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RESEARCH REPORT 131

The Importance of Women's Status for Child Nutrition in Developing Countries

Lisa C. Smith, Usha Ramakrishnan, Aida Ndiaye, Lawrence Haddad, and Reynaldo Martorell

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE, WASHINGTON, DC
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Foreword

Many researchers in the international development field have been startled to note that although child malnutrition is rampant in both Sub-Saharan Africa and South Asia, it is much more widespread in South Asia. According to other Millennium Development Goal indicators, children in South Asia should be in better shape. What lies behind the so-called Asian Enigma? One hypothesis holds that regional differences in women's status—their power relative to men—account for much of the regional differences in children's health and nutrition. In this report, Lisa Smith and her co-authors examine data from these regions, and from Latin America and the Caribbean, to show that a mother's ability to make decisions at home and in her community not only affects the care she receives and thus her own nutritional well-being but also enables her to provide better care and nutrition for her children.

In South Asia, where women's status is particularly low, the report finds that improvements in women's power relative to men's, both within the household and in the community, strongly influence children's nutritional status. If women and men had equal status in South Asia, with all other factors held as is, the percentage of underweight children would decline from 46 to 33 percent—a reduction of 13.4 million malnourished children. The report also finds that the comparatively strong influence of women's status in South Asia takes us a long way down the path toward explaining the higher rates of child malnutrition in the region compared with Sub-Saharan Africa.

In light of the alarming fact that one out of every three children in developing countries is malnourished, IFPRI has examined the causes of child malnutrition from many different angles over the years, including the contribution of commercialized agriculture, of the distribution of food within households, of various transfer or feeding programs, of health care, and of caring practices for children and women. This report adds a strong link to that chain of knowledge.

Joachim von Braun
Director General, IFPRI

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Summary

Malnutrition affects one out of every three preschool-age children living in developing countries. This disturbing, yet preventable, state of affairs causes untold suffering and, given its wide scale, presents a major obstacle to the development process. Volumes have been written about the causes of child malnutrition and the means of reducing it. But the role of women's social status in determining their children's nutritional health has gone largely unnoticed until recently. This study explores the relationship between women's status and children's nutrition in three developing regions: South Asia, Sub-Saharan Africa, and Latin America and the Caribbean.

The study defines women's status as *women's power relative to men.* Women with low status tend to have weaker control over household resources, tighter time constraints, less access to information and health services, poorer mental health, and lower self-esteem. These factors are thought to be closely tied to women's own nutritional status and the quality of care they receive, and, in turn, to children's birth weights and the quality of care they receive.

The study sets out to answer three main questions: First, is women's status an important determinant of child nutritional status in the three study regions? Second, if so, what are the pathways through which it operates? And finally, why is South Asia's child malnutrition rate so much higher than Sub-Saharan Africa's? To answer these questions, this report brings together Demographic and Health Survey data on 117,242 children under three years of age from 36 developing countries. It uses two measures of women's status: women's decision-making power relative to that of their male partners and the degree of equality between women and men in their communities.

The empirical results leave no doubt that higher women's status has a significant, positive effect on children's nutritional status in all three regions. Further, they confirm that women's status impacts child nutrition because women with higher status have better nutritional status themselves, are better cared for, and provide higher quality care to their children. However, the strength of influence of women's status and the pathways through which it influences child nutrition differ considerably across regions.

In South Asia, increases in women's status have a strong influence on both the long- and short-term nutritional status of children, leading to reductions in both stunting and wasting. The human costs of women's lower status in the region are high. The study estimates that if women and men had equal status, the under-three child underweight rate would drop by approximately 13 percentage points, meaning 13.4 million fewer malnourished children in this age group alone. As women's status improves in the region, so does the quality of the pathways through which it influences child nutrition. The pathways identified by the study are women's nutritional status (as measured by body mass index [BMI]), prenatal and birthing care for women, complementary feeding practices for children, treatment of illness and

immunization of children, and the quality of substitute child caretakers. In Sub-Saharan Africa too, women's status and the long- and short-term nutritional status of children are linked. If women and men enjoyed equal status, child malnutrition in the region would decrease by nearly 3 percentage points—a reduction of 1.7 million malnourished children under three. The pathways to this judicious outcome are largely the same as those in South Asia, except that higher women's status improves child nutrition only for women with very little relative decisionmaking power and has no influence on treatment of child illness. Latin America and the Caribbean exhibits a different pattern from that of South Asia and Sub-Saharan Africa. Women's status has a positive effect only on children's short-term nutritional status and only in those households in which women's relative decisionmaking power is very low. Women's status has a distinctly *negative* influence on their BMI in this region, where weight gain is an emerging public health problem. The effect probably reflects the greater tendency among higher status women to "weight watch" and likely does not threaten children's nutritional status. The pathways connecting women's status and children's nutrition include prenatal and birthing care for women, feeding frequency, immunization, and quality of substitute caretakers.

Among the developing-country regions, South Asia's particularly high child malnutrition rate has remained a puzzle. South Asia trails even Sub-Saharan Africa, despite surpassing that region's record on many of the determinants of child nutritional status—national income, democracy, food supplies, health services, and education. The study indicates that three broad socioeconomic factors help explain this "Asian Enigma": women's status, sanitation, and urbanization. Women's status makes by far the greatest contribution to the regional gap in children's nutritional status. It plays this role not only because it is lower in South Asia than in Sub-Saharan Africa but mainly because its positive impact is stronger in South Asia—making its costs in terms of child malnutrition far higher in that region.

The implication of the study's empirical results is clear: in the interest of sustainably improving the nutritional status of children, women's status should be improved in all regions. Doing so is especially urgent for South Asia, followed by Sub-Saharan Africa. Accomplishing this task requires policies that eradicate gender discrimination and policies that reduce power inequalities between women and men by proactively promoting catch-up for women. Examples include enabling women to gain access to new resources, implementing cash transfer programs that promote girls' education and health care, introducing technologies that save household labor, subsidizing child care for working parents, and initiating programs to improve the nutritional status of adolescent girls and young women. In communities that resist shifts in the power balance between genders, policies can mitigate the negative effects of the imbalance, rather than addressing it directly. Targeting health services to communities where women's status is low is one example of this indirect approach. The study also warns that improving women's status can lead to reduced breastfeeding, which is harmful to child nutrition. Efforts to improve women's status, therefore, must be accompanied by efforts to protect, support, and promote breastfeeding.

This research shows unequivocally that making a decision at the policy level to improve women's status produces significant benefits. Not only does a woman's own nutritional status improve but so too does the nutritional status of her young children. Raising women's status today is a powerful force for improving the health, longevity, mental and physical capacity, and productivity of the next generation of young adults.

CHAPTER 1

Introduction

Developing-country malnutrition on its current scale—one-third of all children—causes untold human suffering. Malnutrition is associated with more than half of all child deaths worldwide (Pelletier et al. 1995). It is the source of a major waste of resources and lost productivity because children who are malnourished are less physically and intellectually productive as adults (Gillespie and Haddad 2001). Malnutrition is thus a primary obstacle to the development process itself. It is a violation of the child's human rights, yet virtually all of it can be prevented (Oshaug, Eide, and Eide 1994; Mason et al. 1999).

Table 1.1 shows substantial differences across the developing regions both in the depth of malnutrition and the number of malnourished children. The region with by far the highest number and prevalence of malnutrition is South Asia. It is home to half of all underweight children under five years old in the developing world. Sub-Saharan Africa (SSA), where roughly one child out of every three is underweight, has the second highest rate. East Asia and the Near East and North Africa follow. Latin America and the Caribbean (LAC) has the lowest rate and number of malnourished children. Volumes have been written—by researchers, field practitioners, governments, and international organizations—about the various causes of child malnutrition and ways to eliminate it. Actions identified to improve child nutrition range from general programs to boost countries' economic growth to more specific efforts such as community-based programs to support breastfeeding and national programs to increase child immunizations (Smith and Haddad 2000).

Until recently, too little attention has been paid to an obviously relevant yet little-researched question: What role does the capability and well-being of a child's caretaker, usually the mother, play in a child's health and nutrition? This is the subject of this study. Its overall goal is to understand the links between women's status—that is, women's power relative to men's within both households and communities—and child nutrition in developing countries.

Table 1.1 Prevalence and number of underweight children under five years, 1995

Region	Prevalence (%)	Number (millions)
South Asia	49.3	86.0
Sub-Saharan Africa	31.1	31.4
East Asia	22.9	38.2
Near East and North Africa	14.6	6.3
Latin America/Caribbean	9.5	5.2
All regions	31.0	167.1

Source: Smith and Haddad 2000.

The study is motivated by the "Asian Enigma" hypothesis advanced by Vulimiri Ramalingaswami, Urban Jonsson, and Jon Rohde in UNICEF's *Progress of Nations 1996*. This is the enigma: of the two regions that have the most severe malnutrition problems in the world, South Asia and SSA, South Asia's child malnutrition rate is higher than SSA's by almost 20 percentage points (Table 1.1). Yet, according to many of the long-accepted determinants of nutritional status, South Asia appears to be doing better than SSA (Table 1.2). Its per capita national income is 45 percent higher than SSA's, and the regions' poverty rates are roughly on par. South Asia's governments are more democratic than SSA's and are thus more likely to take actions to meet the basic needs of their citizens. Further, per capita food supplies are substantially higher in South Asian than in Sub-Saharan African countries. While health expenditures per capita are roughly equal, access to safe water is much higher in South Asia. Education levels, which are considered to be one of the most important determinants of child nutritional status, are much higher in South Asia. Ramalingaswami, Jonsson, and Rohde (1996) argue convincingly that income inequality, the inappropriateness of international child growth standards for Asian countries, and South Asia's higher rates of vegetarianism are not responsible for its higher malnutrition.[1]

In the face of this anomaly, Ramalingaswami, Jonsson, and Rohde write, "The exceptionally high rates of malnutrition in South Asia are rooted deep in the soil of inequality between men and women" (1996, 16). They argue that the reason for the Asian Enigma, the difference in malnutrition rates between South Asia and SSA, is the extremely low status of women relative to men in South Asia, compared with that in SSA. Such low status is thought to compromise women's own health, the subsequent birth weight of their children, and the quality of care their children receive.

Regional statistics based on national data substantiate that women's status relative to men's is lower in South Asia than in SSA. When indicators of status are compared in Table 1.3, it is evident that gender inequalities favor men across the regions. Data for LAC and for Norway—the country in which women are considered to have

Table 1.2 Comparison of progress made by South Asia and Sub-Saharan Africa in some determinants of child nutritional status

Determinant	South Asia	Sub-Saharan Africa
Per capita national income (GDP)[a]	2,280.00	1,640.00
Poverty (%)[b]	43.10	39.10
Democracy index (1–7, 1=lowest)[c]	4.10	2.44
Per capita dietary energy supply (kilocalories/day)[c]	2,356.00	2,136.00
Access to safe water (%)[c]	79.70	48.80
Health expenditures per capita[d]	85.90	82.70
Gross school enrollment ratio[e]	53.00	42.00

[a] Gross domestic product (GDP) in purchasing power parity U.S. dollars, 1999 (UNDP 2001).
[b] Ravallion and Chen 1997.
[c] Smith and Haddad 2000.
[d] In purchasing power parity U.S. dollars (World Bank 2001b).
[e] UNDP 2001.

[1]While many studies support the consensus that the widely employed U.S.-based growth standards are applicable to all populations, their applicability to Asian populations is still under debate (see Klasen 2002).

Table 1.3 Inequalities between women and men and women's health, 1990s

Item	South Asia	Sub-Saharan Africa	Latin America/ Caribbean	Norway
Gender inequality				
Female-to-male life expectancy ratio[a]	1.02	1.04	1.10	1.07
Female adult literacy rate as a percentage of male literacy rate[b]	65.00	77.00	98.00	≥99.00
Female share of the labor force (%)[c]	33.30	42.20	34.60	46.30
Female share of earned income (%)[d]	23.90	35.60	26.10	41.00
Female parliamentarians (%)[e]	5.00	10.00	13.00	39.00
Women's health				
Maternal mortality (number per 100,000 live births)[f]	815.00	980.00	180.00	6.00
Underweight women (%)[g]	49.80	11.50	5.13	—
Iron deficiency anemia (%)[h]	60.00	40.00	—	—

[a] Based on female and male life expectancy data reported in World Bank (2001b).
[b] UNDP 2001. The estimate for Norway is based on numbers given for Eastern Europe and the Commonwealth of Independent States (99 percent).
[c] World Bank 2001b.
[d] UNDP 1996.
[e] United Nations 2000.
[f] UNDP 1996 and UNICEF 1996.
[g] Calculated from the data used in this report.
[h] Ramalingaswami, Jonsson, and Rohde 1996.

the highest status in the world (UNDP 2001)—are included for reference. Ratios of female-to-male life expectancy and literacy are lower in South Asia, one indication that lower value is placed on women's well-being and human capital than on men's there, compared with SSA. Moreover, women's shares of the labor force and earned income are much lower in South Asia than in SSA, an indication that women, relative to men, have less control over economic resources in South Asia. Finally, at the national level, differences in political power between women and men are far higher in South Asia than in SSA. But it should be noted that women's status relative to men's is generally very low in both regions, compared with LAC and Norway.

Regional statistics further substantiate that it is in the regions with the largest inequalities between women and men that women's health is the poorest and that child nutritional status is the poorest. While SSA's maternal mortality rate is slightly higher than South Asia's, the percentage of underweight women in South Asia is more than four times higher than that of SSA (Table 1.3). And 60 percent of women in South Asia have iron deficiency anemia, compared with 40 percent in SSA.

The most immediate manifestation of these differences is an extremely large disparity in the regions' incidences of low birth weight babies. While the proportion of newborns with low birth weight is one-third in India and one-half in Bangladesh, for example, it is estimated to be only one-sixth in SSA. Low birth weight is the best single predictor of malnutrition, since it is associated with poor growth in infancy and throughout childhood (Ramalingaswami,

Jonsson, and Rohde 1996). It is not surprising, then, that South Asia's child underweight rate is higher than SSA's.

While descriptive statistics and studies using national-level data support the Asian Enigma hypothesis (for example, Smith and Haddad 2000), it is at the *household* level that the human behaviors that reflect women's status and affect child nutrition actually occur. Analysis of data on individual women, their husbands or partners, and their children is needed for an in-depth understanding of the means through which women's status influences child nutrition. To date, no empirical research has yet linked women's status and child nutritional status on a cross-regional basis using household-level data to clarify whether women's status affects the nutritional status of children and the specific pathways through which it does so.

To fill this gap, this study employs 36 nationally representative data sets collected under the auspices of the Demographic and Health Surveys program (DHS). The DHS data sets contain information on child nutritional status, women's nutritional status, caring practices for women (including prenatal and birthing care), and caring practices for children (including feeding practices and health-seeking behaviors). In addition, they contain data that can be used to construct household- and community-level indicators of women's status. They are collected in each country using nearly identical survey instruments and data collection methodologies. This provides a unique opportunity to use household-level data for a cross-regional comparative investigation of the links between women's status and child nutrition. The regions included in the study are South Asia, SSA, and LAC. The two other developing regions, East Asia and the Near East and North Africa, are not included because there are too few data sets containing child nutrition data. The study sets out to answer three main questions:

1. Is women's status a statistically significant and functionally important determinant of the nutritional status of children in the three regions?
2. If so, what are the pathways through which improved status operates?
3. What explains the so-called Asian Enigma?

Chapter 2 lays out the conceptual framework for the study, including the definition of women's status employed and a review of the literature on the links between women's status and child nutrition. Chapter 3 describes the data, measures, and methodologies employed. The next three chapters present the main empirical results on the impact of women's status. Chapter 4 focuses on child nutritional status, Chapter 5 on women's nutritional status and the quality of care women receive, and Chapter 6 on the quality of care of children. Chapter 7 draws on the empirical results to help explain the Asian Enigma. Finally, Chapter 8 summarizes the main findings, considers their implications for policy to improve child nutrition, and discusses policy options for improving women's status.

CHAPTER 2

Conceptual Framework

In this chapter, women's status is defined and the conceptual links between women's status and children's nutritional status are discussed with an emphasis on women's nutritional status and the quality of care for women and children.

Definition of Women's Status

No consensus has been reached on a single definition of the widely employed term "women's status." It has been associated with women's autonomy, power, empowerment, authority, valuation, and "position" in society, and also simply with women's well-being. Sometimes these components are considered in an absolute sense and sometimes relative to men. Women's status is sometimes referred to as gender inequality or gender equality. Scholars of women's status classify the concept as being "nonunitary," "multidimensional,"[2] and "multilevel," rendering it impossible to develop a consensus on its definition (Mason 1986, 1993; Sen and Batliwala 2000; Pasternak, Ember, and Ember 1997). This failure to define it is not an obstacle to understanding the impacts of women's status, but it makes it especially important to clearly specify what is meant each time it is used. The following definition is used throughout this study: "Women's status is women's power relative to men's in the households, communities, and nations in which they live."

Three aspects of this definition are important to note. First, women's status is considered to be *relative* to men's rather than absolute or relative to other women's. The definition thus implicitly incorporates the idea of gender inequality argued by Ramalingaswami, Jonsson, and Rohde (1996) to be so harmful to children's nutritional status.

Second, it is founded on the concept of *power*. Simply put, power is the ability to make choices. It is the ability of a person or group of people to define goals and pursue them, even in the face of opposition from others. Power is exercised through decisionmaking and can take the form of actual decisions taken on one's own or taken jointly with another person through a process of bargaining and negotiation. It can also take the form of deception and manipulation, subversion and resistance, violence, coercion, threat, or even "nondecisionmaking," in

[2]Examples of sets of dimensions used to describe women's status or related terms are knowledge autonomy, decisionmaking autonomy, physical autonomy, emotional autonomy, and economic and social autonomy (Jejeebhoy 2000); sexual, reproductive, physical mobility, economic access, or control over resources (Sen and Batliwala 2000); health, education, employment, domestic life, political representation, and legal equality (Mohiuddin 1996).

which a person or group accepts the status quo as given without reflection or allows others to make a decision for them (Kabeer 1999; Riley 1997; Safilios-Rothschild 1982; Sen 1990).[3]

A person's control over resources, including economic, human, and social resources, enhances her or his ability to exercise choice. Examples of economic resources are income, time, productive inputs, financial assets, and food. Examples of human resources are education, skills, and knowledge. Membership in groups and access to kin and other social networks are examples of social resources (or "social capital") (Quisumbing and Maluccio 2003; Kabeer 1999; Sen and Batliwala 2000). The definition of women's status thus addresses inequalities in the ability of women and men to make choices, which may be reflected in inequality in control over resources.

Third, the definition has an *intrahousehold* dimension and an *extrahousehold* dimension. Women experience differences in their power relative to men not only within households but also in the communities and nations in which they live. Customs and norms based in deeply held beliefs, values, and attitudes often dictate differential roles, acceptable behaviors, rights, privileges, and life options for women and men (Safilios-Rothschild 1982; World Bank 2001a; Agarwal 1997; Kishor 1999; Kevane 2000; Sen and Batliwala 2000; England 2000). For example, women and men may face different incentives or obstacles to engage in any employment at all or in certain types of employment, as well as different rewards and benefits from employment. Women may garner less respect than men and face greater risk of assault, or be treated as intellectually inferior to men when they come into contact with people, groups, and institutions outside of their homes. They may find that health services for female-specific needs, such as gynecological or maternity needs, are not available. More fundamentally, norms and customs governing social behavior mean that some alternatives are not even considered in the domain of choice for women. They are not conceived to be within the realm of possibility. These differences between women and men as social groups are rooted in unequal power relations between them (Kabeer 1999; Riley 1997; Sen and Batliwala 2000; Barosso and Jacobson 2000).

Because of extrahousehold differences in women's and men's power, *regardless of their power relative to their husbands,* women may face more obstacles to attaining their goals and aspirations than men. Not taking into account the broader institutional context in which women and men operate may lead one to overlook important pathways through which women's status influences outcomes (Mason 1986, 1993; Safilios-Rothschild 1982; Sen and Batliwala 2000).

While the differential power of women and men outside of their households is not necessarily correlated with their differential power within households, the former influences the latter. As noted above, customs and norms determine who has "voice" in decisions, that is, who participates and thus influences them at all (Agarwal 1997; Katz 1997). Customs and norms set limits on the circumstances under which bargaining can be engaged in, for example, norms may call for silent acquiescence of women when men display anger (Kevane 2000). They also set the terms of the "outside options" of women and men and thus their ability to negotiate with their husbands. For example, if a woman has no better alternative than to stay with her husband in order to secure her livelihood because of discriminatory labor policies or the lack of enforced laws against

[3]Some scholars view "status" and "power" as distinct concepts. Sen and Batliwala, for instance, wrote "Status connotes levels within a hierarchy, while power implies the relationships (among the different levels of a hierarchy) which themselves govern status" (2000, 17). This distinction is not made here.

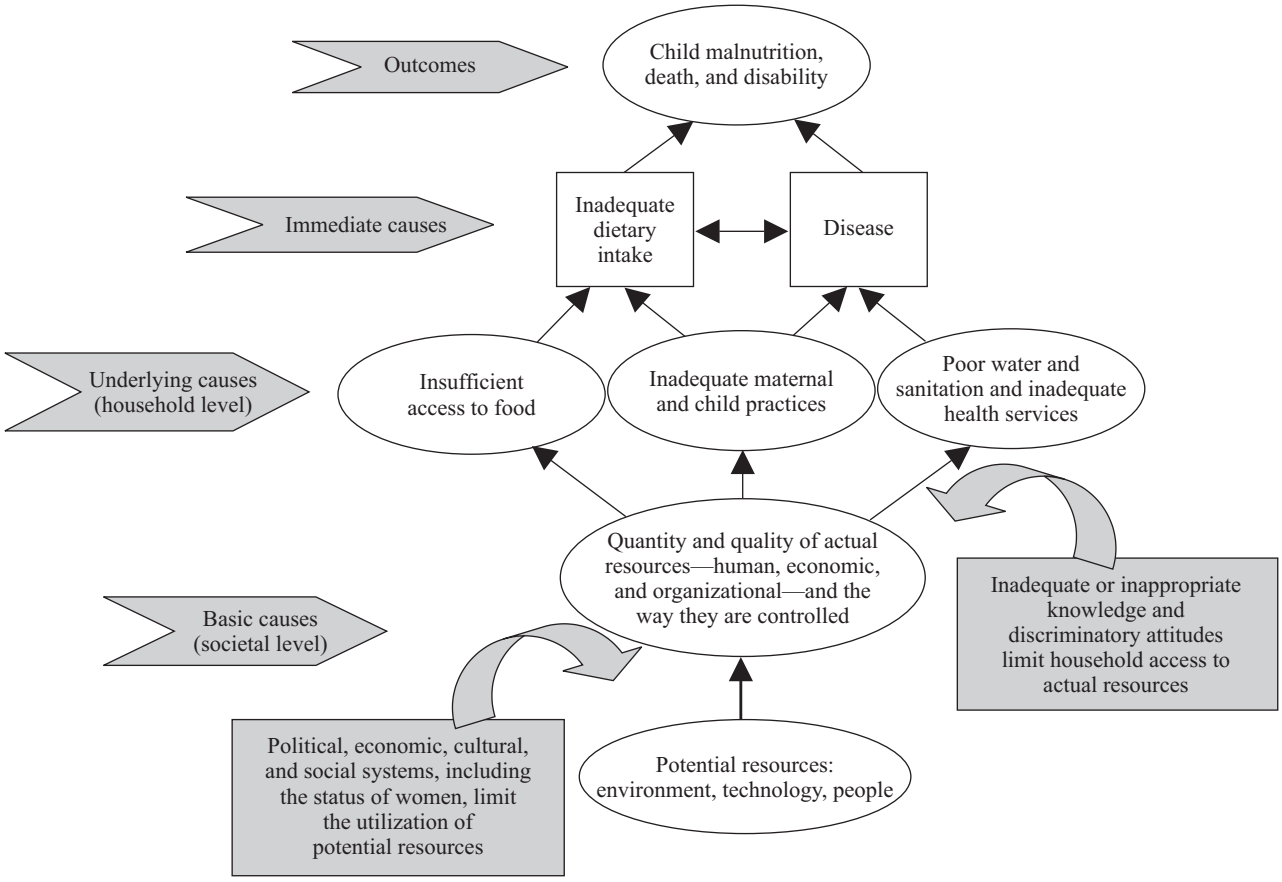
domestic violence, then she will not find it in her interest to disagree with him in the case of conflict (McElroy and Horney 1981; Haddad, Hoddinott, and Alderman 1997; Katz 1997; England 2000). National and state divorce laws, of course, also affect women's options for a viable livelihood outside of marriage (Hoddinott and Adam 1998).

The Causes of Child Malnutrition

The United Nations Children's Fund's conceptual framework for the causes of child malnutrition, death, and disability (UNICEF 1998) lays out the immediate (most proximate), underlying, and basic (most distant) causes of child malnutrition (Figure 2.1). The two immediate causes are inadequate dietary intake and disease. Children can become malnourished either because they do not eat sufficient food of the appropriate form or quality or because they are sick. Illness depresses a child's appetite and inhibits the absorption of nutrients. It also diverts nutrients away from contributing to a child's growth and toward fighting the illness.

The underlying causes of malnutrition, which manifest themselves at the household level, are food insecurity, inadequate maternal and child care practices, and poor health environments and services. Food security is access to sufficient food for an active and healthy life for all household members

Figure 2.1 The causes of child malnutrition, death, and disability



Source: UNICEF 1998.

(Maxwell and Frankenberger 1992). Important components of a proper health environment are sanitary toilet facilities and safe drinking water. Health services should include those for preventive and curative health care, prenatal care, birthing care, and family planning.

"Care" is defined as "the provision in households and communities of time, attention, and support to meet the physical, mental, and social needs of the growing child and other household members" (ICN 1992). Although the actual amount of food ingested by a child is closely related to food security, it is critically dependent on the care-related feeding behaviors of the child's caretaker, such as breastfeeding, complementary feeding, and food preparation. Similarly, a child's health is linked to the health environment in which the child lives, but ultimately it is dependent on the caregiver's use of facilities and services to optimize the child's health (Ramakrishnan 1995). The ability of caretakers, usually their mothers, to provide care to children ultimately rests upon the quality of the care they themselves receive.

Finally, the basic causes of child malnutrition manifest themselves at the societal level. They are the potential and actual resources available—environmental, technological, and human—and how they are controlled.

In this framework, women's status, as defined, can be considered both an underlying and a basic cause of child malnutrition. Its effects are pervasive, ultimately manifesting themselves at the household level and potentially influencing children's nutritional status via food security, maternal and child care, and health environment and services.

The Links between Women's Status and Child Nutritional Status

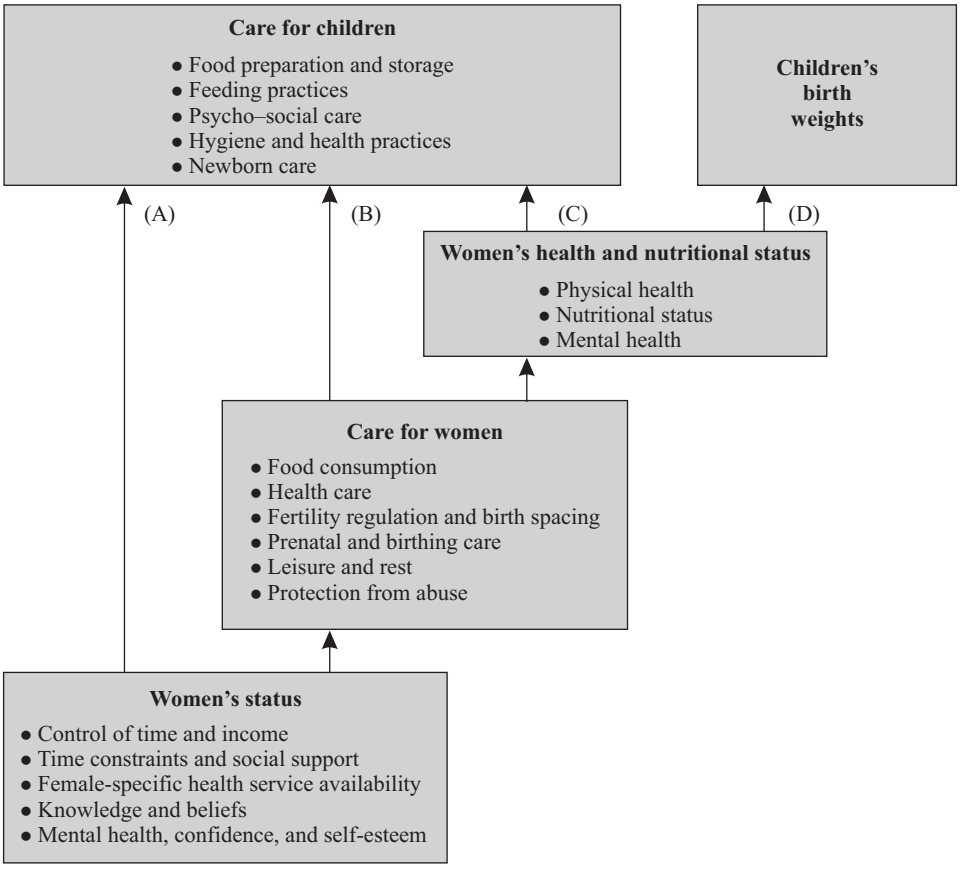
In this section the relationship between women's status and child nutritional status are discussed with special emphasis on care for children and children's birth weights. The reader should keep in mind that in many countries women play a major role in maintaining household food security (Quisumbing et al. 1995) and household health environments (Hoddinott 1997). The influence of status on the ability of women to fulfill their roles in these areas is not addressed in this study due to lack of data. It remains an important area for future research.

Figure 2.2 delineates the major pathways through which women's status influences care for children and children's birth weights. Five caring practices for children are crucial for their nutritional well-being: food preparation and storage, feeding practices, psychosocial care, hygiene and home health practices (Engle, Menon, and Haddad 1999), and newborn care. Foods entering the household must be stored in a hygienic manner and prepared in special ways so that children can eat them. Appropriate food must be offered to the child with correct timing and frequency. The child must receive adequate psychosocial care, including affection and warmth, responsiveness, and the encouragement of autonomy and exploration. The child's environment must be clean to protect him or her from disease. Finally, the child must receive appropriate care in the critical first 28 days of life, including support during labor and delivery and throughout the neonatal period by health workers trained in newborn care.[4]

Critical areas of care for women include adequate quality and quantity of food, care

[4]Neonatal deaths represent an increasing proportion of infant deaths in developing countries, with causes including infections, birth asphyxia, birth injuries, congenital anomalies, and prematurity (WHO 1993, 1996, 2000; Stoll 2000). Several studies have demonstrated the importance of newborn care for improving child health and nutrition (Villar and Bergsjo 1997; Hodnet 2000; Langer et al. 1998; Bang et al. 1999).

Figure 2.2 Women's status, care for children, and children's birth weights



Source: Adapted from Engle, Menon, and Haddad 1999.

to prevent and treat illness, support for sufficient fertility regulation and birth spacing, care during pregnancy and lactation, safe prenatal and birthing care, sufficient time for rest and leisure (important for stress management), and protection from physical and emotional abuse (Engle 1999).

As laid out in Figure 2.2, women's status affects the quality of care for children in a direct manner (arrow A), but also indirectly through the quality of the care women themselves receive (arrow B). Finally, via the medium of women's own health and nutritional status, the care women receive influences both the quality of care for children (arrow C) and their birth weights (arrow D). Each of these linkages is discussed next.

Direct Links between Women's Status and Care for Women and Children

In most societies, it is women who are the caregivers for young children and bear the primary responsibility for their health and survival. They are also the primary caregivers for themselves. Yet women with low status relative to men tend to have little control over household time and income, face tough time constraints, have little social support to relieve those constraints, have little knowledge or inappropriate beliefs, and have poor mental health, low self-confidence, and low self-esteem. Moreover, women living in communities where less value is placed on women's well-being than men's may find that reproductive health

services for women are unavailable. These circumstances make it difficult to undertake the caring practices that are in their children's best interests. They also hamper women's ability to provide adequate care for themselves, further undermining their ability to give adequate care to their children.

Consider, first, women's *control over resources within households.* Simply put, the greater a woman's control over household economic resources, including the use of her own time, the more effective her care for herself and her children will be. Besides the obvious benefit of having more resources to allocate, control over resources gives her the ability to weigh the costs and benefits of alternative uses of resources so that they are employed in the most efficient manner (Smith 1995). To give some examples, the more control a woman has over her own time and household income, the more likely she is to make a timely decision to treat her sick child after discovering an illness. She is more likely to make use of health services and follow through with treatment recommendations, or to have the child immunized. She may be more likely to obtain a special food for a child, prepare it, and feed it to the child at an appropriate frequency and with the degree of patience required. She may also be more likely to make use of health services for her own care during illness, for ongoing gynecological care, and for prenatal and birthing care. *Purdah* (female seclusion), a custom practiced in many South Asian societies, is an extreme case of women being unable to make decisions over the use of their own time, especially how to spend it (Engle, Menon, and Haddad 1999; Mason 1993; Caldwell and Caldwell 1993; Kishor 2000; Defo 1997).

Under certain circumstances differences in relative power and thus control over resources within households do not matter in terms of care given to women and children. Sometimes men and women act as one because they have identical preferences. In this situation, household resources are not controlled individually but are pooled. In this case, we would expect to find that women's status has no behavior-related impact on the nutritional status of children. The economic model underlying this state of affairs—the unitary household model—has been empirically rejected with sufficient frequency and regularity to lead us to expect an impact of women's status on child nutritional status. Numerous studies have demonstrated that income or assets accruing to women or believed to be controlled by women are more likely than those of men to be allocated to expenditures that benefit children (for example, education), as well as themselves, such as food, clothing, and health care (Haddad, Hoddinott, and Alderman 1997; Thomas 1997; Quisumbing and Maluccio 2003).[5]

For the interested reader, Appendix A presents two nonunitary economic models of household decisionmaking to illustrate the role that women's decisionmaking power (relative to men's) plays in influencing children's nutritional status via care for

[5]Further empirical evidence can be found in Doss (1997), Kishor (2000), Obermeyer (1993), and Miles-Doan and Brewster (1998). Doss (1997) finds that the percentage of household assets "held" by women in rural Ghana has a significant and positive effect on the probability that children 0–7 years old receive any vaccinations. Kishor (2000), using a number of indicators of women's empowerment, found that several dimensions of women's status (participation in the modern sector, lifetime exposure to employment, family structure amenable to empowerment, equality in marriage, and marital advantage) are important determinants of whether 12–23-month-old children in Egypt receive the recommended vaccinations. While acknowledging that the complexity of the issue means that further research must be undertaken, Obermeyer (1993) found some evidence that women with higher status are more likely to have prenatal care and to give birth in a medical facility. Miles-Doan and Brewster (1998) used measures of different types of employment to examine the use of prenatal care services by women in the Philippines. They concluded that "work-related autonomy" encourages women to exercise control with respect to their own health.

women and children. This role depends on whether household members undertake decisions jointly and resources are pooled, or whether decisions are taken unilaterally and resources are controlled individually. In the first case a woman's relative decisionmaking power directly affects the degree of influence the woman has over the allocation of her time and her husband's time to caring activities and the allocation of household income to care-related goods and services. Her control over resources is a function of her influence in joint decisionmaking. When decisions are taken unilaterally, relative power influences caring practices indirectly by affecting the distribution of resource control in the household, that is, *who* controls which portions of household time and income. The two models underscore the underlying role of preference differences between women and men in determining household resource allocation and control. In both cases if the woman cares more about child nutrition than her partner, then a balance of power in favor of the man mitigates against child nutrition. If no preference differences exist, the models collapse to the unitary household model. In this situation, even large power inequalities will make no difference for outcomes like child nutrition (Smith 1995).

Consider next the issue of *women's time constraints.* The lower a women's status the more time-constrained she is likely to be, reducing the time she can devote to providing high quality care to herself and her children. Fundamentally, this is a consequence of the low value placed on women's caring activities and leisure time, and it is related to women's multiple productive and reproductive responsibilities. In addition to childcare, women are normally responsible for a wide variety of time-consuming domestic activities, such as water and fuelwood gathering as well as income-generating activities, whereas men are generally responsible only for income-generating activities. This means that women face tight trade-offs in their time allocation. Men are not normally a source of substitute childcare and women may find it difficult to obtain such care from other women, thus being forced to resort to using their older children as caretakers of younger children. Yet having a competent adult caretaker is critical to a child's nutrition and health, especially in the first year of life (Engle, Menon, and Haddad 1999; Hobcraft 2000).

Turning to *women's knowledge and beliefs*, women with low status are often restricted in their mobility and therefore are less likely to go outside of their households and engage in social interactions with people outside of their family. They are thus less likely to be exposed to new health and nutrition knowledge. They are also less likely to call into question culturally based beliefs that are deleterious to children's nutritional status, such as inappropriate food taboos for children and the association of protein-energy malnutrition with the influence of spirits rather than insufficient food consumption. In short, the lower a women's status, the less likely she is to acquire and assimilate the information she needs to best care for herself and her children (McGuire and Popkin 1990; Engle, Menon, and Haddad 1999; Defo 1997; Riley 1997; Kishor 2000).

With regard to *women's mental health, confidence, and self-esteem,* the lower a woman's status, the more dependent she is on her husband, the more likely she is to experience physical violence and disrespect and the more socialized she is to accept her inferior state. The message a woman receives from repeated interactions with others in her household and community is that she is of lower value than men. All of these factors can lead to poor mental health, including depression[6] and anxiety, low self-

[6]Although there is a large literature linking maternal depression and stress with poor caregiving in developed countries, few studies have been conducted in developing countries. Research does show high levels of depression among women in developing countries (Engle, Menon, and Haddad 1999).

esteem, a lack of confidence in one's abilities and self-efficacy (Engle, Menon, and Haddad 1999), and, as shown by Hoddinott and Adam (1998), even suicide. Under these circumstances, a woman may also be less willing to adopt new practices, less likely to respond to new information, and less likely to make timely, independent decisions regarding health care treatment or to insist proactively that a sick or anorectic child eats. The level of confidence of the caregiver is thought to be a particularly critical factor for successful complementary feeding (Engle, Menon, and Haddad 1999). Women with low status may face difficulty in even *perceiving* the need for their own health care, much less garnering the confidence to act on that need (Chaterjee 1988, cited in Sen and Batliwala 2000; England 2000).

Finally, with respect to the *availability of reproductive health services* for women, including services for fertility regulation, ongoing gynecological care, and prenatal and birthing care, in communities where women's status is low, these services may not be available at all. Sen and Batliwala write "The control of women's and girls' sexuality and reproduction is at the core of unequal gender relations and is central to the denial of equality and self-determination of women" (2000, 24). These services may be lacking both because governments place low priority on them and because there is a lack of demand for them. The failure to provide such services is a manifestation of women's lack of reproductive and sexual rights and the lower power of women relative to men as social groups. Silence about the widespread pain and suffering women bear as a result helps to maintain this state of affairs, which often results in maternal death (Adamson 1996).

Care for women has an important indirect effect on care for children through the means of reproductive health (arrow B in Figure 2.2). Women of low status are believed to have a higher total fertility rate than women of high status.[7] And their children are more closely spaced. Caring for a large number of children reduces the quality of care a woman can provide to each new child. Evidence that the survival chances of children are greater when births are well spaced throughout a woman's reproductive life is abundant (Engle, Menon, and Haddad 1999; Defo 1997; Hobcraft 2000; Riley 1997).

Indirect Links between Women's Status, Care of Children, and Birth Weights

The lower the quality of care a woman receives, the more likely she is to be malnourished, sick, or injured as the result of violence. Such a woman, in turn, generally has a low energy level, making her less responsive to her child's needs and impairing her ability to carry out essential tasks necessary for proper childcare (arrow C in Fig-

[7]In addition to restricted access to services for fertility regulation, there are several potential reasons for this. First, in societies in which women have low status, early marriage is often used as a way to control their sexuality. The earlier a woman marries, the earlier she is likely to begin childbearing. Second, inequality in favor of males in families channels the rewards of children disproportionately to men and the costs of rearing them to women, thus encouraging high fertility. Third, women's economic dependency on men leads to a high preference for sons, for risk insurance and old age security. This preference leads to a desire for more pregnancies to increase the number of sons. Fourth, women with low status are less motivated to limit fertility because they tend to be more dependent on the maternal role for legitimacy, security, and satisfaction. Fifth, women with lower status have less access to modern knowledge and modes of action and hence lower propensity to engage in innovative behavior, including fertility limitation within marriage. Finally, where there is more social equality and emotional intimacy between husbands and wives, wives' health and well-being receive higher priority in fertility decisionmaking and the effectiveness of contraceptive use is increased. Mason (1993) reviewed the evidence. Recent empirical studies examining the relationship between women's status and contraceptive use or women's status and fertility are Kishor (1999) and Ergocmen (1997).

ure 2.2). For example, a woman who is malnourished may be less capable of breastfeeding successfully (Ramalingaswami, Jonsson, and Rohde 1996; Engle, Menon, and Haddad 1999). Micronutrient deficiencies, especially iron deficiencies, cause fatigue and may affect women's cognitive performance and therefore their ability to adequately care for a young child (Beard 2001). Violence toward women in their homes is widespread; emotional and psychological abuses are even more common. While little research has been conducted on the links between such abuse and child nutrition, it can go so far as to leave a woman incapacitated and unable to care for a child without aid (Engle, Menon, and Haddad 1999). Finally, a women who spends a significant part of her life pregnant or lactating or both may have considerably depleted nutrient reserves, leading to poor growth of her children (Martorell and Merchant 1992; Engle, Menon, and Haddad 1999; Defo 1997).

