

## Nutritional status and spousal empowerment among native Amazonians

Ricardo A. Godoy<sup>a,\*</sup>, Ankur Patel<sup>a</sup>, Victoria Reyes-García<sup>a</sup>, Craig F. Seyfried Jr.<sup>a</sup>, William R. Leonard<sup>b</sup>, Thomas McDade<sup>b</sup>, Susan Tanner<sup>b</sup>, Vincent Vadez<sup>c</sup>

<sup>a</sup>Heller School for Social Policy and Management Waltham, Brandeis University, Waltham, MA 02454, USA

<sup>b</sup>Northwestern university, Evanston, IL 60201, USA

<sup>c</sup>ICRISAT, Patancheru 502 324, Andhra Pradesh, India

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### Abstract

Researchers and development organizations have shown interest in individual empowerment because it presumably improves well-being. Estimates of empowerment's effects on well-being contain biases from the potential endogeneity of empowerment. Using data from a sexually egalitarian and highly autarkic society of foragers and horticulturalists in the Bolivian Amazon, the Tsimane', we overcome the problems that this poses by: (1) matching spouses' responses to the same questions about who makes decisions or who breaks ties in 10 domains to improve accuracy in measures of empowerment; and (2) using parental attributes of spouses as instrumental variables for spousal empowerment. Outcomes include two anthropometric indices of short-run nutritional status: body-mass index and age and sex-standardized *z* scores of mid-arm muscle area. The amount of empowerment of household heads did not affect their nutritional status or other indicators of their well-being, such as income, wealth, expenditures, happiness, social capital, or self-perceived health. It also did not affect the nutritional status of their offspring. Nor did it affect the difference in income, wealth, or monetary expenditures between spouses. The insubstantial effects persisted with other definitions of empowerment or types of regressions. We end with a discussion of why empowerment, despite its popularity in development discourse, has such tenuous links with objective indicators of well-being, and the implication of this finding for future studies of empowerment's effects.

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### Introduction

Since at least the 1960s, researchers and development organizations have noted that individual empowerment matters because it improves the well-being of individuals and households (Kar, Pascual, & Chickering, 1999). Researchers have drawn on the idea to direct interventions to marginalized groups, such as women of poor rural households. The interventions presumably empower

\*Corresponding author. Tel.: +1 781 736 2784.

E-mail addresses: [rgodoy@brandeis.edu](mailto:rgodoy@brandeis.edu) (R.A. Godoy), [ankur@brandeis.edu](mailto:ankur@brandeis.edu) (A. Patel), [vreyes@brandeis.edu](mailto:vreyes@brandeis.edu) (V. Reyes-García), [cfs126@brandeis.edu](mailto:cfs126@brandeis.edu) (C.F. Seyfried Jr.), [w-leonard1@northwestern.edu](mailto:w-leonard1@northwestern.edu) (W.R. Leonard), [t-mcdade@northwestern.edu](mailto:t-mcdade@northwestern.edu) (T. McDade), [stanner@umich.edu](mailto:stanner@umich.edu) (S. Tanner), [v.vadez@cgiar.org](mailto:v.vadez@cgiar.org) (V. Vadez).

people, thereby enhancing their well-being. The belief that empowerment contributes to well-being and that it counts in its own right has grown to attain iconic prominence in organizations promoting economic development (Narayan, 2002; Smith, Ramakrishnan, Ndiaye, Haddad, & Martorell, 2003; United Nations Development Program, 2002; World Bank, 1991) and in studies of economic development (Agarwal, 1997; Kabeer, 1999; Sen, 1985; Quisumbing & Maluccio, 2003).

In quantitative household-level studies of development researchers have typically defined empowerment in at least two ways. Some have equated empowerment to desirable attributes, such as schooling, income, social capital, civil liberties, contraceptive use, age of marriage, or good health (Jewkes, 2002; Lambert, Millimet, & Slottje, 2005; Nanda, 1999; Scanlan, 2004; Zimmerman, 1990). Other researchers have defined empowerment by the ability to make decisions, principally inside the household (Agarwal, 1994; Grasmuck & Espinal, 2000; Holvoet, 2005; McElroy, 1992). The second definition implies that individual empowerment matters in its own right because it expands people's choices and their ability to shape their lives (Sen, 1999). Here we follow the second definition.

#### *Individual empowerment in quantitative household-level studies of development: The evidence*

Much of the discussion of individual empowerment has centered on women (Blumberg, Rakowski, Tinker, & Monteon, 2005; Smith et al., 2003; Quisumbing and Maluccio, 2003). Studies suggest that resources in the hands of women improve their own and their children's well-being more than resources in the hands of men (Haddad & Hoddinnott, 1994; Rubalcava, Teruel, & Thomas, 2004; Thomas, 1994). The practice makes economic sense. In societies where women have few resources and depend on their children for support during old age, women invest in children as a form of old-age insurance (Quisumbing and Maluccio, 2003). The finding that women have fewer resources than men and that they use resources more prudentially than men provides the intellectual and empirical lynchpin for the trend in development programs of skewing resources to women (Rubalcava et al., 2004; Quisumbing, 2003). The transfers should enhance women's empowerment or their ability to make decisions and, thus, their own and their children's

well-being. We next turn to the empirical foundation for the claim.

Some studies have found positive associations between empowerment and well-being. In a study that most closely resembles the study we are about to present, Hindin (2000) found that adult women in Zimbabwe with less power had lower body-mass index (BMI; kg/m<sup>2</sup>) than women with more power. Less empowered women faced a greater likelihood of suffering from chronic energy deficiency (BMI < 18.5). Hindin equated empowerment with a woman's self-perceived ability to decide on large household expenditures, on whether to work outside the home, and on the number of children to have. Hindin did not control for the endogeneity of individual empowerment. Kantor (2003) found that in Ahmedabad, India, women who worked at home producing garments for sale felt more empowered when deciding on the uses of their earnings, but she did not assess whether empowerment affected a woman's choice to work at home. The PROGRESA program in Mexico used an experimental research design to transfer income to poor women. Evaluators found that over time the transfers reduced the likelihood that husbands would dictate decisions about the household economy. Evaluators measured empowerment by asking women about their ability to make decisions in the household (Adato, de la Briere, Mindek, & Quisumbing, 2000). Smith et al. (2003) did a comparative study of children < 3 years of age in 36 developing nations and found that women's status (a proxy for empowerment) bore a positive association with their children's nutritional status. Results were strongest in Asia and weakest in Latin America. They defined status by the ability of a woman to make decisions in her household and by the amount of female–male equality in the community. Smith et al. did not correct for biases from the endogeneity of status.

