669	6.67	4.59	0	21	9,943

(years completed)										
Woman's age	34.32	8.19	15	49	34,741	32.68	8.25	15	49	9,943
Husband's age	38.92	9.53	12	98	32,303	37.44	9.52	16	95	9,577
Rural	0.75	0.43	0	1	34,741	0.75	0.43	0	1	9,943
Currently breastfeeding	0.33	0.47	0	1	17,571	0.35	0.48	0	1	9,943
Female respondent works	0.34	0.47	0	1	34,689	0.35	0.48	0	1	9,891
Household size	5.61	2.53	1	28	34,741	6.33	3.04	1	28	9,943
	Timor-Leste					**Sri Lanka**				
Variable	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N
Woman's education	6.94	5.50	0	21	7,628	10.2	2.8	0	14	17,170
Husband's education	7.39	5.88	0	21	7,628	9.6	3.0	0	14	15,098
Woman's age	33.61	8.37	15	49	7,628	35.6	7.9	15	49	17,170
Husband's age	38.96	10.66	15	98	7,628	39.8	8.8	12	71	15,098
Rural	0.69	0.46	0	1	7,628	0.8	0.4	0	1	17,170
Currently breastfeeding	0.30	0.46	0	1	7,628	No data available				
Female respondent works	0.42	0.49	0	1	7,628	0.3	0.5	0	1	17,170
Household size	6.66	2.80	1	26	7,628	4.7	1.6	1	21	17,170

3.2 Mean empowerment scores for SWPER domains

Figure 1 and 2 summarize the mean index across domains in each country for the modified SWPER index (Figure 1) and the original SWPER index (Figure 2). Using the modified SWPER index, the findings suggest that women in PNG are characterized by negative scores between -.6 and -1 across all three domains, particularly with regards to the experience of violence. Women in Sri Lanka are characterized by scores between 0.2 and 0.6 in all three domains. Women in Timor-Leste have a low score in the domain of social independence (around -.5) but

have empowerment scores of essentially zero (neither positive nor negative) in the other two domains. For the original SWPER index in Figure 2, the patterns are somewhat distinct. Women in Papua New Guinea show a positive score in the domain of attitudes toward violence, though the scores in the other two domains remain negative (particularly in the decision-making domain). Women in Timor-Leste have a negative score in the domain of attitudes toward violence (around -.2), but positive scores in the other two domains.

Using the cutoff scores calculated in Ewerling et al. (2019), both Papua New Guinea and Timor-Leste are characterized by medium empowerment in all three domains, as the estimates do not cross the thresholds for either low or high empowerment. If the same thresholds were applied to the modified SWPER index, women in PNG are characterized by low empowerment in the domains of experience of violence and social independence, and medium empowerment in decision-making. Women in Sri Lanka are characterized by high empowerment in the domain of social independence, and medium empowerment in the other two domains; and women in Timor-Leste are characterized by low empowerment in the domain of social independence, and medium empowerment in the other two domains.