With regard to children's birth weights, women's health and nutrition during pregnancy affects children's nutritional status in two ways. First, malnourished women tend to give birth to low birth-weight infants due to intrauterine growth retardation (WHO 1995). In turn, low birth-weight infants tend to remain underweight as children, despite partial catch-up with their adequate birth-weight peers (Martorell et al. 1998; WHO 1995). Second, recent evidence suggests that maternal micronutrient malnutrition, for example, deficiencies of iron, vitamin A, and iodine, may be associated with prenatal or postnatal growth retardation in children (Ramakrishnan et al. 1999).

Potential Negative Effects of Improved Women's Status

The effects of improvements in women's status on the nutritional status of children may not all be positive, however.

Women with higher status are more likely to enter the labor force, which may reduce the time they spend in childcare. They may, for example, breastfeed less and spend less time playing with their children, yet both of these activities are important for children's psychosocial development. A substitute caretaker may not provide as high quality of care for a child as the child's own mother would (Leslie 1998; McGuire and Popkin 1990; Hobcraft 2000).

An increase in women's status may also raise the potential for increased domestic or social conflict. When a group of people has had a monopoly on power for a long time and finds this power taken away or shared with another group, it can feel threatened. Increased conflict and tension both within and outside of households may arise. The increased conflict in a household can ultimately lead to its dissolution, which can lower the quality of care given to young children in many ways. Outside the household a change in power relations can set off a backlash from men, resulting in increased physical or psychological abuse of women, which is also detrimental to the quality of care for children (Riley 1997; Adato et al. 2000; Hobcraft 2000; Isvan 1991; Sen and Batliwala 2000).

Empirical Evidence

The body of multivariate empirical evidence regarding the impact of women's status on children's and women's health and nutritional status is surprisingly slim. The few studies that exist are either cross-country or single-country studies. They support a net positive association.

With respect to child nutritional status, Smith and Haddad (2000), using cross-country data from 63 developing countries during 1970–96, found that women's status has a negative effect on the percentage of children who are underweight. The measure of women's status employed is a ratio of female-to-male life expectancy. Thomas (1997) used household- and individual-level data from Brazil to demonstrate that income accruing to women has a statistically significant and larger positive impact

on child nutritional status than income accruing to men.

Both Caldwell (1986, cited in Mason 1993) and Dyson and Moore (1983) found evidence that women's autonomy promotes child survival by comparing settings in which such autonomy is known to vary. Caldwell compared Muslim populations, in which seclusion of women is common, and non-Muslim populations. Dyson and Moore compared the states of India, in particular the north where kinship structure is very patriarchal, to the east and south. More recently, Kishor (1995, 2000) used a variety of measures of women's "empowerment" to show that women's status is positively associated with child survival in Egypt.

With respect to women's health, Williamson and Boehmer (1997), using data from 40–97 developing countries, found that a number of proxy indicators of women's status are positively related to female life expectancy at birth. Using data from 79 developing countries and similar proxy indicators, Shen and Williamson (1999) found that women's status is a strong predictor of maternal mortality. In a country-level study, Defo (1997) find a positive relationship between several proxy measures of women's status and women's illness postpartum.[8]

Conclusion

This chapter has provided the conceptual basis on which the rest of the study is founded. Women's status is defined as women's power relative to men's. Because a woman can have a strong influence over decisions within her household but still not be highly valued in the community or society in which she lives (and vice versa), the definition encompasses relative power both inside and outside of households. Women's status influences child nutrition through three major pathways: food security, caring practices for women and children, and health environment quality. This study focuses on only one of the pathways: caring practices for women and children. The nature and extent of these practices ultimately affect children's nutritional status by influencing the quality of care children receive and their birth weights. The next chapter describes the data and methods used in the empirical analysis.

[8]Note that the studies cited in this paragraph suffer from statistical problems (in particular endogeneity problems) that make the results difficult to interpret.

CHAPTER 3

Data, Measures, and Methods

This chapter describes the data employed in the study, lists the dependent variables and their measures, and explains the construction of the measures of women's status. Finally, it presents the estimation strategy.

The Data

This study uses data from 36 Demographic and Health Surveys (DHS)[9] conducted between 1990 and 1998 in the three regions of focus: South Asia, Sub-Saharan Africa (SSA), and Latin America and the Caribbean (LAC). The countries and years of data collection are listed in Table 3.1. The study countries cover 97 percent of the population of South Asia, 61 percent of the population of SSA, and 55 percent of the population of LAC.[10] The data sets were chosen based on the availability of data on child nutritional status. Two regions, East Asia and the Near East and North Africa (NENA), were excluded because not enough data sets were available to give adequate regional representation.

The DHS data sets are from nationally representative surveys of households with at least one woman of reproductive age, usually between 15 to 49 years.[11] The data were collected by various in-country research and statistical agencies with technical assistance from Macro International, Inc., and major funding from the United States Agency for International Development. Because the survey instruments and data collection methodologies were similar, the data collected are largely comparable across countries.

All eligible women in each selected household were surveyed. In some cases, only women who were currently or ever married were considered eligible. The surveys were based on two-stage sample designs. In the first stage, enumeration units or "clusters" were selected from larger regional units within countries. Next households were randomly selected within clusters.[12] Detailed information on the women, their male partner if they had one, and their children under either three or five years old was gathered.

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[9]More information about the DHS program can be found at www.measure.dhs.com.

[10]The source of population data and country compositions of the regions is World Bank 2001b.

[11]The only exception among the countries included in this study is Bangladesh (10–49 years).

[12]For some countries, some regions of the country were excluded due to practical constraints (for example, Nigeria and Uganda). Note also that in a few cases the samples were selected using a three-stage sample design. For example, in Tanzania the selection of the clusters was undertaken in a two-stage process (with clusters being selected from among wards) and then the households were selected in a third stage. For details of sample designs for the DHS surveys, see Macro International, Inc., 1996.

Table 3.1 Description of data sets employed and study sample sizes

Region/country	Year of collection	DHS[a] phase	Number of children	Number of women/partners	Number of households	Number of clusters
South Asia						
Bangladesh	1997	3	2,767	2,633	2,547	312
India	1998	3	24,360	22,149	17,466	4,689
Nepal	1996	3	3,692	3,349	3,125	253
Pakistan	1991	2	2,497	2,203	2,062	380
Total			33,316	30,334	25,200	5,634
Sub-Saharan Africa						
Benin	1996	3	2,199	2,043	1,747	199
Burkina Faso	1993	2	2,398	2,283	1,955	226
Cameroon	1998	3	1,391	1,253	1,147	199
Central African Republic	1995	3	1,921	1,716	1,572	229
Chad	1996	3	3,235	2,958	2,669	247
Comoros	1996	3	841	729	716	98
Côte d'Ivoire	1994	3	2,504	2,297	1,969	245
Ghana	1998	3	1,495	1,391	1,341	381
Kenya	1998	3	2,410	2,129	2,084	512
Madagascar	1997	3	2,328	2,095	2,081	264
Malawi	1992	2	1,827	1,638	1,602	222
Mali	1996	3	4,355	3,980	3,590	299
Mozambique	1997	3	2,500	2,345	2,208	378
Namibia	1992	2	948	858	784	159
Niger	1997	3	3,683	3,367	2,893	267
Nigeria	1990	2	3,294	2,965	2,674	297
Rwanda	1992	2	2,285	2,085	2,079	197
Senegal	1997	3	2,205	2,007	1,514	250
Tanzania	1996	3	2,692	2,459	2,358	346
Togo	1998	3	3,218	3,010	2,604	280
Uganda	1995	3	3,032	2,625	2,526	290
Zambia	1996	3	2,988	2,655	2,562	311
Zimbabwe	1994	3	1,753	1,627	1,554	229
Total			55,502	50,515	46,229	6,125
Latin America/Caribbean						
Bolivia	1997	3	3,230	2,814	2,781	777
Brazil	1996	3	2,004	1,793	1,778	682
Colombia	1995	3	2,254	1,979	1,961	778
Dominican Republic	1996	3	1,856	1,595	1,583	380
Guatemala	1995	3	4,816	4,052	3,930	406
Haiti	1995	3	1,370	1,201	1,161	163
Nicaragua	1998	3	3,205	2,818	2,709	573
Paraguay	1990	2	1,925	1,551	1,522	258
Peru	1996	3	7,764	6,915	6,780	420
Total			28,424	24,718	24,205	5,437
Total from all three regions			117,242	105,567	95,634	17,196

[a] The data from the Demographic and Health Surveys (DHS) were collected two slightly different questionnaire designs. DHS phase 2 refers to the questionnaire used from 1988 to 1993.

The sample of children for this report was chosen based on the need for quality data on (1) child nutritional status, that is, data on the age, weights, and heights of children; (2) the indicators of women's status; and (3) other independent variables, including household sociodemographic characteristics and the characteristics of women and

their partners. The sample was selected in several steps. First, only children under three years old were included because this is the only age group common to all of the data sets.[13] Second, all children with missing weight or height data or with data considered to be implausible according to DHS standards were excluded.[14] Third, all children not living with their mother were excluded because it was felt that, for these children, the information on caring practices reported by their mother would not be of sufficient accuracy. Fourth, the children of all women who were not currently married were excluded. This was necessary for the construction of one of the main measures of women's status, which compares women to their husbands on a number of characteristics (see below). Fifth, all children of women with missing data for any of the independent variables controlled for in the regression analysis, including the variables used to construct the women's status measures, were excluded.[15] Finally, a data cleaning process was undertaken, after which some additional cases were excluded.[16] Of the original 151,313 children surveyed, 22.3 percent were excluded from the study sample.[17]

The sample analyzed for this report includes 117,242 children under three years of age and 105,567 women, usually their mothers. The sample children include only those who live in two-parent households. The sample women include only those who are married and have at least one child younger than three years old who living with them. The country-specific sample sizes range from a low of 841 children (729 women) for Comoros to a high of 24,360 children (22,149 women) for India. Note that India makes up 73 percent of the South Asian sample.

Dependent Variables and Their Measures

Table 3.2 lists the 25 dependent variables examined in the study. The first six are measures of child nutritional status, the main variable of focus. A child's height-for-age Z-score (*haz*) is a long-term measure of her or his nutritional status. It reflects linear growth achieved both in utero and during early childhood. A child is classified as "stunted" if her or his *haz* is below –2 standard deviations from the median of the National Center for Health Statistics/World Health Organization international growth reference (WHO 1995). A stunted child has suffered from long-term inadequate nutrition or poor health. A child's weight-for-height Z-score (*whz*) is a shorter term measure of nutritional status that is

[13]Of the 36 countries, 19 collected anthropometry data for 0- to 5-year-olds, 1 collected data for 0- to 4-year-olds, and 16 collected data for 0- to 3-year olds.

[14]Any weight-for-age or height-for-age Z-score that is greater than +6 or less than –6 is considered to be implausible. The plausible range for weight-for-height Z-scores is –4 to +6.

[15]For some of these variables (men's ages and education, economic status, household age-sex composition, use of well water, and use of a flush toilet), first order regressions (Haddad et al. 1995) were undertaken to replace missing values. If more than two variables were estimated using first order regressions, then the case was dropped.

[16]For all dependent variables, leverage versus residuals plots (StataCorp 2001) were employed to detect influential observations with high errors. For the anthropometry data, all height-for-age and weight-for-height Z-scores falling outside of region-specific WHO exclusion ranges (WHO 1995) were considered data entry or reporting errors and dropped.

[17]The number (percentage) of cases excluded for each reason are as follows: missing or implausible weight or height data according to DHS survey data analysts: 19,678 (13 percent); child not living with mother: 208 (0.14 percent); child's mother unmarried: 11,096 (7.3 percent); missing independent variable: 1,824 (1.21 percent); anthropometric Z-score outside of WHO exclusion range: 1,580 (1.04 percent).

Table 3.2 Dependent variables of the study

Variable	Type
Child nutritional status	
Child's height-for-age Z-score	Continuous
Whether child is stunted	Dichotomous
Child's weight-for-age Z-score	Continuous
Whether child is wasted	Dichotomous
Child's weight-for-age Z-score	Continuous
Whether child is underweight	Dichotomous
Proximal determinants of child nutritional status	
Woman's nutritional status	
Woman's body mass index	Continuous
Whether woman is underweight	Dichotomous
Whether woman is overweight	Dichotomous
Prenatal and birthing care for woman	
Whether woman received any prenatal care	Dichotomous
Whether woman with any prenatal care had at least three visits	Dichotomous
Number of months before birth at which woman had first prenatal visit (for women with any prenatal care)	Continuous
Whether woman gave birth in a medical facility	Dichotomous
Child feeding practices	
Breastfeeding	
Whether breastfeeding was initiated within one day of birth	Dichotomous
Whether child 0–4 months is exclusively breastfed	Dichotomous
Whether child 0–4 months did not receive anything from a bottle (last 24 hours)	Dichotomous
Duration of breastfeeding (months)	Continuous
Complementary feeding	
Whether child 6–12 months has received complementary foods	Dichotomous
Whether child >6 months received a high-quality food in the past 24 hours	Dichotomous
Number of times child >6 months received anything to eat in the past 24 hours	Continuous
Health of and health-seeking behaviors for children	
Whether child had diarrhea, fever, or cough in the past two weeks	Dichotomous
Whether child with diarrhea was treated	Dichotomous
Whether child has ever been vaccinated	Dichotomous
Whether child received recommended vaccinations for his or her age	Dichotomous
Caretaker of child	
Whether child has adult caretaker while woman works	Dichotomous

sensitive to recent and severe events leading to a substantial weight loss, usually as a consequence of acute shortage of food or severe disease or both. A child is considered "wasted" if *whz* is below –2 standard deviations from the international reference. Finally, a child's weight-for-age Z-score (*waz*), the most commonly used measure of child nutritional status, is a summary measure of height-for-age and weight-for-height. A child is considered to be "underweight" if *waz* is less than –2 standard deviations from the international reference (ACC/SCN 2000).

The other dependent variables are measures of some of the key determinants of child nutritional status discussed in Chapter 2. They include (1) women's nutritional status; (2) prenatal and birthing care for women; (3) child feeding practices, including breastfeeding and complementary feeding; (4) health-seeking behaviors for children; and (5) the quality of a child's caretaker.

To distinguish them from the broader "socioeconomic" determinants (child, woman, and household characteristics) that are employed as independent variables in the regression analyses in the next three chapters, these factors will be referred to as "proximal" determinants. The proximal determinants are closely associated with the biological functionings of children and their mothers. The selection of the variables was based on relevance to the study's research question as well as data availability. They are described in detail in Chapters 5 and 6.

Measures of Women's Status

Two measures of women's status are used, one to capture relative power within the household and the other, relative power outside of the household. The first is women's decisionmaking power relative to their male partners, which is measured at the household level.[18] The second is women's power relative to men as manifested in the degree of equality between females and males in communities. The latter is termed "societal gender equality." Each measure is based on a number of indicators that are combined into an index using factor analysis. The indicators are chosen based on their conceptual relevance, their applicability across diverse cultures, and their availability for all of the countries in the study. Four countries from the Near East and North Africa (NENA) region, Egypt, Morocco, Turkey, and Yemen, are included in the construction of the indexes in order to capture as much of the variation in women's status across the developing world as possible. Additionally, women with children older than three years but younger than five are included. The sample for the creation of the women's status measures thus includes 133,555 women from 40 countries.

Women's Relative Decisionmaking Power in Households

Before presenting the indicators of women's relative decisionmaking power within households that will be employed, we first set the context by giving some background on indicators in current usage. According to Kishor (2000), such indicators can be of three types: (1) those that give direct evidence of such power; (2) those that are sources of power; and (3) those that characterize the *setting* of power. All three are important in measuring women's relative decisionmaking power, with the first capturing the end product and (2) and (3) capturing the process leading to the outcome.

"Direct evidence" indicators come from data collected through detailed surveys of the nature of decisionmaking in households, including control over resources, women's autonomy, and women's and men's attitudes on gender roles and acceptable behaviors. For example, Kishor (1999, 2000) used data from Egypt's 1995 DHS collected in a special women's status module to construct an index of women's participation in household decisionmaking. The index uses data on who in the household has the final say in decisions over visits to friends and family, the household budget, having another child, contraception, children's education and medicine, and food cooked. Other direct measures employed are women's freedom of movement, participation in decisions regarding their marriage, and attitudes toward wife beating. Similarly, Mason and Smith (1999), in a study of five Asian countries,

[18]Six percent of sample women share the same household, following the DHS survey sample design. Thus, the measure of relative decisionmaking power is actually at the "couple" level rather than the household level. Nevertheless, for expositional purposes, we treat each pair (wife and husband) as an individual household.

constructed indexes of economic and fertility decisionmaking using survey data on a woman's control over and involvement in a number of decisions such as purchases and work outside of the home as well as how many children to have and women's freedom of movement. For recent examples from SSA (Uganda) and LAC (Mexico), see Adato et al. (2000) and Wolff, Blanc, and Gage (2000). Yount (1999) and Kabeer (1999) review other studies.

"Source" indicators of power are indicators of the "building blocks" of power, which are knowledge and advantage in access to or control of resources. Examples of such indicators are education, employment, media exposure, earnings, and asset ownership. This is the approach typically followed by economists, who use data from household surveys to construct measures of income and assets attributable in some way to women and men as proxies of their bargaining power. Because the indicators are used in analyses of the impact of relative bargaining power on various outcomes (for example, expenditure patterns), a primary concern is with ensuring that the measure is exogenous to the household decisionmaking process. Proxies such as actual income earned or assets owned are not considered useable. Examples of those that are considered useable include resources brought to the marriage, resources of the families of the spouses, inherited assets, and welfare receipts (Quisumbing and Maluccio 2003; Thomas, Frankenberg, and Sikoki 1999; Agarwal 1997). Source indicators are not direct evidence of power because people may not use their knowledge and resources to achieve their goals.

Finally, "setting" indicators refer to the circumstances in which women and their partners find themselves that are a constant of their environment or that they were exposed to at different times in their lives. Examples of setting indicators are customs and norms regarding marriage (for example, dowry, levirate, co-residence with in-laws), the literacy and education of spouses' parents, age differences between spouses, education differences between spouses, and the degree of spousal communication (Kishor 2000).

Most data sets used in this study do not contain variables giving direct evidence of power. Therefore the study employs source and setting indicators of women's decisionmaking power relative to their partners. In keeping with the multidimensionality of the concept of women's status, four indicators, one for employment, one for marriage, and two for human capital (education and experience) are used. These are

1. whether the woman works for cash income (*workcash*),
2. the woman's age at first marriage (*agemar*),
3. the percent difference in the woman's and her partner's age (*agedif*), and
4. the difference in the woman's and her partner's years of education (*educdif*).

Indicators (1) and (2) are source indicators, while (3) and (4) are setting indicators. Each is constructed such that a higher value is associated with greater decisionmaking power of a woman relative to her partner. A brief description of the indicators and the conceptual basis for choosing them is provided. Table 3.3 compares them across the 40 countries and four regions.

Whether the woman works for cash income. This indicator is equal to one if the woman states that she works to increase the resources available to the household and receives cash for that work; it is zero otherwise. While the actual question asked varies across surveys, it typically takes the form of the following sequence (Kishor and Neitzel 1996): "Aside from your own housework, are you currently working?" If the answer is no, the woman is then asked, "As you know, some women take up jobs for which they are paid in cash or kind. Others sell things, have a small business, or work on the family farm or in the family business. Are you currently doing any of these things

Table 3.3 Means of indicators of women's decisionmaking power relative to men's, by region and country

Region/country	Number of cases	Whether woman works for cash (yes = 1)	Woman's age at first marriage (years)	Age difference of woman and partner (%)	Education difference of of woman and partner (years)
All women	133,555	0.316	17.7	–17.78	–1.516
South Asia	32,438	0.154	17.1	–17.98	–2.451
Sub-Saharan Africa	55,937	0.464	17.3	–22.83	–1.325
Latin America/Caribbean	33,042	0.290	18.8	–11.82	–0.774
Near East and North Africa[a]	12,138	0.145	18.5	–10.19	–1.923
Bangladesh	3,769	0.200	14.3	–26.39	–1.164
India	22,418	0.165	17.6	–17.40	–2.476
Nepal	3,363	0.071	16.2	–13.26	–3.167
Pakistan	2,888	0.107	17.9	–16.97	–3.105
Benin	2,057	0.848	17.8	–21.81	–1.465
Burkina Faso	2,907	0.541	17.2	–28.39	–0.255
Cameroon	1,270	0.720	16.9	–25.03	–1.338
Central African Republic	1,737	0.699	16.7	–17.66	–2.611
Chad	3,676	0.420	15.9	–25.74	–1.601
Comoros	736	0.280	18.1	–22.91	–0.667
Côte d'Ivoire	2,316	0.388	17.4	–27.54	–1.847
Ghana	1,402	0.708	18.7	–19.35	–2.565
Kenya	2,173	0.404	18.5	–19.67	–1.278
Madagascar	2,120	0.451	17.7	–15.22	–0.625
Malawi	2,019	0.257	17.2	–19.07	–2.667
Mali	4,030	0.384	16.0	–28.49	–0.776
Mozambique	2,377	0.085	17.0	–19.01	–1.481
Namibia	1,106	0.277	21.1	–18.64	–0.057
Niger	3,404	0.396	15.2	–26.60	–0.254
Nigeria	3,705	0.499	16.9	–28.74	–1.269
Rwanda	2,595	0.602	19.6	–13.50	0.679
Senegal	2,463	0.449	16.5	–31.97	–0.513
Tanzania	3,070	0.511	17.7	–20.77	–0.903
Togo	3,037	0.677	18.1	–21.18	–2.176
Uganda	2,908	0.339	17.0	–18.70	–2.357
Zambia	3,190	0.405	17.1	–18.93	–2.212
Zimbabwe	1,639	0.408	18.4	–22.43	–1.084
Bolivia	2,844	0.319	19.5	–8.58	–1.614
Brazil	2,683	0.359	19.6	–11.42	0.482
Colombia	2,759	0.327	19.8	–12.58	–0.076
Dominican Republic	2,180	0.272	17.9	–16.25	–0.314
Guatemala	5,064	0.182	17.5	–10.73	–0.910
Haiti	1,564	0.416	19.7	–15.67	–1.235
Nicaragua	4,063	0.245	17.1	–12.53	–0.051
Paraguay	2,040	0.233	19.6	–13.51	–0.407
Peru	9,845	0.321	19.2	–10.98	–1.401
Egypt	5,116	0.132	18.6	–18.57	–1.879
Morocco	3,070	0.112	18.9	–18.26	–1.250
Turkey	2,390	0.277	18.9	22.38	–2.077
Yemen	1,562	0.045	16.5	–16.74	–3.151

Note: The means are unweighted.

[a]The four countries in this region are included in this study only for the purposes of constructing the women's status indexes.

or any other work?" Women who say no to both questions are considered not employed. Women saying yes to either are asked whether they earn cash for the work. Roughly one-third of women in the sample work for cash. The proportion is lowest for NENA, followed closely by South Asia. It is highest for SSA. Note that because the large majority of men work for cash, this indicator essentially captures women's cash earnings relative to men's cash earnings.[19]

Contributing cash income to a household's budget is thought to be a source of increased decisionmaking power of women relative to their partners for a number of reasons. First, it can increase a woman's perceived contribution to her household's economic status. Second, employment is at the root of women's economic independence from men. If such employment is not in a family business, it increases a woman's fall-back position, giving her greater bargaining power. Her control over income may be enhanced either through her own earnings or a greater influence over the allocation of total household income, depending on her household's decisionmaking mode. It is thought that these benefits are enhanced if the woman works for cash. Additional benefits if the woman works outside of her home are increased social contact, which provides a source of social capital outside of the immediate family or kinship group, exposure to knowledge and new norms of behavior, enhanced capability, and a clearer perception of individuality and well-being, all of which may enhance a woman's power relative to her partner (Sen 1990; England 2000; Riley 1997; Kishor 1999, 2000).[20]

Woman's age at first marriage. Column 3 of Table 3.3 reports the mean age at first marriage of women in the study countries. Across the four regions, the mean is lowest for South Asia, at 17.1 years, followed closely by SSA. Women in LAC and NENA tend to marry more than a year later.

Across the world women usually begin married life sooner than men. The average age at first marriage in Western Europe is estimated to be 27 for women and 30 for men. Differences are much larger in developing countries; for example, the difference in South Asia is estimated to be five years and that in SSA (excluding Southern Africa), six years (United Nations 2000). At its foundation, age at marriage is directly linked to women's power, because early marriage is a strategy used by older generations to control the sexuality of unmarried females (Mason 1993). From a practical standpoint early marriage is thought to perpetuate the weaker decisionmaking power of women than men in households. The earlier a woman marries the less likely she is to have an opportunity to develop an income-earning career, to create support networks beyond her family, or to complete schooling. This is partially because of the de-

[19]It is not possible to compute an exact number for the percentage of women's partners who work for cash from the DHS survey data. However, 99 percent of them do work and, given information on their occupations, we estimate that at a minimum, 80 percent of them work for cash. This is a conservative estimate based on the assumption that only 50 percent of men who work in self-employed agricultural occupations receive cash for that work.

[20]There is a long-standing debate over whether women who work outside of their home in very patriarchal cultures, for example, those practicing *purdah*, actually gain power from doing so. Much of this debate surrounds the use of the same terms, for example, "status" or "prestige," to mean different things. For example, women in many South Asian areas may be looked down on if they work outside of the home because it is considered a sign of poverty, since most only do so out of dire economic need (Mason 1986; Sathar and Kazi 1990; Safilios-Rothschild 1982). Many studies have shown that even in the most patriarchal of cultures, women who work eventually gain greater power despite initial resistance (Agarwal 1997, Kishor 2000; Simmons, Mita, and Koenig 1992).

mands of childbearing, which start soon after marriage (Riley 1997; Kishor 1999). Men's ages at first marriage are not reported in the DHS surveys so it is not possible to construct a relative measure of this indicator.

Percent difference in the woman's and her partner's age. The country means for this variable are given in Table 3.3, column 4.[21] The percent difference (rather than the difference itself) controls for the age of the woman's partner, so that the same difference (say, three years) is given a higher value the lower the man's age, basically giving this factor more importance for younger couples. All regions and almost all countries have a negative mean difference, with the average woman in the sample being about 18 percent younger than her partner. Unlike the other indicators, the region with the lowest percent difference is SSA, followed by South Asia. The region with the highest is NENA. This indicator is included because wives are believed to have a disadvantage in their ability to exercise power when their husbands are much older than they are (Balk 1997, cited in Yount 1999; Jejeebhoy 1991; Kishor 1999).

Difference in the woman's and her partner's years of education. This indicator is measured as the simple difference between the woman's and her partner's years of education.[22] The difference is negative for all regions, with the average woman having 1.5 fewer years of education than her partner. South Asia is the region where the education gap is greatest; it is smallest in LAC (Table 3.3, column 5). Education confers many benefits that are potential sources of power, including increased opportunities for employment and increased knowledge and skills, enabling more educated people to better understand, interpret, and operate within their environments (Kishor and Neitzel 1996; Kishor 1999). Education also tends to increase social contacts outside of the home.

Factor analysis is employed to combine the four indicators into an index.[23] This "data reduction" technique reduces a set of

[21]Use of the age difference as a percent of the mean of the woman's and man's ages as well as the difference as a percent of the woman's age were also considered. In all cases the difference as a percent of the man's age did better in validation analysis.

[22]In constructing this measure, a substantial number of cases (26.7 percent) were found where the difference in years of education is zero because both the woman and her husband have zero years of education. The validation analysis reported in Appendix B revealed a weak association between *educdif* and direct measures of relative decisionmaking power, contrary to expectations, when these cases were included. It is hypothesized that the double zero cases actually represent situations where poverty limits all children from attending school, regardless of their gender (either because incomes are low, schools are nonexistent, or both) rather than gender disparities in decisionmaking power. We therefore adjusted *educdif* by predicting the double zero cases using a regression of *educdif* on the three other indicators and various other household characteristics as independent variables. As expected, the mean of the adjusted measure dropped considerably from the original (–2.15 compared with –1.51).

[23]The main technique used in this report to test the influence of women's status on child nutritional status is regression analysis. In the regression analysis, we chose to use indexes to represent women's status, rather than the actual indicators because the latter (while serving the purpose of controlling for women's status in identifying the impact of other variables) would not identify the impact of women's status. This is because the indicators on their own can have effects on child nutritional status that cannot be attributed to women's status (see Filmer and Pritchett 1998 for a discussion of this issue in the context of measuring wealth effects). For example, women who work for cash may breastfeed less, thereby reducing their children's nutritional status. Similarly, women who are married early may have more children, thereby depleting their own nutritional reserves and harming the nutritional status of their children. As the factor analysis index employed is based only on the shared variance of the indicators, we can be sure that the effect of women's status is identified rather than the effects of other influences such as these.

observed variables that are hypothesized to be related to one another to a smaller number of unobserved, more fundamental constructs called "factors." It does so by detecting structure in the relationships among the observed variables as represented by their correlation matrix. For each identified factor, the analysis produces "loadings," one for each variable, which are estimated drawing only on the shared variance of the variables. They are the correlation between the observed variables and the factor. If, after examining the loadings, the hypothesis is borne out, then new variables (indexes, or "factor scores") that are linear combinations of the observed variables are estimated, based on the loadings. Note that the original observed variables are standardized before analysis so that their ranges and variations do not affect their index coefficients. The coefficients apply to the variables in their standardized form (Sharma 1996).[24]

We hypothesize that the four indicators described above are all positively associated with the underlying construct "women's relative decisionmaking power" and that the intercorrelations among them are due to this commonality. Table 3.4 gives their correlation matrix. All statistically significant correlations are positive. The strongest correlations are between *agemar* and *agedif* (0.29) and between *agemar* and *educdif* (0.17). *Workcash* has significant correlations with *agemar* and *educdif,* but no correlation with *agedif.* The correlation between *agedif* and *educdif* is significant but practically zero. While these correlations are not strong, they are adequate for performing a factor analysis.[25]

Table 3.5 contains the factor analysis output. Of the four factors identified, only the first two capture sufficient variance to be retained (Panel A).[26] The first factor accounts for 33.7 percent of the total variance of the four indicators; the second accounts

Table 3.4 Correlation matrix for indicators of women's relative decisionmaking power

	Whether woman works for cash	Woman's age at first marriage	Percent age difference between woman and partner	Education difference between woman and partner
Whether woman works for cash	1			
Woman's age at first marriage	0.0619***	1		
Percent age difference between woman and partner	–0.0015	0.2855***	1	
Education difference between woman and partner	0.0688***	0.1681***	0.0062**	1

Note: The number of cases is 133,555; ** significant at the 5 percent level; *** significant at the 1 percent level.

[24]Additional information on factor analysis can be found online; see Tucker and MacCallum 1997 and Statsoft, Inc., 2002.

[25]The Kaiser-Meyer-Olkin measure of sampling adequacy, a measure of the homogeneity of a set of variables, is 0.5, which just passes the "acceptability" criteria (≥ 0.50) (Sharma 1996). This statistic was calculated using SPSS (version 11).

[26]The factor analysis was conducted in STATA (version SE/7.0) using the default "principal factors" (pf) option. Unlike other options, such as principal-component factors (not to be confused with principal components analysis), for which eigenvalues only take on positive values, the pf option reports eigenvalues both less than and greater than zero. The usual "eigenvalue greater than one" rule for retaining factors does not apply. Instead, eigenvalues greater than zero are retained (StataCorp 2001).

Table 3.5 Index of women's relative decisionmaking power: Factor analysis output

Panel A	Factor	Eigenvalue	
	1	0.4367	
	2	0.0856	
	3	–0.0460	
	4	–0.2396	
	Factor loadings		
Panel B	**1**	**2**	**Communality**
Whether woman works for cash	0.1028	0.1669	0.0384
Woman's age at first marriage	0.4756	–0.0042	0.2262
Percent age difference of woman and partner	0.3881	–0.1474	0.1724
Education difference of woman and partner	0.2218	0.1896	0.0851
	Scoring coefficients		
Panel C	**Factor 1**		
Whether woman works for cash	0.0701		
Woman's age at first marriage	0.3645		
Age difference of woman and partner	0.2832		
Education difference of woman and partner	0.1540		

for 26 percent.[27] Panel B of the table shows the factor loadings. The loadings of all four indicators are positive for the first factor. This, then, is the factor that was chosen to represent women's relative decisionmaking power. The second factor has positive loadings for *workcash and educdif* but negative loadings for the other indicators. The communalities reported in Panel B represent the proportion of variance of each indicator that is shared with the others.

The index coefficients assigned to the indicators are reported in Panel C. The decisionmaking index (*dm_index*) is calculated as follows:

$$dm_index = 0.0701 * workcash + 0.3645 * agemar + 0.2832 * agedif + 0.1540 * educdif, \quad (1)$$

where the values of the indicators are standardized values. Accordingly, *agemar* is given the greatest weight, followed by *agedif, educdif,* and lastly *workcash.* The final index is placed on a 0–100 scale for ease of interpretation in the regression analysis of the following chapters.[28] The

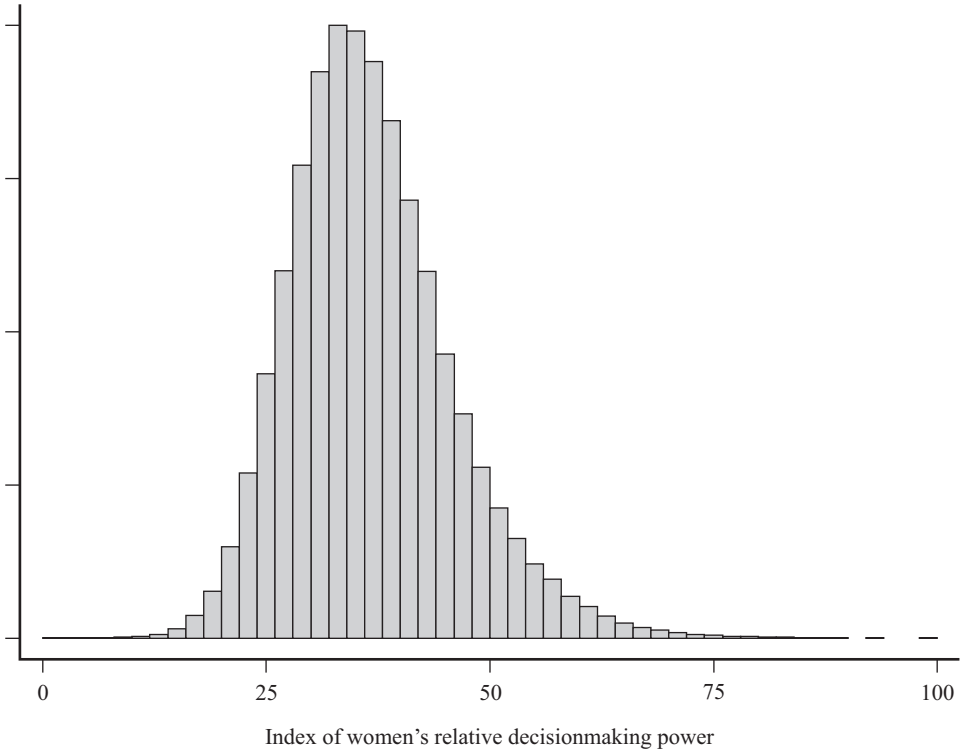
[27]The variance percentages reported by the "principal factors" option can be negative or greater than one, that is, they are not true percentages. Those reported here are generated by the "principal-component factors" option, which reports true percentages. While the two options use somewhat different methods, the resulting indexes of women's decisionmaking power estimated by each are for all practical purposes identical (correlation coefficient = 0.9965).

[28]Factor analysis was chosen after experimenting with three other methods. First is an index based on "absolute cutoffs" in which women are assigned points (either –1, 0, or +1) for achieving specified levels of each indicator and then summing the points to construct the index. This method has the advantage of being straightforward in the exact way it combines the indicators. Its disadvantages are that it assigns equal weight to each indicator, does not take into account their interrelations, and is based on cutoffs that may not be widely agreed upon as meaningful. Second is a method in which the women are divided into equal-sized groups along each indicator and then assigned points. Based on population proportions, this method relies on the variation in the sample, rather than cutoffs, to separate women into distinct groups. It has the same advantages and disadvantages as the cutoffs method. Third is principal components analysis, which yields an index almost identical to the factor analysis index. Note that the factor analysis index performs far better than those based on the first two methods when subjected to validation analysis.

shape of its probability distribution is normal, as shown in Figure 3.1. The distribution is quite narrow, with the large majority of observations falling in between the 25th and 75th percentiles. The sample mean is 36.7. Descriptive statistics by region and country will be presented in the next chapter. Note that the index value for Norway, which is used as a reference level of women's decisionmaking power relative to men in this study, is 59.2.[29]

In order to convincingly test the hypothesis that women's decisionmaking power relative to their husbands', as measured by the index constructed here, affects child nutritional status, the index must be associated with some measure known for sure to affect women's relative decisionmaking power. In other words, the index has to be validated. Appendix B undertakes a validation analysis in which the "known for sure" variables, or "validation variables," give *direct evidence* of such decisionmaking power. For the countries for which these variables are available, the validation analysis shows that all four of the indicators used to construct *dm_index* as well as the index itself are significantly and positively associated with the validation variables. The index is quite strongly associated with them, and the indicators are ranked in strength of association as follows: *agemar* (strongest), *agedif*, *educdif* (roughly equal strengths), *workcash* (weakest).

Figure 3.1 Distribution of index of women's relative decisionmaking power



[29]This number is calculated using standardized values of the indicators, with the following (unstandardized) values: *workcash* = 0.68; *agemar* = 29; *agedif* = –0.065 (based on the difference in women's and men's ages at marriage, 29 versus 31); *educdif* = 0 (based on the following statistics on the female percent of the student body: primary (48), secondary (49) and tertiary (54) [United Nations 2000]).

Societal Gender Equality

The indicators used to construct the index of societal gender equality are all measured at the community (cluster) level. They are

1. the difference in age-adjusted weight-for-age Z-scores of girls and boys under five years (*wazdif*),
2. the difference in age-adjusted vaccination score of girls and boys under five (*vacdif*), and
3. the difference in years of education of adult women and men (*educdifc*).[30]

Age adjustments for indicators (1) and (2) are carried out in order to render the outcomes (*wazdif* and *vacdif*) comparable across children in different age groups. They are conducted by subtracting from each child's value a one-year-old equivalent adjustment factor.[31] The difference in the weight-for-age Z-score of girls and boys under five is a mea-sure of the differential nutritional status of boys and girls in a community. Note that for this indicator it is important not to interpret an absolute difference greater than zero as indicating favoritism toward girls because at young ages boys are more vulnerable to illness than girls for biological, rather than behavioral, reasons (Agnihotri 1999). The vaccination score is an indicator of the percentage of recommended vaccinations each child has received, given her or his age. The difference in it across the boys and girls in a community indicates differential quality of care by gender. The last indicator mea-sures differences in investment in the human capital of females and males. Evidence of nutritional status, care, and human capital investment differences in favor of males indicates that they are valued more than females in a community.

Table 3.6 compares the indicators across regions and countries. As for the indicators of women's relative decision-making power, South Asia is the region with the values most skewed against females. The difference in weight-for-age Z-scores, the difference in vaccination scores for boys and girls, and the female-male differences in schooling are all lowest in South Asia. Table 3.7 shows the correlation matrix for the indicators. While none of them are highly correlated, all correlations are positive and statistically significant.[32]

Table 3.8 contains the factor analysis output. Of the three factors identified only the first is retained (Panel A). This factor has positive loadings on all three indicators and thus can be used as the basis for the index of societal gender equality (*ge_index*). The index is calculated as follows:

$$\begin{aligned} ge_index &= 0.1703 * wazdif \\ &+ 0.2059 * vacdif \\ &+ 0.1743 * educdifc, \end{aligned} \tag{2}$$

where the values of the indicators are standardized values. The indicators are given roughly equal weights. After rescaling the index to a range of 0 to 100, the sample

[30]The percentage of female children out of the total under five was also experimented with but dropped as it was found to not correlate with the other measures and to not make any difference for the index of societal gender equality.