However, other studies have found that empowerment bore ambiguous or non-linear associations with well-being. Researchers have hypothesized that the decline in fertility stems from female empowerment (Sanderson & Dubrow, 2000). However, Schuler et al. (1997), by reviewing the demographic literature, found tenuous support for the hypothesis. Brown and Park (2002) studied how the empowerment of mothers in China affected the school performance of children. They defined empowerment by the self-assessed role of mothers relative to fathers to make decisions about the school enrollment of their children. Brown and Park

found that a mother's empowerment bore no strong association with the academic performance of her children, and even bore a negative association with the academic performance of her daughters. Jewkes (2002) reviewed the literature on domestic violence against women in developing and industrial nations and found that only high levels of empowerment reduced the likelihood of violence against women. Jewkes defined individual empowerment by the school attainment and by the amount of income and social support available to a woman. In Latin America, female empowerment improved child nutritional status chiefly among women with low status (Smith et al., 2003).

Four conclusions flow from the review. First, to show that individual empowerment shapes well-being or that it can stand on its own as a proxy of individual well-being one must provide a definition of individual empowerment that excludes its determinants or consequences. For example, equating individual empowerment with desirable outcomes conflates cause with effect and treats empowerment as a latent construct. Because individual empowerment shapes and reflects the outcomes, the outcomes must stand on their own, apart from the definition of individual empowerment.

Second, even if one provides definitions of individual empowerment and outcomes so that the two stand apart, individual empowerment and individual well-being could affect each other, and both could reflect shared unmeasured traits (Pahl, 1983). To advance the empirical understanding of how individual empowerment affects individual well-being one must correct for the endogeneity biases of empowerment by using either an experimental research design or convincing instrumental variables (Quisumbing & Maluccio, 2003).

Third, researchers have shown agreement that people's perception of their empowerment revealed through answers to questions about decision-making in the household matters most in shaping people's well-being (Hindin, 2000; Kar et al., 1999; Kantor, 2003; Stein, 1997). However, self-assessed answers about decision-making likely contain random measurement errors, thus attenuating the effect of empowerment on well-being.

Last, most of the quantitative studies showing a positive association between individual empowerment and individual well-being come from South Asia, a region with a tradition of discrimination against women. In societies with less female–male inequality or with less discrimination against

women the effects of female empowerment on well-being are less clear. None of the quantitative studies known to us has examined empowerment's effects on well-being in societies without marked socioeconomic inequality between the sexes.

### *Objectives and hypotheses*

Here we estimate the effect of individual empowerment of the female and the male head of a household on their own anthropometric indicators of short-run nutritional status. For the analysis we use data from the Tsimane', a sexually egalitarian and highly autarkic society of native Amazonian foragers and farmers in Bolivia in the early stages of continuous contact with the market economy. The Tsimane' follow a sexual division of labor in subsistence and child-rearing activities. Women fish, do all farm chores besides cutting large trees, cook, prepare and serve home-brewed beverages, provide child care, and do household maintenance. Men hunt, clear forests, and work for wages in cattle ranches and logging firms. These tasks aside, women and men substitute with ease for each other in work. The Tsimane' practice preferential cross-cousin marriage, meaning that a man weds his mother's brother's daughter. Residence is matrilocal shortly after marriage, followed by neolocal residence. Polygynous in the past, the Tsimane' today mostly practice monogamy and live in nuclear households in small villages with about 24 households. Neolocal residence plus preferential cross-cousin marriage creates a wide and thick tangle of kin linked by blood and marriage available for social support. 36% of wives and 39% of husbands in our sample lived in their village of birth, hinting that wives and husbands benefit from equal amounts of social support from people they have known since childhood. Even in their myths one finds evidence of sexual egalitarianism. In one myth, the Tsimane' were ruled by an old woman and in most myths one finds women playing prominent roles, often as tricksters.

Our specific objectives include: (1) to measure the empowerment of the female and the male head of a household through perceived measures of decision-making in the household economy, (2) to reduce random measurement error of perceived measures of empowerment by estimating the overlap between own and spouse's perceptions of decision-making, (3) to use instrumental variables for individual empowerment to estimate the effect of empowerment on own

anthropometric indicators of short-run nutritional status, and (4) to test the hypothesis that individual empowerment has a weaker effect on own well-being in a society with greater socioeconomic equality between the sexes.

## Materials and methods

Data comes from a 2004 survey done among all 231 households in 13 villages straddling the Maniqui river, province of Beni in the Bolivian Amazon. To avoid imposing our definition of household heads, we asked people in each household to identify the female and the male head of the household. Participants in the study included all female and male heads of the 231 households in the 13 villages; we surveyed 227 female and 213 male heads; we call them wife and husband or spouses. Of the 231 households, 209 households were headed jointly by a wife and by a husband, and 22 were headed by a single adult (women = 18; men = 4). The 2004 survey formed part of a panel study in progress that started in 1999. Experienced interviewers and translators who had been part of the panel from the start did the 2004 survey.

### *Anthropometric indices of short-run nutritional status*

We use anthropometric indices of short-run nutritional status as dependent variables because nutritional status stands for well-being across cultures (Kabeer, 1999; Sen, 1990). We trained surveyors how to measure physical stature, weight, and mid-arm muscle area. We use two anthropometric indices that reflect different dimensions of short-run nutritional status: age and sex-standardized  $z$  score of mid-arm muscle area (ZAM) and BMI. Scores of mid-arm muscle area provide an index of lean body (muscle) development and protein reserves. With acute nutritional stress or protein deprivation, muscle wasting and low indices of arm muscularity occur. BMI provides a general measure of under nutrition and obesity. The two measures had a partial correlation coefficient of only .31 ( $p = .001$ ,  $n = 407$ ), buttressing the point that the two measures capture different aspects of short-run nutritional status.

### *Individual empowerment*

We followed three steps to measure individual empowerment. First, we built on the work of Ashraf

(2005) to develop a draft survey, which we pilot-tested before applying it in its final form. Second, during the formal survey we asked each spouse who made decisions and who broke the tie when they wrangled. We tried to interview each household head alone, but sometimes the spouse was present; we did not code for the presence of the spouse. We first asked a question such as “Who *normally* makes decisions about food preparation and about cooking food?” and we then asked “Who breaks the tie when you and your spouse have a *disagreement* on what food to prepare or buy?” We analyzed each of the two answers separately because the two questions allow one to assess the amount of empowerment in different areas of the household economy. A spouse might decide during normal conditions, but the other spouse might decide during a disagreement. We did not impose our definition of “normally” or “disagreement”; instead, we allowed people to decide on the meaning of the terms. We did not collect separate, objective data to decide how well self-assessed answers matched actual decisions made by wives and husbands.