Figure 1: Modified SWPER Index

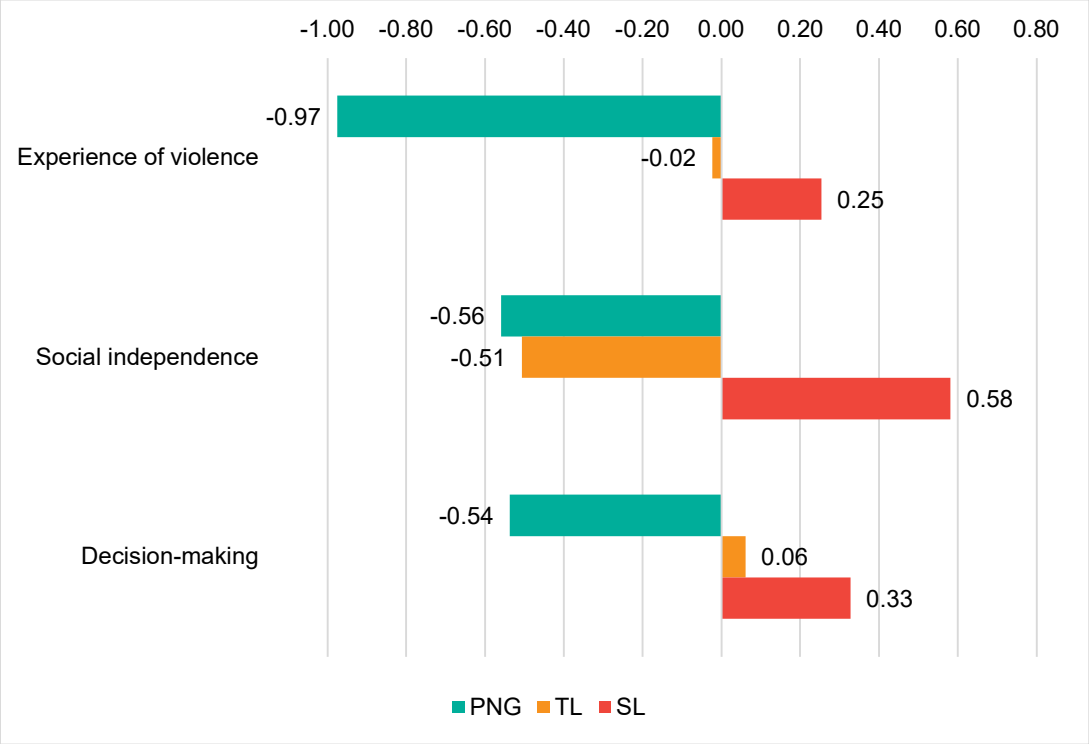
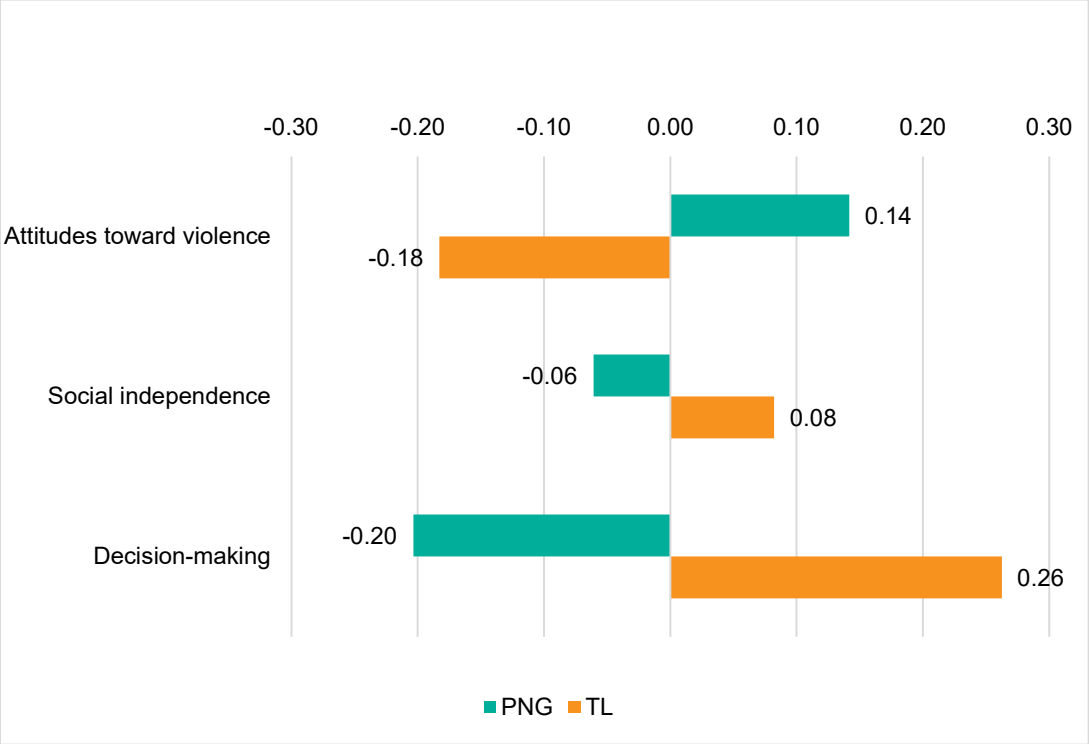