[31]This adjustment is necessary because the average age of girls and boys in a cluster is not necessarily the same. Yet children's weight-for-age Z-scores vary systematically by age (falling off precipitously during the first year before leveling out). Vaccination scores also vary systematically by age, with the percent of recommended vaccinations a child receives increasing with age.

[32]The Kaiser–Meyer–Olkin measure for homogeneity among the indicators is 0.523, just above the acceptability cutoff.

Table 3.6 Means of indicators of societal gender equality, by region and country

Region/country	Number of cases	Girl–boy weight-for-age Z-score difference (Z-scores)	Girl–boy vaccination score difference (points)	Male–female adult education difference (years)
All women	17,371	0.055	–0.886	–1.483
South Asia	4,106	–0.029	–2.622	–2.397
Sub-Saharan Africa	6,151	0.095	–0.214	–1.455
Latin America/Caribbean	5,674	0.080	–0.214	–0.699
Near East and North Africa[a]	1,440	0.022	–1.457	–2.084
Bangladesh	313	–0.057	–3.522	–1.221
India	3,150	–0.032	–2.330	–2.367
Nepal	253	–0.070	–3.053	–3.149
Pakistan	390	0.046	–3.972	–3.092
Benin	199	0.168	–0.939	–1.571
Burkina Faso	229	0.075	0.546	–0.364
Cameroon	199	0.124	–0.175	–1.355
Central African Republic	229	0.102	0.545	–2.620
Chad	247	0.025	–1.856	–1.808
Comoros	98	0.091	0.702	–0.558
Côte d'Ivoire	245	0.176	–1.494	–2.016
Ghana	381	0.060	0.941	–2.681
Kenya	514	0.110	–0.427	–1.279
Madagascar	264	0.167	–0.189	–0.585
Malawi	225	0.150	–0.063	–2.667
Mali	300	0.020	–1.442	–0.977
Mozambique	379	0.102	–2.001	–1.474
Namibia	161	0.095	2.710	0.179
Niger	267	0.011	0.026	–0.304
Nigeria	298	0.038	1.116	–1.319
Rwanda	197	0.087	–0.598	–0.719
Senegal	255	0.060	1.063	–0.654
Tanzania	352	0.121	0.090	–0.890
Togo	280	0.106	–1.163	–2.670
Uganda	291	0.097	–1.281	–2.297
Zambia	312	0.084	0.881	–2.229
Zimbabwe	229	0.149	–0.035	–0.971
Bolivia	779	0.158	–0.997	–1.681
Brazil	751	0.057	–1.057	0.441
Colombia	872	0.068	–0.446	–0.051
Dominican Republic	391	0.156	0.821	–0.285
Guatemala	406	0.059	–0.714	–0.919
Haiti	169	0.083	0.830	–1.452
Nicaragua	589	0.066	0.177	–0.047
Paraguay	259	–0.010	0.088	–0.523
Peru	1,458	0.065	0.305	–1.408
Egypt	538	0.015	–1.570	–1.822
Morocco	211	0.056	–0.461	–1.479
Turkey	460	0.015	–0.648	–2.060
Yemen	231	0.025	–3.714	–3.295

Notes: The means are unweighted.

[a] The four countries in this region are included in this study only for the purposes of constructing the women's status indexes.

Table 3.7 Correlation matrix for indicators of societal gender equality

	Girl–boy weight-for-age Z-score difference	Girl–boy vaccination score difference	Male–female adult education difference
Girl–boy weight-for-age *Z*-score difference	1		
Girl–boy vaccination score difference	0.069***	1	
Male–female adult education difference	0.038***	0.072***	1

Note: The number of cases is 17,371; *** significant at the 1 percent level.

Table 3.8 Index of societal gender equality: Factor analysis output

Panel A	**Factor**	**Eigenvalue**
	1	0.1277
	2	–0.0318
	3	–0.0742
Panel B	**Factor loadings**	
	1	**Communality**
Girl–boy weight-for-age *Z*-score difference	0.1911	0.0365
Girl–boy vaccination score difference	0.2301	0.0530
Education difference of woman and partner	0.1955	0.0382
	Scoring coefficients	
Panel C	**Factor 1**	
Girl–boy weight-for-age *Z*-score difference	0.1703	
Girl–boy vaccination score difference	0.2059	
Education difference of woman and partner	0.1743	

mean is 55.2. The probability distribution is shown in Figure 3.2. The reference index value for Norway is 59.5.[33] A validation analysis is not undertaken for *ge_index* as the indicators with which it is constructed give direct evidence of gender inequality in communities.

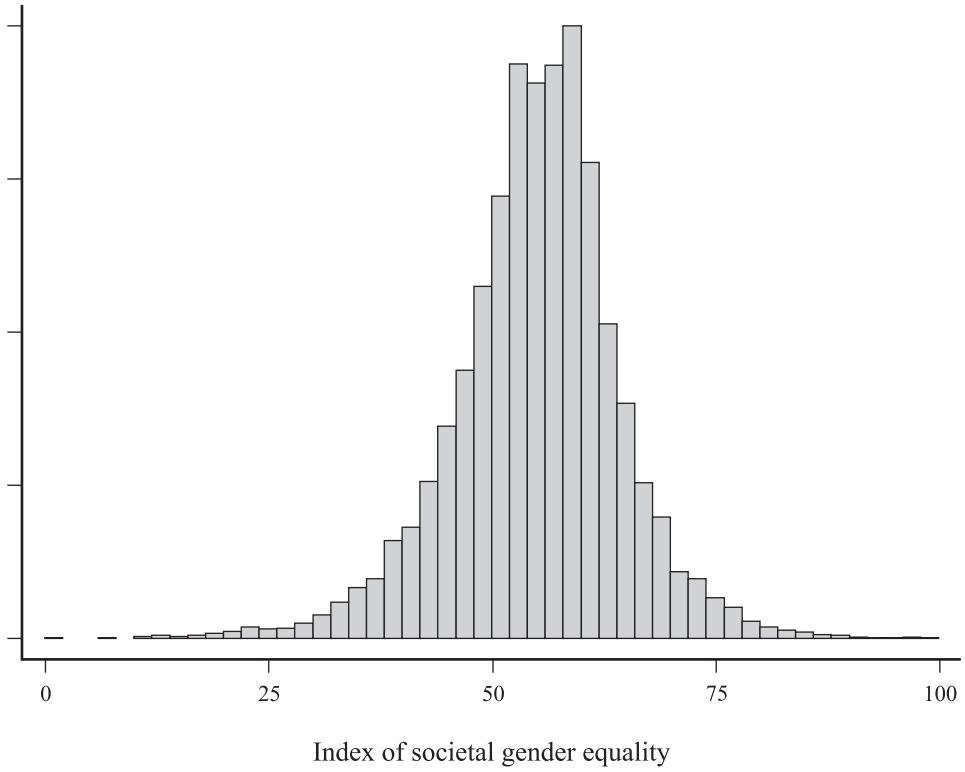
Estimation Strategy

Empirical Model

The main questions posed by this study—whether and how women's status affects children's nutritional status—are answered using multivariate country fixed-effects regression to estimate reduced-form

[33]This number is calculated using standardized values of the indicators, with the following (unstandardized) values: *wazdif* = 0; *vacdif* = 0; *educdifc* = 0 (based on statistics on the female percent of the student body: primary (48), secondary (49), and tertiary (54) [United Nations 2000]).

Figure 3.2 Distribution of index of societal gender quality



equations for each of the 25 dependent variables. A reduced-form analysis is one in which all right-hand-side, or independent, variables are exogenous to household decisionmaking. Adult household members, the decisionmakers, are assumed to value (or receive "utility" from) their children's nutritional health and act so as to optimize it within the confines of income constraints, time constraints, the availability of services, and the "technology" used to bring about nutritional health. The preferences of household members concerning children's nutritional health can differ, and members may face different constraints. The technology is assumed to be a function of a number of inputs, including the time the caretaker spends and the quality of care given, education of the caretaker, nutrients consumed through food and breast milk, the child's health status and genetic makeup, the health status of the child's mother, and so forth. These general assumptions, when expressed in mathematical form, lead to a set of equations in which the left-hand-side variables are all of those that are endogenous in the system, that is, dependent on household decisions, and the right-hand-side variables are all of those that are exogenous, that is, not influenced by household decisions (Behrman and Deolalikar 1988).

Specific to this study, the 25 endogenous dependent variables, denoted Y, are hypothesized to be determined by K exogenous explanatory variables, denoted X and indexed k = 1…K. Among these explanatory variables are the two measures of women's status, women's decisionmaking power relative to their male partner, denoted *dm_index*, and societal gender equality, denoted *ge_index*. Assuming for the

moment a continuous dependent variable, the basic cross-country model relating the dependent and independent variables takes the form

$$\begin{aligned} Y_{ic} &= \alpha + \beta_{dm}\, dm_index + \beta_{ge}\, ge_index \\ &\quad + \sum_{k=1}^{K} \beta_k X_{k,ic} + \mu_c + \upsilon_{ic},\ \upsilon_{ic} \sim N(0, \sigma^2) \\ i &= 1,\ldots,n \quad c = 1,\ldots C, \end{aligned} \tag{3}$$

where i denotes children or women (depending on the dependent variable) and c denotes countries. The μ_c are unobservable country-specific, household-invariant effects and the v_{ic} are stochastic. Unbiased and consistent estimates of the β_k can be obtained using ordinary least squares (OLS) estimation if the error term does not contain components that are correlated with an explanatory variable. The country effects are included to avoid any such bias emanating from country-specific factors that may be correlated with the explanatory variables. They also give an idea of which countries have national-level factors that cause them to have exceptionally high or low values of the dependent variable and thus are of policy interest in their own right.

Logistic regression is used when the dependent variable is dichotomous. Here the probability of a positive outcome ($Y = 1$) is modeled as a linear function of the independent variables as follows:

$$\begin{aligned} \ln\left(\frac{Y_{ic}}{1-Y_{ic}}\right) &= \alpha + \beta_{dm}\, dm_index \\ &\quad + \beta_{ge}\, ge_index + \sum_{k=1}^{K} \beta_k X_{k,ic} \\ &\quad + \mu_c + \upsilon_{ic},\ \upsilon_{ic} \sim N(0,1) \end{aligned} \tag{4}$$

The probability that the dependent variable is equal to one can then be calculated as

$$Prob(Y_{ic} = 1) = \frac{\exp(\gamma)}{1+\exp(\gamma)},$$

where

$$\begin{aligned} \gamma &= a + b_{dm}\, dm_index \\ &\quad + b_{ge}\, ge_index + \sum_{k=1}^{K} \beta_k X_{k,ic} + m_c . \end{aligned}$$

The a, the bs, and m are the estimated model coefficients. The coefficients are used to compute odds ratios (reported in results tables), which give the ratio of two odds of an event occurring ($Y = 1$) (Demaris 1992). In the case of a continuous independent variable, an odds ratio can be interpreted as the increase in the odds (or likelihood) of an event occurring with a one-unit increase in the independent variable. In the case of a dichotomous independent variable, the odds ratio can be interpreted as the increased odds of a positive outcome on the dependent variable for the affirmative category ($X = 1$) over the negative one ($X = 0$). An odds ratio more than one indicates a positive association between the independent and dependent variables; an odds ratio less than one indicates a negative association.

Because of the sample design, more than one woman-child set is sampled for each cluster. Thus the possibility that the error term will not be independently and identically distributed arises. Unobserved cluster-specific attributes will influence the outcome variables similarly for households living in the same cluster, leading to biased estimates of the parameter covariance matrix. Thus a robust covariance matrix is used to compute standard errors.[34]

This study does not attempt to estimate the nutrition provision technology due to the absence of appropriate data. For example, a proper estimating equation would include measures of children's nutrient in-

[34]The percentage of cases with multiple women in one household is 6.05 percent. That with multiple children belonging to one woman is 11 percent. Note that due to the multicountry nature of this study (data from more than one country are included in the regressions), we are not able to fully correct for the stratified, two-stage sampling design using the weights provided with the surveys.

takes, including nutrients derived from breast milk consumption, and measures of long-term morbidity. Data on these measures are not available in the DHS data sets.

The reduced-form equations from the models of household decisionmaking, presented in Appendix A (equations 12 and 29), are the basis for the choice of independent variables, which are termed "socioeconomic" variables in the rest of this report. Table 3.9 lists those variables that are controlled for in the regressions. The variable measuring children's ages is formulated as a step dummy, with children 0–1 year old (0–11 months) the reference category and indicator variables for children aged 1–2 years (12–23 months) and 2–3 years (24–36 months). "Male" is the

Table 3.9 Independent variables of the study (socioeconomic determinants)

Variable	Type
Women's status	
Index of women's relative decisionmaking power	Continuous
Index of societal gender equality	Continuous
Child characteristics	
Child aged 0–1 (reference category)	Dichotomous
Child aged 1–2	Dichotomous
Child aged 2–3	Dichotomous
Child's sex (male is reference category)	Dichotomous
Characteristics of woman and partner	
Woman's age	Continuous
Man's age	Continuous
Woman's education: none (reference category)	Dichotomous
Woman's education: primary	Dichotomous
Woman's education: secondary	Dichotomous
Man's education: none (reference category)	Dichotomous
Man's education: primary	Dichotomous
Man's education: secondary	Dichotomous
Household characteristics	
Household size	Continuous
Percent females 0–15 (reference category)	Dichotomous
Percent females 15–55	Dichotomous
Percent females 55+	Dichotomous
Percent males 0–15	Dichotomous
Percent males 15–55	Dichotomous
Percent males 55+	Dichotomous
Surface water used (reference category)	Dichotomous
Well water used	Dichotomous
Piped water used	Dichotomous
No latrine used (reference category)	Dichotomous
Pit latrine used	Dichotomous
Flush latrine used	Dichotomous
Rural location (reference category)	Dichotomous
Urban location	Dichotomous
Destitute (reference category)	Dichotomous
Poor	Dichotomous
Middle	Dichotomous
Rich	Dichotomous
Country[a]	Dichotomous

[a]The reference categories for regional analyses are Benin, Bolivia, and India unless otherwise noted.

reference category for indicating the child's sex (male = 0, female = 1).[35]

The characteristics of women and their husbands (in addition to women's status) are women's and men's years of age and education. The latter are treated as step dummy variables, with "no education" being the reference category and indicator dummies for both primary and secondary education. Note that the level of education is classified slightly differently across the countries. And the definition of what one year of education is (a fully or partially completed year) differs from survey to survey (Gardner 1998).

The household characteristics are household size, household age and sex composition, water and toilet use, location in an urban or rural area, economic status, and country of residence. Household size is the number of people who usually live and eat together (Ayad, Barrere, and Otto 1997). To capture household demographic composition, which is an important factor determining households' demands for commodities such as food (Deaton 1997), the percentage of females and males in the following age groups are calculated: 0–15, 15–55, and greater than 55. Households' health environments are measured using indicators of type of water and latrine use. For water, the reference category is the use of surface water, and dummy variables for well water and pipe water indicate safer water use. For latrine use, the reference category is no latrine, while dummy variables for pit latrine and flush latrine indicate more sanitary facilities.

Income data are not collected in the DHS data sets. Instead of this direct measure of households' economic status, a measure based on assets and amenities is employed. Households are classified into four groups: destitute (lowest economic status), poor, middle, and rich. The classification is based on consideration of two factors. The first is the degree to which a household has satisfied basic needs that generally require an investment of household (rather than public) resources. The variables used as indicators of basic needs are (1) a home with a finished floor, (2) a home with a toilet facility of some kind, and (3) access to water piped into the home or use of bottled water as the main source of drinking water. The second factor is household ownership of various assets. Assets are broken into two groups: those that are relatively cheap (radio, television, and bicycle) and those that are relatively expensive (refrigerator, motorcycle, and car). In order to maintain cross-country comparability, the classification is based on the *number* of basic needs satisfied and the *number* of cheap or expensive assets owned rather than on any specific type of need or asset. A detailed explanation of the classification system is presented in Appendix C.

Note that the economic status measure represents households' real incomes, taking into account prices faced. Because the study relies on assets and amenities, the endogeneity problems normally associated with income are expected to be far less serious than usual; it is assumed that the economic status variable used is contemporaneously exogenous to household decisionmaking.

Calculation of Effects of Women's Status Across Economic Status Groups

In order to determine whether the effect of women's status differs across poor and rich households, coefficients are estimated for

[35]We do not include the child's birth order because in a sample where the large majority of children are the last born, birth order is for all practical purposes equal to the number of children a woman has given birth to, which is not exogenous to household decisionmaking.

the four economic status groups as follows. First, a regression with all of the independent variables and their interactions with the economic status group dummy variables is run (three interactions, with the "destitute" group as the reference category).[36] Second, the set of interaction terms for a variable are kept in the equation if any of them have a statistically significant coefficient, which indicates a significant difference in slope from the destitute group. If none of the interaction terms are significant, all are dropped. This allows for differences in the effects of women's status and the other independent variables across the economic status groups, but only if they are statistically significant.

Finally, estimated coefficients of *dm_index* and *ge_index* for each economic status group are calculated. If the coefficients on the interaction terms for *dm_index*, for example, have all been dropped, then the estimated coefficient for all groups is assumed to be the same and simply given by the coefficient of *dm_index*. If a coefficient on at least one of the interaction terms is significant, then separate coefficients are calculated for each group. For the destitute group, this is given by the coefficient on *dm_index* itself. For the poor group, it is given by the coefficient on *dm_index* plus the coefficient on the interaction term with the "poor" group dummy variable, and so on.

Specification Tests

To determine whether there are significant differences in the parameter estimates for the main child nutritional status variables (anthropometric Z-scores) across the three regions, F-tests for parameter stability are performed. Here the sum of squared residuals (SSR) of a regression that includes data from all regions is compared with the sum of the SSRs of three separate regressions, one for each region. An *F*-test is used to determine whether the null hypothesis that the parameter estimates are the same across the regions is rejected (Kennedy 1998). The test results then dictate the level of analysis—all regions together or separately by region—that is to be pursued for the remaining variables in the study.

Tests for heteroskedasticity and multicollinearity are undertaken for the main nutritional status measures. The heteroskedasticity test is the Cook-Weisberg test using fitted values of the dependent variables. To test for multicollinearity, variance inflation factors (VIF) are used with the following criteria: multicollinearity is present if the largest VIF is greater than 30 or the mean VIF is considerably greater than 1 (StataCorp 2001).

[36]When the economic status groups are only interacted with the women's status variables and not all variables in the model, an inaccurate picture of the group coefficient differences results due to correlations among the independent variables and differences in these across the groups.

CHAPTER 4

Results: Women's Status and Child Nutrition

This chapter presents the results on the main variable of focus in this study: child nutritional status. The measures of women's status—the indexes of women's relative decisionmaking power in households and societal gender equality—are first compared across the three regions and the countries within them. Second, the effects of women's status on the nutritional status of children are examined for the full sample, each region, and each country in the study. Finally, these effects are compared across the economic status groups to gain insight into the interactions between poverty and women's status in determining child nutritional status.

Comparison of Child Nutritional Status and Women's Status Across Countries and Regions

Table 4.1 presents sample means and standard deviations of height-for-age (*haz*), weight-for-height (*whz*), and weight-for-age (*waz*) Z-scores for each region and country in the study. The inequalities in these measures across the regions are striking. Child nutritional status is lowest by far in South Asia and highest in Latin America and the Caribbean (LAC) by all measures. Sub-Saharan Africa (SSA) ranks between the other two regions.

Starting with weight-for-age, the summary measure of nutritional status, the mean *waz* for South Asia is –1.83, which is 45 percent lower than SSA's and almost six times as low as LAC's. Accordingly, the proportion of children in South Asia who are underweight is much higher than in the other regions, as illustrated in Figure 4.1. The proportion in South Asia is 46.4 percent—slightly less than half of all children. In SSA, almost one child in every three is underweight (30.0 percent).The share of underweight children is far lower in LAC than in the other regions.

At the country level, Bangladesh has the lowest mean *waz* of all the countries in the sample; Brazil and Paraguay have the highest. In South Asia, Pakistan's *waz* is much higher than the other countries. In SSA, Niger and Mali, both West African countries, have *waz*'s on par with those of South Asian countries. Finally, in LAC, at –1.16, Guatemala has an extremely low mean *waz*, compared with the other countries. Note that the countries within each region are fairly homogeneous, with all countries in South Asia falling below the mean *waz* for SSA, most SSA countries falling in between the regional means for South Asia and LAC, and all of the LAC countries having means higher than the regional mean for SSA.

At a regional level, the same patterns seen for *waz* hold for *haz*, the measure of long-term nutritional deprivation, and for *whz*, the measure of short-term nutritional deprivation. Stunt-

Table 4.1 Child nutritional status, by region and country (Z-scores)

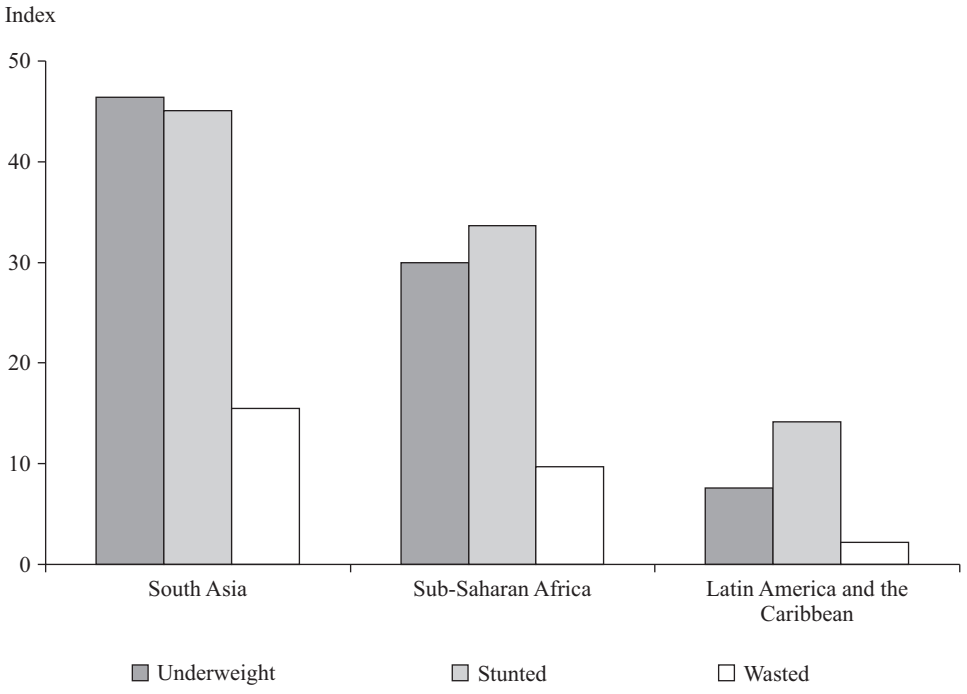
Region/country	Weight-for-age (*waz*) Mean	Standard deviation	Rank	Height-for-age (*haz*) Mean	Standard deviation	Weight-for-height (*whz*) Mean	Standard deviation
South Asia	–1.83	1.28	1	–1.83	1.57	–0.87	1.19
Sub-Saharan Africa	–1.26	1.33	2	–1.38	1.47	–0.49	1.19
Latin America and the Caribbean	–0.31	1.19	3	–0.65	1.24	0.16	1.09
Bangladesh	–2.03	1.25	1	–1.92	1.45	–1.06	1.19
India	–1.84	1.28	4	–1.82	1.58	–0.88	1.19
Nepal	–1.87	1.14	3	–1.95	1.28	–0.83	1.01
Pakistan	–1.53	1.34	7	–1.78	1.66	–0.52	1.19
Benin	–1.29	1.23	12	–1.06	1.39	–0.78	1.16
Burkina Faso	–1.35	1.42	10	–1.08	1.54	–0.91	1.22
Cameroon	–0.89	1.42	28	–1.20	1.46	–0.19	1.23
Central African Republic	–1.18	1.29	16	–1.37	1.45	–0.42	1.11
Chad	–1.50	1.44	8	–1.31	1.67	–0.90	1.19
Comoros	–1.13	1.34	20	–1.40	1.42	–0.32	1.28
Côte d'Ivoire	–1.08	1.25	25	–1.04	1.36	–0.55	1.09
Ghana	–1.11	1.26	22	–0.88	1.37	–0.73	1.17
Kenya	–0.99	1.35	27	–1.27	1.50	–0.24	1.30
Madagascar	–1.55	1.30	6	–1.85	1.37	–0.49	1.12
Malawi	–1.12	1.43	21	–1.69	1.40	–0.08	1.38
Mali	–1.61	1.40	5	–1.22	1.60	–1.11	1.26
Mozambique	–1.18	1.28	17	–1.45	1.51	–0.33	1.22
Namibia	–1.09	1.32	23	–1.22	1.35	–0.38	1.27
Niger	–1.88	1.32	2	–1.65	1.51	–1.10	1.12
Nigeria	–1.38	1.38	9	–1.47	1.57	–0.56	1.17
Rwanda	–1.28	1.15	13	–1.73	1.32	–0.22	1.11
Senegal	–1.01	1.36	26	–1.02	1.38	–0.47	1.27
Tanzania	–1.34	1.27	11	–1.63	1.39	–0.40	1.20
Togo	–1.19	1.23	14	–1.01	1.35	–0.70	1.15
Uganda	–1.18	1.29	15	–1.51	1.35	–0.29	1.13
Zambia	–1.15	1.25	19	–1.59	1.39	–0.20	1.15
Zimbabwe	–0.75	1.25	29	–1.01	1.27	–0.15	1.19
Bolivia	–0.38	1.26	32	–1.07	1.41	0.37	1.14
Brazil	–0.19	1.18	36	–0.44	1.24	0.17	1.10
Colombia	–0.44	1.11	31	–0.77	1.10	0.09	1.00
Dominican Republic	–0.24	1.23	34	–0.52	1.23	0.14	1.08
Guatemala	–1.16	1.30	18	–1.81	1.37	–0.01	1.17
Haiti	–1.08	1.36	24	–1.15	1.41	–0.47	1.22
Nicaragua	–0.62	1.21	30	–1.05	1.31	0.07	1.08
Paraguay	–0.19	1.07	35	–0.78	1.18	0.42	0.89
Peru	–0.33	1.26	33	–1.05	1.30	0.43	1.08

Notes: The country-level means are calculated using household sample weights provided with each data set. Regional means are calculated using a weighted average of the country-level means, where the weights are country population proportions.

ing rates are 45 percent for South Asia, 33 percent for SSA, and 14 percent for LAC. While wasting rates are much lower, they represent a more severe form of malnutrition. Almost 15 percent of 0- to 3-year-old children in South Asia and 9.7 percent in SSA are wasted, whereas only 2.2 percent of sample children in LAC are wasted.

Table 4.2 reports means and standard deviations of the women's status indexes.

Figure 4.1 Percentage of stunted, wasted, and underweight children, by region



Source: Authors' calculations.

Recall that both indexes are calibrated to range from 0 to 100 (see Chapter 3). Figure 4.2 illustrates the regional differences in women's status. Both the index of women's relative decisionmaking power (*dm_index*) and the index of societal gender equality (*dm_index*) rank the three regions exactly the same: women's status is lowest in South Asia, highest in LAC, with SSA falling in between. These rankings match those found in numerous other analyses using country-level measures related to women's status (Mohiuddin 1996; World Bank 2001a). Notably, the rankings are the same as those given by the nutritional status Z-scores in Table 4.1.

South Asia has the lowest mean value of *dm_index*, at 34.0. That for SSA is 34.8, only about 2 percent higher. LAC's is the highest, at 42.4. Considering the full range of the index, these regional differences are not that large. In South Asia, *dm_index* is lowest for Bangladesh and highest for Pakistan. In SSA, the mean varies widely across the countries, ranging from a low of 31.2 for Mali, which is below the South Asian average, to a high of 43.2 for Namibia. All of the LAC countries have relatively high values, falling well above the mean for SSA. As for child nutritional status, women's decision-making power exhibits a high degree of homogeneity across countries within the regions. Note that mean values of *dm_index* for all of the regions are far below that of Norway (59.2), a country where women's status is considered to be among the highest in the world. The same general trends with respect to regional rankings hold for the

Table 4.2 Women's status, by region and country

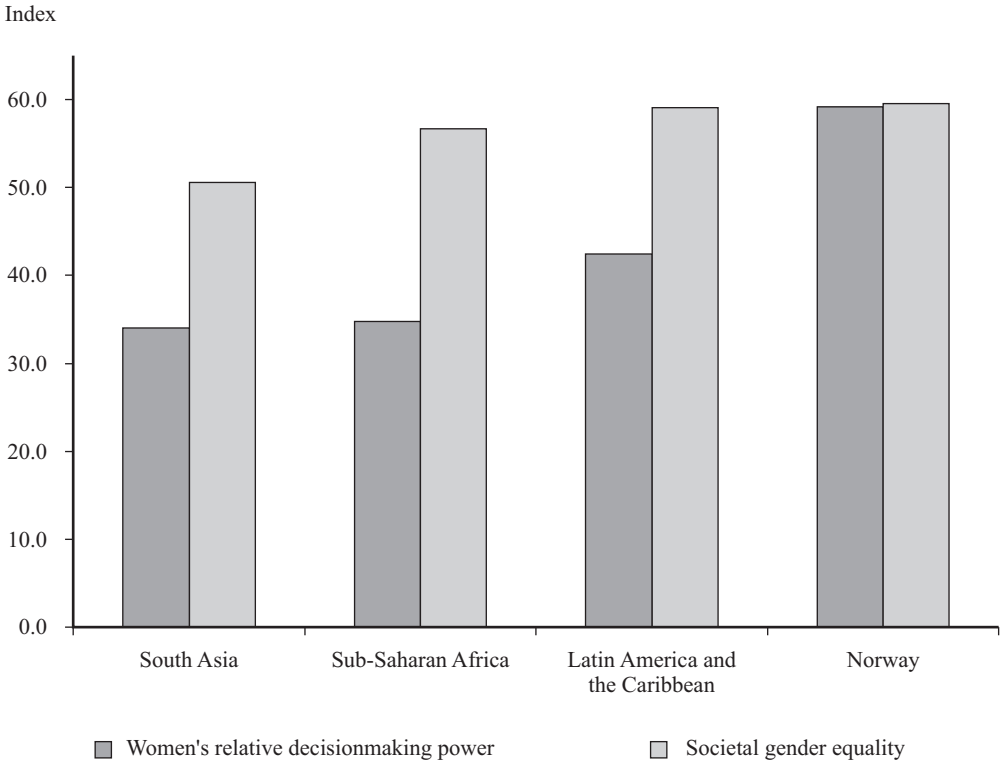
Region/country	Women's relative decisionmaking power (*dm_index*) Mean	Standard deviation	Rank	Societal gender equality (*ge_index*) Mean	Standard deviation	Rank
South Asia	34.0	7.2	1	50.5	10.2	1
Sub-Saharan Africa	34.8	7.8	2	56.7	8.9	2
Latin American and the Caribbean	42.4	10.0	3	59.1	5.8	3
Bangladesh	28.6	6.4	1	53.3	8.8	7
India	34.5	7.2	11	50.3	10.3	3
Nepal	33.7	6.8	9	47.9	10.2	1
Pakistan	35.8	8.2	17	49.8	11.0	2
Benin	36.9	7.1	19	55.8	9.0	15
Burkina Faso	33.1	6.1	7	59.5	6.8	31
Cameroon	34.5	8.1	10	57.4	8.0	21
Central African Republic	35.4	7.7	15	53.7	9.6	8
Chad	31.6	6.9	5	55.0	8.1	11
Comoros	36.2	9.0	18	59.0	10.3	28
Côte d'Ivoire	33.2	8.4	8	55.3	9.7	12
Ghana	38.3	8.3	24	53.0	6.2	6
Kenya	38.3	7.8	25	56.6	6.3	18
Madagascar	38.5	8.7	26	59.6	8.9	33
Malawi	34.6	7.0	12	53.9	7.8	9
Mali	31.2	6.3	4	56.7	9.8	19
Mozambique	34.9	7.6	14	55.7	8.5	13
Namibia	43.2	10.2	36	62.0	8.9	36
Niger	30.2	5.8	2	58.3	9.4	27
Nigeria	32.2	8.6	6	57.7	11.0	24
Rwanda	42.3	8.0	32	57.7	6.1	23
Senegal	30.9	6.9	3	59.2	8.8	29
Tanzania	37.3	7.6	22	57.7	7.5	25
Togo	37.1	7.9	20	52.4	9.8	4
Uganda	34.8	7.2	13	52.9	9.9	5
Zambia	35.5	6.7	16	54.6	7.2	10
Zimbabwe	37.3	7.5	21	57.6	9.3	22
Bolivia	42.6	9.4	34	55.8	5.9	14
Brazil	43.0	10.3	35	59.9	5.2	34
Colombia	42.6	9.9	33	59.3	5.5	30
Dominican Republic	38.9	9.7	27	60.2	8.2	35
Guatemala	38.9	8.4	27	56.4	7.3	17
Haiti	40.8	9.0	29	57.1	7.7	20
Nicaragua	38.1	8.7	23	59.6	6.9	32
Paraguay	41.9	9.4	30	57.9	7.7	26
Peru	42.0	9.7	31	55.9	7.5	16

Notes: The country-level means are calculated using household sample weights provided with each data set. Regional means are calculated using a weighted average of the country-level means, where the weights are country population proportions.

index of societal gender equality. For this index, the mean for LAC is on a par with Norway's (59.5).

As noted in Chapter 2, women's status in their households is not necessarily highly correlated with their status in their communities. In accordance, the correlations between *dm_index* and *ge_index* across countries, at 0.34 ($p = 0.032$), and across women, at 0.096 ($p = 0.000$), are positive but not high. Women in the sample with high decisionmaking power relative to their

Figure 4.2 Women's status indexes, by region



Source: Authors' calculations.

husbands do not necessarily live in communities in which gender equality is high. This finding also highlights the fact that the two women's status measures indeed represent different aspects of women's status and thus may have different impacts on child nutritional status.

Global Model and Tests for Differences Across Regions

The consistent rankings of the three regions with respect to child nutritional status and women's status—with South Asia ranking the lowest for both measures, followed by SSA and LAC—have already been noted. The correlations at the country-level between the indexes and *waz* are quite high: 0.666 (p = 0.000) for *dm_index* and 0.490 (p = 0.007) for *ge_index*. The correlations at the child level are much lower: 0.168 (p = 0.000) for *dm_index* and 0.088 (p = 0.000) for *ge_index*, respectively. Nevertheless, these numbers are indicative of a strong positive association between women's status and child nutritional status.

The results of OLS regression of the women's status indexes on children's *waz* for all three regions combined (n = 117,242) are found in Table 4.3. The variables controlled for are the child's age and sex, the woman's and her partner's age and education, household size, age/sex composition, the state of water and sanitation, whether the household is located in an urban area and its economic status, as well as country of location. The coefficients on *dm_index* (0.0076 at the sample mean) and *ge_index* are both statistically significant and positive, with *dm_index* exhibiting a

Table 4.3 Effect of women's status on child weight-for-age Z-scores: Global model (OLS regression)

Variable	Coefficient	t-statistic
Women's status		
Women's decisionmaking power	0.0121	4.43***
Women's decisionmaking power squared	–0.0001	–2.01**
Societal gender equality	0.0018	3.52***
Child characteristics		
Child aged 1–2	–0.9739	–109.55***
Child aged 2–3	–0.8894	–97.40***
Child's sex (female = 1)	0.0517	6.49***
Characteristics of woman and partner		
Woman's age	0.0127	2.52**
Woman's age squared	–0.0003	–3.98***
Man's age	0.0142	5.26***
Man's age squared	–0.0001	–3.04***
Woman's education: primary	0.0861	8.10***
Woman's education: secondary	0.2377	15.17***
Man's education: primary	0.0890	8.35***
Man's education: secondary	0.2387	18.06***
Household characteristics		
Household size	–0.0078	–6.97***
Percent females 15–55	0.0033	7.17***
Percent females 55+	0.0021	2.97***
Percent males 0–15	–0.0006	–2.23**
Percent males 15–55	0.0025	6.10***
Percent males 55+	0.0011	1.48
Well water used	–0.0033	–0.25
Piped water used	0.0397	2.76***
Pit latrine used	0.0962	8.58***
Flush latrine used	0.1671	10.03***
Urban location	0.0227	1.84*
Poor	0.0971	9.86***
Middle	0.2106	15.26***
Rich	0.4191	23.18***
Number of observations	117,242	
R-squared	0.276	
	F-statistic	**p-value**
Joint significance of country effects	275.13	0.000
Structural differences across regions	22.18	0.000

Notes: The country fixed-effect terms (coefficients not shown) are included in the regressions as well. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

declining marginal effect. The coefficient of *dm_index* is roughly four times higher than that of *ge_index*, signifying that intrahousehold power relations between women and men are more important in determining children's nutritional status than extrahousehold power relations.