Third, since we collected separate information from the wife and from the husband we assessed whether self-perceived measures of empowerment coincided with a spouse’s measures. Cross-checking a self-perceived measure of empowerment with a spouse’s self-perceived measure improves the accuracy of estimates. In the 22 households headed by only one person, indices of empowerment captured only the self-assessed answers of the household head, so the definition of empowerment would have differed from the definition of empowerment for the rest of the sample. To have consistency in the measure of empowerment, we dropped from the analysis the 22 households headed by only one person.

In Tables 1a-b we summarize how wives and husbands responded to questions about who made the decision (Table 1a) and who broke the tie during discords (Table 1b) in the following 10 areas of the household economy: (1) cooking and buying food, (2) buying alcohol, (3) wage labor, (4) buying clothing, (5) setting the level of educational attainment for children, (6) helping children, family, or in-laws in work, (7) having children, (8) buying luxury goods, (9) selling goods, and (10) starting reconciliation after marital conflicts.

From answers to the 10 questions we constructed two variables (*decider* and *tie breaker*) that captured total general individual empowerment. If both

Table 1a  
Self-perceived role of wife and husband as main decider or tie breaker among Tsimane', Bolivia, 2004

Topic	<i>N</i>	Wife	Husband	Both	Other
A.1. Main decider—Wife answers (%)					
Buy alcohol	147	11.56	83.67	3.40	1.36
Wage labor	179	12.85	69.83	17.32	0
Buy clothing	203	61.08	28.57	10.34	0
Children's schooling	183	31.69	36.61	29.51	2.19
Buy food	202	55.94	32.18	11.88	0
Help kin	199	54.27	31.66	14.07	0
Fertility	188	7.45	9.04	9.57	73.94
Buy luxury goods	203	38.42	45.32	16.26	0
Start reconciliation	193	41.97	52.33	5.70	0
Sell goods	202	47.52	26.24	26.24	0
A.2. Main decider—Husband answers (%)					
Buy alcohol	170	5.88	90.00	2.35	1.77
Wage labor	191	6.81	75.92	17.28	0
Buy clothing	207	12.56	79.23	8.21	0
Children's schooling	186	14.52	50.00	32.80	2.70
Buy food	205	32.20	48.29	19.51	0
Help kin	203	13.30	73.40	13.30	0
Fertility	192	5.73	8.85	11.46	73.96
Buy luxury goods	206	23.30	57.28	19.42	0
Start reconciliation	194	34.54	57.22	8.25	0
Sell goods	206	25.73	40.29	33.50	.49
Topic	<i>N</i>	Wife	Husband	Both	Other
B.1. Tie breaker—Wife answers (%):					
Buy alcohol	148	16.89	78.38	4.73	0
Wage labor	176	19.89	72.73	7.39	0
Buy clothing	203	58.13	33.99	7.88	0
Children's schooling	177	23.73	35.03	30.51	10.73
Buy food	200	49.00	34.00	17.00	0
Help kin	197	51.27	41.62	7.11	0
Fertility	186	12.37	8.60	11.29	67.74
Buy luxury goods	203	33.99	51.72	14.29	0
Start reconciliation	145	37.67	54.11	8.22	0
Sell goods	201	50.75	30.35	18.91	0
B.2. Tie breaker—Husband answers (%):					
Buy alcohol	170	10.00	85.29	3.53	1.18
Wage labor	186	23.12	69.35	7.53	0
Buy clothing	207	15.94	72.95	11.11	0
Children's schooling	180	15.56	42.22	32.22	10.00
Buy food	203	31.53	48.28	20.20	0
Help kin	202	22.77	68.32	8.91	0
Fertility	192	8.33	9.38	11.98	70.31
Buy luxury goods	205	25.37	57.56	17.07	0
Start reconciliation	152	38.16	54.61	7.24	0
Sell goods	206	33.98	41.26	23.79	.98

spouses agreed that the wife or the husband made the decision, we coded the answer as +1. We assigned a zero when the spouses agreed that either a third party or both spouses decided, or when the

spouses disagreed on who decided. We re-coded answers so each re-coded answer contained either a +1 or a zero for each spouse. So defined, the +1 category captures unambiguous agreement between

Table 2  
Score in summary measures of empowerment by Tsimane' wives and husbands: Decider and Tie breaker

Score	Wives				Husbands			
	Decider		Tie breaker		Decider		Tie breaker	
	Freq	%	Freq	%	Freq	%	Freq	%
0	90	43.06	83	39.71	24	11.48	34	16.27
1	58	27.75	60	28.71	37	17.70	24	11.48
2	35	16.75	29	13.88	32	15.31	38	18.18
3	14	6.70	20	9.57	38	18.18	38	18.18
4	9	4.31	10	4.78	34	16.27	31	14.83
5	3	1.44	5	2.39	23	11.00	27	12.92
6			2	.96	10	4.78	10	4.78
7					8	3.83	4	1.91
8					3	1.44	1	.48
9							2	.96
10								

the spouses that either the wife or the husband made the decision. Our rule for assigning +1 raises the standard of acceptable evidence for individual empowerment since it excludes decision-making by both spouses or by third parties. We added the 10 re-coded answers to arrive at an index of total general perceived decision-making; we call the variable *decider*. We repeated the procedure for answers to the 10 questions about who broke ties; we call the variable *tie breaker*. The variable *tie breaker* captures empowerment because studies suggest that the capacity to resolve a disagreement in the households reflects bargaining power (Quisumbing and Maluccio, 2003). Table 2 contains frequency distribution for the variables *decider* and *tie breaker*.

#### Instrumental variables for individual empowerment

We followed two steps to select instrumental variables for individual empowerment. First, we ran two regressions with each of the two measures of empowerment (*decider* and *tie breaker*) as dependent variables; as explanatory variables we included potential instrumental variables for empowerment (columns a-b, Table 3). We did so to identify the instrumental variables most highly linked to empowerment. Potential instrumental variables for individual empowerment included: (a) the modern human capital of the household head's mother and father and (b) the household head's perceived

physical stature of their same-sex parent relative to themselves. Modern human capital refers to the maximum school grade completed, writing skills, and competence speaking Spanish, Bolivia's national language. We next explain the rationale for the use of the potential instrumental variables.