Figure 2: Original SWPER Index



We also assess the internal consistency of the indices using Cronbach's alpha, reporting estimates for each domain within each country sample. As shown in Table A1 in the Appendix, reliability in the pooled sample is generally acceptable: the domains capturing attitudes toward violence and decision-making both exceed the conventional 0.70 threshold, while the domain capturing experience of IPV experience is somewhat lower, and the domain capturing social independence shows the weakest internal consistency. Reliability scores for the individual country samples are typically lower—especially for social independence—consistent with the hypothesis that there is more limited variation within-country in responses.

Using these indices, we evaluate the association between empowerment and children's nutritional outcomes. Table 3 reports associations between the modified SWPER index and child stunting and wasting; Table 4 reports associations between the modified SWPER index and underweight status and minimum MDD. In Table 3, a higher level of empowerment in the domain of experiencing violence (i.e., reduced experience of violence) is associated with a weakly reduced probability of child stunting in PNG (1.5%, $p<0.1$) and a reduced probability of wasting in PNG (0.8%, $p<0.05$) and Timor-Leste (2.5%, $p<0.05$). A higher level of empowerment e in the domain of social independence is associated with a reduced probability of stunting in PNG (3.1%, $p<0.01$) and Sri Lanka (2.9%, $p<0.01$). There are no significant associations between empowerment in the domain of decision-making and anthropometric outcomes for any of the three countries included in the analysis.

Table 3: Associations between modified SWPER index and stunting and wasting

	(1)	(2)	(3)	(4)	(5)	(6)
	Stunted (PNG)	**Stunted (TL)**	**Stunted (SL)**	**Wasted (PNG)**	**Wasted (TL)**	**Wasted (SL)**
Empowerment score: experience of violence	-0.015*	0.013	-0.003	-0.008**	-0.025**	0.000
	(0.008)	(0.018)	(0.005)	(0.004)	(0.011)	(0.004)
Empowerment score: social independence	-0.031***	-0.012	-0.029***	-0.005	-0.014	-0.015
	(0.009)	(0.009)	(0.007)	(0.006)	(0.014)	(0.012)
Empowerment score: decision-making	-0.004	-0.015	-0.008	-0.002	0.009	-0.022
	(0.013)	(0.014)	(0.022)	(0.005)	(0.012)	(0.023)
Female child	-0.033**	-0.075***	-0.013	-0.008	-0.045*	-0.007
	(0.014)	(0.016)	(0.009)	(0.009)	(0.024)	(0.009)
Age of child in months	0.003***	0.003***	-0.000	-0.001	-0.001	-0.000
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Rural	0.045***	0.001	-0.036**	-0.007	0.049**	0.022*
	(0.015)	(0.021)	(0.014)	(0.005)	(0.022)	(0.012)
Currently breastfeeding	0.038***	-0.022	0.027*	0.026***	0.022	0.008
	(0.011)	(0.022)	(0.014)	(0.004)	(0.018)	(0.014)
Sex of household head	-0.044	-0.051*	0.007	-0.002	-0.019	0.020
	(0.037)	(0.027)	(0.011)	(0.017)	(0.020)	(0.013)