These results indicate that women's decisionmaking power relative to their partners and the degree of gender equality in the community in which they live both have positive effects on their children's nutritional status. However, the overall coefficients presented here may mask wide variation across the regions and countries in the sample. In the last section of this chapter, it was found that the regions are quite homogeneous with respect to levels of both child nutritional status and women's status. Further, while wide variation within regions

Table 4.4 Effect of women's status on child weight-for-age Z-scores: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Women's status						
Women's decisionmaking power	0.0156	11.00***	0.0046	4.52***	0.0010	0.79
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	0.0023	2.72***	0.0010	1.30	0.0009	0.78
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2	–0.9382	–57.61***	–1.0582	–80.72***	–0.8426	–47.60***
Child aged 2–3	–0.9316	–56.09***	–0.9294	–66.60***	–0.7472	–42.20***
Child's sex (female = 1)	–0.0176	–1.18	0.0847	7.12***	0.0696	4.31***
Characteristics of woman and partner						
Woman's age	–0.0148	–5.66***	0.0237	3.66***	0.0286	3.04***
Woman's age squared	—	—	–0.0005	–4.49***	–0.0004	–2.77***
Man's age	0.0308	4.72***	0.0052	5.18***	0.0027	1.70*
Man's age squared	–0.0003	–3.04***				
Woman's education: primary	0.0867	4.60***	0.0810	5.32***	0.0762	3.48***
Woman's education: secondary	0.2022	7.74***	0.2221	8.98***	0.2374	7.49***
Man's education: primary	0.1037	5.62***	0.0971	6.26***	0.0491	2.00**
Man's education: secondary	0.2663	12.94***	0.2345	11.57***	0.1791	5.74***
Household characteristics						
Household size	–0.0052	–2.65***	–0.0067	–4.50***	–0.0192	–6.11***
Household size squared	—	—	—	—	—	—
Percent females 15–55	0.0029	3.48***	0.0010	1.45	0.0074	7.89***
Percent females 55+	0.0009	0.86	0.0010	0.88	0.0053	3.45***
Percent males 0–15	0.0003	0.55	–0.0006	–1.33	–0.0015	–2.68***
Percent males 15–55	0.0017	2.49**	0.0017	2.89***	0.0036	4.34***
Percent males 55+	0.0019	1.87*	–0.0024	–1.84*	0.0034	2.13**
Well water used	–0.0801	–2.39**	0.0039	0.23	0.0748	2.79***
Piped water used	–0.0105	–0.30	0.0350	1.67*	0.0532	2.03**
Pit latrine used	0.2410	10.74***	0.0411	2.57**	0.0566	2.58**
Flush latrine used	0.1836	6.61***	0.1758	5.17***	0.1749	5.85***
Urban location	–0.0815	–3.37***	0.0959	5.32***	0.0159	0.71
Poor	0.0750	4.48***	0.1058	7.51***	0.1343	5.69***
Middle income	0.1694	6.63***	0.2266	11.26***	0.2565	9.04***
Rich	0.4126	11.99***	0.3862	14.09***	0.4875	14.34***

(continued)

Table 4.4—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Coefficient	t-statistic	Latin America/Caribbean	Coefficient	t-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	–0.1809	–5.71***	Burkina Faso	–0.0020	–0.05	Brazil	0.0393	1.01
	Nepal	0.1158	4.1***	Cameroon	0.2853	4.73***	Colombia	–0.1946	–5.17***
	Pakistan	0.2674	7.9***	Central African Republic	0.0829	1.91*	Dominican Republic	–0.0311	–0.75
				Chad	–0.1220	–2.81***	Guatemala	–0.5878	–17.04***
				Comoros	0.1001	1.51	Haiti	–0.3719	–8.05***
				Côte d'Ivoire	0.1541	3.58***	Nicaragua	–0.0333	–0.95
				Ghana	–0.0340	–0.77	Paraguay	0.2381	6.02***
				Kenya	0.1608	3.72***	Peru	–0.0570	–1.90*
				Madagascar	–0.2514	–5.52***			
				Malawi	0.2173	4.01***			
				Mali	–0.3108	–7.75***			
				Mozambique	0.0602	1.30			
				Namibia	0.0114	0.19			
				Niger	–0.3939	–10.51***			
				Nigeria	–0.1853	–4.38***			
				Rwanda	0.0638	1.43			
				Senegal	0.2986	7.17***			
				Tanzania	–0.0936	–2.19**			
				Togo	0.0542	1.38			
				Uganda	0.1233	3.03***			
				Zambia	–0.0122	–0.30			
				Zimbabwe	0.3445	7.80***			
Number of observations	33,316			55,502			28,424		
R-squared	0.210			0.199			0.230		
	F-statistic	**p-value**		**F-statistic**	**p-value**		**F-statistic**	**p-value**	
Joint significance of country effects	39.29	0.000		40.86	0.000		83.31	0.000	
Cook–Weisberg heteroscedasticity test	8.99	0.000		378.65	0.000		37.97	0.000	
Structural differences across economic status groups	208.78	0.000		12.91	0.000		14.83	0.000	

Notes: The t-statistics are based on White-corrected standard errors and are robust to intracluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 4.5 Effect of women's status on child height-for-age Z-scores: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Women's status						
Women's decisionmaking power	0.0140	8.20***	0.0034	2.96***	–0.0008	–0.63
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	0.0046	4.71***	0.0004	0.49	0.0012	0.90
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2	–1.1737	–59.15***	–1.1810	–83.40***	–0.8789	–49.88***
Child aged 2–3	–1.2111	–58.87***	–1.2239	–79.95***	–0.7020	–36.58***
Child's sex (female = 1)	–0.0237	–1.30	0.1158	8.93***	0.0806	4.62***
Characteristics of woman and partner						
Woman's age	–0.0166	–5.14***	0.0339	4.46***	0.0330	3.31***
Woman's age squared	—	—	–0.0005	–4.42***	–0.0004	–2.80***
Man's age	0.0539	7.76***	0.0130	3.20***	0.0055	3.09***
Man's age squared	–0.0005	–5.79***	–0.0001	–2.10**	...	...
Woman's education: primary	0.1465	6.48***	0.0782	4.77***	0.1640	6.77***
Woman's education: secondary	0.2945	9.66***	0.2203	8.46***	0.3686	11.04***
Man's education: primary	0.1386	6.02***	0.0601	3.50***	0.0492	1.81*
Man's education: secondary	0.2842	11.32***	0.2067	9.46***	0.2113	6.30***
Household characteristics						
Household size	–0.0090	–3.83***	–0.0069	–4.58***	–0.0555	–4.53***
Household size squared	0.0019	2.69***	—	—	—	—
Percent females 15–55	0.0050	4.98**	0.0017	2.32**	0.0086	8.59***
Percent females 55+	0.0023	1.84*	0.0015	1.15	0.0068	4.21***
Percent males 0–15	–0.0003	–0.45	–0.0005	–1.01	–0.0015	–2.53**
Percent males 15–55	0.0016	1.88*	0.0022	3.49***	0.0063	7.02***
Percent males 55+	–0.0005	–0.38	–0.0017	–1.15	0.0052	3.14**
Well water used	–0.0193	–0.51	0.0292	1.52	0.1224	4.17***
Piped water used	0.0159	0.41	0.0383	1.60	–0.0035	–0.12
Pit latrine used	0.1154	4.35***	–0.0064	–0.37	0.0280	1.16
Flush latrine used	0.2193	6.81***	0.1624	4.59***	0.1643	5.26***
Urban location	–0.0300	–1.12	0.1512	7.87***	0.0568	2.37**
Poor	0.0717	3.43***	0.0846	5.52***	0.1326	4.89***
Middle income	0.1933	6.38***	0.2134	9.96***	0.3036	9.34***
Rich	0.3822	9.72***	0.3875	13.55***	0.5822	15.54***

(continued)

Table 4.5—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Coefficient	t-statistic	Latin America/Caribbean	Coefficient	t-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	–0.0313	–5.71***	Burkina Faso	0.0546	1.07	Brazil	0.4078	9.43***
	Nepal	0.1113	4.1***	Cameroon	–0.1941	–3.21***	Colombia	0.1412	3.51***
	Pakistan	–0.0038	7.9***	Central African Republic	–0.2674	–4.92***	Dominican Republic	0.3702	8.67***
				Chad	–0.1155	–2.16**	Guatemala	–0.5154	–12.53***
				Comoros	–0.3352	–4.71**	Haiti	0.3232	6.75***
				Côte d'Ivoire	–0.0178	–0.34	Nicaragua	0.2128	5.46***
				Ghana	0.0277	0.52	Paraguay	0.3079	7.27***
				Kenya	–0.2805	–5.28***	Peru	–0.0357	–1.09
				Madagascar	–0.6914	–12.00***			
				Malawi	–0.5659	–10.34***			
				Mali	–0.1193	–2.47**			
				Mozambique	–0.3959	–7.32***			
				Namibia	–0.3213	–4.63***			
				Niger	–0.3890	–7.72***			
				Nigeria	–0.4602	–8.63***			
				Rwanda	–0.5096	–8.45***			
				Senegal	0.0817	1.58			
				Tanzania	–0.5119	–9.39***			
				Togo	0.0471	0.95			
				Uganda	–0.3262	–6.54***			
				Zambia	–0.6143	–12.19***			
				Zimbabwe	–0.0924	–1.74*			
Number of observations	33,316			55,502			28,424		
R-squared	0.202			0.212			0.265		
	F-statistic	**p-value**		**F-statistic**	**p-value**		**F-statistic**	**p-value**	
Joint significance of country effects	4.45	0.005		41.19	0.000		93.83	0.000	
Cook–Weisberg heteroscedasticity test	46.19	0.000		109.92	0.000		93.50	0.000	
Structural differences across economic status groups	8.17	0.000		16.36	0.000		24.12	0.000	

Notes: The t-statistics are based on White-corrected standard errors and are robust to intracluster correlation. * Significant at the 10 percent level; **significant at the 5 percent level; *** significant at the 1 percent level.

Table 4.6 Effect of women's status on child weight-for-height Z-scores: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Women's status						
Women's decisionmaking power	0.0094	6.18***	0.0039	4.08***	0.0143	3.00***
Women's decisionmaking power squared	—	—	—	—	–0.0001	–2.62***
Societal gender equality	–0.0010	–1.06	0.0007	1.07	–0.0001	–0.07
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2	–0.5024	–29.06***	–0.5960	–45.58***	–0.5084	–29.21***
Child aged 2–3	–0.3408	–20.65***	–0.2886	–21.98***	–0.4712	–28.95***
Child's sex (female = 1)	0.0217	1.40	0.0467	4.03***	0.0494	3.24***
Characteristics of woman and partner						
Woman's age	–0.0072	–2.83***	–0.0083	–6.20***	0.0000	–0.01
Woman's age squared	—	—	—	—	—	—
Man's age	0.0019	1.01	0.0029	3.21***	0.0001	0.05
Man's age squared	—	—	—	—	—	—
Woman's education: primary	–0.0047	–0.24	0.0358	2.51**	–0.0385	–1.85*
Woman's education: secondary	0.0291	1.10	0.0980	4.10***	0.0059	0.20
Man's education: primary	0.0176	0.95	0.0735	4.99***	0.0292	1.29
Man's education: secondary	0.1171	5.56***	0.1389	7.28***	0.0717	2.50**
Household characteristics						
Household size	–0.0001	–0.06	–0.0033	–2.42**	–0.0082	–2.92***
Household size squared	—	—	—	—	—	—
Percent females 15–55	–0.0003	–0.40	0.0000	0.05	0.0023	2.61***
Percent females 55+	–0.0007	–0.63	–0.0001	–0.07	0.0019	1.32
Percent males 0–15	0.0003	0.49	–0.0003	–0.83	–0.0006	–1.11
Percent males 15–55	0.0008	1.14	0.0005	0.85	–0.0004	–0.51
Percent males 55+	0.0031	2.96***	–0.0010	–0.77	0.0007	0.44
Well water used	–0.0909	–2.89***	–0.0238	–1.48	–0.0103	–0.40
Piped water used	–0.0292	–0.92	0.0028	0.14	0.0613	2.54**
Pit latrine used	0.2250	9.34***	0.0579	3.97***	0.0400	1.97**
Flush latrine used	0.0647	2.19**	0.1080	3.22***	0.0900	3.32***
Urban location	–0.0870	–3.36***	0.0012	0.07	–0.0236	–1.14
Poor	0.0380	2.24**	0.0685	5.24***	0.0596	2.70***
Middle income	0.0631	2.38**	0.1263	6.74***	0.0857	3.15***
Rich	0.2359	6.55***	0.2066	8.12***	0.1699	5.34***

(continued)

Table 4.6—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Coefficient	t-statistic	Latin America/Caribbean	Coefficient	t-statistic
Country effects	India	—		Benin	—	—	Bolivia	—	—
	Bangladesh	–0.2241	–6.53***	Burkina Faso	–0.0961	–2.05**	Brazil	–0.2321	–6.35***
	Nepal	0.0515	1.87*	Cameroon	0.4935	8.06***	Colombia	–0.3351	–9.82***
	Pakistan	0.3513	10.94***	Central African Republic	0.2977	6.25***	Dominican Republic	–0.3034	–8.12***
				Chad	–0.0978	–2.13**	Guatemala	–0.3136	–9.54***
				Comoros	0.4025	6.39***	Haiti	–0.7447	–16.88***
				Côte d'Ivoire	0.1930	4.07***	Nicaragua	–0.1866	–5.77***
				Ghana	–0.0785	–1.61	Paraguay	0.0967	2.60***
				Kenya	0.4387	8.99***	Peru	–0.0388	–1.42
				Madagascar	0.2459	5.39***			
				Malawi	0.7180	12.14***			
				Mali	–0.3398	–7.50***			
				Mozambique	0.4077	8.43***			
				Namibia	0.3068	5.20***			
				Niger	–0.2165	–5.09***			
				Nigeria	0.1290	2.86***			
				Rwanda	0.5143	10.05***			
				Senegal	0.3113	6.76***			
				Tanzania	0.3026	6.63**			
				Togo	0.0228	0.52			
				Uganda	0.4352	9.50***			
				Zambia	0.4809	10.73***			
				Zimbabwe	0.5051	10.50***			
Number of observations	33,316			55,502			28,424		
R-squared	0.063			0.130			0.088		
	F-statistic	**p-value**		**F-statistic**	**p-value**		**F-statistic**	**p-value**	
Joint significance of country effects	60.18	0.000		66.92	0.000		68.40	0.000	
Cook–Weisberg heteroscedasticity test	8.08	0.000		183.17	0.000		53.77	0.000	
Structural differences across economic status groups	193.46	0.000		9.27	0.000		10.37	0.000	

Notes: The t-statistics are based on White-corrected standard errors and are robust to intracluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

and countries in cultural, social, economic, and political systems exists, when looking broadly across the regions most would agree that they have distinctive regional characteristics, characteristics that may lead them to differ in both the determinants of child nutritional status and the strengths of their effects. To test this hypothesis, a Chow F-test for parameter stability across the regions is undertaken. The test yields an F-statistic of 22.18 ($p = 0.000$), giving strong evidence of differences in the determinants or their strengths or both across the regions. The rest of this study thus undertakes regression analyses for each region separately.

Regression Results by Region

The Effect of Women's Status

Tables 4.4, 4.5, and 4.6 contain regression results for *waz*, *haz*, and *whz*, respectively, by region. The Cook-Weisberg tests indicate strong heteroscedasticity (see bottom rows of the tables). Thus robust standard errors are reported.[37]

The results give us a number of important insights into the relationship between women's status and child nutrition in the three regions. First, women's decisionmaking power relative to men's has a strongly significant and positive effect on *waz*, *haz*, and *whz* for both South Asia and SSA. In LAC, the effect is only significant for *whz* and only positive at the lower levels of *dm_index*. Second, the effect of women's relative decisionmaking power on all nutritional status measures is stronger for South Asia than for SSA, particularly so for *haz*, where the South Asia coefficient is more than four times higher. Third, societal gender equality has a statistically significant and positive effect on both *waz* and *haz*, but not on *whz*, in South Asia. This aspect of women's status appears to be associated with longer term measures of nutritional status in the region. It has no significant effect on child nutritional status in SSA and LAC.

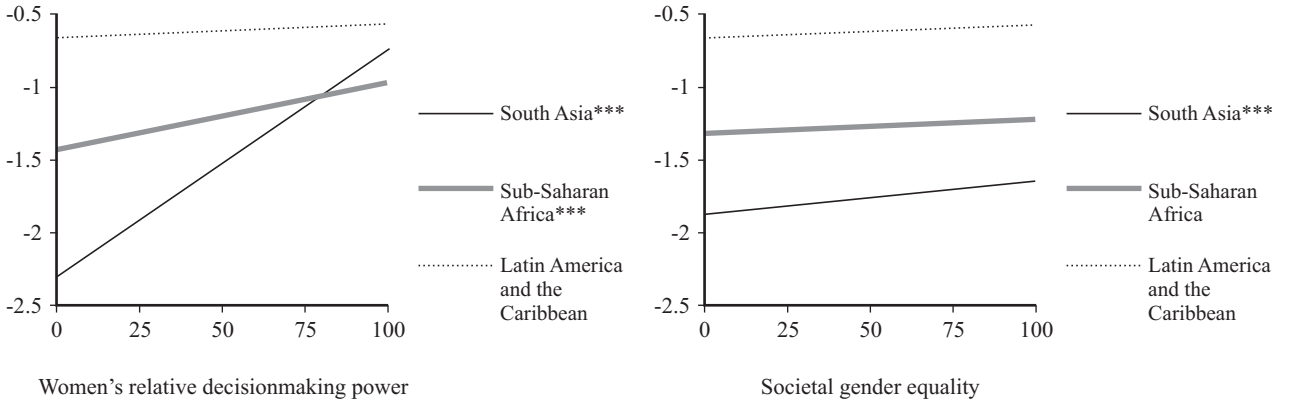
Figure 4.3 gives a sense of the magnitudes of the effects of women's status and the differences in these magnitudes across the regions. It shows the predicted levels of the nutritional status variables for each value of the women's status indexes, holding all other variables at their sample means. Starting with South Asia, this region's *dm_index* curve for *waz* is quite steep (Panel A, left side). To illustrate, according to the regression coefficients, if *dm_index* were raised by just 10 points over its current mean (from 34.0 to 44.0), the region's mean weight-for-age Z-score would rise by 0.156. If it were raised to the level of Norway (59.2), its mean weight-for-age Z-score would rise by 0.393, a fairly substantial increase. This means that women's relative decisionmaking power has a quite strong effect on child nutrition in South Asia and that current inequalities in decisionmaking power between women and men have large costs in child malnutrition. The logistic regression results for underweight confirm that the odds of a child being underweight decline with increases in *dm_index* (Table 4.7). Figure 4.4 illustrates a rapid decline in the predicted probability of a child being underweight with increases in women's relative decisionmaking power.

South Asia's *dm_index* curve for *haz* is steeper than that for *whz* (see Figure 4.3, Panels B and C), suggesting that women's decisionmaking power has a stronger effect on chronic than acute malnutrition in South Asia. Figure 4.4, Panels B and C, concur with this finding. These results suggest that

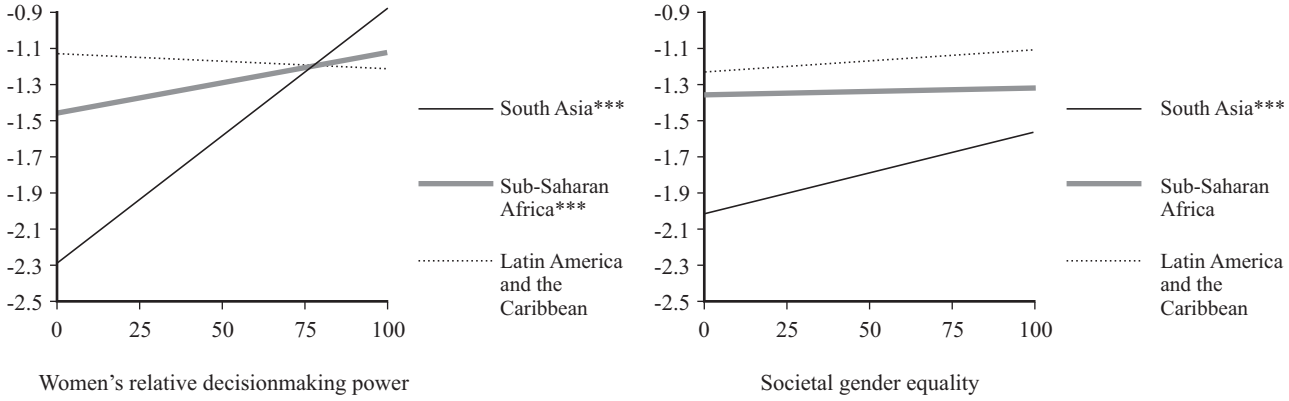
[37]Ramsey–Reset tests (StataCorp 2001) reveal possible omitted variable bias in the regressions of all regions, but more so for LAC than for South Asia and SSA.

Figure 4.3 Predicted child nutritional status Z-scores, by indexes of women's status

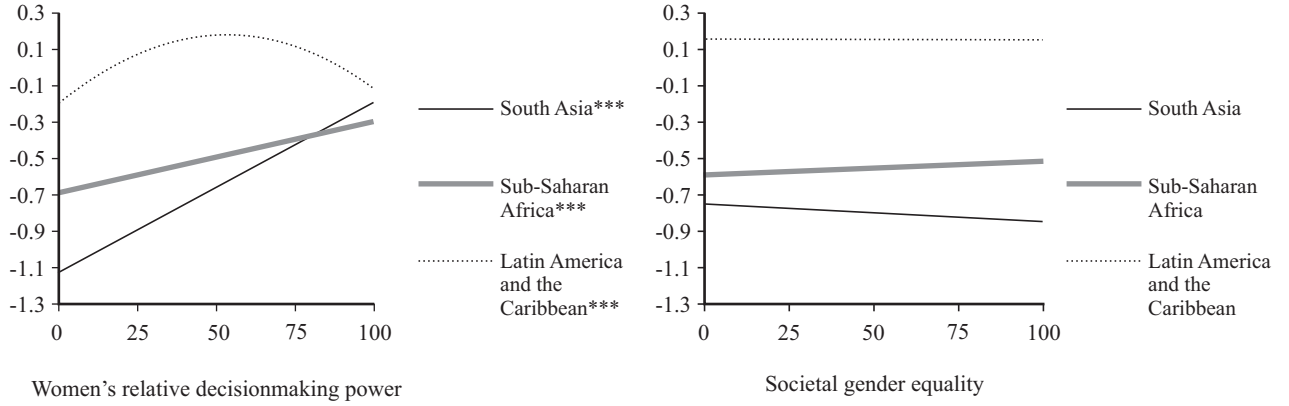
a. Weight-for-age Z-score



b. Height-for-age Z-score



c. Weight-for-height Z-score



*** Significant at the 1 percent level.

Table 4.7 Effect of women's status on child stunting, wasting, and underweight (logistic regression, summary of results)

	South Asia		Sub-Saharan Africa		Latin America/ Caribbean	
Variable	Odds ratio	F- / Z-statistic	Odds ratio	F- / Z-statistic	Odds ratio	F- / Z-statistic
Whether child is underweight						
Women's decisionmaking power	0.976	–8.83***	0.994	3.24***	0.995	–1.36
Societal gender equality	0.996	–2.97***	0.998	–1.26	1.006	1.90*
Pseudo R-squared	0.121		0.105		0.149	
Whether child is stunted						
Women's decisionmaking power	0.980	–7.48***	0.994[a]	4.41**	0.995	–1.81*
Societal gender equality	0.994	–4.17***	0.999	–0.48	1.000	0.17
Pseudo R-squared	0.129		0.127		0.193	
Whether child is wasted						
Women's decisionmaking power	0.986	–3.80***	0.992	–2.66***	0.989[a]	2.93*
Societal gender equality	1.004	2.38**	0.998	–1.20	1.002	0.33
Pseudo R-squared	0.040		0.076		0.062	
Number of children	33,316		55,502		28,424	

Notes: The t-statistics and Z-statistics, are based on White-corrected standard errors and are corrected for intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

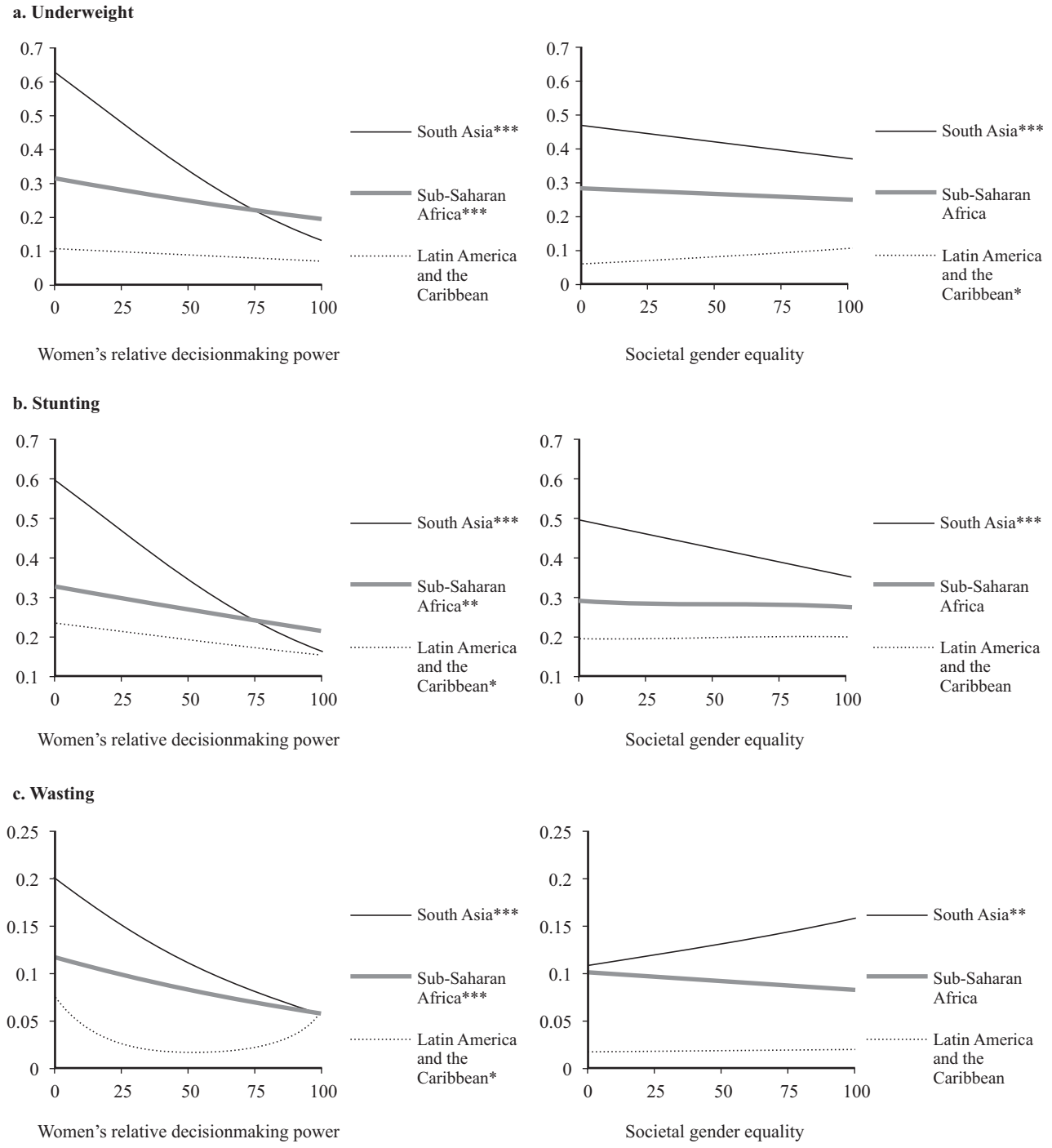
[a]Odds ratio at the mean (quadratic term statistically significant). The significance statistic is the F-statistic for the joint significance of the base and quadratic terms.

while the limitations associated with women's low status, a deep-seated cultural barrier, can be overcome to respond to a short-term morbidity or food intake problem, they may not be so easily overcome to respond to problems associated with ongoing long-term deprivation.

Turning to SSA, the region's *dm_index* curve for *waz*, while not as steep as South Asia's, still shows an increasing trend (Figure 4.3, Panel A, left side). Here, the regression coefficients imply that a 10-point increase in *dm_index* over SSA's current mean (from 34.8 to 44.8) would raise the region's mean *waz* by 0.046. If the *dm_index* were raised to the level of Norway's, SSA's mean *waz* would rise by 0.112. Women's relative decisionmaking power has a positive but relatively moderate effect on child nutritional status in SSA. Unlike South Asia, the *dm_index* curve for *haz* is slightly less steep than for *whz* (Panels A and B). The trends for underweight, stunting, and wasting can be seen in Figure 4.4. The probability of a child being malnourished in SSA declines with increases in women's relative decisionmaking power. The decline is less rapid than for South Asia.

In the case of LAC, the left sides of Figures 4.3 and 4.4 demonstrate the weak influence of women's relative decisionmaking power on child nutritional status in this region, compared with the others. Note that for *whz*, the only nutritional status measure for which *dm_index* has a statistically significant coefficient, the effect is quite nonlinear. Women's decisionmaking power increases child weight-for-height Z-scores up

Figure 4.4 Predicted probability of child malnutrition, by indexes of women's status



* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

to a certain point (at 53 on the index), but thereafter serves to reduce it (see Figure 4.3, Panel C). Since the large majority of women (90 percent) have a *dm_index* value below this threshold, the influence is likely to be positive for most households in the region.

The effect of gender equality at the community level is significant only for South Asia. Figures 4.3 and 4.4 (right side of A panels) illustrate the strength of its effect on children's weight-for-age Z-scores and on the probability of children being underweight in the region. The variable *waz* exhibits a steady, linear increase with *ge_index* for South Asia. The regression coefficients imply that a 10-point increase in the index over South Asia's current mean (from 50.5 to 60.5) would raise the region's mean *waz* by 0.023. Thus its effect is relatively weak and certainly substantially weaker than that of *dm_index*. In the next two chapters the reason for this weak effect is explored in more depth through regression analyses of *ge_index* on women's nutritional status and care for women and children, the factors hypothesized to mediate the relationship between women's status and child nutritional status.

Note that variance inflation factor (VIF) tests indicate the presence of multicollinearity, but that it is weak. The maximum *waz* VIFs for South Asia, SSA, and LAC, respectively, are 4.84, 3.38, and 5.07, all of which are well below 30. The respective mean VIFs are 2.03, 2.01, and 2.3, which are not far above the cutoff (of 1).

The Effects of Other Key Variables

Past studies show that in developing countries, child nutritional status declines significantly from the first year of a child's life to the second and remains low in the third (Martorell 1995; Martorell et al. 1995). The regression results are consistent with these findings for all nutritional status measures and all regions, with strongly significant and negative coefficients on the dummy variables for children in their second and third years. For SSA and LAC, the coefficients on the dummy variables for the child's sex are positive and significant. This may be explained by biological differences between boys and girls; that is, boys are more likely to fall ill during the first few years of life than girls are (Agnihotri 1999). Notably, the sex effect is not significant for South Asia, suggesting the presence of discrimination against female children.

As expected, both women's and men's education have strong positive impacts on child nutritional status in all three regions. For example, the child of a woman with a primary education in South Asia has a *waz* 0.087 Z-scores higher than the child of a woman with no education. The increase for a child whose mother has a secondary education is more than double that for primary education, at 0.202 (Table 4.4). Education of men has an even stronger impact. For a man, having a primary education raises his child's *waz* by 0.104. Having a secondary education raises it by 0.266. It is interesting that, after controlling for women's status, men's education has a stronger impact on *waz* than women's for both South Asia and SSA. This stronger impact has its foundations in a stronger effect of men's education on children's short-term nutritional status (see Table 4.6). In LAC, women's education has a slightly stronger impact than men's education for *waz* and *haz*. Note that education of both women and men generally exerts a much stronger effect on long-term nutritional status (*haz*) than on short-term (*whz*).

Turning to the health environments of households, use of well water appears to improve child nutritional status only in LAC. It appears to have a strongly negative effect on children' weight-for-height Z-scores for South Asia. This may be due to contamination of water beyond its source, which is related to household hygiene practices, coupled with the region's high population density. The benefits of use of piped water over the use of surface water do not appear to be strong. In contrast, use of a pit

latrine has a significant and positive effect on child nutritional status, which is particularly strong for South Asia. The use of a flush latrine raises child nutritional status even further in SSA and LAC, but in South Asia this is only true for *haz*. It is interesting that living in an urban area *reduces* a child's nutritional status in South Asia but increases it in SSA. This may be due to the particularly unsanitary and crowded living conditions in South Asia's major cities. Living in an urban area does not appear to alter a child's short-term nutritional status in LAC, but it has a positive effect on long-term nutritional status.

The economic status of the household a child lives in exerts a very strong influence on her or his nutritional status. This result is consistent across the regions. To illustrate, a child whose household falls in the "rich" category in LAC (the region where economic status has the strongest influence) can be expected to have a 0.488 higher *waz* than a child in a household falling in the destitute category. The same number for SSA is 0.386 and for South Asia, 0.413. For all three regions, economic status has a much more potent effect on long-term nutritional status (*haz*) than on short-term (*whz*).

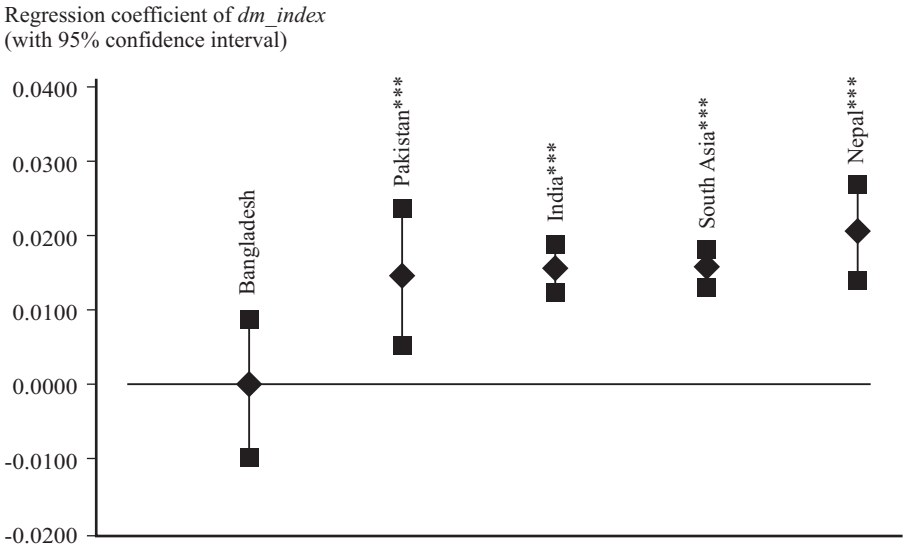
Finally, the combined effects of the country dummy variables are very strong for all regions (see test statistics at the bottom of Tables 4.4, 4.5, and 4.6). Even after controlling for child, household, and community variables included in the regressions, unobserved factors at the country level, such as food supply, infrastructure, national policies, existence of ongoing violent conflict, and type of political system, have a strong influence on a child's nutritional status. These kinds of national-level factors contribute to child weight-for-age Z-scores being lower in Bangladesh than in the other South Asia countries and higher in Pakistan, regardless of the differences between these countries in women's status, education, health environments, and economic status. Similarly, among SSA countries, *waz* is substantially lower in Niger and higher in Zimbabwe as the result of (unknown) national factors. Within LAC they exert a particularly negative influence on children's *waz*'s in Guatemala.

Regression Results by Country

Figures 4.5 through 4.10 report estimated regression coefficients by country for children's weight-for-age Z-scores. Ninety-five percent confidence intervals are also shown. In interpreting these results, the reader should keep in mind that sample sizes are much smaller than for the regional regressions. Further, within-country variation in the women's status indexes is often smaller than within-region variation. Thus problems of power, that is, not being able to detect an effect that actually exists, are more likely to arise. In particular, it is important to remember that in the case of an insignificant coefficient for an individual country, confidence in the coefficient's reported magnitude should be low, and further, it cannot be assumed that in reality an effect does not exist.

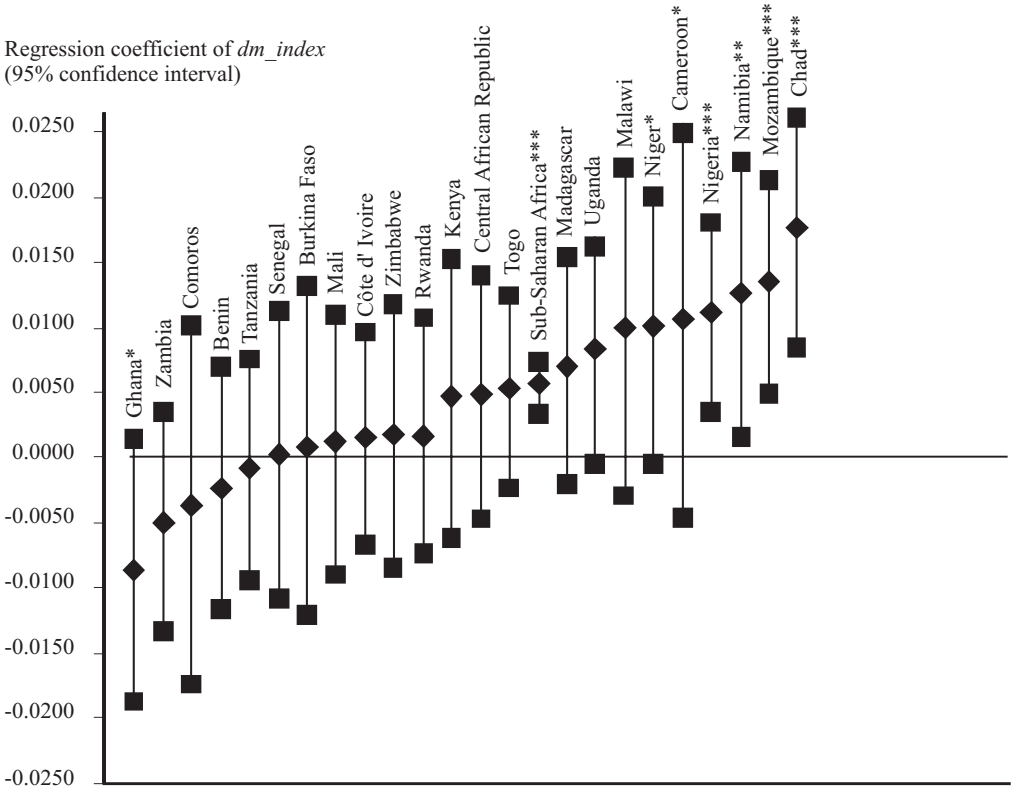
Starting with *dm_index*, for South Asia (Figure 4.5), all country coefficients are statistically significant and positive except that of Bangladesh. This gives confidence that the regional results for South Asia reported in Tables 4.4 to 4.6 are not being driven solely by India, the country with by far the largest sample size. Of the countries with statistically significant coefficients, Nepal has the highest and Pakistan the lowest. Note that Bangladesh has the second smallest sample size (after Pakistan) among the four countries and the lowest variation in *dm_index* (see standard deviations in Table 4.2). It stands out from the other countries as having a far lower value of *dm_index* and the lowest *waz*. The regression results should not be interpreted to mean that women's decisionmaking power has no effect on child nutritional status in that country, however.

Figure 4.5 Effect of women's relative decisionmaking power on child weight-for-age Z-scores, South Asian countries



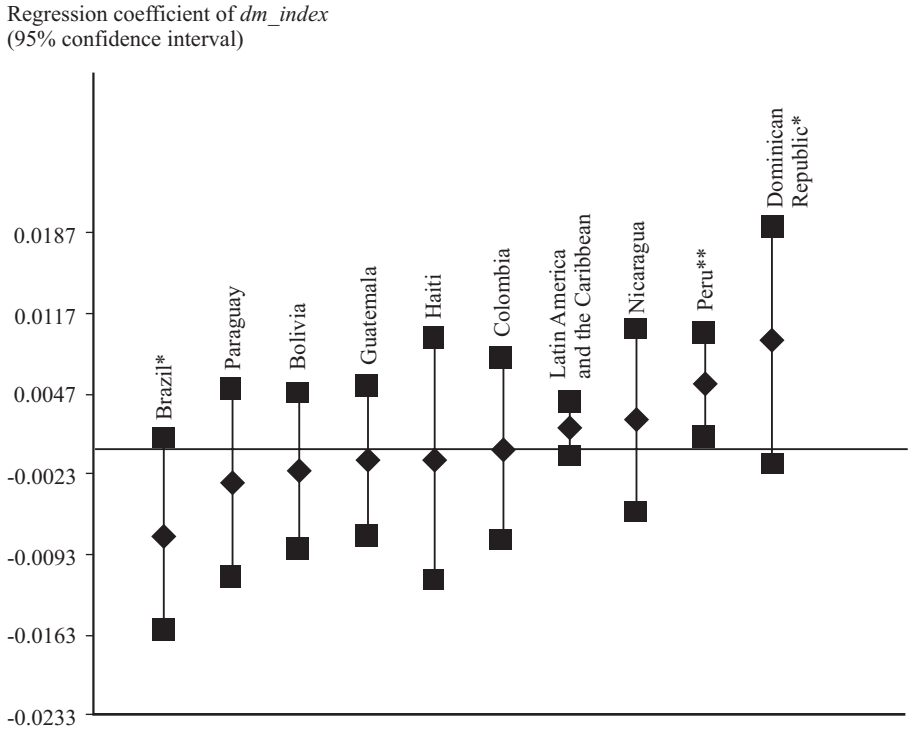
Note: *** Significant at the 1 percent level.

Figure 4.6 Effect of women's relative decisionmaking power on child weight-for-age Z-scores, Sub-Saharan African countries



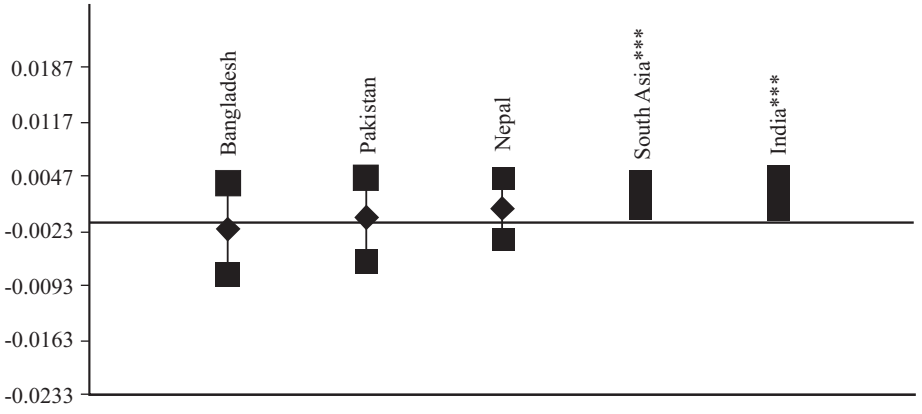
Note: * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Figure 4.7 Effect of women's relative decisionmaking power on child weight-for-age Z-scores, Latin American and the Caribbean countries



Note: * Significant at the 10 percent level; ** significant at the 1 percent level.