In household-based development studies, researchers have found associations between own modern human capital and own empowerment (Narayan, 2002), and in our research we have shown that modern human capital in the forms of schooling and fluency in spoken Spanish contributes to higher individual earnings (Godoy, Reyes-García et al., 2006). Researchers in industrial nations have used parental modern human capital as an instrumental variable for own modern human capital (Wooldridge, 2003). Parents with more modern human capital likely transmit to their offspring a greater sense of mastery and ability to make decisions, so parental modern human capital should contribute to own empowerment. A spouse reporting being taller than her or his parents would suggest having received significant parental investments while young, though it could also reflect individual variation. Elsewhere we show the absence of secular changes in adult physical stature among Tsimane' during the 20th century (Godoy, Leonard et al., 2006), so we rule out the idea that perceived parental physical stature picks up secular trends. For perceived parental stature, we asked each spouse the following question about each of their same-sex parent: "Was (is) your mother (father) taller, shorter, or about the same height as you?"

For the second step we regressed each of the two measures of nutritional status (dependent variables) against the statistically significant parental attributes just discussed (instrumental variables) plus the person's age, sex, schooling, and physical stature, and village dummy variables. We show those results in columns c-f of Table 3.

The results of Table 3 suggest that some parental attributes bore an association with the empowerment of household heads but not with the two anthropometric indices of short-run nutritional status of the spouse. Among wives (part A, Table 3), mother's writing ability bore a positive association with *tie breaker* (column a), but not with anthropometric indicators (columns c-d); father's physical stature bore an association with *decider* (column b), but not with anthropometric indicators (columns e-f). Among husbands (part B, Table 3), father's schooling bore a positive association with

Table 3  
Test of adequacy of instrumental variables: Results of OLS regressions

Variables:	Dependent variables:					
	Empowerment:		Anthropometric index:			
	Tie breaker	Decider	ZAM	Log BMI	ZAM	Log BMI
	[a]	[b]	[c]	[d]	[e]	[f]
<i>A. Wives</i>						
Tie breaker	^	^	.04(.03)	.002(.006)	^	^
Decider	^	^	^	^	.02(.03)	-.007(.007)
Potential instrumental variables (attributes of person's parents):						
Mother:						
Schooling	-.25(.30)	-.17(.20)	^	^	^	^
Writing	1.37(.64) <sup>b</sup>	.51(.49)	-.05(.16)	-.02(.04)	^	^
Spanish	-.16(.17)	-.04(.19)	^	^	^	^
Stature	.14(.12)	.24(.10) <sup>b</sup>	^	^	-.12(.04) <sup>c</sup>	.006(.01)
Father:						
Schooling	.05(.08)	-.02(.08)	^	^	^	^
Writing	-.17(.38)	.07(.35)	^	^	^	^
Spanish	.02(.16)	.14(.15)	^	^	^	^
Stature	-.16(.18)	-.23(.13) <sup>a</sup>	^	^	-.05(.07)	-.006(.01)
<i>N</i>		189		203		195
Joint: $F$ & $p > F$	Na	4.73 (.01)	Na	Na	4.07 (.01)	.23 (.79)
<i>B. Husbands</i>						
Tie breaker	^	^	-.03(.02)	-.004(.003)	^	^
Decider	^	^	^	^	.007(.02)	.001(.004)
Potential instrumental variables (attributes of person's parents):						
Mother:						
Schooling	-.09(.32)	-.06(.24)	^	^	^	^
Writing	.31(.84)	-1.58(.85) <sup>a</sup>	^	^	-.02(.45)	-.07(.05)
Spanish	-.11(.23)	-.05(.20)	^	^	^	^
Stature	-.03(.15)	.08(.16)	^	^	^	^
Father:						
Schooling	.13(.08) <sup>a</sup>	.11(.06) <sup>a</sup>	.02(.01)	.003(.002)	.02(.01)	.003(.002)
Writing	-.46(.41)	-.09(.36)	^	^	^	^
Spanish	.11(.26)	.008(.21)	^	^	^	^
Stature	-.16(.17)	-.19(.15)	^	^	^	^
<i>N</i>		184			199	
Joint: $F$ & $p > F$	Na	3.59 (.02)	Na	Na	0.70(.49)	1.96(.14)

Note: Regressions are OLS with constant (not shown). Control variables not shown include village dummies (13–1 = 12), and person's age, maximum school grade, and physical stature. Cells contain coefficients and, in parenthesis, standard errors. Joint is  $F$  test and  $p$  value for  $p > F$  for test of joint significance of statistically significant instrumental variables (columns a-b) and all IVs (column c-f). ^ = variable intentionally left out.

Na = not applicable.

<sup>a</sup> $p$  significant at the 10% level.

<sup>b</sup> $p$  significant at the 5% level.

*tie breaker* (column a), but not with anthropometric outcomes (columns c-d). Mother's writing ability and father's schooling each bore a statistically significant association with *decider* (column b); together the two variables also bore a statistically joint significant association with *decider* ( $F = 3.59$ ,

$p > F = .02$ ), yet neither of the two variables alone or together bore a statistically significant association with anthropometric outcomes (columns e-f). Table 4 contains definition and summary statistics of the dependent, explanatory, and instrumental variables used in the regression analyses.

Table 4  
Definition and summary statistics of variables used in regression analyses

Variable	Wives			Husbands		
	N	Mean	Std Dev	N	Mean	Std Dev
<i>(A) Outcome variables (anthropometric indicators of short-run nutritional status of each household head):</i>						
ZAM. Age and sex-standardized z score of mid-arm muscle area following norms of Frisancho (1990)	205	−.26	.62	202	−1.25	.65
BMI. Body-mass index. Weight in kilograms/physical stature in meters squared. In regression entered in logarithms.	205	23.46	2.95	202	23.49	2.37
<i>(B) Explanatory variables refer to household heads:</i>						
Decider (see text)	209	1.05	1.21	209	2.89	1.97
Tie breaker (see text)	209	1.22	1.38	209	2.80	1.98
Age in years	209	38.03	16.90	209	39.64	16.39
Schooling. Maximum school grade attained	209	1.12	1.49	209	2.52	2.93
Physical stature in centimeters	205	151.01	4.76	202	162.7	4.85
<i>(C) Instrumental variables for empowerment refer to attributes of parents of each household head and come from Table 3:</i>						
Mother's writing skills: 0 = cannot; 1 = with difficulty; 2 = well	207	.03	.20	207	.009	.09
Father's physical stature: same = 1, shorter = 0, taller = 2	199	1.82	.53	Not applicable		
Father's schooling (maximum school grade attained)		Not applicable		204	.76	2.31

## The people

In this section we discuss spousal empowerment and disparities in well-being between spouses. In a recent publication in this journal we cover general aspects of Tsimane' ethnography and history, including evidence of their egalitarianism and autarky (Godoy, Byron, et al., 2005), so here we only discuss spousal empowerment and disparities in well-being between spouses.