Primary respondent currently working	-0.050***	-0.019	-0.012	0.007	0.025	-0.008
	(0.015)	(0.033)	(0.009)	(0.011)	(0.019)	(0.018)
Household size	-0.005	-0.000	0.001	0.003***	-0.003	-0.002
	(0.009)	(0.004)	(0.004)	(0.001)	(0.004)	(0.003)
Sleeps under mosquito net	-0.038*	-0.012		0.011	-0.043	
	(0.021)	(0.030)		(0.007)	(0.029)	
Wealth index: first quintile (q1)	0.174***	0.150***	0.109***	0.038	0.012	0.046***
	(0.056)	(0.041)	(0.017)	(0.025)	(0.034)	(0.014)
Wealth index: second quintile (q2)	0.169**	0.140***	0.067***	0.021	0.040	0.041**
	(0.078)	(0.040)	(0.021)	(0.030)	(0.040)	(0.018)
Wealth index: third quintile (q3)	0.081**	0.156***	0.029**	-0.022	0.015	0.039***
	(0.036)	(0.035)	(0.014)	(0.022)	(0.033)	(0.014)
Wealth index: fourth quintile (q4)	0.080***	0.111***	0.017	0.018	0.009	0.025
	(0.016)	(0.030)	(0.012)	(0.031)	(0.024)	(0.021)
Observations	2,323	2,919	5,721	2,299	2,913	5,714

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4: Associations between modified SWPER index and underweight and MDD

	(1)	(2)	(3)	(4)	(5)	(6)
	Underweight (PNG)	Under-weight (TL)	Underweight (SL)	MDD (PNG)	MDD (TL)	MDD (SL)
Empowerment score: experience of violence	-0.007	-0.012	-0.007*	0.006	0.005	0.064**
	(0.006)	(0.011)	(0.004)	(0.016)	(0.018)	(0.027)
Empowerment score: social independence	-0.018**	-0.010	-0.027**	0.027	0.020**	0.047**
	(0.008)	(0.010)	(0.014)	(0.030)	(0.010)	(0.020)
Empowerment score: decision-making	0.008***	0.006	-0.043***	-0.001	0.013	-0.001
	(0.002)	(0.009)	(0.014)	(0.012)	(0.018)	(0.035)
Female child	0.000	-0.075***	-0.005	-0.050**	0.043**	0.014
	(0.014)	(0.017)	(0.012)	(0.020)	(0.018)	(0.025)
Age of child in months	0.001***	0.005***	0.001**	0.010***	0.014***	0.019***
	(0.000)	(0.000)	(0.001)	(0.002)	(0.003)	(0.004)
Rural	-0.042**	0.039*	-0.006	-0.086***	-0.040	-0.026
	(0.021)	(0.022)	(0.008)	(0.026)	(0.040)	(0.021)
Currently breastfeeding	0.031**	0.000	0.038**	0.175***	0.049**	0.285***
	(0.015)	(0.021)	(0.016)	(0.046)	(0.025)	(0.054)
Sex of household head	0.008	-0.010	0.016	-0.063	-0.007	0.007

	(0.014)	(0.023)	(0.012)	(0.093)	(0.032)	(0.037)
Primary respondent currently working	0.013	0.014	-0.006	0.027	0.032	0.019
	(0.021)	(0.038)	(0.017)	(0.033)	(0.046)	(0.029)
Household size	0.006***	0.004	-0.004	0.010	0.000	-0.010**
	(0.001)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)
Sleeps under mosquito net	-0.001	-0.019		0.005	0.068	
	(0.014)	(0.022)		(0.035)	(0.045)	
Wealth index: first quintile (q1)	0.135***	0.122***	0.113***	-0.190***	-0.159***	-0.267***
	(0.011)	(0.030)	(0.032)	(0.005)	(0.046)	(0.053)
Wealth index: second quintile (q2)	0.129***	0.101***	0.079***	-0.199***	-0.163***	-0.189***
	(0.049)	(0.035)	(0.020)	(0.037)	(0.035)	(0.068)
Wealth index: third quintile (q3)	0.061***	0.113***	0.057***	-0.114***	-0.084***	-0.159***
	(0.020)	(0.025)	(0.019)	(0.027)	(0.029)	(0.053)
Wealth index: fourth quintile (q4)	0.072***	0.110***	0.013	-0.097***	-0.054	-0.053
	(0.023)	(0.031)	(0.019)	(0.037)	(0.034)	(0.058)
Observations	2,549	3,136	5,794	913	1,059	1,725

Standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 5: Associations between original SWPER index and nutritional outcomes (PNG and Timor-Leste only)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Stunted (PNG)	**Stunted (TL)**	**Wasted (PNG)**	**Wasted (TL)**	**Underweight (PNG)**	**Underweight (TL)**	**MDD (PNG)**	**MDD (TL)**
Empowerment score: attitudes toward violence	0.002	0.017	0.005*	-0.021	0.009	-0.003	-0.027***	0.035**
	(0.003)	(0.013)	(0.003)	(0.015)	(0.011)	(0.009)	(0.003)	(0.014)
Empowerment score: social independence	-0.027***	-0.014*	0.007	-0.007	-0.004	-0.012*	0.024**	0.005
	(0.010)	(0.008)	(0.007)	(0.009)	(0.007)	(0.006)	(0.010)	(0.009)
Empowerment score: decision-making	-0.009	0.001	-0.007**	-0.001	0.001	0.000	0.017***	0.009
	(0.015)	(0.012)	(0.003)	(0.010)	(0.005)	(0.010)	(0.006)	(0.023)
Female child	-0.040**	-0.052***	0.005	-0.039***	0.004	-0.048***	-0.039***	0.010
	(0.016)	(0.011)	(0.008)	(0.014)	(0.013)	(0.016)	(0.014)	(0.014)
Age of child in months	0.003***	0.003***	-0.001**	-0.001**	0.001***	0.005***	0.009***	0.015***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)
Rural	0.043***	0.002	0.003*	0.010	-0.020	0.023	-0.097***	-0.002
	(0.015)	(0.013)	(0.001)	(0.021)	(0.016)	(0.014)	(0.027)	(0.046)
Currently breastfeeding	0.021**	-0.008	0.032***	0.014	0.027**	-0.013	0.179***	0.042**
	(0.010)	(0.017)	(0.004)	(0.016)	(0.013)	(0.011)	(0.019)	(0.019)

Sex of household head	-0.022	-0.020	0.013**	-0.016	0.006	-0.023	-0.018	0.003
	(0.030)	(0.025)	(0.006)	(0.016)	(0.014)	(0.025)	(0.071)	(0.022)
Primary respondent currently working	-0.052***	-0.022	-0.004	0.022*	-0.004	0.003	0.059	0.034
	(0.009)	(0.024)	(0.011)	(0.013)	(0.020)	(0.025)	(0.038)	(0.032)
Household size	-0.002	-0.001	0.004***	-0.004	0.005***	0.004**	0.009***	0.000
	(0.006)	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)	(0.003)	(0.007)
Sleeps under mosquito net	-0.056***	-0.020	0.019**	-0.008	-0.005	0.004	-0.014	0.086**
	(0.015)	(0.022)	(0.008)	(0.019)	(0.012)	(0.022)	(0.032)	(0.036)
Wealth index: first quintile (q1)	0.184***	0.139***	0.040	0.054**	0.146***	0.131***	-0.168***	-0.185***
	(0.036)	(0.029)	(0.032)	(0.027)	(0.006)	(0.023)	(0.032)	(0.037)
Wealth index: second quintile (q2)	0.198***	0.130***	0.020	0.064**	0.136***	0.122***	-0.150***	-0.177***
	(0.058)	(0.027)	(0.036)	(0.028)	(0.047)	(0.016)	(0.031)	(0.041)
Wealth index: third quintile (q3)	0.092***	0.115***	-0.018	0.018	0.062***	0.111***	-0.122***	-0.104***
	(0.025)	(0.029)	(0.019)	(0.022)	(0.017)	(0.012)	(0.016)	(0.036)
Wealth index: fourth quintile (q4)	0.098***	0.088***	0.024	0.031*	0.086***	0.098***	-0.123***	-0.091***
	(0.018)	(0.019)	(0.028)	(0.019)	(0.024)	(0.024)	(0.008)	(0.032)
Observations	2,891	5,802	2,873	5,774	3,172	6,265	2,403	2,188