Figure 4.8 Effect of societal gender equality on child weight-for-age Z-scores, South Asian countries

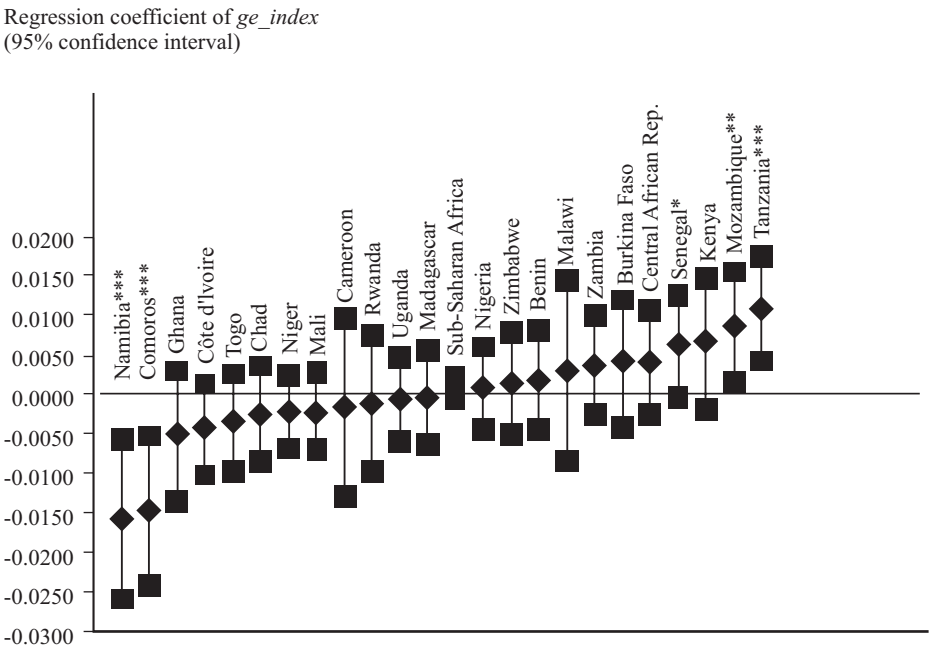


Note: *** Significant at the 1 percent level.

The results for SSA (Figure 4.6) and LAC (Figure 4.7) suggest that these regions' lower regional regression coefficients than South Asia's may not derive not from a consistently lower effect for all countries. Instead, strong effects for some countries may balance out weak effects in others. Very few of the country regressions yield statistically significant coefficients. The only coefficients that are strongly significant are the highly positive ones. In SSA, women's decisionmaking power appears to have a particularly strong influence on child nutritional status in Namibia, Mozambique, and Chad, whose coefficients are 0.123 (t = 2.27), 0.132 (t = 3.16), and 0.0173 (t = 3.85), respectively. In LAC, it has a statistically significant and positive influence for only two countries, Peru and the Dominican Republic. Note that the majority of the negative coefficients reported for the SSA and LAC country-level regressions are statistically insignificant. The negative coefficients of Ghana and Brazil are significant only at the 1 percent level.

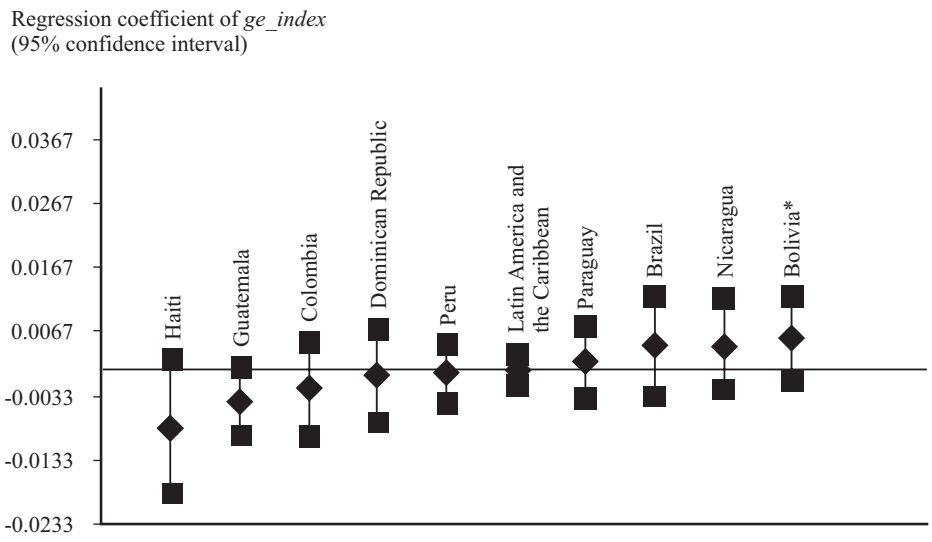
In the case of *ge_index*, Figure 4.8 shows that South Asia's significant and positive coefficient is paralleled only by India. While the other countries exhibit no significant effect, the effect is most likely lower for them since the overall regional coefficient is lower than India's. Turning to SSA (Figure 4.9), the statistically insignificant coefficient for the region as a whole masks a great deal of variation across countries. The lowest coefficients (for Namibia and Comoros) and the highest (for Mozambique and Tanzania) are all statistically significant. In this case, societal gender equality evidently has a negative effect on child nutrition in some of the countries. For LAC (Figure 4.10), the coefficients are largely

Figure 4.9 Effect of societal gender equality on child weight-for-age Z-scores, Sub-Saharan African countries



Note: * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Figure 4.10 Effect of societal gender equality on child weight-for-age Z-scores, Latin American and the Caribbean countries



Note: * Significant at the 10 percent level.

insignificant at both regional and country levels.

The country-level results highlight the added benefits, in terms of determining whether and how women's status influences child nutritional status, of undertaking cross-country analyses by combining the household-level data from multiple countries. Doing so takes advantage of both the greater power afforded by larger sample sizes as well as wider variation in the data. The country-level results also point to the importance of taking into account within-region variations in the impact of women's status, especially for SSA. Because statistical power issues come into play for the country-level regressions, they are not undertaken for the dependent variables examined in the next two chapters.

The Mediating Influence of Economic Status

The means of the women's status indexes across the economic status groups for each region are presented in Table 4.8. In all regions, women's relative decisionmaking power increases as their household's economic status increases. Societal gender equality, a community-level measure, remains roughly constant.

The coefficients on the women's status indexes by economic status group for *waz*, *haz*, and *whz* regressions are given in Table 4.9. Chow tests for parameter stability across the groups indicate significant differences for all three measures (test statistics are reported in Tables 4.4 to 4.6). However, only some are detectable when the differences are actually allowed for and individual coefficients are calculated for each group. The main differences are found for women's relative decisionmaking power.

In South Asia, women's relative decisonmaking power has a stronger positive effect on child nutritional status in poorer households than in rich (Table 4.9). The coefficient of *dm_index* in the *waz* equation declines by 82 percent across the destitute and rich economic status groups, falling from 0.0177 to 0.0097. In Sub-Saharan Africa, differences across economic status

Table 4.8 Means of women's status indexes across economic status groups

Economic status group	South Asia: Women's relative decisionmaking power	South Asia: Societal gender equality	Sub-Saharan Africa: Women's relative decisionmaking power	Sub-Saharan Africa: Societal gender equality	Latin America/Caribbean: Women's relative decisionmaking power	Latin America/Caribbean: Societal gender equality
Destitute	32.6	50.6	33.9	56.9	39.1	58.9
Poor	33.2	49.9	34.3	56.7	39.8	59.3
Middle	35.6	51.2	35.5	56.4	41.3	59.2
Rich	39.5	51.8	37.5	56.2	44.2	59.1

Table 4.9 Effect of women's status on child nutritional status, by economic status group (OLS, summary of results)

Variable	South Asia: Coefficient	South Asia: t- / F-statistic	Sub-Saharan Africa: Coefficient	Sub-Saharan Africa: t- / F-statistic	Latin America/ Caribbean: Coefficient	Latin America/ Caribbean: t- / F-statistic
Weight-for-age Z-score						
Women's decisionmaking power		11.00***		4.52***		0.79
Destitute	0.0177		0.0085		0.0007	
Poor	0.0150		0.0032		0.0007	
Middle	0.0165		0.0009		0.0007	
Rich	0.0097		0.0059		0.0007	
Societal gender equality		2.72***		1.30		0.78
Destitute	0.0023		0.0008		0.0006	
Poor	0.0023		0.0008		0.0006	
Middle	0.0023		0.0008		0.0006	
Rich	0.0023		0.0008		0.0006	
Height-for-age Z-score						
Women's decisionmaking power		8.20***		2.96***		–0.63
Destitute	0.0137		0.0046		–0.0008	
Poor	0.0137		0.0035		–0.0008	
Middle	0.0137		–0.0011		–0.0008	
Rich	0.0137		0.0079		–0.0008	
Societal gender equality		4.71***		–0.49		0.90
Destitute	0.0046		0.0004		0.0009	
Poor	0.0046		0.0004		0.0009	
Middle	0.0046		0.0004		0.0009	
Rich	0.0046		0.0004		0.0009	
Weight-for-height Z-score						
Women's decisionmaking power		6.18***		4.08***		5.19***
Destitute	0.0090		0.0072		0.0032[a]	
Poor	0.0090		0.0014		0.0031[a]	
Middle	0.0090		0.0037		0.0027[a]	
Rich	0.0090		0.0037		0.0019[a]	
Societal gender equality		–1.06		1.07		–0.07
Destitute	–0.0001[b]		0.0007		–0.0002	
Poor	0.0002[b]		0.0007		–0.0002	
Middle	–0.0040[b]		0.0007		–0.0002	
Rich	–0.0009[b]		0.0007		–0.0002	
Number of observations	33,316		55,502		28,424	

Notes: See Chapter 3 for an explanation of how coefficients are calculated. The t-statistics are approximated using those of the full-sample models (see Tables 4.4–4.6). They are based on White-corrected standard errors and are robust to intra-cluster correlation. *** Significant at the 1 percent level.

[a] Coefficient at the mean of the decisionmaking power index (quadratic term statistically significant). The significance statistic is the F-statistic for the joint significance of the base and quadratic term.

[b] Coefficient at the mean of the societal gender equality index (quadratic term statistically significant). The significance statistic is the F-statistic for the joint significance of the base and quadratic term.

groups in the impact of women's decision-making power follow a U-shaped pattern, dropping across the destitute and poor groups and then rising again for the rich. Nevertheless, as for South Asia, the coefficient of *dm_index* in the *waz* equation is highest for the destitute group (0.0085). The same trend can be found in LAC. The coefficient on *dm_index* in the *whz* equation (the only one for which *dm_index* is statistically significant) falls from 0.0032 for the destitute economic status group to 0.0019 for the rich (a 40 percent decline).

Thus, across all three regions, women's relative decisionmaking power has a stronger effect on child nutritional status in poor households than in rich households. Evidently, women's ability to influence decisions over the allocation of economic resources is more important when these resources are scarce than when they are more abundant. This may be because improvements in women's relative decisionmaking power among the poorest of households is especially important for directing existing scarce resources to children's needs. It means that the costs of women's low decisionmaking power relative to their husbands—costs in terms of child malnutrition (see next section)—are borne disproportionately by poor households.

The Malnutrition Cost of Inequality in the Status of Women and Men

The costs in child malnutrition of women's lower status than men's can be estimated by looking at the increase in child nutritional status in each region if women's status were raised to the level of Norway's. If each South Asian woman's relative decision-making power were raised to the level of Norway's, the region's *dm_index* value would rise by 25.2 points (59.2–34.0). Its *ge_index* value would rise by 9 points (59.5–50.5). These increases would result in an increase in the average child's *waz* of approximately 0.414 Z-scores. In terms of child malnutrition, this translates into 12.9 percentage points of its underweight rate, or 13.4 million of its children. For SSA, the cost is lower but still substantial. The weight-for-age Z-score increase of 0.112 translates into 2.8 percentage points of its underweight rate, or 1.7 million children.[38] Given the nonsignificant effect of women's status on *waz* and *haz* in LAC, and the nonlinear relationship between *dm_index* and *whz*, the unequal status of women and men there has no apparent measurable costs in malnutrition when considered at the aggregate regional level.

Conclusion

The results of this chapter leave no doubt that women's status plays a positive role in determining child nutritional status. However, the strength of its effect differs widely across the three regions studied. Women's relative decisionmaking power has a strong positive effect on child nutritional status in South Asia, a more moderate yet still positive effect in SSA, and it affects only short-term nutritional status in LAC. Societal gender equality appears to have a weaker influence on child nutritional status, show-

[38]These estimates are undertaken by increasing each sample woman's *dm_index* and *ge_index* value to that of Norway's and then multiplying the increases by the regression coefficients reported in Table 4.4. The mean increase in the weight-for-age Z-score for each country is calculated using household sample weights. That for each region is then calculated using country population weights. The total number of children under three in each region is estimated as three-fifths of the total number of children under five, itself calculated from the numbers in Table 1.1.

ing a positive impact only in South Asia. Country-specific regressions reveal fairly homogeneous results for South Asian countries, but strong differences across countries within SSA and LAC. Finally, economic status and women's status are strongly interlinked in all three regions. The impact of women's relative decisionmaking power on child nutritional status is stronger among poorer households. The next two chapters take a deeper look at the relationship between women's status and child nutrition by examining the effects of women's status on three critical proximal determinants of child nutritional status: women's nutritional status, care for women, and care for children.

CHAPTER 5

Results: Women's Status, Women's Nutritional Status, and Care for Women

As discussed in Chapter 2, women's health and nutritional status influence children's nutritional status in a variety of ways both during pregnancy and early childhood. To summarize, women who are malnourished are more likely to deliver low birth weight children, increasing the risk that such children will grow and develop poorly, remaining malnourished throughout their childhood. Malnourished women may also be less successful at breastfeeding, a caring practice that is vitally important for a child's health and proper growth. Finally, malnourished women may have low energy levels and reduced cognitive abilities, both of which hamper their ability to adequately care for young children.

Also discussed in Chapter 2 is the strong link between the quality of care that women receive, especially during the vulnerable periods of pregnancy and childbirth, and children's nutritional status. Prenatal care provides an opportunity for a number of preventive interventions for pregnant woman, including tetanus toxoid immunizations, prevention and treatment of problems such as anemia and infections, and detection of high-risk pregnancies needing special delivery care. Prenatal care visits also present an opportunity to disseminate health messages to women. Delivery in a medical facility is an important element in reducing health risks for mothers and children. Proper medical attention and hygienic conditions during delivery reduce the risk of infection and facilitate the safe management of obstetric complications (Stewart, Stanton, and Ahmed 1997; Mitra et al. 1997).

Chapter 4 showed that women's status does indeed influence children's nutritional status in all three regions of the study. Bearing in mind the vital importance of a woman's own nutritional status and two caring practices for women—prenatal care and birthing care—to a child's nutritional status, this chapter's purpose is to determine whether women's status also influences women's own nutritional status and the care they receive. If so, it can be surmised that these are two of the pathways linking women's status and child nutrition, thus helping to explain *why* the link exists.

Women's Nutritional Status

Body mass index (BMI) is a well-recognized indicator of energy reserves in adults.[39] A low BMI—less than 18.5—indicates chronic energy deficiency whereas a BMI of more than 25

[39]Body mass index is calculated as weight in kilograms divided by the square of height in meters.

indicates overweight and is indicative of excess energy reserves (WHO 1995). The mean values of BMI for the nonpregnant women in the study sample are presented by region in Table 5.1. Pakistan in South Asia, Nigeria and Rwanda in SSA, and Paraguay in LAC are not included because data on women's height and weight were not collected in these countries. Note that the large majority of women's BMIs fall within a range of 15 to 30.

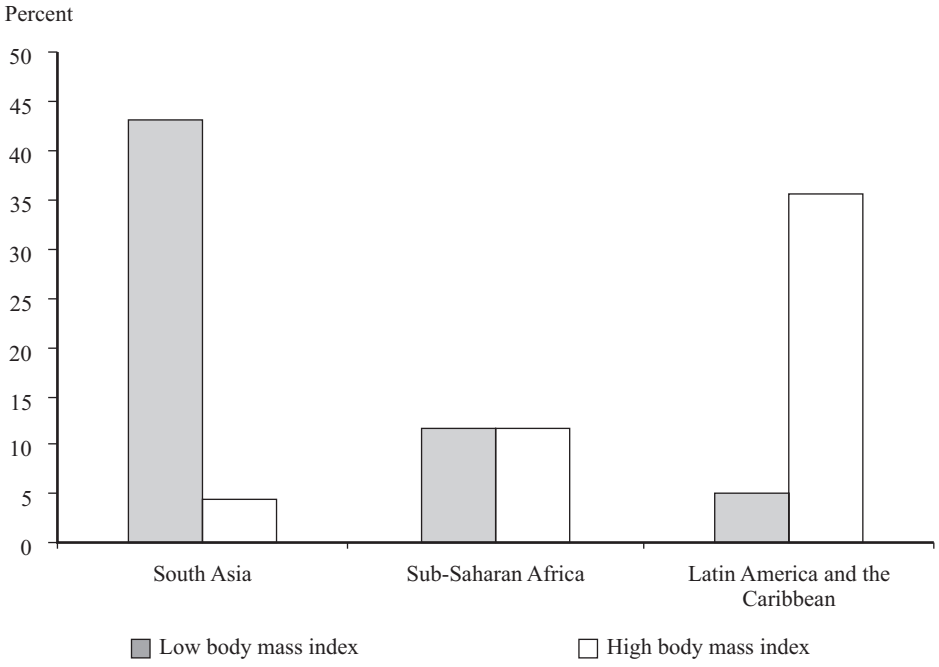
As expected, the lowest BMI values are seen in South Asia, followed by SSA and LAC. Forty-three percent of the women in South Asia are underweight, whereas nearly 35 percent are overweight in LAC (Figure 5.1). In contrast, in SSA the prevalences of both underweight and overweight are near the expected value of 10 percent.

Table 5.1 Women's body mass index, by region (nonpregnant women)

Region	Body mass index	Number of women
South Asia		
Mean	19.33	25,416
Standard deviation	2.84	40,021
Sub-Saharan Africa		
Mean	21.64	
Standard deviation	3.11	
Latin America/Caribbean		20,727
Mean	24.11	
Standard deviation	4.16	

Note: Pakistan, Nigeria, Rwanda, and Paraguay are not included.

Figure 5.1 Percentage of nonpregnant women with low and high body mass indexes



Source: Authors' calculations.

Table 5.2 Effect of women's status on their body mass index: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Women's status						
Women's decisionmaking power	–0.0153	–0.94	0.0272	2.06**	–0.0779	–4.05***
Women's decisionmaking power squared	0.0006	2.90***	–0.0004	–2.23**	0.0004	1.82*
Societal gender equality	0.0013	0.62	0.0011	0.54	0.0018	0.43
Societal gender equality squared	—	—	—	—	—	—
Characteristics of woman and partner						
Woman's age	0.0634	2.49**	0.1698	8.74***	0.3878	12.13***
Woman's age squared	–0.0007	–1.80*	–0.0020	–6.67***	–0.0041	–8.28***
Man's age	0.0540	3.30***	0.0330	3.05***	0.0037	0.59
Man's age squared	–0.0005	–2.38**	–0.0002	–1.83*		
Woman's education: primary	0.0001	0.00	0.4030	9.21***	0.4370	5.82***
Woman's education: secondary	0.3174	4.42***	0.7347	8.91***	0.4590	4.12***
Man's education: primary	0.1954	4.67***	0.3674	8.33***	0.3643	4.53***
Man's education: secondary	0.4032	7.78***	0.5037	8.05***	0.1360	1.27
Household characteristics						
Household size	–0.0033	–0.65	0.0022	0.31	–0.0346	–3.36***
Household size squared	—	—	–0.0004	–2.02**	—	—
Percent females 15–55	–0.0023	–1.07	0.0031	1.54	–0.0047	–1.44
Percent females 55+	0.0013	0.49	–0.0060	–2.05**	–0.0006	–0.11
Percent males 0–15	0.0002	0.17	–0.0006	–0.63	–0.0024	–1.45
Percent males 15–55	0.0000	0.01	–0.0008	–0.48	–0.0020	–0.66
Percent males 55+	0.0035	1.29	–0.0096	–2.64***	0.0029	0.50
Well water used	–0.4561	–6.46***	–0.0293	–0.65	0.3853	4.03***
Piped water used	–0.2495	–3.40***	0.2326	3.76***	0.3484	4.12***
Pit latrine used	0.3551	6.62***	0.1389	3.31***	0.0089	0.13
Flush latrine used	0.5959	7.79***	1.0608	7.81***	0.2665	2.52**
Urban location	0.1078	1.69*	0.5436	9.82***	0.4643	5.86***
Poor	0.0729	1.94*	0.1511	4.36***	0.4924	6.36***
Middle income	0.4615	6.54***	0.6232	10.93***	0.9673	9.47***
Rich	1.8159	16.96***	1.2926	13.53***	1.6449	12.82***

(continued)

Table 5.2—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Coefficient	t-statistic	Latin America/Caribbean	Coefficient	t-statistic
Country effects	India	—	—	Benin	—		Bolivia	—	—
	Bangladesh	–0.6193	–8.24***	Burkina Faso	–0.2228	–2.09**	Brazil	–1.5679	–11.28***
	Nepal	0.7378	9.54***	Cameroon	0.9070	5.09***	Colombia	–0.9323	–7.11***
				Central African Republic	–0.4412	–3.64***	Dominican Republic	–1.2224	–8.32***
				Chad	–0.4544	–3.59***	Guatemala	–0.9056	–7.94***
				Comoros	0.8891	4.83***	Haiti	–3.1663	–21.28***
				Côte d'Ivoire	0.4776	4.04***	Nicaragua	–0.3205	–2.65***
				Ghana	0.1052	0.75	Peru	–0.1968	–2.15**
				Kenya	–0.0923	–0.73			
				Madagascar	–0.8055	–6.76***			
				Malawi	0.2690	2.12**			
				Mali	–0.0866	–0.80			
				Mozambique	0.3378	2.91***			
				Namibia	0.3265	1.63			
				Niger	0.1099	0.92			
				Senegal	0.3146	2.36**			
				Tanzania	0.3031	2.41**			
				Togo	0.1283	1.17			
				Uganda	0.1744	1.37			
				Zambia	–0.1460	–1.23			
				Zimbabwe	0.9941	7.04***			
Number of observations	25,416			40,021			20,727		
R-squared	0.157			0.137			0.140		

Notes: Pakistan, Nigeria, Rwanda, and Paraguay are not included due to lack of data. The t-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

OLS regression results on the relationship between women's BMI and status in the three regions, controlling for characteristics of the woman and her household, are presented in Table 5.2. Logistic regression results for underweight and overweight are presented in Table 5.3. The results indicate pronounced nonlinear relationships with women's relative decisionmaking power, as illustrated in Figures 5.2 and 5.3, and strong differences across the regions.

For South Asia, the BMI coefficient of *dm_index* is near zero at the low end of the index. However, as women's decisionmaking power rises, its effect becomes increasingly positive. Accordingly, Figure 5.3 (Panel A) shows a sharp fall off in the probability of a woman being underweight as *dm_index* rises. The effect on BMI is weaker in SSA, where women's decisionmaking power begins to exhibit a negative influence after a *dm_index* value of approximately 35. This negative influence, however, does not cause women to become underweight: the coefficient of *dm_index* in the underweight regression (Table 5.3) is not statistically significant.[40] The results for LAC, where the *over*weight rate is fairly high, indicate a negative association across the full range of *dm_index*. Figure 5.3 corroborates this finding, showing a slight increase in the probability that a woman is underweight (Panel A) and a sharp decrease in the probability that she is overweight (Panel B) as *dm_index* rises. Here, as in SSA, among women with high decisionmaking power, when women gain power relative to

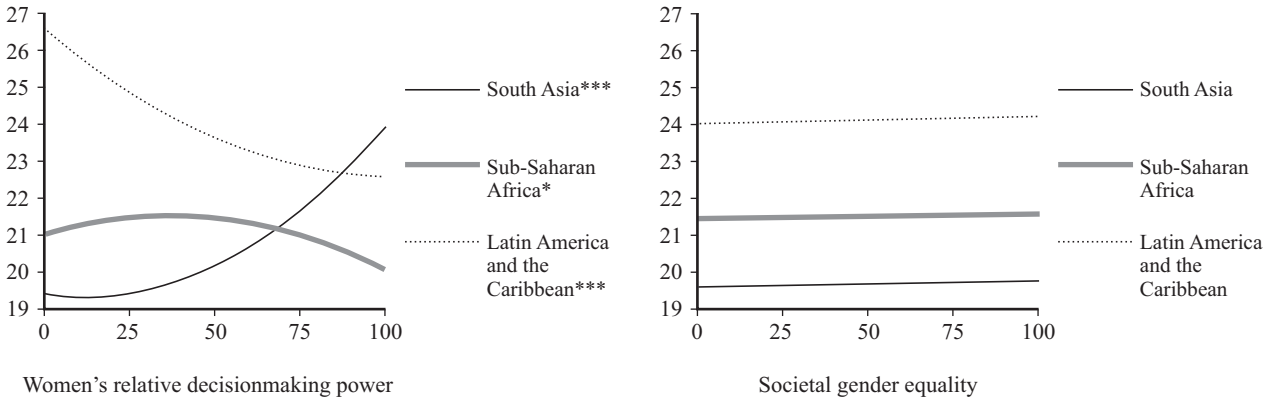
Table 5.3 Effect of women's status on their nutritional status: Underweight and overweight (logistic regression, summary of results)

	South Asia		Sub-Saharan Africa		Latin America/ Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Whether woman is underweight						
Women's decisionmaking power	1.013	0.94	0.977	–1.90*	1.019	3.08***
Women's decisionmaking power squared	0.999	–2.49**	1.000	1.68*		
Societal gender equality	1.001	0.62	1.001	0.32	1.004	0.73
Societal gender equality squared						
Number of women	25,416		40,021		20,727	
Pseudo R-squared	0.052		0.034		0.110	
Whether woman is overweight						
Women's decisionmaking power	1.002	0.37	0.994	–1.98**	0.979	–7.62***
Women's decisionmaking power squared						
Societal gender equality	1.010	2.36**	0.973	–2.14**	1.002	0.89
Societal gender equality squared			1.000	2.13**		
Number of women	25,416		40,021		20,727	
Pseudo R-squared	0.215		0.146		0.083	

Notes: All variables included in Table 5.4 are controlled for here. Only the odds ratios for the variables of main interest are shown. Pakistan, Nigeria, Rwanda, and Paraguay are not included. The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. ** Significant at the 5 percent level; *** significant at the 1 percent level.

[40]The p-value for the joint significance of the *dm-index* and *dm-index* squared terms is 0.135.

Figure 5.2 Predicted women's body mass index by indexes of women's status



* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

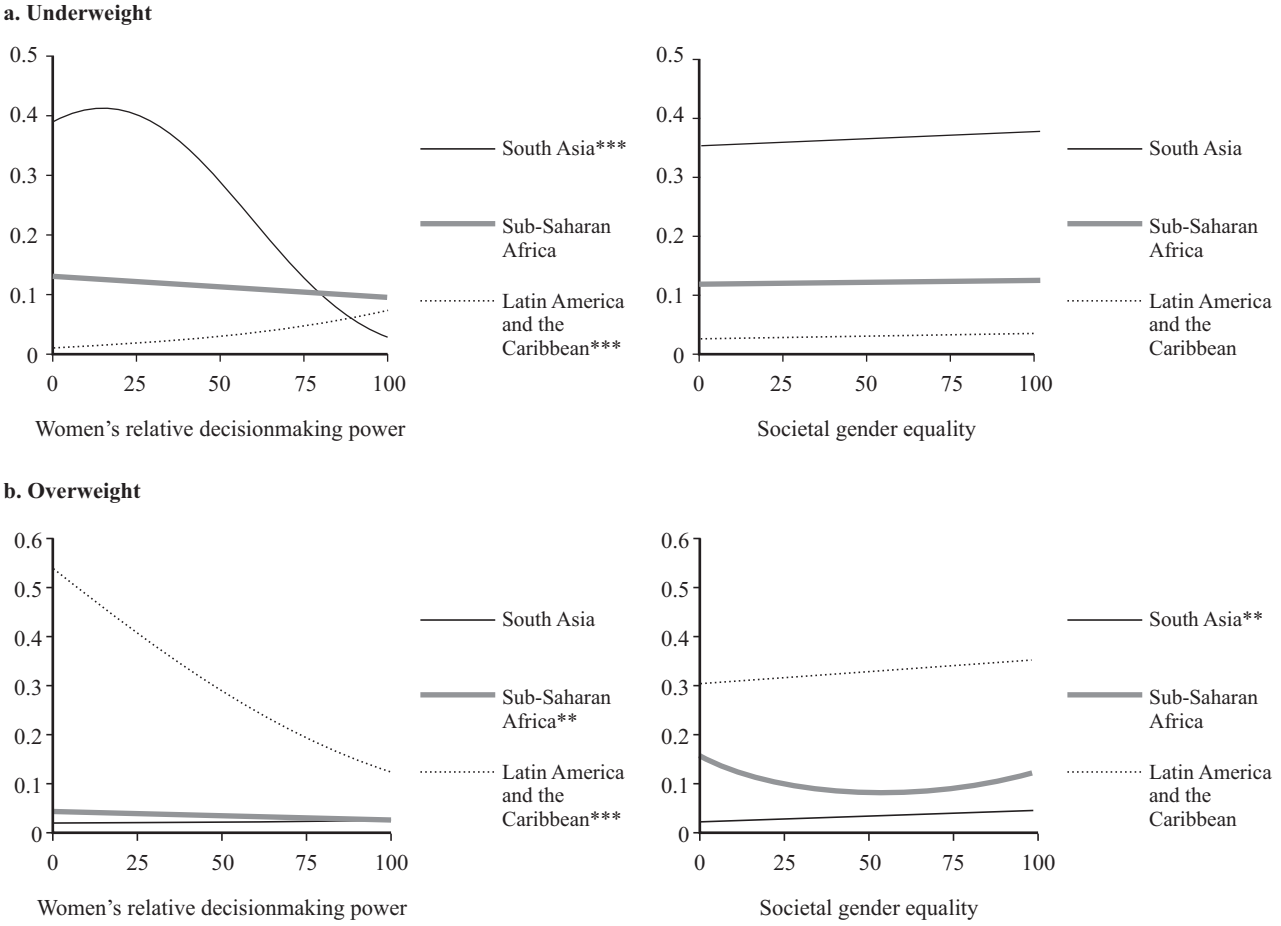
their husbands, they opt to allocate resources toward reducing their body weight.

Apart from women's status, several other factors show strong effects on women's nutritional status (Table 5.2). Increases in both women's and men's education lead to large increases in women's BMI, especially in SSA. In LAC, only primary education appears to make a substantial difference. Similar to the results on child nutritional status, in South Asia well water use is negatively associated with women's nutritional status. While the use of piped water is positively associated with women's nutritional status in SSA and LAC, it appears to have a negative influence in South Asia. The use of flush latrines has a quite strong positive effect, especially for SSA, where it increases BMI by a full 1.06 points. Economic status shows strong positive effects in all three regions. This means that low household incomes definitely constrain poorer households from meeting the food and health care needs of all of their members. Differences in BMI due to country-specific factors are very strong in LAC. Mean BMI in Haiti is 3.2 points lower than in Bolivia, even after controlling for household characteristics such as education and economic status.

Prenatal and Birthing Care for Women

The World Health Organization recommends at least four routine prenatal care visits during pregnancy and delivery by a trained birth attendant. Increasing evidence also supports the benefits of early entry into prenatal care (Villar and Bergsjo 1997; Ahluwalia et al. 1998). Regional numbers on the use of prenatal and birthing care and, for women who receive any prenatal care, the number of visits and the timing of the first visit are presented in Table 5.4. The use of prenatal and birthing care is worst in South Asia, followed by SSA and LAC (Figure 5.4). At least 75 percent of women receive some prenatal care in both SSA and LAC, whereas only 63 percent do so in South Asia. Of the women receiving prenatal care, the percentage having at least three visits follows the same regional ranking. The number of months before birth at the time of the first visit is lowest in SSA, at 4.2 months on average (or approximately 5

Figure 5.3 Predicted probability of woman being malnourished, by indexes of of women's status



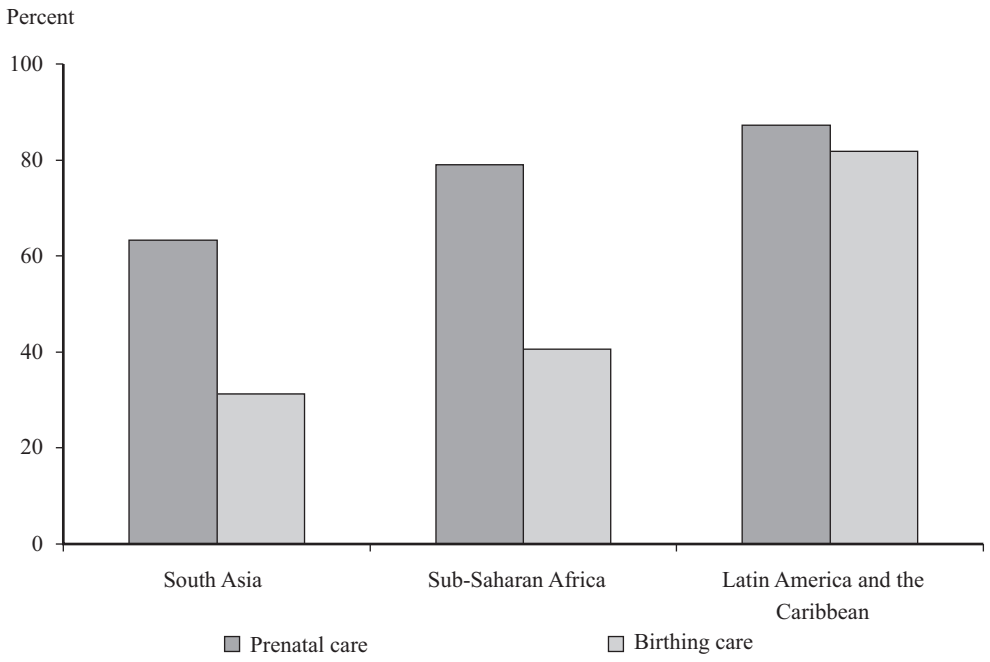
** Significant at the 5 percent level; *** significant at the 1 percent level.

Table 5.4 Prenatal and birthing care, by region

Indicator	South Asia	Sub-Saharan Africa	Latin America/ Caribbean
Women receiving any prenatal care (%)	63.30	79.00	87.20
For women receiving prenatal care			
Women who had at least three visits during pregnancy (%)	65.30	82.50	92.10
Months before birth of woman's first visit (mean)	5.04	4.20	6.23
Number of women	30,130	48,684	24,345
Women who gave birth in a medical facility (%)	31.20	40.50	81.80
Number of women	30,279	49,073	24,410

Source: Authors' calculations.

Figure 5.4 Percentage of women who receive any prenatal care and who give birth in a medical facility



Source: Authors' calculations.

months into pregnancy), followed by South Asia, and is highest (most advantageous to the mother and child) in LAC. The most dramatic contrasts are seen in the proportion of women delivering in a medical facility. While only about 31 percent of women in South Asia deliver in a medical facility, just over 40 percent do so in SSA and 82 percent in LAC.

Regression results for the effect of women's status and the other independent variables on prenatal and birthing care are presented in Tables 5.5 to 5.8. The results on women's status are summarized in Table 5.9. In all three regions, women's relative decisionmaking power is positively and significantly associated with prenatal care. When a woman's decisionmaking power relative to her partner's is increased, she is more likely to receive prenatal care, is more likely to have at least three visits, and her first visit is initiated earlier in her pregnancy. As can be seen in the left-hand panels of Figure 5.5, the relationship between women's decisionmaking power and measures of care described is stronger in South Asia than in SSA or LAC.