### Spousal empowerment

The Tsimane' words *ji'fercati* or *Ayo'joij* come closest to the English word empowerment, and connote the ability to govern or give orders; the words apply to animals (e.g., the head of a troop) and to humans.

Out of a potential range from zero to 10 for the variables *decider* or *tie breaker*, no spouse scored a 10 (Table 2). Wives were the main deciders in only 1.05 areas (SD = 1.21), whereas husbands were the main deciders in almost three times as many areas (mean = 2.89; SD = 1.97) ( $t = 11.46$ ;  $p < .001$ )

(Table 4). On average, wives broke ties in only 1.22 areas (SD = 1.38), whereas husbands broke ties in twice as many areas (mean = 2.80; SD = 1.98) ( $t = 9.46$ ,  $p < .001$ ). The low scores reflect the high standards imposed on the definition of empowerment and disagreement between spouses, discussed next.

The results shown in Tables 1a and b suggest that wives and husbands disagreed on who decided and who broke ties. For instance, wives mostly said they decided on food purchases and preparation (55.94%, part A.1 Table 1a); however, when asking husbands, they also mostly said that they decided (48.29%, part A.2 Table 1a). To the question of who bore the main responsibility for deciding what clothes to buy, 61.08% of wives said they decided (part A.1 Table 1a), but 79.23% of husbands disagreed and said they decided (part A.2 Table 1a). In a few areas, such as wage labor or the purchase of alcohol, couples agreed that husbands decided. We found the same pattern just described when we examine answers about who broke the tie during disagreements (Table 1b).

In answers to most queries, wives and husbands said the decision rested with themselves, the other

spouse, or with both of them, but with the question about fertility 73% of wives and husbands said the answer depended on forces over which they had no control. Birth control is new in the area, and most people felt they had little choice on how many children to have.

The two measures of empowerment, *decider* and *tie breaker*, had a correlation coefficient of +0.70 ( $p = .001$ ,  $n = 418$ ). We found a negative correlation between spouses in each of the two measures of empowerment. The correlation was stronger for *tie breaker* ( $-.27$ ,  $p = .001$ ) than for *decider* ( $-.07$ ,  $p = .26$ ), suggesting that the more one spouse considered her or himself the *tie breaker*, the less the other spouse considered her or himself the *tie breaker*.

#### Disparities in well-being between spouses

Tsimane' husbands and wives own separate physical assets, keep their own monetary income, decide what to sell, barter, or buy, and have separate usufruct rights to forest plots cleared each year for agriculture. Large domesticated animals (e.g., pigs, cattle) tend to belong to husbands, whereas smaller domesticated animals (e.g., chick-

ens, ducks) tend to belong to women and children. Despite separate ownership and management of some resources, spouses pool resources in consumption. Families often literally eat from a common plot. Particularly in communities far from market towns, husbands buy durable and consumption goods for their wives. People take a lax attitude toward the use of physical assets. Large expensive assets aside (e.g., rifles), people often take other people's assets when they need them, sometimes without asking, but return them. Elsewhere we document the extensive practice of sharing and reciprocity within and across households (Reyes-García, Godoy, Vadez, Huanca, & Leonard, 2006).

Wives and husbands differed in indices of well-being, particularly those associated with the market economy. For example, in part A of Table 5 we compare differences between wives and husbands in mean income, wealth, and monetary expenditures. In all the comparisons wives did worse than husbands. Husbands had six times more income and more than twice as much wealth, and spent almost seven times more than their wives. Part B suggests that wives were less likely to engage in pro-social behavior, defined as the number of times a

Table 5  
Comparison of indicators of well-being between wives and husbands, Tsimane', Bolivia, 2004

	Wives			Husbands		
	N	Mean	SD	N	Mean	SD
<i>(A) Economic outcomes:</i>						
Income	208	29.81	95.30	208	185.87 <sup>c</sup>	326.96
Wealth	208	716.62	602.44	208	1956.48 <sup>c</sup>	1748.88
Expenditure	207	7.76	31.89	208	61.10 <sup>c</sup>	169.05
<i>(B) Social and health outcomes:</i>						
Illness	209	1.10	2.54	208	0.66 <sup>b</sup>	1.40
Pro-social behavior	208	.36	1.15	208	1.15 <sup>c</sup>	2.17
<i>(C) Nutritional outcomes—Anthropometric indices of nutritional status:</i>						
ZAM	205	-.26	.62	202	-1.25 <sup>c</sup>	0.65
ZSF	205	-.31	.77	201	-.59 <sup>c</sup>	.77
BMI	205	23.46	2.95	202	23.49	2.37
ZWT	205	-.76	.55	202	-1.12 <sup>c</sup>	.51
ZHT	205	-1.72	.73	202	-1.81	.71

Note: <sup>a</sup>, <sup>b</sup>, and <sup>c</sup> significant at the 10%, 5%, and 1% level in *t* tests comparing the difference in mean between wives and husbands. Income is the value in *bolivianos* of monetary earnings and value of goods received in barter during the two weeks before the day of the interview. Exchange rate is 7.92 *bolivianos* = 1 US dollar. Wealth is the value of 13 modern physical assets (e.g., rifles, metal fish hooks). Expenditure is value of all expenditures made during the two weeks before the day of the interview. Illness is self-reported days bed ridden during the 2 weeks before the day of the interview. Pro-social behavior is sum of all gifts and episodes of communal work or help offered by person to people of other households during the week before the day of the interview. ZAM, ZSF, ZWT, and ZHT are age and sex-standardized *z* scores of mid-arm muscle area, sum of skinfolds, weight, and physical stature. BMI is body-mass index (kg/m<sup>2</sup>). Norms of Frisancho used to estimate *z* scores (Frisancho, 1990).

person gave gifts or helped Tsimane' in other households during the week before the day of the interview. Wives also had higher levels of self-reported illness. Nevertheless, part C suggests that wives did better than husbands in anthropometric indices of short-run nutritional status, including age and sex-standardized  $z$  scores of mid-arm muscle area (ZAM), sum of triceps and subscapular skinfolds (ZSF), and weight (ZWT). Disparities in anthropometric indicators in favor of women are not unique to the Tsimane' and have been reported for rural Ethiopia as well (Ferro-Luzzi, Morris, Taffesse, Demissie, & D'Amato, 2001; Quisumbing, 2003). We lack data on energy expenditure or objective indicators of disease to assess whether the

disparities in anthropometric indicators reflect a heavier work or illness load for men. The extensive systems of intra and inter-household sharing among Tsimane' might explain why the economic disparities between wives and husbands documented in parts A-B do not translate into disparities in anthropometric indices of nutritional status, as happens in other societies (Haddad, Hoddinott, & Alderman, 1997; Smith et al., 2003).