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

In Table 4, a higher level of empowerment is associated with a weakly reduced probability of underweight status in Sri Lanka (0.7%, p<0.10), and an increased probability of achieving MDD (6.4%, p<0.05). Higher empowerment in the domain of social independence is associated with reduced probability of underweight status in PNG (1.8%, p<0.05) and Sri Lanka (2.7%, p<0.05), and again higher probability of achieving MDD in Timor-Leste (2%, p<0.05) and Sri Lanka (4.7%, p<0.05). Puzzlingly, higher empowerment in the domain of decision-making is characterized by an increased probability of underweight status in PNG (0.8%, p<0.01), but a decrease in this probability in Sri Lanka (4.6%, p<-.05).

In Table 5, using the original SWPER index (capturing attitudes toward violence) and the reduced sample (PNG and Timor-Leste only), we observe that some patterns in the domain of attitudes toward violence are reversed in sign: higher empowerment is weakly associated with an increase in wasting (0.5%, p<0.1) in PNG and a decrease in the probability of achieving MDD (2.7%, p<0.01) in PNG, though in Timor-Leste, the association with the probability of achieving MDD remains positive (3.5%, p<0.05). Higher empowerment in the domain of social independence is associated with a lower probability of stunting in PNG (2.7%, p<0.01) and is weakly associated with the same variable in Timor-Leste (1.4%, p<0.1); it is also weakly associated with a lower probability of underweight status (1.2%, p<0.1) and associated with a higher probability of achieving MDD (2.4%, p<0.05), both in Timor-Leste. Higher empowerment in the domain of decision-making is associated with a lower probability of wasting in PNG (0.7%, p<0.05) and a higher probability of MDD status in PNG (1.7%, p<0.01).

5. DISCUSSION

Our findings here suggest that there are varying levels of empowerment observed among women in the Asia – Pacific region as measured using the SWPER index: Papua New Guinea is characterized by low to moderate empowerment, Timor-Leste by moderate empowerment, and Sri Lanka by moderate to high empowerment. In general, higher empowerment is associated with better nutritional outcomes for children (a reduced probability of stunting, wasting, or underweight status, and an increased probability of achieving minimum diet diversity). In addition, there is some heterogeneity in the observed pattern depending on whether we use the modified SWPER index (drawing on reports of violence experienced) or the original SWPER index (drawing on reported attitudes toward violence).

To situate our findings in the existing literature, we can compare the levels of empowerment estimated in this study to other contexts. When using the modified SWPER index and comparing to the sample from south and central Asia analyzed in Onah (2021), we see that Papua New Guinea is characterized by notably low levels of empowerment in all three domains, and Timor-Leste is characterized by notably low empowerment in the social independence domain. The only country-domains in a similar range in Onah et al. are social independence in Bangladesh (-0.35) and attitudes toward violence in Tajikistan (-0.54). Sri Lanka, by contrast, is characterized by moderate empowerment in our three-country sample, but its domain scores are notably lower than the more positive scores reported in Onah (2021) for Kyrgyzstan and for Tajikistan in the social independence domain. When using the original SWPER index, the domain scores for both PNG and Timor-Leste are at an intermediate level close to zero, comparable to (for example) Pakistan or

Nepal in the South Asian sample. The empowerment scores for Ethiopia reported in Baye et al. (2024) are, however, similar to the scores reported for both PNG and Timor-Leste even in the modified SWPER index (-1 for attitudes toward violence in Ethiopia, and -0.5 for social independence).