The relationship of women's relative decisionmaking power to receipt of prenatal care is curvilinear in SSA: it is strongly positive at lower levels of *dm_index*, but it becomes slightly negative after a *dm_index* value of about 70. Since the large majority (99.9 percent) of women sampled in SSA have *dm_index* values below this cutoff, decisionmaking power likely exerts a positive influence for most women in the region. A curvilinear relationship is also exhibited for the timing of the first visit in both SSA and LAC. Here the effect is slightly negative at *dm_index* values lower than 25. Since only 9.4 percent of women in

Table 5.5 Effect of women's status on whether woman received any prenatal care: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0347	9.44***	1.0829	6.86***	1.0147	4.23***
Women's decisionmaking power squared	—	—	0.9993	–4.44***	—	—
Societal gender equality	1.0151	6.56***	0.9951	–1.71*	1.0655	2.48**
Societal gender equality squared	—	—	—	—	0.9994	–2.65***
Characteristics of woman and partner						
Woman's age	0.8933	–4.90***	0.9722	–7.45***	1.0862	3.55***
Woman's age squared	1.0008	2.18**	—	—	0.9984	–4.59***
Man's age	1.1195	6.59***	1.0183	6.85***	1.0163	3.69***
Man's age squared	0.9990	–4.63***	—	—	—	—
Woman's education: primary	1.9016	14.50***	1.8919	14.17***	1.3379	5.18***
Woman's education: secondary	3.3657	17.54***	2.6773	8.90***	2.7468	11.14***
Man's education: primary	1.4280	9.24***	2.1024	17.43***	1.2185	3.20***
Man's education: secondary	1.6893	11.43***	3.3459	17.65***	1.8793	7.60***
Household characteristics						
Household size	0.9411	–4.49***	0.9966	–0.70	0.9590	–5.31***
Household size squared	1.0013	2.34**	—	—	—	—
Percent females 15–55	1.0107	5.55***	1.0011	0.55	1.0198	6.88***
Percent females 55+	1.0115	4.79***	1.0049	1.53	1.0040	0.92
Percent males 0–15	0.9949	–4.87***	0.9992	–0.78	0.9987	–1.11
Percent males 15–55	1.0033	2.04**	1.0006	0.33	1.0093	3.92***
Percent males 55+	0.9979	–0.88	0.9952	–1.44	1.0105	2.37**
Well water used	1.3431	3.67***	1.0042	0.06	1.2483	3.19***
Piped water used	1.9438	8.14***	1.4203	4.37***	1.5925	6.77***
Pit latrine used	1.1811	2.92***	1.5295	8.19***	1.4964	7.22***
Flush latrine used	1.5671	6.18***	1.0307	0.18	1.5733	5.35***
Urban location	1.6849	7.75***	2.8267	14.07***	1.2350	3.31***
Poor	1.2783	6.72***	1.4873	10.70***	1.3788	6.03***
Middle income	1.6798	8.32***	1.9586	10.39***	1.5124	5.60***
Rich	2.5535	9.01***	3.5608	12.46***	2.8025	9.94***

(continued)

Table 5.5—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	0.1993	–19.54***	Burkina Faso	0.4108	–4.68***	Brazil	2.4161	7.37***
	Nepal	0.6104	–5.83***	Cameroon	0.2909	–6.25***	Colombia	1.8213	5.83***
	Pakistan	0.2091	–19.16***	Central African Republic	0.3106	–6.52***	Dominican Republic	19.0664	10.94***
				Chad	0.1111	–12.94***	Guatemala	5.5230	15.28***
				Comoros	0.7940	–1.00	Haiti	2.4925	7.19***
				Côte d'Ivoire	0.7072	–1.78*	Nicaragua	4.0373	13.91***
				Ghana	1.0165	0.08	Paraguay	5.4093	12.84***
				Kenya	1.4293	1.85*	Peru	0.9595	–0.54
				Madagascar	0.8076	–1.16			
				Malawi	1.8185	3.12***			
				Mali	0.1535	–11.75***			
				Mozambique	0.7054	–1.94*			
				Namibia	0.5325	–3.08***			
				Niger	0.2431	–8.28***			
				Nigeria	0.1947	–9.31***			
				Rwanda	2.9759	4.99***			
				Senegal	0.8520	–0.87			
				Tanzania	5.4255	5.53***			
				Togo	0.9460	–0.31			
				Uganda	1.3926	1.86*			
				Zambia	1.7898	2.59**			
				Zimbabwe	1.3898	1.57			
Number of observations	30,130			48,684			24,345		
Pseudo R-squared	0.244			0.316			0.209		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 5.6 Effect of women's status on whether a woman who received prenatal care had at least three visits: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0264	6.37***	1.0077	2.92***	1.0143	3.38***
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	1.0361	3.01***	0.9982	–0.98	1.0007	0.20
Societal gender equality squared	0.9998	–1.78*				
Characteristics of woman and partner						
Woman's age	0.9610	–5.29***	1.0429	2.46**	1.0493	1.63
Woman's age squared	—	—	0.9993	–2.55**	0.9990	–2.35**
Man's age	1.1373	7.23***	1.0360	4.00***	1.0611	3.24***
Man's age squared	0.9987	–5.55***	0.9997	–3.70***	0.9995	–2.26**
Woman's education: primary	1.2600	4.69***	1.2485	6.29***	1.4602	5.83***
Woman's education: secondary	1.8166	8.85***	1.5885	7.10***	2.4460	8.87***
Man's education: primary	1.1175	2.22**	1.2477	6.21***	1.1401	1.83*
Man's education: secondary	1.2352	3.68***	1.5733	9.02***	1.5841	4.80***
Household characteristics						
Household size	0.9411	–4.76***	0.9963	–1.12	0.9667	–3.89***
Household size squared	1.0014	2.78***	—	—	—	—
Percent females 15–55	1.0156	7.06***	1.0052	3.04***	1.0083	2.69***
Percent females 55+	1.0116	4.21***	1.0065	2.14***	1.0082	1.57
Percent males 0–15	0.9978	–1.79**	0.9984	–1.78*	0.9989	–0.81
Percent males 15–55	1.0119	6.21***	1.0032	2.14**	1.0082	3.10***
Percent males 55+	1.0123	4.59***	0.9991	–0.28	1.0040	0.76
Well water used	0.9776	–0.25	1.0728	1.69*	1.3753	4.44***
Piped water used	1.3760	3.49***	1.1417	2.53**	1.2997	3.69***
Pit latrine used	1.1080	1.68*	1.2005	4.69***	1.2340	3.54***
Flush latrine used	1.2230	2.86**	1.2486	2.16**	1.4353	3.96***
Urban location	1.4781	6.13***	1.2071	4.15***	1.2153	3.04***
Poor	1.1494	3.24***	1.2151	5.62***	1.1417	1.93*
Middle	1.6020	7.29***	1.5093	8.25***	1.3570	3.63***
Rich	2.3968	9.50***	1.8635	8.91***	2.0812	6.64***

(continued)

Table 5.6—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	0.3226	–11.75***	Burkina Faso	0.4360	–7.35***	Brazil	2.9422	8.43***
	Nepal	0.8186	–2.44**	Cameroon	0.7605	–2.11**	Colombia	2.7792	8.19***
	Pakistan	0.6056	–4.60***	Central African Republic	0.4963	–5.78***	Dominican Republic	4.2279	10.05***
				Chad	0.4137	–7.40***	Guatemala	4.3084	14.55***
				Comoros	0.6250	–3.17***	Haiti	1.0009	0.01
				Côte d'Ivoire	0.1993	–15.57***	Nicaragua	2.5089	9.59***
				Ghana	0.6167	–4.00***	Paraguay	1.5262	3.80***
				Kenya	0.9573	–0.37	Peru	1.0778	0.97
				Madagascar	0.7200	–2.82***			
				Malawi	1.2943	1.97**			
				Mali	0.4126	–8.04***			
				Mozambique	0.5683	–5.24***			
				Namibia	0.4530	–5.24***			
				Niger	0.3895	–8.73***			
				Nigeria	1.6124	3.31***			
				Rwanda	0.1798	–13.65***			
				Senegal	0.3746	–8.16***			
				Tanzania	1.6654	4.21***			
				Togo	0.8390	–1.71*			
				Uganda	0.5596	–5.38***			
				Zambia	1.3340	2.41**			
				Zimbabwe	1.8605	4.45***			
Number of observations	18,907			38,261			19,548		
Pseudo R-squared	0.143			0.102			0.121		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 5.7 Effect of women's status on number of months before birth of woman's first prenatal visit: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Women's status						
Women's decisionmaking power	0.0171	5.88***	–0.0082	–1.29	–0.0131	–1.41
Women's decisionmaking power squared	—	—	0.0002	2.13**	0.0002	2.64***
Societal gender equality	0.0052	3.07***	–0.0206	–2.59**	0.0382	2.40**
Societal gender equality squared	—	—	0.0002	2.21**	–0.0003	–2.52**
Characteristics of woman and partner						
Woman's age	–0.0232	–3.90***	0.0285	2.61***	0.0850	4.30***
Woman's age squared	—	—	–0.0006	–3.48***	–0.0014	–4.71***
Man's age	0.0684	5.11***	0.0222	3.98***	0.0495	4.50***
Man's age squared	–0.0006	–3.34**	–0.0002	–3.59***	–0.0005	–3.77***
Woman's education: primary	0.1284	3.25***	0.0388	1.73*	0.2106	4.41***
Woman's education: secondary	0.6001	11.73***	0.2199	6.32***	0.4224	6.88***
Man's education: primary	0.0355	0.84	0.1617	6.82***	0.1410	2.89***
Man's education: secondary	0.2306	5.04***	0.3006	10.07***	0.3974	6.69***
Household characteristics						
Household size	–0.0165	–3.82***	–0.0241	–4.99***	–0.0880	–4.27***
Household size squared	—	—	0.0005	3.57***	0.0021	1.68*
Percent females 15–55	0.0078	4.97***	0.0086	8.43***	0.0082	4.83***
Percent females 55+	0.0051	2.57**	0.0040	2.28**	0.0028	1.07
Percent males 0–15	0.0000	–0.02	–0.0009	–1.65*	–0.0012	–1.42
Percent males 15–55	0.0053	3.94***	0.0046	5.27***	0.0063	4.18***
Percent males 55+	0.0067	3.48***	0.0036	1.84*	0.0076	2.62***
Well water used	0.0970	1.35	–0.0034	–0.13	0.0548	1.02
Piped water used	0.0548	0.75	0.0276	0.90	0.0514	0.94
Pit latrine used	0.1164	2.61***	0.0548	2.11**	0.0397	0.93
Flush latrine used	0.1147	2.37**	0.0425	0.81	0.2142	4.07***
Urban location	0.1595	3.89***	0.0376	1.38	0.2426	5.99***
Poor	0.1273	3.43***	0.0379	1.77*	0.1533	2.87***
Middle income	0.4359	8.57***	0.1759	5.92***	0.2872	4.74***
Rich	0.7375	12.38***	0.5261	12.82***	0.6017	9.01***

(continued)

Table 5.7—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Coefficient	t-statistic	Latin America/Caribbean	Coefficient	t-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	–0.5093	–6.36***	Burkina Faso	0.2607	3.35***	Brazil	0.4205	6.73***
	Nepal	–0.5140	–6.93***	Cameroon	0.4339	5.05***	Colombia	0.2305	3.63***
	Pakistan	–0.4890	–5.19***	Central African Republic	0.1762	2.37**	Dominican Republic	0.6476	10.65***
				Chad	0.6077	8.08***	Guatemala	1.0909	16.46***
				Comoros	0.4085	3.97***	Haiti	0.0635	0.76
				Côte d'Ivoire	–0.2369	–3.18***	Nicaragua	0.6302	10.18***
				Ghana	0.5199	6.87***	Paraguay	0.1246	1.58
				Kenya	–0.6628	–9.46***	Peru	–0.2071	–3.76***
				Madagascar	–0.1594	–2.04**			
				Malawi	–0.7879	–10.80***			
				Mali	0.2616	3.12***			
				Mozambique	0.0623	0.92			
				Namibia	0.1200	1.16			
				Niger	0.3911	5.07***			
				Nigeria	–0.3566	–4.54***			
				Rwanda	–1.4830	–19.36***			
				Senegal	0.7862	8.65***			
				Tanzania	–0.4145	–5.89***			
				Togo	–0.4023	–6.05***			
				Uganda	–0.6409	–8.31***			
				Zambia	–0.5081	–7.11***			
				Zimbabwe	–0.1902	–2.49**			
Number of observations	18,907			38,261			19,548		
R squared	0.154			0.130			0.138		

Notes: The t-statistics are based on White-corrected standard errors and are robust to intracluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 5.8 Effect of women's status on whether woman gives birth in a medical facility: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0525	13.10***	1.0604	5.99***	1.0170	5.04***
Women's decisionmaking power squared	—	—	0.9995	–3.93***	—	—
Societal gender equality	1.0130	5.12***	1.0018	0.81	0.9991	–0.26
Societal gender equality squared	—	—	—	—	—	—
Characteristics of woman and partner						
Woman's age	0.8538	–5.59***	0.9223	–5.59***	0.9467	–2.21**
Woman's age squared	1.0016	3.35***	1.0010	4.67***	1.0007	1.72*
Man's age	1.1609	7.22***	1.0414	5.34***	1.0577	3.62***
Man's age squared	0.9986	–4.89***	0.9997	–3.59***	0.9995	–2.55**
Woman's education: primary	1.6140	10.23***	1.6783	15.73***	1.6128	8.27***
Woman's education: secondary	2.1167	12.49***	2.3777	15.46***	2.9678	13.56***
Man's education: primary	1.5403	8.25***	1.6812	14.43***	1.4891	6.21***
Man's education: secondary	1.9365	11.46***	2.4554	19.80***	2.6582	12.36***
Household characteristics						
Household size	0.9391	–4.61***	0.9861	–3.92***	0.9224	–2.89***
Household size squared	1.0015	2.64***	—	—	1.0028	1.75*
Percent females 15–55	1.0215	10.35***	1.0092	6.03***	1.0208	8.85***
Percent females 55+	1.0196	7.78***	1.0071	2.84***	1.0143	3.59***
Percent males 0–15	0.9971	–2.38**	1.0004	0.51	0.9993	–0.58
Percent males 15–55	1.0150	8.28***	1.0039	3.06***	1.0128	5.73***
Percent males 55+	1.0109	4.27***	1.0085	3.02**	1.0178	4.11***
Well water used	1.5508	4.11***	0.9773	–0.52	1.4062	4.79***
Piped water used	2.0893	6.83***	1.3817	6.18***	1.4408	5.29***
Pit latrine used	1.1280	1.90*	1.6353	12.51***	1.2377	3.80***
Flush latrine used	1.5165	6.42***	2.5717	9.69***	1.9512	8.91***
Urban location	2.6015	14.66***	2.9877	21.36***	2.5853	15.72***
Poor	1.3364	6.24***	1.2593	7.52***	1.3646	5.08***
Middle income	1.9199	10.07***	1.9084	14.79***	1.8602	8.73***
Rich	2.6474	11.18***	3.2145	17.97***	3.2785	13.36***

(continued)

Table 5.8—Continued

Variable	South Asia			Sub-Saharan Africa			Latin America/Caribbean		
	Country	Odds ratios	Z-statistic	Country	Odds ratios	Z-statistic	Country	Odds ratios	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	0.1088	–18.21***	Burkina Faso	0.5250	–3.65***	Brazil	10.5281	15.65***
	Nepal	0.3628	–9.65***	Cameroon	0.2213	–8.82***	Colombia	2.0363	6.55***
	Pakistan	0.2826	–12.68***	Central African Republic	0.2173	–9.95***	Dominican Republic	23.7145	17.25***
				Chad	0.0465	–18.44***	Guatemala	0.5848	–5.27***
				Comoros	0.1755	–9.67***	Haiti	0.2552	–10.49***
				Côte d'Ivoire	0.2113	–10.56***	Nicaragua	2.9183	11.47***
				Ghana	0.1167	–13.97***	Paraguay	0.9873	–0.11
				Kenya	0.0867	–16.74***	Peru	0.5116	–8.83***
				Madagascar	0.1515	–10.72***			
				Malawi	0.3969	–6.07***			
				Mali	0.1536	–12.35***			
				Mozambique	0.3732	–6.75***			
				Namibia	0.3469	–6.39***			
				Niger	0.1582	–12.39***			
				Nigeria	0.1034	–14.09***			
				Rwanda	0.1058	–14.64***			
				Senegal	0.3204	–6.59***			
				Tanzania	0.1861	–11.18***			
				Togo	0.3747	–6.53***			
				Uganda	0.1431	–12.89***			
				Zambia	0.1017	–15.28***			
				Zimbabwe	0.4555	–5.10***			
Number of observations	30,279			49,073			24,410		
Pseudo R-squared	0.327			0.245			0.396		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

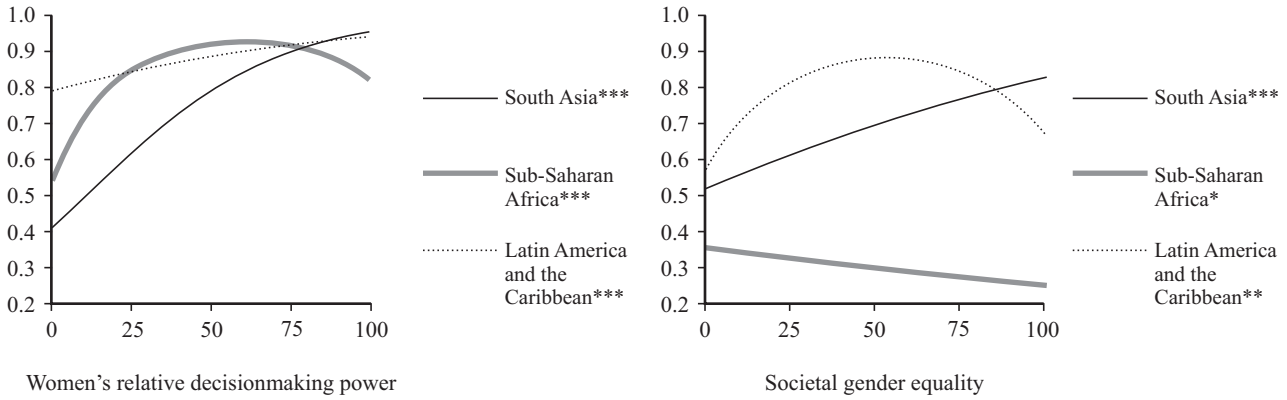
Table 5.9 Effect of women's status on prenatal and birthing care: Summary of results (OLS or logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/ Caribbean	
Variable	Odds ratio or coefficient	t-/Z-statistic	Odds ratio or coefficient	t-/Z-statistic	Odds ratio or coefficient	t-/Z-statistic
Whether woman receives any prenatal care						
Women's decisionmaking power	1.0347	9.44***	1.0829	6.86***	1.0147	4.23***
Women's decisionmaking power squared	—	—	0.9993	–4.44***	—	—
Societal gender equality	1.0151	6.56***	0.9951	–1.71*	1.0655	2.48**
Societal gender equality squared	—	—	—	—	0.9994	–2.65***
Number of observations	30,130		48,684		24,345	
Pseudo R-squared	0.244		0.316		0.209	
Whether woman who receives care has at least three visits						
Women's decisionmaking power	1.0264	6.37***	1.0077	2.92***	1.0143	3.38***
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	1.0361	3.01***	0.9982	–0.98	1.0007	0.20
Societal gender equality squared	0.9998	–1.78*	—	—	—	—
Number of observations	18,907		38,261		19,548	
Pseudo R-squared	0.143		0.102		0.121	
Number of months before birth of first visit						
Women's decisionmaking power	0.0171	5.88***	–0.0082	–1.29	–0.0131	–1.41
Women's decisionmaking power squared	—	—	0.0002	2.13**	0.0002	2.64***
Societal gender equality	0.0052	3.07***	–0.0206	–2.59**	0.0382	2.40**
Societal gender equality squared	—	—	0.0002	2.21**	–0.0003	–2.52**
Number of observations	18,907		38,261		19,548	
Pseudo R-squared	0.154		0.130		0.138	
Whether woman gives birth in a medical facility						
Women's decisionmaking power	1.0525	13.1***	1.0604	5.99***	1.0170	5.04***
Women's decisionmaking power squared	—	—	0.9995	–3.93***	—	—
Societal gender equality	1.0130	5.12***	1.0018	0.81	0.9991	–0.26
Societal gender equality squared	—	—	—	—	—	—
Number of observations	30,279		49,073		24,410	
Pseudo R-squared	0.327		0.245		0.396	

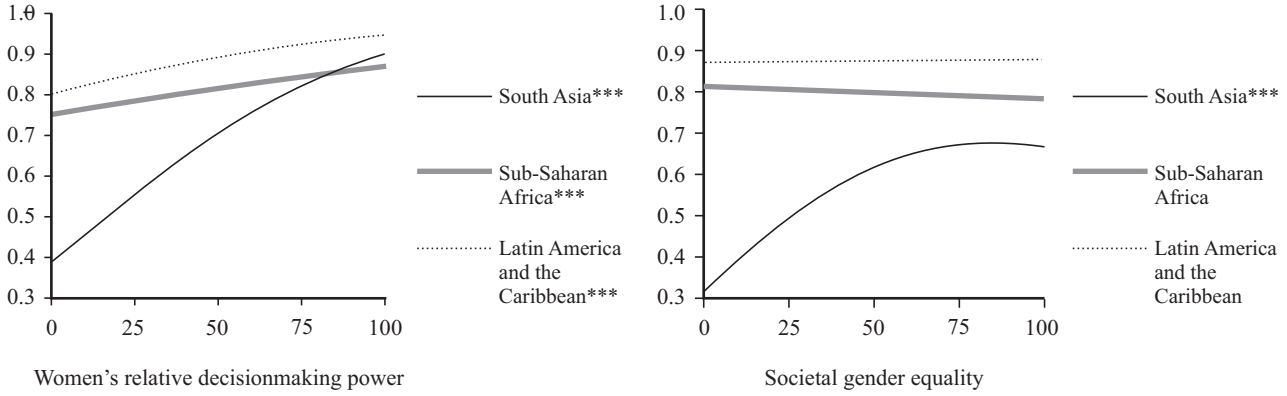
Notes: The Z-statistics and t-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Figure 5.5 Predicted prenatal care variables, by indexes of women's status

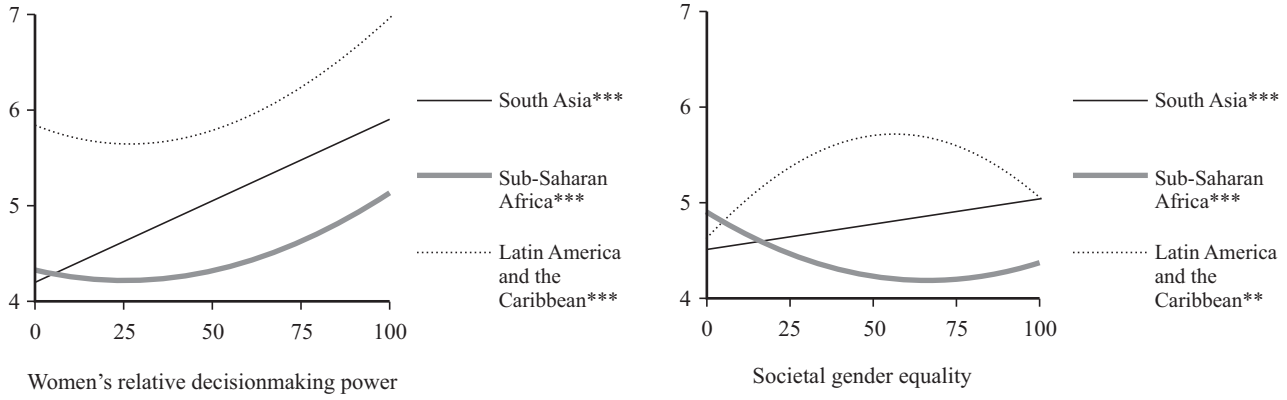
a. Whether woman receives any prenatal care (probability)



b. Whether woman who receives care has at least three visits (probability)

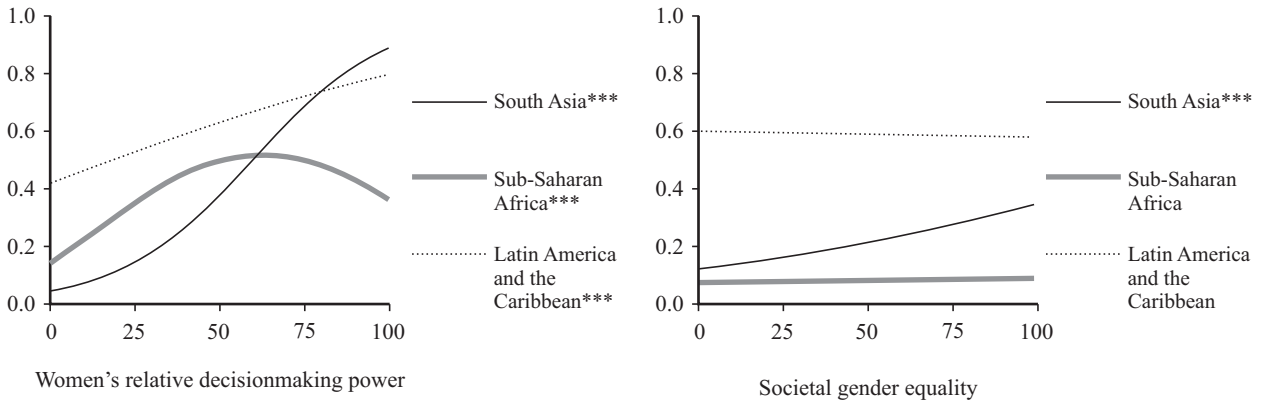


c. For woman who receives care, number of months into pregnancy at first visit



* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Figure 5.6 Predicted probability of a woman giving birth in a medical facility, by indexes of women's status



*** Significant at the 1 percent level.

SSA and 3 percent of women in LAC fall below this cutoff, again, we can say that the effect of women's relative decisionmaking power is likely to be positive for the large majority of women in these regions.

In South Asia, greater gender equality at the community level gives a powerful added boost to prenatal care above and beyond women's relative decisionmaking power within households (see Table 5.9 and the panels on the right-hand side of Figure 5.5). This may be because reproductive health care services are not as available in communities where women's health is given low priority. In LAC the effect is positive for receipt of any prenatal care and timing of the first visit for the large majority of women. At very high levels of *ge_index*, levels that only a tiny minority of women in the region have reached, the effect is negative. The results for SSA differ strangely from those of the other regions. The effect of society gender equality on receipt of prenatal care is weakly negative, although the coefficient is significant only at the 10 percent level. The effect on the timing of prenatal care is negative for the majority of women (those with *ge_index* values below 60). It seems that as equality between women and men in communities increases, women who receive prenatal care are likely to delay their first visit even more.

In terms of other independent variables that are important determinants of prenatal care, both women's and men's education are strongly associated with prenatal care and the adequacy of its use. For example, a woman with a secondary education is 3.4 times more likely to receive prenatal care in South Asia. The odds ratios for SSA and LAC are also quite large, both at 2.7. Living in an urban area, where reproductive health services are more widely available, is also a strong determinant of prenatal care for women, especially in SSA. Again, economic status is found to be a very important determinant in all regions.

Finally, some very large differences in prenatal care use across the countries within regions are rooted in country-specific factors that may be related to health service availability and access. For example, even

after controlling for differences across households in education levels and economic status, women in Pakistan are 80 percent less likely to receive prenatal care than women in India. Women in some of the Sahelian West African countries (Chad, Mali, and Niger) appear to be far less likely to use prenatal care than those living in other countries in the region. Within LAC, women in the Dominican Republic are 19 times more likely to receive prenatal care than women in Bolivia.

Turning to birthing care, women's relative decisionmaking power is positively and very strongly associated with delivery in a medical facility for women in South Asia. While less strongly so, the association is also positive in SSA (although not for women with very high decisionmaking power) and LAC (Table 5.9 and Figure 5.6). While societal gender equality gives an added boost to a woman's likelihood of giving birth in a medical facility in South Asia, it has no significant effect in either of the other regions. As for prenatal care, education and economic status have quite potent effects on birthing care. Notably, in South Asia, Bangladeshi women are 90 percent less likely to receive birthing care in a medical facility than in India due to unobserved country-specific factors. In LAC, these factors lead the women of the Dominican Republic and Brazil to be far more likely to give birth in a medical facility than other women in the region.

Conclusion

The findings presented in this chapter clearly support a strong relationship between a woman's status and her nutritional well-being, as measured by BMI, in all regions. Women's relative decisionmaking power has a positive effect on women's nutritional status in South Asia, the region where the prevalence of chronic energy deficiency among women is highest. In SSA, where the prevalence of underweight among women is much lower, a positive influence is found only for women with very low decisionmaking power relative to their husbands. In LAC, where being overweight is an emerging public health problem, women's relative decisionmaking power has a *negative* effect on women's BMI.

Patterns of prenatal and birthing care differ by region, with the situation generally being the worst in South Asia, followed by SSA and LAC. Improvements in women's relative decisionmaking power lead to increases in prenatal and birthing care for most women in all regions. In South Asia, gender equality at the community level has a strong positive influence on the use of prenatal and birthing care over and above women's relative decisionmaking power in their households.

CHAPTER 6

Results: Women's Status and Care for Children

This chapter presents the empirical results on the relationship between women's status and several caregiving practices that influence the nutritional status of children. These include breastfeeding, complementary feeding, and preventive and curative health-seeking practices. The quality of substitute caretakers for children is also considered.

Chapter 4 established that, as hypothesized, women's status has a positive relationship with children's nutritional status. Chapter 5 showed that women's nutritional status and prenatal and birthing care for women are two of the pathways mediating that relationship. Given the solid evidence that good quality care for children is vital to their nutritional status, the purpose of this chapter is to determine whether women's status positively influences the quality of care. If so, we can surmise that the selected caring practices for children are additional pathways linking women's status and child nutrition.

Child Feeding Practices

Several key feeding practices are known to be beneficial for the health and nutrition of young children. First, initiation of breastfeeding almost immediately after birth takes advantage of the newborn's intense suckling reflex, which in turn stimulates milk production. Early initiation of breastfeeding also fosters bonding of the mother and child and protects the newborn by providing a rich source of antibodies and nutrients through colostrum, the first milk (Linkages 1999; Newman 1995). Second, breast milk can provide all of the nutrients needed by the young infant, and exclusive breastfeeding ensures adequate growth until six months of age (Cohen et al. 1994). Breast milk also confers passive immunity on the young infant and significantly reduces the risk of infection (IOM 1990). For these reasons, exclusive breastfeeding is recommended during the first four to six months of life, with continued breastfeeding into the second year of a child's life (Brown, Dewey, and Allen 1998).

Third, to meet a growing child's macro- and micronutrient requirements, high-quality complementary foods should be introduced by six months of age. The introduction of foods and liquids (nutritive and nonnutritive) other than breast milk before this time not only reduces breast milk intake but also increases exposure to pathogens, especially in the unsanitary environments typical of poor households in developing countries. However, too late an introduction of complementary foods is a key risk factor for malnutrition in children (Huffman and Martin 1994; Martorell 1995). Fourth, young children have relatively high nutrient requirements per kilogram of body weight, but their intake is limited by their small gastric capacity

and naive immune systems. They are therefore entirely dependent on their caregiver to ensure that good quality complementary foods are offered frequently (Engle, Menon, and Haddad 1999). Additionally, because of the associated exposure to pathogens and interference with successful breastfeeding, bottle-feeding is not recommended (Newman 1990). Based on the availability of comparable data in the Demographic and Health Surveys (DHS) the following seven indicators of good feeding practices are employed in this section:

1. whether breastfeeding is initiated within one day of birth,
2. whether a 0- to 4-month-old child is exclusively breastfed,
3. whether a 0- to 4-month-old child has not received anything from a bottle in the past 24 hours,
4. the number of months a child is breastfed,
5. whether a 6- to 12-month-old child has received complementary foods,
6. whether a child more than 6 months old has received a high-quality food (milk, eggs, fish, poultry, or meat) in the past 24 hours,
7. the number of times per day a child older than 6 months eats.

The patterns of breastfeeding and complementary feeding practices are presented in Table 6.1. For breastfeeding, comparison by region shows substantial differences that are not consistent across indicators. While breastfeeding initiation takes place within one day of birth for only 42 percent of children in South Asia, it does so for 70 percent of children in Sub-Saharan Africa (SSA) and 74 percent in Latin America and the Caribbean (LAC). The percent of young infants (0- to 4-month olds) who are exclusively breastfed is highest in South Asia (51 percent), followed by LAC (39 percent). SSA has the lowest rate, at 31 percent. Bottle-feeding is highest in LAC; it is much lower in South Asia and SSA, where more than 80 percent of infants less than 4 months of age do not receive liquids in a bottle. The mean duration of breastfeeding is more than one year in both SSA and South Asia, but in LAC, it is only about 8 months.

Complementary feeding practices are for the most part worst in South Asia. Only 45 percent of 6- to 12-month-old infants have begun to receive complementary foods, compared with more than 80 percent in the other two regions. Although data are available only for Nepal, it also seems that dietary quality may be worst in South Asia. In Nepal, only 19 percent of children older than 6 months had been fed a high-quality food in the past 24 hours. Finally, feeding frequency—at three times per day—is equally low in South Asia (represented by Nepal) and SSA; it is much higher in LAC—almost five times per day.

The regression results for the effects of women's status on breastfeeding and complementary feeding are presented in Tables 6.2 through 6.8 and summarized in Table 6.9. Breastfeeding initiation is affected by women's status only in South Asia. There, as a woman's relative decisionmaking power increases, the likelihood that she will initiate breastfeeding within one day of birth increases steeply at low levels of relative power but declines at higher levels (the quadratic turning point is at 60) (Figure 6.1, Panel A). By contrast, as gender equality in a community increases, the likelihood of initiation within the first day rises monotonically and steeply.

The likelihood that a child under four months old will be exclusively breastfed, and, relatedly, that he or she will not receive anything from a bottle are both influenced by women's status in South Asia. In that region, as women's relative decisionmaking power increases, there is a sharp decline in the likelihood that a woman will exclusively breastfeed her child. Further, the likelihoods of both exclusive breastfeeding and bottle-feeding are only affected by women's relative decisionmaking power within households. For each one unit in-

Table 6.1 Child feeding practices, by region

	South Asia	Sub-Saharan Africa	Latin America/ Caribbean
Breastfeeding			
Percent for whom breastfeeding is initiated within one day of birth	42.0	69.7	73.9
Number of children	29,374	49,238	23,365
Percent of 0- to 4-month-olds who are exclusively breastfed[a]	50.7	31.1	38.8
Number of children	3,317	5,192	2,202
Percent of 0- to 4-month-olds who do not receive anything in a bottle[b]	87.0	82.8	46.1
Number of children	3,020	6,085	2,647
Average number of months of breastfeeding (mean)	14.0	17.2	7.8
Number of children	7,884	17,428	13,767
Complementary feeding			
Percent of 6- to 12-month-olds who have received complementary foods[c]	45.4	80.9	82.3
Number of children	5,689	10,364	4,715
Percent of > 6-month-olds who have received high quality food in the last day[d]	19.0	51.0	77.4
Number of children	3,104 (Nepal only)	32,438	19,682
Number of times per day > 6-month-olds eat (mean)[e]	3.1	3.0	4.8
Number of children	3,084 (Nepal only)	32,641	20,781

[a] Côte d'Ivoire, Malawi, Nigeria, Haiti, and Paraguay not included.
[b] Bangladesh and Mozambique not included.
[c] Haiti not included.
[d] Bangladesh, India, Pakistan, Burkina Faso, Côte d'Ivoire, Malawi, Namibia, Nigeria, Rwanda, Senegal, Dominican Republic, Haiti, and Paraguay not included.
[e] Aside from breast milk. Bangladesh, India, Pakistan, Burkina Faso, Cameroon, Malawi, Namibia, Nigeria, Rwanda, Senegal, Haiti, and Peru not included.

crease in *dm_index*, there is a 3.4 percent decrease in the likelihood of exclusive breastfeeding and a 2.1 percent decrease in the likelihood of a child not receiving anything from a bottle. Bottle-feeding is also influenced by women's relative decision-making power in SSA, where a one unit increase in *dm_index* is associated with a 2 percent decrease in the likelihood of a child not receiving anything from a bottle.

Women's relative decisionmaking power has a statistically significant and negative effect on the duration of breastfeeding in all three regions. The effect is strongest in South Asia, where just a 10-point increase in the index value results in a reduction in the duration of breastfeeding by nearly one and a half months. In SSA and LAC, the effects are also large, with a 10-point increase in the index leading to declines in the duration of breastfeeding of more than half a month. Gender equality at the community level has an added negative effect in LAC. It seems clear that increases in women's status lead them to breastfeed less.

Table 6.2 Effect of women's status on whether breastfeeding is initiated within one day of birth: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0589	4.99***	1.0024	1.11	0.9995	–0.16
Women's decisionmaking power squared	0.9995	–3.34***	—	—	—	—
Societal gender equality	1.0190	8.33***	1.0009	0.51	1.0012	0.43
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child's sex (female = 1)	1.0062	0.22	1.0483	1.89*	1.1358	3.31***
Characteristics of woman and partner	—	—	—	—	—	—
Woman's age	0.9675	–6.14***	1.0799	6.03***	0.9908	–1.73*
Woman's age squared	—	—	0.9988	–5.92***	—	—
Man's age	1.0831	6.50***	1.0032	1.68*	0.9992	–0.21
Man's age squared	0.9993	–4.36***	—	—	—	—
Woman's education: primary	1.2583	5.83***	1.1137	3.47***	1.1297	2.41**
Woman's education: secondary	1.3270	5.35***	1.1593	2.72***	1.2658	3.21***
Man's education: primary	1.2742	6.47***	1.1541	4.39***	1.0394	0.68
Man's education: secondary	1.1413	3.06***	1.1555	3.36***	1.0412	0.57
Household characteristics						
Household size	0.9907	–2.09**	0.9918	–2.74***	0.9849	–2.17**
Household size squared	—	—	—	—	—	—
Percent females 15–55	1.0014	0.87	0.9961	–2.73***	0.9922	–3.83***
Percent females 55+	0.9995	–0.25	0.9976	–0.98	0.9939	–1.79*
Percent males 0–15	0.9980	–1.78*	0.9991	–1.00	1.0033	2.62***
Percent males 15–55	0.9986	–0.99	0.9962	–3.12***	1.0002	0.10
Percent males 55+	0.9968	–1.58	0.9918	–3.17***	1.0043	1.19
Well water used	0.4567	–8.96***	0.8644	–3.38***	1.2215	3.23***
Piped water used	0.6631	–4.99***	1.0345	0.67	1.0462	0.77
Pit latrine used	1.5980	9.36***	1.1320	3.48***	1.1368	2.64***
Flush latrine used	1.4413	6.46***	0.7195	–4.09***	1.1782	2.47**
Urban location	1.0039	0.07	1.2987	5.90***	1.2900	4.93***
Poor	0.9294	–2.04**	1.0953	3.09***	0.9086	–1.70*
Middle income	0.8560	–2.97***	1.2970	6.08***	0.9643	–0.52
Rich	0.7398	–4.36***	1.4042	6.08***	1.0003	0.00

(continued)

Table 6.2—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	1.8942	8.49***	Burkina Faso	0.5551	–5.05***	Brazil	0.7217	–4.11***
	Nepal	2.5771	8.70***	Cameroon	0.6903	–2.53**	Colombia	1.4452	4.28***
	Pakistan	0.5329	–7.51***	Central African Republic	0.8850	–1.11	Dominican Republic	1.6350	5.41***
				Chad	0.3918	–8.17***	Guatemala	1.1770	2.13**
				Comoros	1.2307	1.48	Haiti	0.2935	–10.36***
				Côte d'Ivoire	0.9892	–0.10	Nicaragua	2.7983	11.13***
				Ghana	0.5257	–5.62***	Paraguay	0.4211	–9.69***
				Kenya	2.7001	8.10***	Peru	1.1112	1.72*
				Madagascar	2.0873	5.76***			
				Malawi	7.6672	13.81***			
				Mali	0.9581	–0.38			
				Mozambique	15.5097	17.10***			
				Namibia	3.4552	7.06***			
				Niger	0.6318	–3.66***			
				Nigeria	0.6197	–4.19***			
				Rwanda	0.5933	–4.30***			
				Senegal	0.5073	–5.92***			
				Tanzania	4.5899	11.85***			
				Togo	0.5826	–4.82***			
				Uganda	3.2150	9.70***			
				Zambia	6.1328	13.43***			
				Zimbabwe	5.8168	12.77***			
Number of observations	29,374			49,238			23,365		
Pseudo R-squared	0.070			0.144			0.052		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.3 Effect of women's status on whether child 0–4 months is exclusively breastfed: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	0.9656	–4.05***	1.0088	1.09	0.9961	–0.43
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	0.9956	–1.04	1.0046	0.82	0.9956	–0.63
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2 months	1.1924	1.39	0.7434	–2.05**	0.7949	–1.22
Child aged 2–3 months	0.8604	–1.28	0.4613	–5.23***	0.4272	–4.57***
Child aged 3–4 months	0.5267	–5.43***	0.2567	–9.02***	0.3005	–6.47***
Child's sex (female = 1)	1.1308	1.43	1.0051	0.05	1.1625	1.27
Characteristics of woman and partner						
Woman's age	1.0080	0.52	0.9885	–0.91	1.1948	2.86***
Woman's age squared	—	—	—	—	0.9969	–3.20***
Man's age	0.9172	–2.54**	1.0098	1.17	0.9747	–2.23**
Man's age squared	1.0008	1.98**	—	—	—	—
Woman's education: primary	0.8480	–1.49	0.9316	–0.61	0.7551	–1.89*
Woman's education: secondary	1.1888	1.12	0.8670	–0.78	0.6832	–1.74*
Man's education: primary	0.8204	–1.83**	1.3335	2.38**	0.8990	–0.66
Man's education: secondary	0.6856	–3.09**	1.2858	1.56	0.9632	–0.18
Household characteristics						
Household size	1.0032	0.31	1.0572	1.50	1.0349	1.76*
Household size squared	0.0000	0.00	0.9974	–1.72*	—	—
Percent females 15–55	0.9995	–0.11	1.0084	1.53	0.9978	–0.34
Percent females 55+	1.0160	2.61***	1.0040	0.45	1.0058	0.57
Percent males 0–15	1.0002	0.06	0.9981	–0.62	1.0012	0.32
Percent males 15–55	0.9973	–0.68	1.0004	0.09	0.9975	–0.41
Percent males 55+	0.9987	–0.22	0.9954	–0.46	0.9736	–2.47**
Well water used	1.3414	1.80*	0.8014	–1.98**	0.6936	–2.22**
Piped water used	1.0689	0.39	0.7542	–1.86*	1.1107	0.69
Pit latrine used	0.7521	–2.43**	1.2740	1.93*	0.8833	–0.95
Flush latrine used	0.5913	–3.48***	2.0024	2.46**	0.6237	–2.55**
Urban location	0.9257	–0.62	1.1847	1.22	0.7470	–2.18**
Poor	0.8430	–1.75*	1.1714	1.54	1.1821	1.06
Middle income	1.0416	0.28	1.0546	0.33	0.7786	–1.27
Rich	0.6913	–1.89**	1.4701	1.70*	0.7142	–1.47

(continued)

Table 6.3—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratios	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	0.8609	–0.93	Burkina Faso	0.0956	–4.06***	Brazil	0.4283	–3.69***
	Nepal	4.6214	9.04***	Cameroon	0.8094	–0.59	Colombia	0.1131	–7.64***
	Pakistan	0.1728	–8.05***	Central African Republic	0.1571	–3.71***	Dominican Republic	0.2128	–6.17***
				Chad	0.2319	–3.74***	Guatemala	0.6292	–2.41**
				Comoros	0.3342	–1.93*	Nicaragua	0.2275	–7.05***
				Ghana	3.3756	3.92***	Peru	0.8522	–0.98
				Kenya	1.0346	0.11			
				Madagascar	8.7986	7.84***			
				Mali	0.8997	–0.35			
				Mozambique	3.2918	4.12***			
				Namibia	0.9517	–0.12			
				Niger	0.1251	–4.91***			
				Rwanda	32.0137	9.87***			
				Senegal	0.2264	–3.57***			
				Tanzania	5.0682	5.46***			
				Togo	1.0429	0.15			
				Uganda	8.9680	7.37***			
				Zambia	2.2843	2.69***			
				Zimbabwe	0.9011	–0.26			
Number of observations	3,317			5,192			2,202		
Pseudo R-squared	0.127			0.312			0.155		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. Côte d'Ivoire, Malawi, Nigeria, Haiti, and Paraguay are not included. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.4 Effect of women's status on whether child 0–4 months receives nothing from a bottle: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	0.9789	–1.80*	0.9803	–2.10**	0.9909	–1.10
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	0.9963	–0.65	1.0049	0.70	1.0003	0.05
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2 months	0.7492	–1.33	0.5523	–2.76***	0.7700	–1.47
Child aged 2–3 months	0.6356	–2.29**	0.4688	–3.57***	0.5304	–3.66***
Child aged 3–4 months	0.4343	–4.33***	0.3968	–4.32***	0.4868	–4.18***
Child's sex (female = 1)	1.1740	1.27	1.0642	0.52	1.1817	1.54
Characteristics of woman and partner						
Woman's age	0.9732	–1.14	1.1369	2.14**	1.2081	3.33***
Woman's age squared	—	—	0.9981	–1.93**	0.9967	–3.67***
Man's age	0.9898	–0.61	0.9931	–0.77	0.9699	–3.00***
Man's age squared						
Woman's education: primary	0.6112	–2.64***	0.8210	–1.28	0.6219	–3.37***
Woman's education: secondary	0.5395	–2.81***	0.5480	–2.78***	0.5147	–3.26***
Man's education: primary	0.8291	–0.95	0.8242	–1.19	0.8898	–0.77
Man's education: secondary	0.6921	–1.73*	0.6168	–2.60***	0.7335	–1.56
Household characteristics						
Household size	0.9900	–0.63	0.9380	–2.14**	1.0046	0.26
Household size squared	—	—	1.0019	1.99**	—	—
Percent females 15–55	0.9857	–2.16**	0.9964	–0.55	0.9999	–0.02
Percent females 55+	0.9905	–1.02	0.9972	–0.29	1.0019	0.20
Percent males 0–15	0.9940	–1.17	1.0027	0.63	1.0024	0.68
Percent males 15–55	0.9951	–0.84	1.0053	0.92	0.9974	–0.48
Percent males 55+	1.0061	0.67	1.0085	0.66	0.9913	–0.91
Well water used	1.3077	1.05	0.9426	–0.38	0.9424	–0.37
Piped water used	1.1742	0.62	0.8596	–0.86	0.8562	–1.00
Pit latrine used	0.7649	–1.41	1.1823	1.02	0.8577	–1.15
Flush latrine used	0.6735	–2.01**	0.8797	–0.44	0.8111	–1.18
Urban location	0.8671	–0.84	0.5868	–3.73***	0.6619	–3.21***
Poor	0.7203	–1.79*	0.6907	–2.43**	1.1947	1.10
Middle income	0.7107	–1.47	0.4903	–4.08***	1.0600	0.31
Rich	0.6011	–1.91*	0.2845	–5.75***	0.7912	–1.08