### Regression results

We begin by assessing the exogeneity of empowerment in nutritional status (Table 6). We first ran a regression of empowerment (dependent variable)

Table 6  
Testing the exogeneity of empowerment

Explanatory variables:	Dependent variables:			
	ZAM	Log BMI	ZAM	Log BMI
	[a]	[b]	[c]	[d]
<i>(A) Wives</i>				
Tie breaker	-.06 (.35)	-.04(.08)	^	^
Decider	^	^	.30(.42)	.02(.09)
Age	-.006 (.003) b	-.0001(.0007)	-.008 (.004) b	-.0006(.0009)
Schooling	-.03 (.03)	.00001(.007)	-.02 (.03)	-.002(.006)
Stature	.03 (.008) c	.0005(.002)	.04(.01) c	.0008(.002)
$\hat{U}$ :				
Coefficient and SE	.11 (.35)	.05(.08)	-.28(.42)	-.03(.09)
$t$ & $p$ values	.31 (.75)	.63 (.52)	.67 (.50)	.35 (.72)
Instruments:				
Mother's writing	Yes	Yes	No	No
Father's stature	No	No	Yes	Yes
$N$		203		199
<i>(B) Husbands</i>				
Tie breaker	.31(.25)	.04(.03)	^	^
Decider	^	^	.17(.17)	.04(.02)
Age	.009(.005) <sup>a</sup>	.001(.0008) <sup>a</sup>	.005(.003)	.001(.0005) <sup>b</sup>
Schooling	.04(.02) <sup>b</sup>	.009(.003) <sup>c</sup>	.03(.01) <sup>a</sup>	.008(.002) <sup>c</sup>
Stature	.04(.01) <sup>c</sup>	.002(.002)	.03(.009) <sup>c</sup>	.0009(.001)
$\hat{U}$ :				
Coefficient and SE	-.34(.25)	-.04(.03)	-.16(.17)	-.04(.02)
$t$ & $p$ values	1.35 (.18)	1.21 (.22)	.96 (.33)	1.54 (.12)
Instruments:				
Mother's writing	No	No	Yes	Yes
Father's schooling	Yes	Yes	Yes	Yes
$N$			199	

Note:  $\hat{u}$  is residual from first-stage regression; in row, we show  $t$  and, in parenthesis,  $p$  value. SE = standard errors. Same notes as in Table 3.

<sup>a</sup> $p$  significant at the 10% level.

<sup>b</sup> $p$  significant at the 5% level.

<sup>c</sup> $p$  significant at the 1% level.

against the statistically significant instrumental variables from Table 3 and the largely exogenous covariates of the two anthropometric indicators of nutritional status to obtain a predicted value for empowerment ( $\hat{u}$ ). We then used the predicted value as an explanatory variable in the regressions with the two anthropometric indicators as outcome variables. We found stronger evidence of endogeneity among husbands than wives as shown by the lower p values for  $\hat{u}$ . The evidence for endogeneity across outcomes or by the type of empowerment varied. Since we found mixed evidence for the endogeneity of empowerment, we use OLS and two-stage least squares regressions.

Table 7 contains the main regression results. The most noteworthy finding of Table 7 is that empowerment produced no large effect on anthropometric indices of short-run nutritional status. The results held up when using age and sex-standardized z score of mid-arm muscle area (columns a–b, e–f) or when using BMI (columns c–d, g–h), when using OLS regressions (columns a, c, e, and g) or when using two-stage instrumental variable regressions (columns b, d, f, and h), or when using either of the two definitions of empowerment: *tie breaker* (columns a–d) or *decider* (columns e–h).

Empowerment exerted a wisp of an effect on the nutritional status of wives or husbands. For

Table 7  
Effect of empowerment on short-run nutritional status: Ordinary-least squares (OLS) and instrumental-variable (IV) estimations, Tsimane', Bolivia, 2004

Explanatory variables	Dependent variables							
	ZAM		Log BMI		ZAM		Log BMI	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	[a]	[b]	[c]	[d]	[e]	[f]	[g]	[h]
<b>(A) Wives</b>								
Empowerment	.04	-.06	.002	-.04	.01	.30	-.005	.02
Age	(.02)	(.23)	(.006)	(.09)	(.03)	(.37)	(.007)	(.09)
	-.007 <sup>c</sup>	-.006 <sup>b</sup>	-.0004	-.0001	-.007 <sup>c</sup>	-.008 <sup>a</sup>	-.0003	-.0006
	(.002)	(.002)	(.0006)	(.0008)	(.002)	(.004)	(.0006)	(.0009)
Schooling	-.03	-.03	-.002	.00001	-.03	-.02	-.002	-.002
	(.02)	(.02)	(.006)	(.008)	(.02)	(.02)	(.006)	(.007)
Stature	.03 <sup>c</sup>	.03 <sup>c</sup>	.0004	.0005	.03 <sup>c</sup>	.04 <sup>c</sup>	.0004	.0008
	(.008)	(.009)	(.001)	(.002)	(.008)	(.01)	(.001)	(.002)
N	205	203	205	203	205	199	205	199
Instrumental variables	Na	A	Na	A	Na	B	Na	B
Definition of empowerment	Tie breaker				Decider			
<b>(B) Husbands</b>								
Empowerment	-.02	.31	-.003	.04	.009	.17	.001	.04
Age	(.02)	(.35)	(.003)	(.04)	(.02)	(.18)	(.003)	(.03)
	.003	.009	.0007 <sup>a</sup>	.005	.003	.005	.0008 <sup>b</sup>	.001 <sup>a</sup>
	(.002)	(.007)	(.0004)	(.001)	(.002)	(.003)	(.0004)	(.0007)
Schooling	.02	.04	.006 <sup>a</sup>	.009 <sup>a</sup>	.02 <sup>a</sup>	.03 <sup>a</sup>	.007 <sup>a</sup>	.008 <sup>a</sup>
	(.01)	(.03)	(.003)	(.005)	(.01)	(.01)	(.003)	(.004)
Stature	.02 <sup>c</sup>	.04 <sup>b</sup>	.0005	.002	.03 <sup>c</sup>	.03 <sup>c</sup>	.0007	.0009
	(.009)	(.02)	(.001)	(.003)	(.009)	(.01)	(.001)	(.001)
N	202	199	202	199	202	199	202	199
Instrumental variables	Na	C	Na	C	Na	A & C	Na	A & C
Over-identification test	Na				Na	.88	Na	.88
Definition of empowerment	Tie breaker				Decider			