If we focus on the modified SWPER index and compare to the regional averages reported in Ewerling et al. (2019), the scores for Papua New Guinea and Timor-Leste are notably low and most similar to the regional averages reported for west and central Africa (though even in this region, the average domain scores in Ewerling et al. are only -0.3). The estimated scores for Sri Lanka are estimated to be broadly similar to South Asia. Using the original SWPER index, the more intermediate empowerment scores for PNG and Timor-Leste are also similar to the regional averages for South Asia, but generally lower than the regional average for East Asia and the Pacific (this average is as high is 0.7 for the decision-making domain in the region). Fully disaggregated country-level scores reported in Ewerling et al. (2021a) confirm that the domain scores using the modified SWPER index reported for PNG and Timor-Leste are among the lowest in the 62-country sample, comparable to scores observed in Afghanistan and in the Sahel (Chad and Mali) – with Ethiopia also showing notably low empowerment, consistent with other evidence presented above.

The relationship between women's empowerment in various domains and better nutritional outcomes is generally consistent with the evidence in Aboagye et al. (2024), Baye et al. (2024), and Onah (2021): higher levels of empowerment are associated with better nutritional outcomes across multiple indicators. There are, however, some notable differences in the findings presented here for the domains capturing experience of or attitudes toward intimate partner violence. In the analysis of samples drawn from south and central Asia in Onah (2021) and in sub-Saharan Africa in Aboagye et al. (2024), the SWPER domain capturing attitudes toward violence largely does not exhibit any associations with child nutritional outcomes (note that Aboagye et al. (2024) only analyzes MDD, and does not assess anthropometric outcomes). By contrast, all three domains show predictive power in Ethiopia (Baye et al., 2024). In our analysis here, when we use the modified SWPER index, drawing on reports of experience of violence, we find that the violence-related domain is highly predictive of child growth outcomes, particularly in Papua New Guinea and Sri Lanka (and exhibits more predictive power, for example, than empowerment in decision-making). When we use the original SWPER index, drawing on attitudes toward violence, however, some of the associations have now reversed in sign and suggest that a higher level of empowerment leads to more adverse nutritional outcomes.

This pattern constitutes at least suggestive evidence that attitudes toward violence may not be an informative measure of empowerment in this context, or may be less informative than actual experience of intimate partner violence.[6] There is, in general, evidence that cross-country variation in stated attitudes around IPV is predictive of cross-country variation in the prevalence of violence (Heise and Kotsadam, 2015), and one recent analysis finds that empowerment as measured by

[6] The comparison across indices constructed using attitudes toward and experience of violence cannot be conducted for Sri Lanka; Sri Lanka is also characterized by relatively lower rates of IPV vis-à-vis PNG and Timor Leste, and low rates when compared to other countries in South Asia (Jayasuriya et al., 2011).

the SWPER is negatively associated with exposure to physical, sexual, and emotional IPV in sub-Saharan Africa (Donkoh et al., 2024).

One possible hypothesis implied by our findings here is that this correlation between attitudes toward intimate partner violence and experience of violence is weaker in the Pacific context or in PNG and Timor-Leste specifically, vis-à-vis other contexts in which this relationship has been examined. In particular, women's stated attitudes towards violence may not reflect their actual power in the household: women may state that violence is unacceptable, but social and cultural norms, expectations linked to bride price, and fear of adverse consequences may limit their ability to challenge the experience of violence. This gap between attitudes and lived experiences would be consistent with the observed pattern in this analysis in which the attitudes domain is not significantly associated with nutritional outcomes, while the domain capturing experience of violence does show this association.