(continued)

Table 6.4—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Nepal	4.7589	3.91***	Burkina Faso	1.3970	0.83	Brazil	0.3176	–5.20***
	Pakistan	0.3167	–6.27***	Cameroon	0.1712	–4.25***	Colombia	0.1666	–7.57***
				Central African Republic	6.3509	2.50**	Dominican Republic	0.1715	–7.21***
				Chad	0.7314	–0.92	Guatemala	0.7498	–1.50
				Comoros	0.1297	–5.08***	Haiti	0.4076	–3.61***
				Côte d'Ivoire	1.4391	0.86	Nicaragua	0.1927	–8.30***
				Ghana	0.2755	–3.38***	Paraguay	0.3336	–4.67***
				Kenya	0.2222	–4.02***	Peru	1.2884	1.51
				Madagascar	0.8453	–0.40			
				Malawi	1.2181	0.43			
				Mali	1.8811	1.45			
				Namibia	0.2091	–3.75***			
				Niger	0.9174	–0.22			
				Nigeria	0.0788	–8.28***			
				Rwanda	2.2582	1.27			
				Senegal	1.0464	0.12			
				Tanzania	0.3017	–3.09***			
				Togo	0.7210	–0.93			
				Uganda	0.9952	–0.01			
				Zambia	2.0116	1.53			
				Zimbabwe	1.2564	0.52			
Number of observations	3,020			6,085			2,647		
Pseudo R-squared	0.141			0.246			0.164		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. Bangladesh and Mozambique are not included. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.5 Effect of women's status on number of months of breastfeeding: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Women's status						
Women's decisionmaking power	–0.1464	–7.96***	–0.0654	–8.45***	–0.0799	–8.33***
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	–0.0099	–1.15	–0.0023	–0.47	–0.0199	–2.32***
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child's sex (female = 1)	0.1241	0.69	–0.0268	–0.29	0.2293	1.88*
Characteristics of woman and partner						
Woman's age	0.6329	4.57***	0.3364	6.45***	0.6613	9.12***
Woman's age squared	–0.0063	–2.71***	–0.0031	–3.71***	–0.0080	–7.05***
Man's age	–0.0912	–3.89***	–0.0170	–2.35**	–0.0450	–3.87***
Man's age squared	—	—	—	—	—	—
Woman's education: primary	0.3659	1.55	0.0716	0.63	–0.1665	–0.98
Woman's education: secondary	0.3517	1.15	–0.5529	–3.00***	–0.7810	–3.32***
Man's education: primary	–0.1462	–0.65	–0.3329	–2.90***	–0.0806	–0.45
Man's education: secondary	–0.6913	–2.80***	–0.9094	–6.34***	–0.6705	–2.99***
Household characteristics						
Household size	–0.0022	–0.10	–0.0400	–1.82*	–0.1706	–2.15**
Household size squared	—	—	0.0012	1.90*	0.0077	1.70*
Percent females 15–55	0.0439	4.28***	0.0306	5.79***	0.0089	1.24
Percent females 55+	0.0095	0.77	0.0127	1.48	0.0023	0.20
Percent males 0–15	0.0020	0.29	0.0042	1.31	0.0055	1.33
Percent males 15–55	0.0014	0.16	0.0186	4.29***	0.0172	2.65***
Percent males 55+	0.0034	0.28	0.0214	2.09**	0.0183	1.47
Well water used	–0.4380	–1.42	–0.0435	–0.35	–0.5133	–2.59**
Piped water used	–0.5982	–1.87*	–0.3272	–2.15**	–0.2047	–1.09
Pit latrine used	0.6244	2.59**	0.1184	1.05	–0.2093	–1.35
Flush latrine used	–0.2574	–0.90	–1.4168	–6.26***	–0.9868	–4.60***
Urban location	–0.9188	–3.79***	–0.5872	–4.77***	–0.6443	–4.08***
Poor	–0.1940	–0.93	0.0892	0.86	–0.3595	–2.07**
Middle income	–0.5621	–1.90*	–0.1740	–1.22	–1.0135	–4.83***
Rich	–1.5937	–4.33***	–1.2763	–7.01***	–1.7461	–6.93***

(continued)

Table 6.5—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Odds ratio	t-statistic	Latin America/Caribbean	Odds ratio	t-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	2.3301	4.55***	Burkina Faso	1.9828	6.50***	Brazil	–6.0773	–21.29***
	Nepal	3.6692	11.03***	Cameroon	–2.6490	–8.18***	Colombia	–3.4126	–12.21***
	Pakistan	–0.1363	–0.45	Central African Republic	–2.1721	–7.61***	Dominican Republic	–4.6705	–16.28***
				Chad	–2.0218	–7.51***	Guatemala	–3.5696	–14.31***
				Comoros	–5.1165	–9.18***	Haiti	0.1328	0.42
				Côte d'Ivoire	–1.3811	–4.91***	Nicaragua	–4.4289	–16.82***
				Ghana	–0.7945	–2.24**	Paraguay	–3.6345	–12.31***
				Kenya	–2.5671	–7.68***	Peru	0.2066	0.93
				Madagascar	–2.8673	–8.78***			
				Malawi	–1.0979	–3.12***			
				Mali	–0.8366	–3.15***			
				Mozambique	–1.4160	–4.44***			
				Namibia	5.0844	–10.94***			
				Niger	–0.8723	–3.21***			
				Nigeria	–3.4850	–11.95***			
				Rwanda	–0.0238	–0.05			
				Senegal	–1.4925	–5.29***			
				Tanzania	–0.0125	–0.04			
				Togo	0.8800	2.89***			
				Uganda	–3.3753	–11.29***			
				Zambia	0.1303	0.48			
				Zimbabwe	–0.9423	–3.08***			
Number of observations	7,884			17,428			13,767		
R-squared	0.095			0.167			0.220		

Notes: The t-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.6 Effect of women's status on whether child 6–12 months receives complementary foods: regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0306	4.53***	1.0222	3.70***	1.0016	0.19
Societal gender equality	1.0187	5.43***	0.9988	–0.35	0.9971	–0.44
Child characteristics						
Child aged 7–8 months	1.2154	2.10**	1.8684	7.43***	1.7760	4.45***
Child's aged 8–9 months	1.8508	6.61***	2.5200	10.60***	3.7739	9.24***
Child aged 9–10 months	2.4456	9.20***	3.9916	14.66***	4.2851	9.96***
Child aged 10-11 months	4.2328	14.45***	5.9346	16.96***	7.6985	11.76***
Child aged 11-12 months	5.2195	15.47***	7.5187	17.55***	8.9237	12.60***
Child's sex (female=1)	1.0997	1.38	0.9622	–0.60	0.9812	–0.17
Characteristics of woman and partner						
Woman's age	0.9624	–3.11***	0.9932	–0.83	0.9891	–0.68
Woman's age squared	—	—	—	—	0.0000	0.00
Man's age	1.0369	4.11***	1.0429	2.33**	1.0156	1.41
Man's age-squared	—	—	0.9996	–2.13**	—	—
Woman's education: primary	1.3352	3.29***	1.1672	1.89*	1.2665	1.92*
Woman's education: secondary	1.4155	3.02***	1.4497	2.38**	1.8753	3.16***
Man's education: primary	1.3476	3.55***	1.4789	4.85***	1.0231	0.17
Man's education: secondary	1.5014	4.26***	1.6443	4.40***	1.1498	0.74
Household characteristics						
Household size	0.9642	–4.21***	0.9939	–0.99	0.9857	–0.80
Percent females 15–55	1.0061	1.52	1.0015	0.40	1.0096	1.55
Percent females 55+	1.0033	0.65	1.0119	1.87*	1.0137	1.36
Percent males 0–15	1.0023	0.88	0.9998	–0.11	1.0053	1.49
Percent males 15–55	1.0019	0.57	1.0014	0.42	1.0095	1.78*
Percent males 55+	1.0020	0.42	1.0000	0.00	0.9894	–1.06
Well water used	0.4890	–5.35***	1.0684	0.80	0.9047	–0.66
Piped water used	0.8281	–1.37	1.0970	0.87	0.9782	–0.15
Pit latrine used	1.7777	5.79***	1.1545	1.83*	1.0337	0.29
Flush latrine used	1.2446	1.93*	0.8980	–0.54	1.0912	0.48
Urban location	0.9349	–0.70	1.1093	1.12	1.0513	0.39
Poor	0.9816	–0.24	1.0772	1.03	1.2322	1.62
Middle	0.8320	–1.63	1.0259	0.24	1.4283	2.17**
Rich	1.0492	0.32	1.1314	0.89	2.0912	3.51***

(continued)

Table 6.6—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	0.5271	–4.68***	Burkina Faso	0.0575	–13.32***	Brazil	0.4192	–4.27***
	Nepal	3.6937	10.49***	Cameroon	0.3311	–4.44***	Colombia	4.4422	5.07***
	Pakistan	1.8391	4.67***	Central African Republic	1.9067	2.14**	Dominican Republic	1.8346	2.26**
				Chad	0.5366	–2.87***	Guatemala	0.6125	–2.87***
				Comoros	1.9907	1.74*	Nicaragua	3.0413	5.23***
				Côte d'Ivoire	0.6654	–1.76*	Paraguay	13.3150	6.05***
				Ghana	0.1493	–8.02***	Peru	1.2335	1.39
				Kenya	0.8331	–0.70			
				Madagascar	1.1291	0.45			
				Malawi	2.8174	3.01***			
				Mali	0.0881	–12.08***			
				Mozambique	1.1191	0.48			
				Namibia	0.5459	–2.11**			
				Niger	0.5522	–2.88***			
				Nigeria	0.5154	–3.06***			
				Rwanda	0.5675	–2.29**			
				Senegal	0.3819	–4.34***			
				Tanzania	1.4761	1.41			
				Togo	1.0053	0.02			
				Uganda	0.2492	–6.41***			
				Zambia	2.5046	2.93***			
				Zimbabwe	1.7634	1.86**			
Number of observations	5,689			10,364			4,715		
Pseudo R-squared	0.148			0.232			0.181		

Notes: The t-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.7 Effect of women's status on whether child older than 6 months receives high-quality food: Regression results, by region (logistic regression)

	South Asia (Nepal only)		Sub-Saharan Africa		Latin America/Caribbean	
Variable	Odds ratio	Z-statistic	Odds ratio	Z-statistic	Odds ratio	Z-statistic
Women's status						
Women's decisionmaking power	1.0262	2.34**	0.9848	–1.48	0.9984	–0.49
Women's decisionmaking power squared	—	—	1.0003	1.98**	—	—
Societal gender equality	1.0060	0.99	0.9991	–0.46	0.9998	–0.05
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 12–18 months	2.3712	5.04***	2.7463	26.52***	3.0674	21.55***
Child aged 18–24 months	3.1332	6.69***	3.3662	30.17***	4.2162	26.87***
Child aged 24–30 months	3.2584	7.19***	3.8939	33.60***	5.2292	29.65***
Child aged 30–36 months	3.7775	7.78***	3.9203	32.84***	4.9030	28.66***
Child's sex (female = 1)	0.9665	–0.29	0.9986	–0.05	0.9971	–0.07
Characteristics of woman and partner						
Woman's age	0.9582	–2.37**	0.9904	–2.70***	1.0006	0.09
Woman's age squared	—	—	—	—	—	—
Man's age	1.0197	1.45	1.0083	3.35***	1.0059	1.37
Man's age squared	0.0000	0.00	—	—	—	—
Woman's education: primary	1.1768	0.95	1.3756	8.62***	1.5714	8.88***
Woman's education: secondary	1.3350	1.20	1.9530	10.41***	2.0948	8.98***
Man's education: primary	1.3248	2.26**	1.1044	2.55**	1.0487	0.84
Man's education: secondary	1.1230	0.70	1.3314	5.73***	1.4122	4.43***
Household characteristics						
Household size	1.0229	1.41	1.0217	2.21**	0.9965	–0.46
Household size squared	0.0000	0.00	0.9988	–3.14***	—	—
Percent females 15–55	1.0056	0.85	1.0006	0.35	1.0035	1.39
Percent females 55+	1.0032	0.40	0.9996	–0.13	0.9956	–1.05
Percent males 0–15	1.0028	0.69	0.9983	–1.79*	0.9992	–0.57
Percent males 15–55	1.0047	0.98	1.0031	2.19**	1.0060	2.63***
Percent males 55+	1.0058	0.69	0.9950	–1.62	0.9973	–0.62
Well water used	0.6754	–2.21**	1.0396	0.92	1.0983	1.42
Piped water used	1.1807	1.16	1.1474	2.52**	0.8764	–2.10**
Pit latrine used	0.8268	–1.16	1.1725	4.00***	1.1569	2.84***
Flush latrine used	0.4727	–1.29	1.1811	1.75*	1.2570	3.10***
Urban location	1.7251	2.61***	1.4676	8.16***	1.2053	3.34***
Poor	1.1362	1.15	1.2340	6.52***	1.1835	2.91***
Middle income	1.3381	0.94	1.5671	9.11***	1.5322	5.91***
Rich	0.9422	–0.11	1.8172	8.56***	2.0704	8.07***

(continued)

Table 6.7—Continued

Variable	South Asia (Nepal only)	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
				Central African Republic	0.3782	–7.61***	Brazil	0.4681	–8.03***
				Chad	0.7725	–2.08***	Colombia	1.6930	5.02***
				Comoros	0.6662	–3.67***	Guatemala	0.4660	–9.88***
				Côte d'Ivoire	0.8178	–1.37	Nicaragua	0.5806	–6.66***
				Ghana	0.5787	–4.64***	Peru	0.6522	–6.25***
				Kenya	0.2258	–13.17***			
				Madagascar	0.4214	–7.12***			
				Mali	0.3651	–9.40***			
				Mozambique	0.2452	–12.32***			
				Niger	0.4340	–7.84***			
				Tanzania	0.3280	–9.35***			
				Togo	0.6954	–3.41***			
				Uganda	0.1712	–15.07***			
				Zambia	0.5479	–5.12***			
				Zimbabwe	0.2948	–10.81***			
Number of observations	3,104			32,438			19,682		
Pseudo R-squared	0.055			0.113			0.140		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. Bangladesh, India, Pakistan, Burkina Faso, Cameroon, Malawi, Namibia, Nigeria, Rwanda, Senegal, Dominican Republic, Haiti, and Paraguay are not included. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.8 Effect of women's status on number of times per day child older than 6 months eats: Regression results, by region (OLS regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**
Women's status						
Women's decisionmaking power	0.0094	2.17**	0.0026	1.68*	0.0239	3.06***
Women's decisionmaking power squared	—	—	—	—	–0.0002	–2.46**
Societal gender equality	0.0022	0.85	–0.0007	–0.43	–0.0001	–0.03
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 12–18 months	0.9152	12.82***	0.3523	13.98***	0.5174	14.10***
Child aged 18–24 months	1.2115	16.79***	0.5627	20.90***	0.5812	16.01***
Child aged 24–30 months	1.4348	18.44***	0.6817	24.60***	0.6197	16.99***
Child aged 30–36 months	1.5948	20.78***	0.6952	24.69***	0.5982	17.03***
Child's sex (female = 1)	0.0107	0.23	–0.0102	–0.57	–0.0390	–1.55
Characteristics of woman and partner						
Woman's age	–0.0145	–2.13**	0.0223	2.34**	–0.0066	–1.77*
Woman's age squared	—	—	–0.0003	–2.16**	—	—
Man's age	0.0151	3.04***	0.0040	2.60***	0.0067	2.53**
Man's age squared	—	—	—	—	—	—
Woman's education: primary	0.0980	1.63	0.1065	4.61***	0.1199	3.51***
Woman's education: secondary	0.4579	3.79***	0.3368	8.86***	0.3219	6.50***
Man's education: primary	0.0735	1.39	0.0048	0.19	–0.0485	–1.33
Man's education: secondary	0.2162	3.56***	0.0439	1.39	0.0603	1.27
Household characteristics						
Household size	–0.0107	–2.04*	–0.0025	–0.98	–0.0118	–2.51**
Household size squared	—	—	—	—	—	—
Percent females 15–55	–0.0006	–0.27	0.0016	1.46	0.0018	1.22
Percent females 55+	0.0007	0.20	0.0037	1.91*	–0.0037	–1.60
Percent males 0–15	0.0009	0.59	–0.0006	–1.05	–0.0004	–0.48
Percent males 15–55	0.0018	0.80	0.0017	1.88*	0.0029	2.24**
Percent males 55+	0.0060	1.81*	–0.0002	–0.11	–0.0003	–0.14
Well water used	–0.1113	–1.86*	0.0235	0.83	0.1068	2.30**
Piped water used	0.1054	1.82*	–0.0234	–0.61	0.0748	1.79*
Pit latrine used	0.0134	0.19	0.0203	0.79	0.0539	1.54
Flush latrine used	–0.2659	–1.22	0.0483	0.94	0.1762	3.74***
Urban location	–0.1147	–1.42	0.1655	4.96***	0.0735	1.93*
Poor	0.1215	2.50**	0.0871	3.95***	0.1219	3.20***
Middle income	0.2371	1.83*	0.2101	6.45***	0.1437	3.04***
Rich	0.1028	0.45	0.3768	8.05**	0.3223	5.80***

(continued)

Table 6.8—Continued

Variable	South Asia	Coefficient	t-statistic	Sub-Saharan Africa	Coefficient	t-statistic	Latin America/Caribbean	Coefficient	t-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
				Central African Republic	–1.3623	–16.20***	Brazil	0.5570	8.78***
				Chad	–1.0197	–11.76***	Colombia	0.9287	15.33***
				Comoros	–0.3095	–1.53	Dominican Republic	1.1877	18.25***
				Côte d'Ivoire	–4.2101	–61.82***	Guatemala	–0.7453	–13.96***
				Ghana	–1.4366	–17.55	Nicaragua	–0.0787	–1.24
				Kenya	–0.5381	–6.66***	Peru	–0.6361	–13.59***
				Madagascar	–1.0133	–13.26***			
				Mali	–0.4612	–5.49***			
				Mozambique	–1.3381	–17.64***			
				Niger	–0.2270	–2.27**			
				Tanzania	–0.9075	–11.55***			
				Togo	–0.1527	–1.44			
				Uganda	–2.1840	–29.30***			
				Zambia	–1.0372	–13.86***			
				Zimbabwe	–1.0522	–13.70***			
Number of observations	3,084			32,641			20,781		
R-squared	0.239			0.357			0.238		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. Bangladesh, India, Pakistan, Burkina Faso, Cameroon, Malawi, Namibia, Nigeria, Rwanda, Senegal, Haiti, and Paraguay are not included. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.9 Effect of women's status on breastfeeding and complementary feeding: Summary of results (OLS or logistic regression)

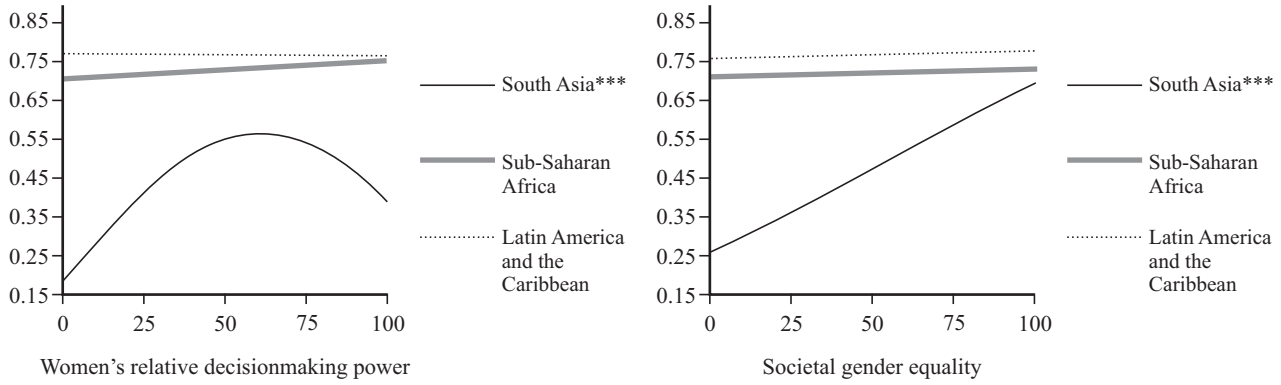
	South Asia		Sub-Saharan Africa		Latin America/ Caribbean	
Variable	Odds ratio or coefficient	t- / Z-statistic	Odds ratio or coefficient	t- / Z-statistic	Odds ratio or coefficient	t- / Z-statistic
Whether breastfeeding is initiated within one day of birth						
Women's decisionmaking power	1.0589	4.99***	1.0024	1.11	0.9995	0.16
Women's decisionmaking power squared	0.9995	–3.34***				
Societal gender equality	1.0190	8.33***	1.0009	0.51	1.0012	0.43
Societal gender equality squared						
Number of observations	29,374		49,238		23,365	
Pseudo R-squared	0.070		0.144		0.052	
Whether child 0–4 months is exclusively breastfed						
Women's decisionmaking power	0.9656	–4.05***	1.0088	1.09	0.9961	–0.43
Societal gender equality	0.9956	–1.04	1.0046	0.82	0.9956	–0.63
Number of observations	3,317		5,192		2,202	
Pseudo R-squared	0.127		0.312		0.155	
Whether child 0–4 months receives nothing from a bottle						
Women's decisionmaking power	0.9789	–1.80*	0.9803	–2.10***	0.9909	–1.1
Societal gender equality	0.9963	–0.65	1.0049	0.70	1.0003	0.05
Number of observations	3,020		6,085		2,647	
Pseudo R-squared	0.141		0.246		0.164	
Number of months of breastfeeding						
Women's decisionmaking power	–0.1464	–7.96***	–0.0654	–8.45***	–0.0799	–8.33***
Societal gender equality	–0.0099	–1.15	–0.0023	–0.47	–0.0199	–2.32***
Number of observations	7,884		17,428		13,767	
R-squared	0.095		0.167		0.220	
Whether child 6–12 months receives complementary foods						
Women's decisionmaking power	1.0306	4.53***	1.0222	3.70***	1.0016	0.19
Societal gender equality	1.0187	5.43***	0.9988	–0.35	0.9997	–0.44
Number of observations	5,689		10,364		4,715	
Pseudo R-squared	0.148		0.232		0.181	
Whether child >6 months receives high quality food[a]						
Women's decisionmaking power	1.0262	2.34**	0.9848	1.48	0.9984	–0.49
Women's decisionmaking power squared			1.0003	1.98**		
Societal gender equality	1.0060	0.99	0.9991	–0.46	0.9998	–0.05
Number of observations	3,104		32,438		19.682	
Pseudo R-squared	0.055		0.113		0.140	
Number of times per day child >6 months eats[a]						
Women's decisionmaking power	0.0094	2.17**	0.0026	1.68*	0.0239	3.06***
Women's decisionmaking power squared					–0.0002	–2.46**
Societal gender equality	0.0022	0.85	–0.0007	–0.43	–0.0001	–0.03
Number of observations	3,084		32,641		20,781	
R-squared	0.239		0.357		0.238	

Notes: The Z-statistics and t-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation.
* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.
[a]Nepal only.

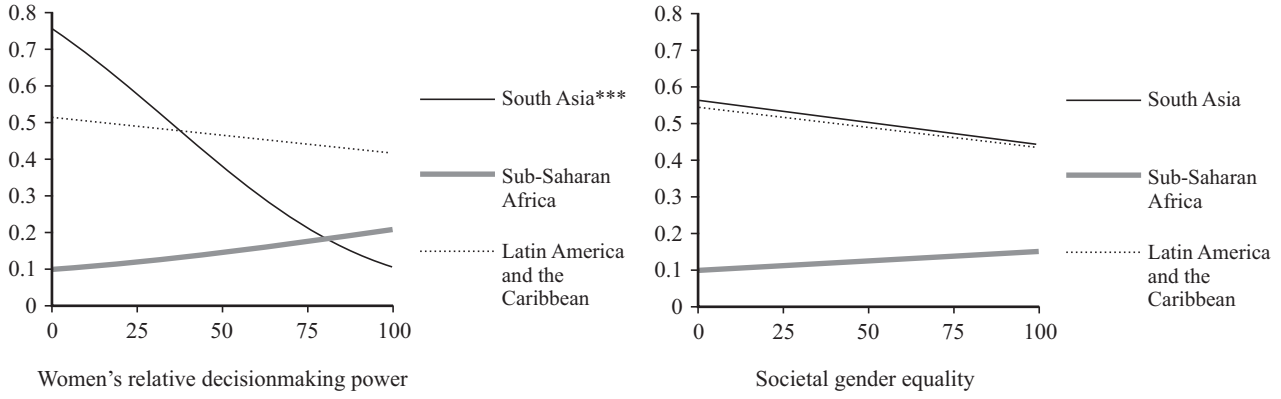
In contrast to breastfeeding, women's relative decisionmaking power has a decidedly positive effect on complementary feeding (Table 6.9 and Figure 6.2). This is not surprising since complementary feeding is directly related to how much of household income is allocated to food for children. The probability of a child 6–12 months of age receiving complementary foods is positively related to women's decisionmaking power in South Asia and SSA. It has no statistically significant effect in LAC. A similar pattern is found for the effect of women's relative decisionmaking power on the quality of food given to children. In the case of feeding frequency, the effect is significant in all regions, although it flattens out and becomes negative at very high index levels in LAC. Similar to the breastfeeding variables, the influence of women's decisionmaking power on complementary feeding is strongest in South Asia. For example, the likelihood that a child 6–12 months of age (in Nepal)

Figure 6.1 Predicted breastfeeding variables, by indexes of women's status

a. Whether breastfeeding is initiated within one day of birth (probability)



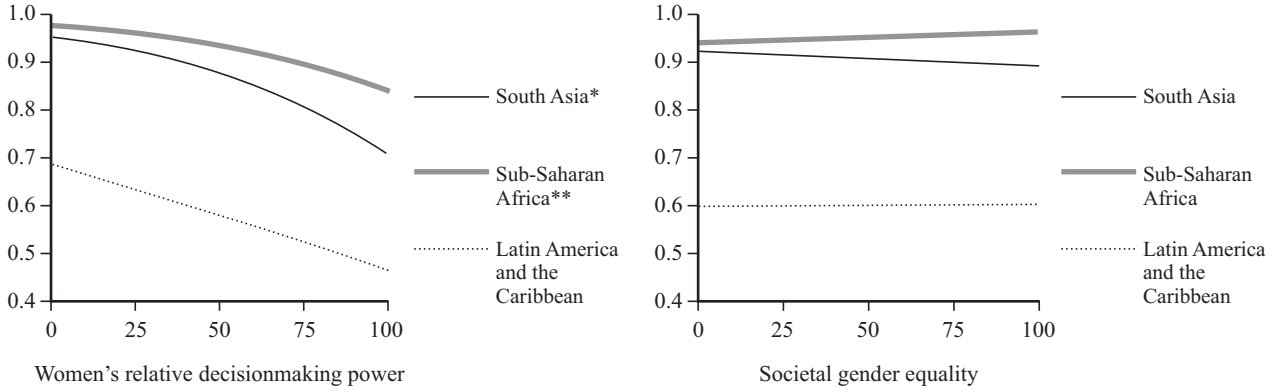
b. Whether 0- to 4-month-old is exclusively breastfed (probability)



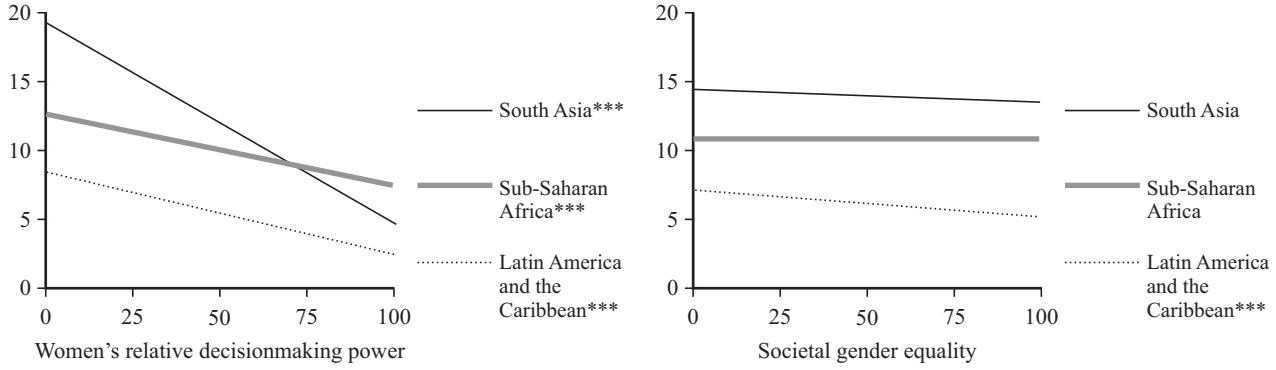
*** Significant at the 1 percent level.

Figure 6.1 Continued

c. Whether 0- to 4-month-old does not receive anything from a bottle (probability)



d. Number of months of breastfeeding



* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

receives complementary foods increases by 3 percent for each unit increase in *dm_index*. That likelihood declines to 2.2 percent for SSA, while there is no significant increase in the likelihood for LAC. Increased gender equality at the community level gives a strong additional boost to complementary feeding in South Asia.

It is interesting to note that education has a similar pattern of influence on child feeding practices as women's relative decisionmaking power. With one exception (men's education in LAC), both women's and men's education are positively associated with the timing of breastfeeding initiation. While women's education is not associated with exclusive breastfeeding in South Asia and SSA and is only weakly so in LAC, in all three regions the more educated a woman is the more likely she is to

make use of a bottle when feeding her child. Both women's and men's education have a negative influence on breastfeeding duration in both SSA and LAC. However, only men's education has a negative influence in South Asia, where the child of a man having a secondary education can be expected to be breastfed for half a month less than a child of a man without secondary education.

Education increases the quality of complementary feeding, including timing, quality, and frequency, in all regions. In South Asia and SSA, the higher the educational achievement of both women and men, the greater is the likelihood that a child aged 6–12 months will have received complementary foods. This positive influence is stronger for men's education than women's, especially in SSA. In LAC, it only applies to women's education. Both women's and men's education are also positively associated with diet quality, women's education in South Asia being the only exception. Education of both partners is positively associated with feeding frequency in South Asia, but only women's education is in the other regions.

With the exception of breastfeeding initiation, being located in an urban area is negatively associated with the quality of breastfeeding practices, especially breastfeeding duration, in all three regions. It is positively associated with diet quality, especially in South Asia, where children older than six months are 76 percent more likely to receive a high quality food than in rural areas. It is positively associated with feeding frequency in SSA and LAC.

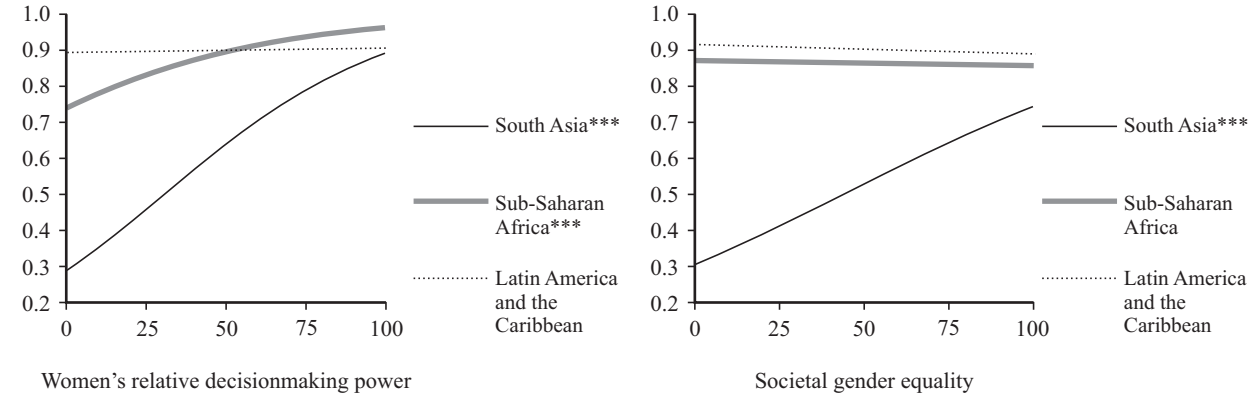
Interestingly, increased economic status generally does not raise the quality of breastfeeding practices. The only exception is the initiation of breastfeeding within one day of birth, which has a greater chance of occurring as economic status rises in SSA. The chances are lower as households become richer in South Asia. The higher the economic status of a child's household, the shorter is the duration of breastfeeding in all three regions. By contrast, the quality (with the exception of South Asia) and frequency of complementary feeding are positively associated with economic status in all regions. The relationship is consistently strong for timing, quality, and frequency of complementary feeding in LAC.

There are strong country-specific effects for some of the breastfeeding practices. For example, breastfeeding is three times more likely to have been initiated within one day of birth in Nepal than in India. It is 15 times more likely to have been initiated within one day of birth in Mozambique than in Benin. The children of Rwanda appear to have a strong advantage compared with those of other SSA countries when it comes to exclusive breastfeeding in the first four months of life. Those of Burkina Faso, where only 1.6 percent of children in their first four months are exclusively breastfed, are at a strong disadvantage. Finally, after controlling for child and household characteristics, breastfeeding duration is six months shorter in Brazil than in Bolivia. These country differences most likely arise from wide differences in cultural beliefs across countries, as well as in exposure to media and health messages.

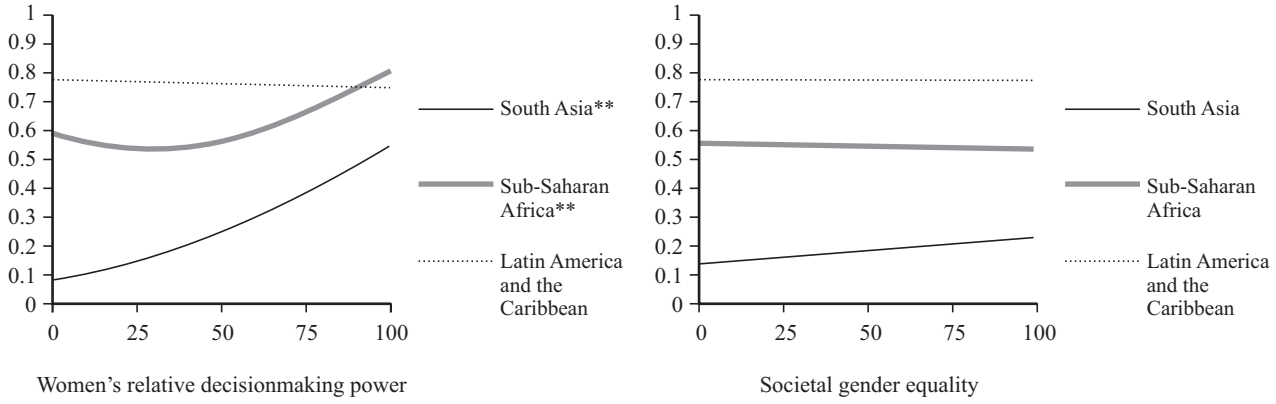
On a final note, young children (0- to 1-year-olds, the age group most likely to still be breastfeeding) whose mothers work for cash differ little from those who do not in terms of breastfeeding duration. Women in LAC who work for cash breastfeed for shorter periods than women who do not, possibly because work environments in urban areas are incompatible with childcare. In South Asia and SSA, where work environments are generally less formal, women who work for cash are actually found to breastfeed longer than those who do not. These numbers imply that the reason why women breastfeed less when they achieve greater decisionmaking power is not because of the inconveniences of breastfeeding while working but because they prefer to do so. The underlying reason may be that they are unaware of the benefits to their child of breastfeeding or they have

Figure 6.2 Predicted complementary feeding variables, by indexes of women's status

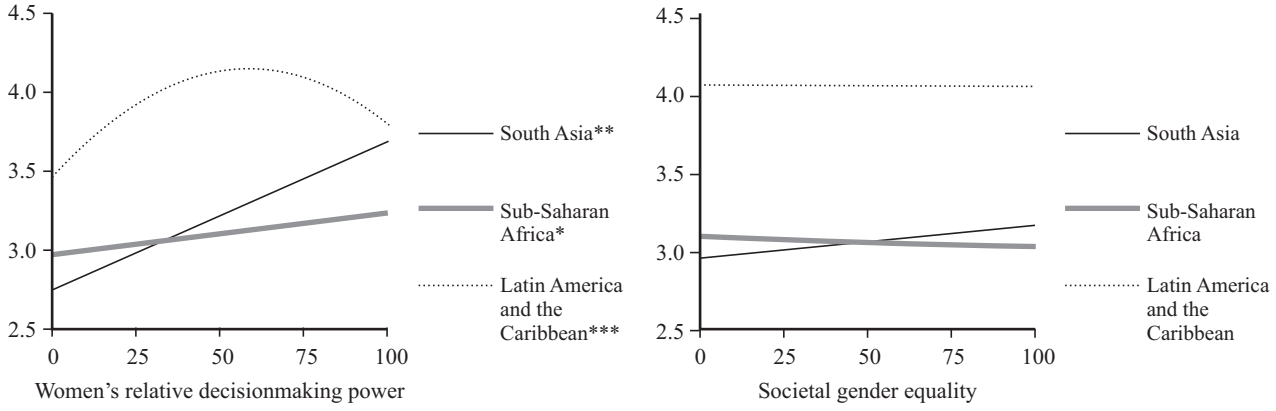
a. Whether 6- to 12-month-old receives complementary feeding (probability)



b. Whether > 6-month-old receives high quality food (in the last 24 hours)



c. Number of times per day > 6-month-old eats



* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

been exposed to media messages promoting the use of bottles and formula.

Health-Seeking Practices

Health-seeking behavior is complex and includes both preventive and curative aspects. Infectious diseases such as diphtheria, polio, tetanus, diarrhea, and respiratory infections are the leading causes of morbidity and mortality in young children. Preventive measures such as immunization and timely and appropriate treatment are important caregiving practices that may be influenced by women's status. Based on the available data, in this section treatment for diarrhea and immunization of children are used as representative measures of health-seeking practices.

The basis for determining whether diarrhea has been treated is the identification of children having had diarrhea in the past two weeks, a short-term morbidity measure. Children having diarrhea are considered to have been treated (or treatment was at least sought) if one of two conditions is satisfied. First, the child was taken for treatment to a public or private health facility or practitioner. Second, he or she received home-based treatment, including oral rehydration or increased liquids or both. Note that the measure employed does not capture the adequacy of treatment.

The World Health Organization (WHO) recommends a schedule of eight basic vaccinations in the first year of life for children in developing countries. This includes one dose of Bacillus Calmette-Guerin (BCG) soon after the child's birth to prevent tuberculosis; three doses of polio vaccine to protect against poliomyelitis; three doses of diptheria, pertussis, and tetanus (DPT) vaccine to protect against those diseases; and a vaccination against measles. It is recommended that the DPT and polio vaccines be given at 6, 10, and 14 weeks of age and that the measles vaccine be given at 9 months (Sommerfelt and Piani 1997). Two measures of child vaccinations are used as dependent variables in this section: (1) whether the child has ever been vaccinated and (2) whether the child has received the recommended vaccinations for her or his age.[41]

Table 6.10 Health and health–seeking practices, by region

Variable	South Asia	Sub-Saharan Africa	Latin America/ Caribbean
Percent of children with diarrhea who received any treatment	85.0	82.82	85.6
Number of children	6,774	14,402	6,328
Percent of children ever vaccinated	82.55	77.65	94.43
Number of children	33,252	55,460	28,391
Percent of children receiving the recommended vaccinations	42.9	46.5	63.1
Number of children	32,372	54,744	27,931

Source: Authors' calculations.

[41]Following the WHO recommendations and allowing for a three-month "grace period," children younger than 3 months old are considered to have received the recommended vaccinations if they received at least one vaccination, children in their third month if they received three vaccinations, and children in their fourth month if they received five vaccinations. Children between 5 and 9 months are expected to have received at least seven of the vaccinations, and children 10 months and older, eight of the vaccinations. Note that the measure does not match the particular vaccination each child received but only the number of vaccinations.