Note: Regressions contain full set of village dummies (13–1 = 12) and constant; neither is shown. Na = not applicable. OLS = Ordinary-least squares. IV = Two-stage instrumental variable estimation. Robust standard errors used when probability of exceeding critical value in Cook-Weisberg test of heteroskedasticity <0.10. In cells we show coefficients and, in parenthesis, standard errors. Instrumental variables: A = mother's writing skills, B = father's stature, C = father's schooling. Over-identification test is p-value from a  $\chi^2$  distribution when using two instrumental variables for one endogenous regressor (Wooldridge, 2003).

instance, in part A we see that a wife who increased by one the number of areas in which she broke a tie (*tie breaker*), would experience a change in BMI of only +.2% (column c) to -4.0% (column d); a wife who increased by one the number of decisions she made in the household (*decider*), would experience a change in BMI of only - .5% (column g) to +2% (column h). Recall from the earlier discussion that the average wife broke ties (*tie breaker*) in 1.22 areas and made decisions (*decider*) in 1.05 areas, so increasing by one the number of areas in which a wife decided amounts to doubling her power to make decisions. Despite such a large increase in a wife's decision-making power, we saw an insubstantial change in her nutritional status. The analysis with husbands (part B) yields essentially the same conclusion of no large, significant effects.

We did further analyses (not shown) to test for the robustness of the main results. First, we used a narrower definition of empowerment that included the answer only to the questions about self-perceived decision-making around food acquisition and preparation. We found no significant results. Second, we used monetary income, self-reported illness, and differences in income, wealth, and in monetary expenditures between spouses as outcome variables and regressed the outcomes against either *decider* or *tie breaker* while conditioning for the person's age, schooling, physical stature, and fixed-effects of villages. Again, we found no significant results. Third, we included a quadratic term for empowerment to detect non-linearities with the two outcomes and the two different definitions of empowerment, and found evidence of both a U and an inverted U-shaped relation, so no consistent pattern emerged; in no case were results large or statistically significant. Fourth, we tested whether results varied by proximity to market town, and did separate analyses for households close and far from market towns, where close and far refer to households above or below the median village-to-town distance. We found no significant result. Fifth, we conditioned for the health status of the household head by including a variable for the total number of self-reported days ill during the two weeks before the day of the interview; adding the variable did not change the main conclusion that empowerment produces no effect on anthropometric indicators. Last, we analyzed the 22 households headed by only one person to estimate the effect of empowerment on their own nutritional status. We ran pooled OLS regressions for women and men together with

anthropometric indices as outcome variables, and included only *decider* or *tie breaker* as explanatory variables because we did not have enough degrees of freedom to estimate parameters for other variables. We found no effect.

## Conclusion

We end with a discussion of three topics: limitations of the study, possible reasons for tenuous effects, and implications for future studies of individual empowerment.

The study has at least two limitations. Nutritional status reflects individual energy expenditure and individual food consumption, neither of which we measured. If the variables bear a strong association with empowerment and with the instrumental variables, then our estimates of empowerment's effect on nutritional status would contain biases of an unknown magnitude and direction.

One can advance several explanations for the tenuous effects of empowerment on own nutritional status. Some may point to random measurement errors when spouses answered questions about who made decisions, questions that we used to create the two indices of individual empowerment. For instance, husbands and wives may have understood something different when asked who decided when to help kin. If husbands and wives provided help to kin in different ways, we would have found little agreement in their answers. Random errors measuring individual empowerment would attenuate the effect of individual empowerment on individual well-being. We acknowledge the possibility, but note that we lowered measurement error by including only cases where the wife and husband concurred on who decided or on who broke the tie, and by using instrumental variables – a standard approach to deal with poorly measured explanatory variables.

Others may be censorious about the validity of our measure of empowerment. The type of empowerment we measured, though reliable, may be too general, too crude to capture the type of empowerment that, in truth, shapes nutritional status. Nevertheless, when we used a narrower definition of empowerment linked only to decisions around food procurement and preparation we again found insubstantial effects. Perhaps our measure of empowerment captured too many activities associated with the market economy, as shown by the many questions about who decided what to buy. However, if our two variables of empowerment

centered too much on market activities, then we should have at least spotted associations between the measures of empowerment and monetary earnings or monetary expenditures—outcomes with an obvious link to the market economy—but we found a wan effect.

On a more substantive side, the tenuous effects of empowerment on own nutritional status might reflect the type of society we studied. Recall from the evidence reviewed in the introduction that most studies of empowerment's effects on well-being come from South Asia, a region with a tradition of discrimination against women. Like other foraging societies (Korotayev & Cardinale, 2003), the Tsimane' stand in sharp contrast to South Asian societies or to economically more developed societies. As noted, wives and husbands substitute with ease for each other's work, live neolocally, and enjoy social support from kin and friends they have known since childhood. Even in their myths one finds evidence of gender equality.

We end by discussing two implications for future studies of individual empowerment. First, future studies would benefit from understanding how people themselves define empowerment and how they might explain empowerment's effects. Ethnographic studies would help to identify paths and explain why and how empowerment might shape well-being (Spiegel, Watson, & Wilkinson, 2005). Second, because the idea of measuring individual empowerment only recently entered development, it remains a gaggle of inchoate ideas. Researchers have yet to agree how to define or measure empowerment, so we should find it unsurprising that individual empowerment bears a weak link to individual well-being. From this one might conclude either that individual empowerment without income, wealth, and human capital is a label without pith signifying little, or that individual empowerment enhances individual well-being, but that we have yet to develop a valid definition and a reliable way to measure empowerment. We hope our study contributes to the second option—to the meliorist idea that conditioning on resources, individual empowerment by itself might still contribute to individual well-being—but that we need a clearer definition and a better metric of empowerment, and a sharper way to assess its effects.