There is relatively little literature that unpacks the relationship between attitudes toward violence and experience of violence in the Pacific. It is widely noted that intimate partner violence is particularly high in PNG (Lewis et al., 2008), where violence often targets women who are perceived as transgressing traditional gender norms or failing to model expected behavior (e.g., questioning male authority, refusing sex, or failing to fulfill domestic responsibilities) (Kelly-Hanku et al., 2016). These patterns have also been reported to recur in intergenerational cycles (Ahinkorah et al., 2023). In both PNG and Timor-Leste, IPV has been linked to stress around bride price – a practice that serves to reinforce traditional gender hierarchies – and the perception that men have absolute authority after the payment of bride price (Eves, 2019; Rees et al., 2017). In Timor-Leste, experience of violence has also (unsurprisingly) been linked to more adverse outcomes in terms of reproductive health and child mortality (Taft et al., 2015). The evidence of persistently high intimate partner violence is consistent with the hypothesis that experience of IPV is strongly associated with children's nutritional outcomes, but future work might beneficially probe the relationship between social norms around violence and experience of violence to further unpack the discrepancy between the findings estimated using the two alternate indices, as described above.

Our findings are also consistent with a larger literature that shows positive associations between the SWPER measure of empowerment and other health-related outcomes. This includes the use of maternal and child health services (Eom et al., 2025; Ewerling et al., 2021b); access to contraception for birth spacing (Salihu et al., 2024); child development outcomes (Ewerling et al., 2020b); and experience of IPV itself, as noted above (Donkoh et al., 2024). We expand this literature by documenting the associations between the SWPER and nutritional outcomes of interest in a Pacific sample characterized by notably poor nutritional outcomes.

This analysis does have a number of limitations. We are only able to draw on the SWPER measure of empowerment given data constraints, and this may be a limitation given the critiques expressed that the SWPER may not have been fully validated – and has not been validated in the Pacific context specifically – or is partly an index of convenience driven by the availability of DHS data (Yount et al., 2018). There is also evidence in the literature of low concordance across different measures of empowerment, suggesting that the patterns identified here could be very different if estimated using a different method (Bageant et al., 2024).

5. CONCLUSION

In this paper, we explore levels of women's empowerment in a multicountry sample drawn from Demographic and Health Survey data in the Asia – Pacific region, constructing the SWPER index as well as a modified index for Papua New Guinea, Sri Lanka, and Timor-Leste. We find that women in PNG are generally characterized by at least moderate disempowerment, particularly in the domain of experience of violence or attitudes toward violence; empowerment is observed to be at intermediate levels in Timor-Leste, and is higher in Sri Lanka. Higher levels of empowerment are associated with enhanced nutritional outcomes across all three countries, though there is some variation in the associations observed across domains and across countries; in some cases, the domain constructed using attitudes toward violence shows associations in the opposite direction of the hypothesized relationship. Further work may usefully probe the channels through which women's empowerment can shift child nutrition, including both direct and indirect pathways such as maternal health (both physical and mental), maternal time allocation, maternal and child access to health services, and food insecurity.

Looking forward, these findings highlight the importance of interventions that seek to strengthen women's empowerment and reduce intimate partner violence in the region. A growing body of evidence has explored strategies – often implemented on a smaller scale or in pilot studies – to reduce gender-based violence in Papua New Guinea (O'Reilly and Fowler, 2025), Sri Lanka (Herath et al., 2018), Timor-Leste (Wild et al., 2022), and in the Pacific more broadly (Campbell et al., 2025; Mannell et al., 2023). Programs that effectively reduce violence and empower women may also have positive benefits in other dimensions, including enhanced children's nutritional status.

ABOUT THE AUTHORS

Jessica Leight is a Senior Research Fellow in IFPRI's Poverty, Gender and Inclusion Unit.

Rishabh Mukerjee is a Research Analyst in IFPRI's Development Strategies and Governance Unit

Peggy Kala is a student is a student in the Master of Public Health at the University of Papua New Guinea.

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Table A1: Cronbach's alpha

	(1)	(2)	(3)	(4)
	PNG	Timor-Leste	Sri Lanka	Overall
Attitude towards violence (domain 1A)	0.83	0.83		0.83
Experience of violence (domain 1B)	0.75	0.36	0.62	0.69
Social independence	0.54	0.52	0.44	0.62
Decision-making	0.72	0.71	0.64	0.75