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### References

- Adato, M., de la Briere, B., Mindek, D., & Quisumbing, A. R. (2000). *The impact of PROGRESA on women's status and intrahousehold relations*. Washington, DC: International Food Policy Research Institute.
- Agarwal, B. (1994). *A field of one's own: Gender and land rights in south Asia*. New York: Cambridge University Press.
- Agarwal, B. (1997). 'Bargaining' and gender relations: Within and beyond the household. *Feminist Economics*, 3, 1–51.
- Ashraf, N. (2005). Spousal control and intra-household decision making: An experimental study in the Philippines. Ph.D. dissertation, Harvard University.
- Blumberg, R. L., Rakowski, C. A., Tinker, I., & Monteon, M. (2005). *Engendering wealth and well-being*. Boulder, Colorado: Westview Press.
- Brown, P. H., & Park, A. (2002). Education and poverty in rural China. *Economics of Education Review*, 21, 523–541.
- Ferro-Luzzi, A., Morris, S., Taffesse, S., Demissie, T., & D'Amato, M. (2001). *Seasonal undernutrition in rural Ethiopia*. (Rep. No. 118). Washington DC: International Food Policy Research Institute.
- Frisancho, R. A. (1990). *Anthropometric standards for the assessment of growth and nutritional status*. Ann Arbor, Michigan: University of Michigan Press.
- Godoy, R., Byron, E., Reyes-García, V., Vadez, V., Leonard, W. R., Apaza, L., et al. (2005). Income inequality and adult nutritional status: Anthropometric evidence from a pre-industrial society in the Bolivian Amazon. *Social Science & Medicine*, 61, 907–919.
- Godoy, R., Leonard, W. R., Reyes-García, V., Goodman, E., McDade, T. W., Huanca, T. et al. (2006). Physical stature of adult Tsimane' Amerindians, Bolivian Amazon in the 20th century. *Economics and Human Biology*, in press.
- Godoy, R., Reyes-García, V., Seyfried, C., Huanca, T., Leonard, W. R., McDade, T. W. et al. (2006). Spanish fluency and earnings in the Bolivian Amazon. *Economics of Education Review*, in press.
- Grasmuck, S., & Espinal, R. (2000). Market success or female autonomy? Income, ideology, and empowerment among microentrepreneurs in the Dominican Republic. *Gender & Society*, 14, 231–255.
- Haddad, L., & Hoddinott, J. (1994). Women's income and boy-girl anthropometric status in the Cote d'Ivoire. *World Development*, 22, 543–553.
- Haddad, L., Hoddinott, J., & Alderman, H. (1997). *Intrahousehold resource allocation in developing countries*. Baltimore: The Johns Hopkins University Press.
- Hindin, M. J. (2000). Women's power and anthropometric status in Zimbabwe. *Social Science & Medicine*, 51, 1517–1528.

- Holvoet, N. (2005). The impact of microfinance on decision-making agency. *Development and Change*, 36, 75–102.
- Jewkes, R. (2002). Intimate partner violence: Causes and prevention. *The Lancet*, 359, 1423–1429.
- Kabeer, N. (1999). Resource, agency, achievements. *Development and Change*, 30, 435–464.
- Kantor, P. (2003). Women's empowerment through home-based work. *Development and Change*, 34, 425–445.
- Kar, S. B., Pascual, C. A., & Chickering, K. L. (1999). Empowerment of women for health promotion. *Social Science & Medicine*, 49, 1431–1460.
- Korotayev, A. V., & Cardinale, J. (2003). Status of women, female contribution to subsistence, and monopolization of information. *Cross-Cultural Research*, 37, 87–104.
- Lambert, P. J., Millimet, D. L., & Slotte, D. (2005). Inequality aversion and the natural rate of subjective inequality. *Journal of Public Economics*, 87, 1061–1090.
- McElroy, M. (1992). The policy implications of family bargaining and marriage markets. In L. Haddad, J. Hoddinott, & H. Alderman (Eds.), *Intra-household resource allocation in developing countries* (pp. 53–74). Baltimore, MD: Johns Hopkins University Press.
- Nanda, P. (1999). Women's participation in rural credit programs in Bangladesh and their demand for formal health care? *Health Economics*, 8, 415–428.
- Narayan, D. (2002). *Empowerment and poverty reduction: A sourcebook*. Washington, DC: The World Bank.
- Pahl, J. (1983). The allocation of money and the structuring of inequality within marriage. *The Sociological Review*, 31, 237–262.
- Quisumbing, A. R. (2003). Food aid and child nutrition in rural Ethiopia. *World Development*, 31, 1309–1324.
- Quisumbing, A. R., & Maluccio, J. A. (2003). Resources at marriage and intrahousehold allocation. *Oxford Bulletin of Economics and Statistics*, 65, 283–328.
- Reyes-García, V., Godoy, R., Vadez, V., Huanca, T., & Leonard, W. R. (2006). Individual and group incentives to invest in pro-social behavior. *Journal of Anthropological Research*, in press.
- Rubalcava, L., Teruel, G., & Thomas, D. (2004). *Spending, saving and public transfers paid to women (Rep. No. 024-04)*. Los Angeles, CA: California Center for Population Research, UCLA.
- Sanderson, S. K., & Dubrow, J. (2000). Fertility decline in the modern world and in the original demographic transition. *Population and Environment*, 21, 511–537.
- Scanlan, S. J. (2004). Women, food security, and development in less-industrialized societies. *World Development*, 32, 1807–1829.
- Schuler, S. R., Hashemi, S., & Riley, A. P. (1997). The influence of women's changing roles and status in Bangladesh's fertility transition. *World Development*, 25, 563–575.
- Sen, A. (1985). Well-being, agency, and freedom. *The Journal of Philosophy*, 132, 169–221.
- Sen, A. (1990). Gender and co-operative conflict. In I. Tinker (Ed.), *Persistent inequalities* (pp. 123–149). Oxford: Oxford University Press.
- Sen, A. (1999). *Development as freedom*. New York: Oxford University Press.
- Smith, L. C., Ramakrishnan, U., Ndiaye, A., Haddad, L., & Martorell, R. (2003). *The importance of women's status for child nutrition in developing countries (Rep. No. 131)*. Washington, DC: IFPRI.
- Spiegel, A., Watson, V., & Wilkinson, P. (2005). Women, difference and urbanization patterns in Cape Town, South Africa. *Anthropology Southern Africa*, 28, 31–38.
- Stein, J. (1997). *Empowerment and women's health: Theory, methods, and practice*. London: Zed Books.
- Thomas, D. (1994). Like father, like sons: Like mother, like daughter. *The Journal of Human Resources*, 29, 950–988.
- United Nations Development Program. (2002). *Human development report 2002*. New York: Oxford University Press.
- Wooldridge, J. M. (2003). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT.
- World Bank. (1991). *Gender and poverty in India*. Washington, DC: World Bank.
- Zimmerman, M. A. (1990). Toward a theory of learned hopefulness. *Journal of Research in Personality*, 24, 71–86.