Table 6.10 presents descriptive statistics on the health-seeking practices by region. Note that the prevalence of diarrhea based on maternal recall for the two weeks prior to the interview is 19 percent in South Asia, 24 percent in SSA, and 19 percent in LAC. A large proportion (>80 percent) of the children with diarrhea received some treatment, with no major differences by region. Vaccination coverage based on reports of a child being "ever vaccinated" is almost universal in LAC (about 94 percent), followed by South Asia (83 percent). In SSA, about three-quarters of children—78 percent—receive at least one vaccination. Similar wide regional differences can be seen in the percentage of children who receive the recommended vaccinations for their age. Almost two-thirds of children in LAC receive the recommended vaccinations, while in SSA and South Asia, the proportion is less than one-half.

The effects of the women's status variables on health-seeking practices for the three regions are presented in Tables 6.11–6.13 and summarized in Table 6.14. For diarrhea treatment, women's relative decisionmaking power has a significant effect only in South Asia. In that region, it exhibits an inverted U-shape: it is very strongly positive until an index level of around 50 is reached, after which it becomes strongly negative (Figure 6.3). Given that 97 percent of sample women in South Asia have a *dm_index* value less than 50, the effect is likely to be positive for most households in the region. The regressions reveal a weak positive influence of societal gender equality on diarrhea treatment in South Asia and no significant influence in the other regions.

The effect of women's status on children's receipts of vaccinations is significant for all regions. In South Asia and SSA, women's relative decisionmaking power has a positive influence on the probability of a child ever being vaccinated as well as receiving the recommended vaccinations. The effect on a child's receipt of the recommended vaccinations is by far the strongest for South Asia. It exhibits an inverted U-shape for both vaccination indicators in SSA. The turning point of around 60 implies that the influence of women's decisionmaking power relative to their husbands is positive for the 99 percent of women with low and moderate levels of such power. In LAC, women's relative decisionmaking power has a positive and significant influence on children's receipt of the recommended vaccinations for the large majority of sample women.

Societal gender equality gives an additional boost to children's vaccination receipts. For both vaccination indicators and for all three regions, its influence is curvilinear, being positive for women living in communities with low and moderate levels of gender equality, that is, the large majority of women. These results may reflect the greater attention to both women's and children's health needs in communities with higher gender equality. In contrast to the regional rankings of the other care indicators discussed so far, the increased probability that a child receives at least one vaccination as gender equality improves is by far the largest for LAC.

In terms of the other independent variables, education and economic status have positive and significant effects in all regions.[42] Urbanization is associated with increased likelihoods of diarrhea treatment and vaccination receipts in South Asia and SSA but with vaccination receipts only in LAC. This result is to be expected, given the greater access to health services in urban areas. Strong country-specific effects may also be related to country differences in health service availability. It is of note

[42]An exception is that economic status has no significant influence on diarrhea treatment in LAC.

Table 6.11 Effect of women's status on whether child's diarrhea is treated: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0851	2.60***	1.0085	1.52	0.9951	–0.73
Women's decisionmaking power squared	0.9991	–2.18**	—	—	—	—
Societal gender equality	1.0065	1.83*	0.9986	–0.42	1.0012	0.23
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2 years	1.9237	8.33***	1.6659	8.42***	1.9439	8.17***
Child aged 2–3 years	1.9582	7.37***	1.5761	6.50***	1.8433	6.39***
Child's sex (female = 1)	0.9210	–1.04	0.9515	–0.80	0.8573	–1.77*
Characteristics of woman and partner						
Woman's age	0.9808	–1.43	1.0721	2.29**	1.1021	2.07**
Woman's age squared	—	—	0.9988	–2.43**	0.9987	–1.89*
Man's age	1.0158	1.59	1.0096	1.99**	1.0022	0.28
Man's age squared	—	—	—	—	—	—
Woman's education: primary	1.1888	1.70*	1.2972	3.36***	1.2304	2.00*
Woman's education: secondary	1.6977	3.20***	1.6378	3.22***	1.6142	2.84***
Man's education: primary	1.1733	1.86*	1.3755	4.56***	1.2336	2.16**
Man's education: secondary	1.8216	5.61***	1.5937	4.62***	1.6437	3.26***
Household characteristics						
Household size	0.9915	–0.88	1.0099	1.61	1.0118	0.73
Household size squared	—	—	—	—	—	—
Percent females 15–55	1.0012	0.26	0.9989	–0.31	0.9993	–0.13
Percent females 55+	1.0048	0.84	0.9976	–0.41	1.0038	0.46
Percent males 0–15	0.9973	–0.97	0.9990	–0.45	0.9951	–1.70*
Percent males 15–55	0.9978	–0.57	1.0038	1.21	0.9979	–0.46
Percent males 55+	0.9938	–1.10	0.9922	–1.26	0.9882	–1.50
Well water used	1.1503	1.26	1.1487	1.76*	1.1342	0.93
Piped water used	1.3094	2.27**	1.0729	0.74	1.0835	0.73
Pit latrine used	0.9104	–0.86	0.9479	–0.72	1.2946	2.63***
Flush latrine used	1.0183	0.12	1.3123	1.28	1.2875	1.66*
Urban location	1.3360	2.54**	1.2297	2.34**	1.1117	0.97
Poor	1.3407	3.81***	1.2564	3.45***	1.0880	0.82
Middle income	1.8056	3.65***	1.4512	3.91***	1.1598	1.08
Rich	1.4734	1.80*	1.6056	3.34***	1.0061	0.03

(continued)

Table 6.11—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	3.4786	3.83***	Burkina Faso	0.3462	–5.05***	Brazil	0.2226	–5.24***
	Nepal	0.4586	–7.98***	Cameroon	0.5072	–2.41**	Colombia	0.2007	–6.00***
	Pakistan	0.6006	–3.54***	Central African Republic	0.9692	–0.12	Dominican Republic	2.6667	1.31
				Chad	0.5503	–2.98***	Guatemala	0.0560	–12.23***
				Comoros	1.0366	0.11	Haiti	0.1800	–6.41***
				Côte d'Ivoire	0.3639	–4.95***	Nicaragua	2.7557	2.30**
				Ghana	0.8394	–0.66	Paraguay	0.3607	–2.82***
				Kenya	0.7133	–1.26	Peru	0.1509	–8.29***
				Madagascar	0.5974	–2.34**			
				Malawi	0.5777	–2.38**			
				Mali	0.3528	–5.42***			
				Mozambique	2.1369	2.57**			
				Namibia	0.4489	–3.06***			
				Niger	11.1335	6.95***			
				Nigeria	0.1787	–8.57***			
				Rwanda	0.2818	–6.00***			
				Senegal	0.2536	–6.91***			
				Tanzania	0.7892	–0.97			
				Togo	7.9960	5.86***			
				Uganda	0.6280	–2.21**			
				Zambia	0.4860	–3.34***			
				Zimbabwe	0.6565	–1.67*			
Number of observations	6,774			14,402			6,328		
Pseudo R-squared	0.099			0.120			0.161		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.12 Effect of women's status on whether child has ever been vaccinated: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0085	2.16**	1.0674	6.26***	1.0031	0.68
Women's decisionmaking power squared	—	—	0.9994	–4.48***	—	—
Societal gender equality	1.0370	4.11***	1.0186	1.35	1.1128	4.00***
Societal gender equality squared	0.9997	–3.85***	0.9998	–1.71*	0.9991	–3.94***
Child characteristics	—	—	—	—	—	—
Child aged 1–2 years	2.5728	24.64***	2.7302	32.14***	4.2116	24.58***
Child aged 2–3 years	2.7554	25.61***	3.2178	34.86***	5.4267	26.30***
Child's sex (female = 1)	0.8175	–5.84***	1.0028	0.10	0.9947	–0.10
Characteristics of woman and partner						
Woman's age	1.0231	1.05	0.9833	–4.75***	1.1148	3.66***
Woman's age squared	0.0000	0.00**			0.9983	–3.69***
Man's age	1.0045	0.99	1.0127	5.26***	1.0051	0.83
Man's age squared	—	—	—	—	—	—
Woman's education: primary	1.7659	10.96***	1.5173	10.47***	1.5544	6.39***
Woman's education: secondary	2.8352	12.84***	1.9228	7.79***	2.3754	6.66***
Man's education: primary	1.3178	6.42***	1.5880	11.41***	1.1331	1.79*
Man's education: secondary	1.5975	9.25***	2.3590	14.47***	1.4257	3.32***
Household characteristics						
Household size	0.9415	–4.36***	1.0117	2.93***	0.9430	–6.00***
Household size squared	0.0000	0.00**	—	—	—	—
Percent females 15–55	1.0090	3.67***	1.0017	0.97	1.0126	3.39***
Percent females 55+	1.0109	3.90***	1.0058	1.94*	1.0168	2.74***
Percent males 0–15	0.9946	–4.16***	1.000	0.01	0.9980	–1.08
Percent males 15–55	1.0009	0.46	1.0016	1.02	1.0027	0.90
Percent males 55+	1.0053	1.90*	0.9965	–1.12	0.9942	–0.99
Well water used	1.3753	3.37***	1.1644	2.86***	1.4000	3.96***
Piped water used	1.6499	5.34***	1.4930	6.09***	1.4259	4.20***
Pit latrine used	0.7293	–5.19***	1.3428	6.62***	1.1092	1.51
Flush latrine used	1.1641	1.94*	1.7927	3.98***	1.4442	3.27***
Urban location	1.2051	2.66***	1.8475	10.17***	1.4292	4.01***
Poor	1.3125	6.41***	1.3371	8.55***	1.1372	1.84*
Middle income	1.7171	7.68***	1.8279	10.80***	1.2592	2.55**
Rich	1.8471	5.75***	2.4096	10.54***	1.7161	3.80***

(continued)

Table 6.12—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	1.5128	4.49***	Burkina Faso	0.8503	–0.96	Brazil	1.6862	3.48***
	Nepal	0.9460	–0.53	Cameroon	0.3671	–5.56***	Colombia	2.2911	5.13***
	Pakistan	0.5291	–7.82***	Central African Republic	0.3699	–5.90***	Dominican Republic	3.3049	5.78***
				Chad	0.1568	–11.39***	Guatemala	1.0849	0.71
				Comoros	0.9619	–0.18	Haiti	0.8179	–1.21
				Côte d'Ivoire	0.3355	–6.56***	Nicaragua	4.5414	10.84***
				Ghana	1.0784	0.40	Paraguay	0.5603	–4.28***
				Kenya	1.2165	1.05	Peru	3.8853	12.16***
				Madagascar	0.5004	–3.73***			
				Malawi	1.4834	2.23**			
				Mali	0.3515	–6.78***			
				Mozambique	0.7187	–1.89*			
				Namibia	1.6294	2.52**			
				Niger	0.2740	–8.21***			
				Nigeria	0.1507	–11.90***			
				Rwanda	3.5287	6.17***			
				Senegal	0.5417	–3.70***			
				Tanzania	1.6376	2.56**			
				Togo	0.6820	–2.34**			
				Uganda	0.3786	–6.07***			
				Zambia	1.3086	1.59			
				Zimbabwe	1.7914	2.84***			
Number of observations	33,252			55,460			28,391		
Pseudo R-squared	0.131			0.226			0.207		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.13 Effect of women's status on whether child has received recommended vaccinations: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	Odds ratio	Z-statistic	Odds ratio	Z-statistic	Odds ratio	Z-statistic
Women's status						
Women's decisionmaking power	1.0568	4.81***	1.0441	5.25***	1.0340	3.31***
Women's decisionmaking power squared	0.9997	–1.86***	0.9997	–3.04***	0.9997	–2.55***
Societal gender equality	1.0435	4.23***	1.0355	3.22***	1.0543	3.18***
Societal gender equality squared	0.9997	–3.34***	0.9997	–3.43***	0.9995	–3.16***
Child characteristics						
Child aged 1–2 years	1.5853	14.21***	1.5645	17.30***	1.8405	18.35***
Child aged 2–3 years	1.8578	19.33***	1.9701	24.26***	2.4612	25.81***
Child's sex (female = 1)	0.7969	–7.95***	1.0035	0.15	1.0063	0.19
Characteristics of woman and partner						
Woman's age	0.9527	–8.92***	0.9804	–6.65***	1.0448	2.14**
Woman's age squared	—	—	—	—	0.9991	–3.05***
Man's age	1.1538	9.57***	1.0341	5.00***	1.0415	3.48***
Man's age squared	0.9985	–7.39***	0.9998	–3.18***	0.9997	–2.33**
Woman's education: primary	1.4144	9.16***	1.2998	8.96***	1.2184	4.50***
Woman's education: secondary	1.7573	10.94***	1.5696	8.90***	1.3869	5.21***
Man's education: primary	1.4628	10.34***	1.3992	10.86***	1.1265	2.57***
Man's education: secondary	1.7822	13.36***	1.8460	15.30***	1.2254	3.37***
Household characteristics						
Household size	0.9514	–4.43***	1.0030	0.95	0.9665	–5.99***
Household size squared	1.0011	2.27**	—	—	—	—
Percent females 15–55	1.0102	5.94***	1.0010	0.74	1.0068	3.65***
Percent females 55+	1.0098	4.87***	1.0036	1.57	1.0093	2.95***
Percent males 0–15	0.9951	–4.54***	0.9994	–0.69	0.9986	–1.35
Percent males 15–55	1.0036	2.53**	1.0022	1.95*	1.0055	3.32***
Percent males 55+	1.0042	2.09**	0.9981	–0.74	1.0009	0.28
Well water used	1.1636	1.89*	1.0249	0.62	1.1011	1.66*
Piped water used	1.7945	7.31***	1.1881	3.79***	1.2119	3.49***
Pit latrine used	0.9633	–0.79	1.3722	9.16***	1.1990	4.13***
Flush latrine used	1.0416	0.76	1.4758	5.11***	1.1378	2.21**
Urban location	1.0317	0.63	1.5195	10.13***	1.0638	1.39
Poor	1.3906	9.55***	1.2127	6.73***	1.1627	3.23***
Middle income	1.5766	8.94***	1.6040	11.77***	1.1658	2.70***
Rich	1.6495	7.43***	1.9186	11.79***	1.3733	4.79***

(continued)

Table 6.13—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	2.4093	12.16***	Burkina Faso	0.4082	–7.09***	Brazil	4.3968	18.77***
	Nepal	2.0471	8.86***	Cameroon	0.2250	–11.12***	Colombia	3.4128	16.56***
	Pakistan	1.3186	3.89***	Central African Republic	0.2586	–10.94***	Dominican Republic	1.5859	5.86***
				Chad	0.1023	–17.03***	Guatemala	2.1276	10.19***
				Comoros	0.6628	–2.73***	Haiti	1.7524	4.90***
				Côte d'Ivoire	0.2724	–11.07***	Nicaragua	9.0087	27.88***
				Ghana	0.7017	–2.76***	Paraguay	1.1847	1.85*
				Kenya	0.5102	–5.70***	Peru	4.5380	25.75***
				Madagascar	0.3309	–8.39***			
				Malawi	1.5816	3.81***			
				Mali	0.2857	–10.82***			
				Mozambique	0.7054	–2.90***			
				Namibia	0.7010	–2.32***			
				Niger	0.2530	–11.13***			
				Nigeria	0.2031	–13.95***			
				Rwanda	4.3056	10.57***			
				Senegal	0.5965	–4.05***			
				Tanzania	1.1323	1.02			
				Togo	0.3496	–8.67***			
				Uganda	0.3537	–9.06***			
				Zambia	1.0879	0.70			
				Zimbabwe	1.1973	1.56			
Number of observations	32,372			54,744			27,931		
Pseudo R-squared	0.119			0.186			0.116		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Table 6.14 Effect of women's status on health–seeking practices: Summary of results (logistic regression)

Variable	South Asia		Sub-Saharan Africa		Latin America/ Caribbean	
	Odds ratio	Z-statistic	Odds ratio	Z-statistic	Odds ratio	Z-statistic
Whether diarrhea is treated						
Women's decisionmaking power	1.8051	2.60***	1.0085	1.52	0.9951	–0.73
Women's decisionmaking power squared	0.9991	–2.18**	—	—	—	—
Societal gender equality	1.0065	1.83*	0.9986	–0.42	1.0012	0.23
Societal gender equality squared	—	—	—	—	—	—
Number of observations	6,774		14,402		6,328	
Pseudo R-squared	0.099		0.120		0.161	
Whether child has ever been vaccinated						
Women's decisionmaking power	1.0085	2.16**	1.0674	6.26***	1.0031	0.68
Women's decisionmaking power squared	—	—	0.9994	–4.48***	—	—
Societal gender equality	1.0370	4.11***	1.0186	1.35	1.1128	4.00***
Societal gender equality squared	0.9997	–3.85***	0.9998	–1.71*	0.9991	–3.94***
Number of observations	33,252		55,460		28,391	
Pseudo R-squared	0.131		0.226		0.207	
Whether child has received vaccinations						
Women's decisionmaking power	1.0568	4.81***	1.0441	5.25***	1.0340	3.31***
Women's decisionmaking power squared	0.9997	–1.86*	0.9997	–3.04***	0.9997	–2.55***
Societal gender equality	1.0435	4.23***	1.0355	3.22***	1.0543	3.18***
Societal gender equality squared	0.9997	–3.34***	0.9997	–3.43***	0.9995	–3.16***
Number of observations	32,372		54,744		27,931	
Pseudo R-squared	0.119		0.186		0.116	

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intracluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

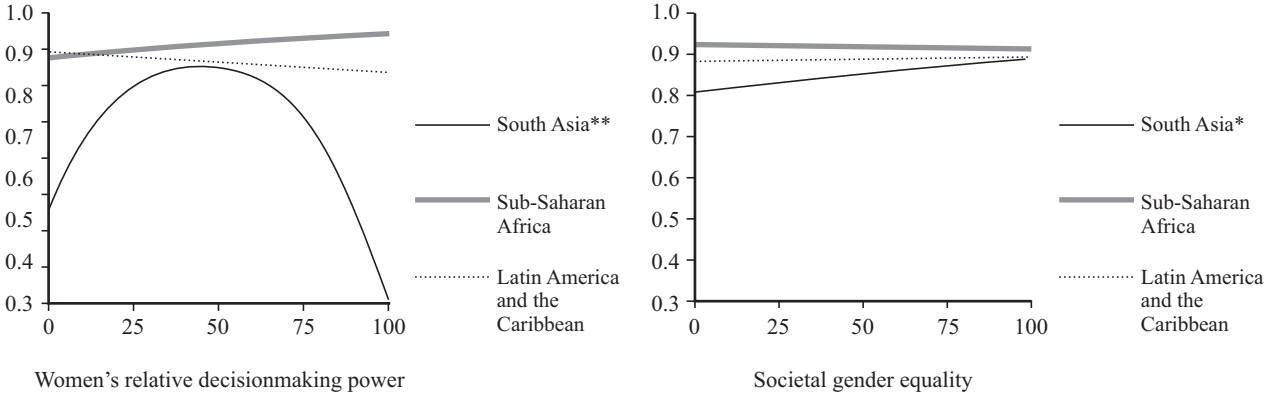
that the likelihoods of diarrhea treatment and of a child having the recommended vaccinations are 3.5 and 2.4 times, respectively, greater in Bangladesh than in India. Within SSA, the children of Niger seem to have a particularly strong advantage in terms of diarrhea treatment, compared with other countries. Within LAC, the children of Guatemala seem to be at a strong disadvantage in terms of diarrhea treatment, and the children of Nicaragua to be at a strong advantage when it comes to vaccination receipts.

Child Caregiver

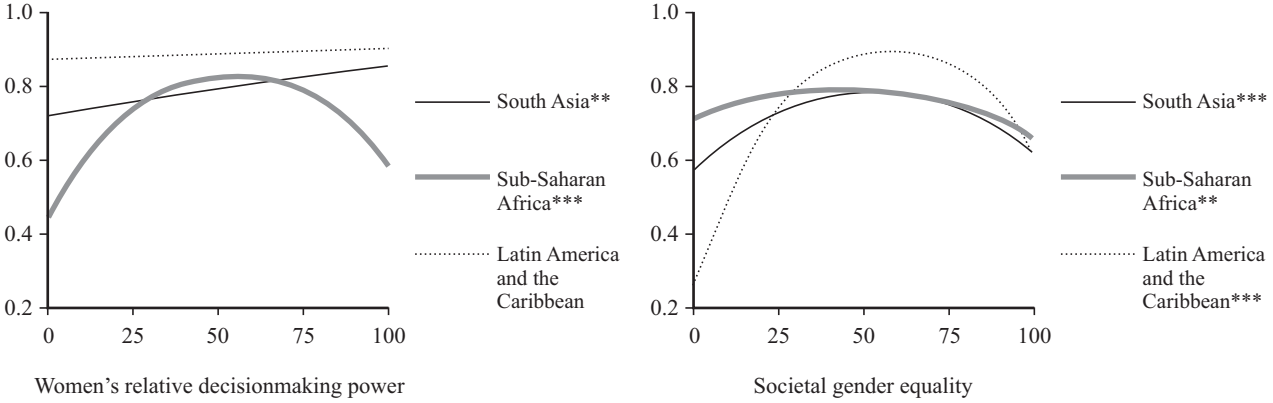
The DHS data contain very little information on childcare arrangements. However, questions are asked about whether the child's mother works outside the home, and what alternative caregiver arrangements are made while she is working. The proxy measure used to judge whether the child has a quality caretaker is whether that caretaker is an adult, as opposed to another child. The type of caregiver that children have while the mother is working is presented by share and region in Figure 6.4. A large proportion

Figure 6.3 Predicted health seeking variables, by indexes of women's status

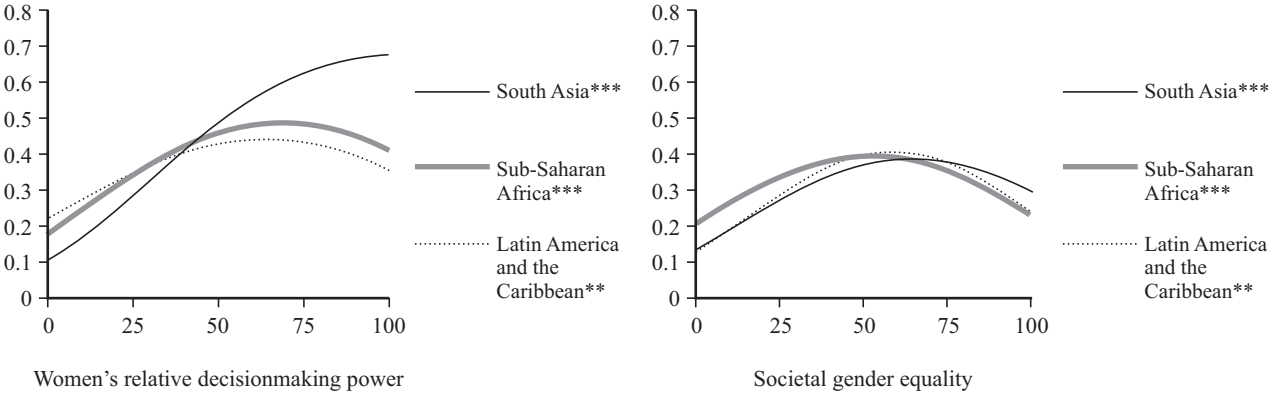
a. Whether child with diarrhea was treated (probability)



b. Whether child has ever been vaccinated (probability)



c. Whether child receives recommended vaccinations (probability)



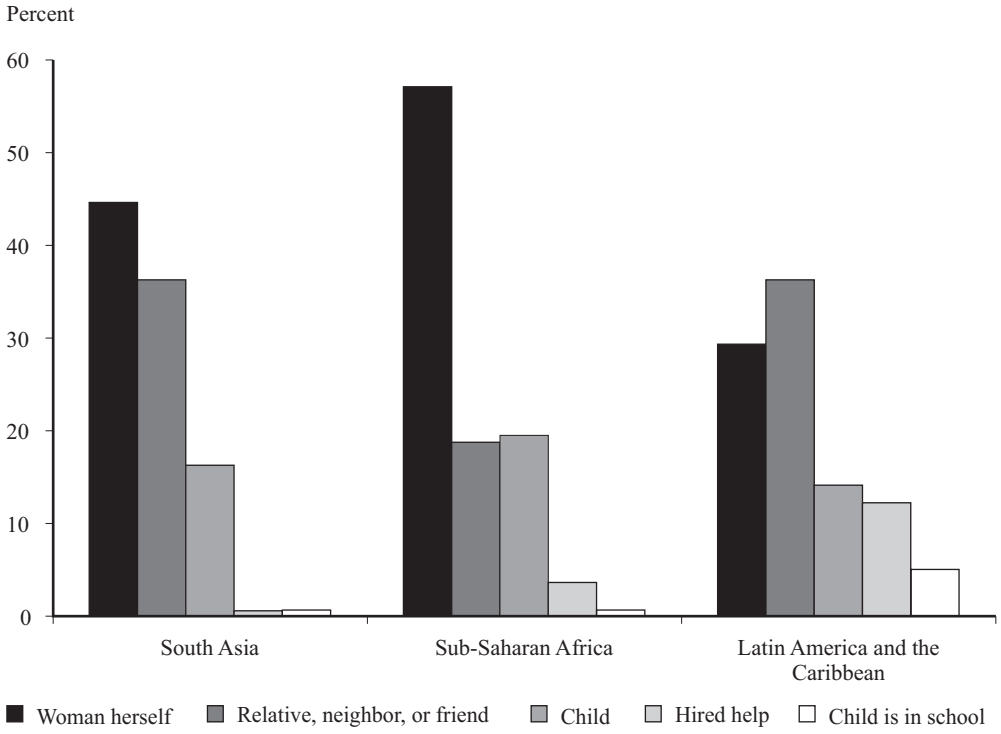
* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

of women take their children with them to work, especially in SSA. About one-third of children are left with an alternative adult caregiver. About 17 percent are left with another child.

The effect of women's status on this outcome is presented in Table 6.15. As can be seen, women's relative decisionmaking power is significantly and positively associated with whether the child has an adult caretaker when the mother is away working in all three regions and with largely the same strength of influence (Figure 6.5). The effect is strongest in LAC, where every 1-point increase in the index of women's relative decisionmaking power is associated with a 6.2 percent increase in the likelihood of a child having an adult caretaker while her or his mother is working. The effect of societal gender equality is statistically insignificant in all regions.

It is interesting that the probability of a child having an adult caretaker is more strongly associated with men's education than with women's. Perhaps as men become more educated, they begin to take on some of the childcare responsibility themselves or to take steps to ensure better quality care for their children. In SSA and LAC, the probability of a child being cared for by an adult while his or her mother is working is lower for women with primary education than those with no education at all. While living in an urban area is associated with an increased likelihood of an adult caregiver in South Asia and SSA (29 percent more likely in the latter region), the likelihood is decreased in LAC (29 percent less likely).

Figure 6.4 Type of caregiver while woman is working (%)



Source: Authors' calculations.

Table 6.15 Effect of women's status on whether child has an adult caretaker while mother is working: Regression results, by region (logistic regression)

	South Asia		Sub-Saharan Africa		Latin America/Caribbean	
Variable	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**	**Odds ratio**	**Z-statistic**
Women's status						
Women's decisionmaking power	1.0590	8.30***	1.0369	10.98***	1.0623	9.21***
Women's decisionmaking power squared	—	—	—	—	—	—
Societal gender equality	1.0000	0.00	0.9971	–1.28	0.9958	–0.75
Societal gender equality squared	—	—	—	—	—	—
Child characteristics						
Child aged 1–2 years	0.8367	–2.48**	0.6732	–10.17***	0.8568	–1.88*
Child aged 2–3 years	0.9094	–1.45	0.6301	–12.33***	0.9590	–0.56
Child's sex (female = 1)	1.0596	0.90	1.2279	6.12***	1.2209	2.66***
Characteristics of woman and partner						
Woman's age	0.6409	–9.30***	0.7355	–13.03***	0.5594	–9.26***
Woman's age squared	1.0051	6.89***	1.0033	9.50***	1.0068	7.40***
Man's age	1.0100	1.27	0.9863	–1.10	0.9696	–1.03
Man's age squared	—	—	1.0003	1.97**	1.0006	1.76*
Woman's education: primary	1.0706	0.66	0.8900	–2.63***	0.6531	–4.08***
Woman's education: secondary	1.2612	1.05	1.3323	3.14***	0.9342	–0.41
Man's education: primary	1.2866	3.46***	0.9629	–0.81	1.6209	4.35***
Man's education: secondary	2.3109	8.87***	1.3938	4.91***	2.5013	6.09***
Household characteristics						
Household size	0.7955	–4.79***	0.8933	–8.11***	0.4997	–9.30***
Household size squared	1.0099	4.02***	1.0030	5.73***	1.0343	7.58***
Percent females 15–55	1.0500	9.25***	1.0369	14.49***	1.0170	3.49***
Percent females 55+	1.0812	10.01***	1.0328	7.45***	1.0874	5.95***
Percent males 0–15	1.0032	1.41	1.0099	7.96***	1.0110	4.12***
Percent males 15–55	1.0329	8.26***	1.0233	11.81***	1.0220	4.69***
Percent males 55+	1.0489	6.76***	1.0251	5.45***	1.0214	2.04**
Well water used	0.8880	–1.12	1.0877	1.69*	1.0312	0.22
Piped water used	1.1197	0.99	1.0334	0.52	1.1799	1.31
Pit latrine used	1.1775	1.54	1.1464	2.76***	0.7864	–2.22**
Flush latrine used	1.1446	0.69	1.3087	2.00**	0.8652	–9.94
Urban location	1.2819	1.83*	1.2864	4.08***	0.7156	–3.19***
Poor	1.2408	3.01***	1.0507	1.18	1.2026	1.63
Middle income	1.3989	1.95*	1.2042	2.93***	1.3085	1.87*
Rich	1.3661	0.96	1.4320	3.73***	2.2030	4.47***

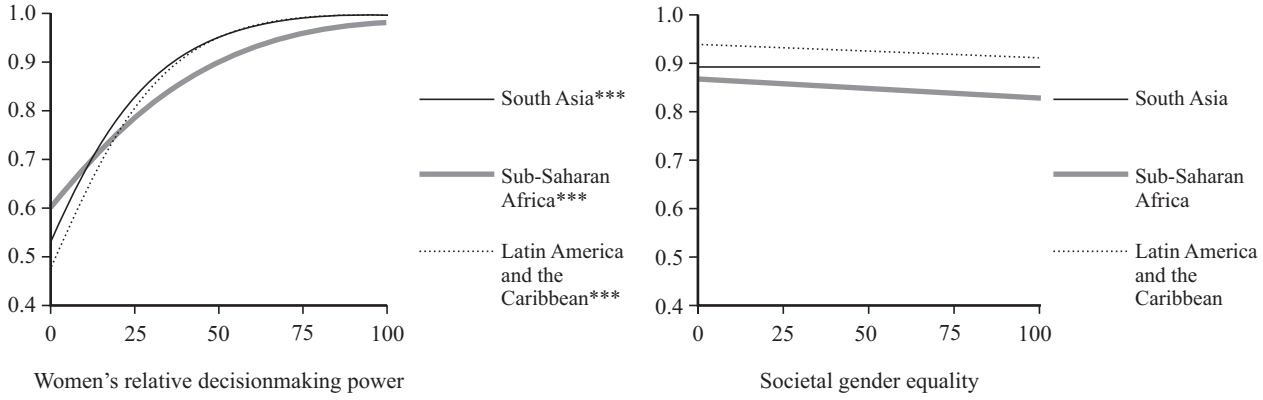
(continued)

Table 6.15—Continued

Variable	South Asia	Odds ratio	Z-statistic	Sub-Saharan Africa	Odds ratio	Z-statistic	Latin America/Caribbean	Odds ratio	Z-statistic
Country effects	India	—	—	Benin	—	—	Bolivia	—	—
	Bangladesh	1.8796	4.00***	Burkina Faso	0.8727	–1.00	Brazil	0.3829	–5.55***
	Nepal	0.7048	–3.72***	Cameroon	0.6716	–2.68***	Colombia	1.2033	0.87
	Pakistan	2.8813	4.83***	Central African Republic	0.4298	–6.34***	Dominican Republic	0.5384	–2.93***
				Chad	0.3964	–6.96***	Guatemala	0.6806	–2.32**
				Comoros	0.2834	–6.92***	Haiti	0.6081	–2.72***
				Côte d'Ivoire	1.2909	1.82*	Nicaragua	0.6544	–2.50**
				Ghana	1.2280	1.33	Paraguay	1.4335	1.51
				Kenya	0.7990	–1.47	Peru	0.7168	–2.49**
				Madagascar	0.4518	–5.84***			
				Malawi	0.4589	–4.28***			
				Mali	0.5186	–4.90***			
				Mozambique	0.6843	–2.68***			
				Namibia	0.7307	–1.34			
				Niger	0.6330	–3.64***			
				Nigeria	0.7078	–2.30**			
				Rwanda	0.4951	–5.12***			
				Senegal	1.0224	0.15			
				Togo	0.7470	–2.11**			
				Uganda	0.4918	–4.95***			
				Zambia	0.4501	–5.48***			
				Zimbabwe	0.7593	–1.72*			
Number of observations	10,787			31,617			9,395		
Pseudo R-squared	0.269			0.147			0.268		

Notes: The Z-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. Tanzania is not included. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Figure 6.5 Predicted probability of child having adult caretaker while mother is working, by women's status



*** Significant at the 1 percent level.

Economic status is positively associated with caretaker quality in all three regions, pointing to the importance of income, which either allows a household member to care for a child (instead of working for income) or pays for alternate care.

The Effect on Caring Practices of the Child's Gender

It is interesting to note that the gender of the child appears to influence very few of the caring practices included in this study. Recall from Chapter 4 on child nutritional status, that the coefficients on the "sex" variable (male = 0, female = 1) are positive and significant for children of SSA and LAC but not significant at all for South Asian children. Since infant girl children generally experience less morbidity than infant boy children, the nonsignificant coefficient for South Asia is attributed to discrimination against girls. The caring practice results give a clue as to the form of such discrimination. Girl children in South Asia are substantially less likely than boy children to receive any vaccinations, and those who do are less likely to receive all that are recommended (see Tables 6.12 and 6.13). On the other hand, for SSA and LAC (but not South Asia), the coefficients on the child's sex are positive and significant for a handful of the caring practice variables, including breastfeeding initiation and quality of substitute caretakers (both regions) and breastfeeding duration (LAC only). The one anomalous result is that girl children in LAC appear to be somewhat less likely to receive treatment for diarrhea than boy children. These results suggest that both biological forces (less morbidity among girls) and behavioral forces (discrimination against girls in South Asia but in favor of girls in SSA and LAC) are at work in determining sex differences in child nutritional status.

Conclusion

The findings presented in this chapter support the role of women's status in determining the adequacy of child caregiving practices, especially the timely introduction of good quality complementary feeding, which is critical for the normal growth and

development of young children. Women's relative decisionmaking power has a positive influence on the likelihood of an infant aged 6–12 months receiving complementary foods, on feeding frequency, and on dietary quality in both South Asia and SSA. In LAC, it has a positive influence only on feeding frequency. Its effect on these practices is the most potent in the region in which they are the worst: South Asia. In contrast to complementary feeding, women's status is negatively associated with breastfeeding practices, significantly reducing the duration of breastfeeding in all three regions. It has a positive influence on the timeliness of breastfeeding initiation, however, in South Asia.

In terms of health-seeking practices, women's relative decisionmaking power is positively associated with treatment for diarrhea and child vaccinations in South Asia, but only with vaccinations in SSA and LAC. It improves the quality of substitute child caretakers in all three regions. Societal gender equality plays little role in feeding practices and substitute caretaker quality but has a positive influence on diarrhea treatment in South Asia and on children's vaccination receipts in all three regions.

In conclusion, these findings demonstrate that the positive effect of women's status on child nutritional status is indeed mediated through a wide variety of caregiving practices for children. The negative influence of women's relative decisionmaking power on breastfeeding appears to be outweighed by the positive influences on a variety of other care practices for both women and children.

CHAPTER 7

The Asian Enigma

Despite better progress in many of the main determinants of child nutritional status, South Asia's child malnutrition rate continues to be much higher than Sub-Saharan Africa's (SSA's). This chapter brings to bear the results of this study to help explain this enigma and to elucidate the role that women's status plays in it. The nutritional status variable focused on is children's weight-for-age Z-scores (*waz*). According to the data, South Asia's mean *waz* is –1.83, while SSA's is –1.26. The gap is thus approximately 0.57 Z-scores, a 31 percent difference.

The nutritional status gap between the two regions has two possible sources. First, South Asia may be doing worse than SSA in some of the factors influencing nutritional status; that is, there may be regional differences in the *levels* of some determinants of nutritional status. Second, the determinants may be different altogether or they may have different strengths of impact in the two regions; that is, there may be differences in the *effects* of some determinants. If one determinant is more important in South Asia than in SSA, then even if the two regions are doing equally poorly in that area, the consequences for child nutrition would be more dire in South Asia.

To help solve the Asian enigma, this chapter first examines regional differences in the levels and effects of the socioeconomic determinants of child nutritional status (for example, women's status, health environment, and economic status). It then moves on to examine the contributions of the proximal determinants considered (for example, women's nutritional status and child feeding practices). Finally, the role of national-level factors that have not been explicitly included in this study are considered

Socioeconomic Determinants Contributing to the Nutritional Status Gap

Table 7.1 compares the levels and effects on nutritional status of the women's status variables and other key socioeconomic variables considered in this study. The following have decidedly lower levels in South Asia than in SSA: women's decisionmaking power relative to men's (2.4 percent lower), societal gender equality (12 percent lower), and latrine use (64 percent of households in South Asia have no latrine; the percentage is only 34 in SSA). Economic status is also slightly lower in South Asia than in SSA, as evidenced by a greater percentage of

Table 7.1 Comparison of levels and effects on child nutritional status of women's status and other socioeconomic determinants: South Asia and Sub-Saharan Africa

	Levels			Effects on weight-for-age Z-scores (regression coefficients)	
Socioeconomic determinant	South Asia	Sub-Saharan Africa	Difference	South Asia	Sub-Saharan Africa
Women's status					
Women's decisionmaking power	34.0	34.8	–0.8	0.0156	0.0046
Societal gender equality	50.5	56.7	–6.2	0.0023	n.s.
Women's education (%)					
No education	55.0	48.3	6.7	—	—
Primary education	22.8	37.3	–14.5	0.0867	0.0810
Secondary education	22.2	14.4	7.8	0.2022	0.2221
Men's education (%)					
No education	31.3	37.2	–5.9	—	—
Primary education	26.7	38.3	–11.6	0.1037	0.0971
Secondary education	42.0	24.5	17.5	0.2663	0.2354
Household health environment (%)					
Surface water	3.4	33.4	–30.0	—	—
Well water	64.9	41.1	23.8	–0.0801	n.s.
Piped water	31.7	25.4	6.3	n.s.	n.s.[a]
No latrine	64.3	34.4	30.3	—	—
Pit latrine	16.0	60.7	–44.7	0.2410	0.0411
Flush toilet	19.7	5.3	14.4	0.1836	0.1758
Urban location (%)					
Located in urban area	22.5	21.4	–1.1	–0.0815	0.0959
Economic status (%)					
Destitute	31.6	28.8	2.8	—	—
Poor	42.1	38.9	3.2	0.0750	0.1058
Middle income	16.1	21.0	–4.9	0.1694	0.2266
Rich	10.1	11.4	–1.3	0.4126	0.3862

Notes: All differences in the levels are statistically significant with the exception of that for women's decisionmaking power
Weighted means are reported.
n.s = not significant.
[a]The coefficient is significant, but only at the 10 percent level.

destitute and poor households in South Asia.[43] These factors, then, may be contributing to the nutritional status gap between the regions.

Turning next to *effects* on *waz*, note, first, that both of the women's status variables have substantially greater impacts in South Asia than in SSA. The coefficient on *waz* of the index of women's relative decisionmaking power is more than three times higher in South Asia than SSA. The coefficient of the index of societal gender equality is positive in South Asia but not even significant in SSA.

Second, one factor that determines child nutritional status in South Asia but does not in SSA is water use. Use of well water has a statistically significant and negative im-

[43]Given the particular formulation used in this study, it is difficult to tell whether education levels are lower in South Asia than in SSA, especially in the case of women's education. But when the number of years of education is employed, it is clear that South Asia has higher education levels. The mean number of years of education of women in South Asia is 3.42 versus 3.30 for SSA. The mean number of years of education of men in South Asia is 5.86 versus 4.61 for SSA.

pact in South Asia, but no impact in SSA. Use of piped water has no impact in either. Third, being located in an urban area has a positive impact on a child's nutritional status in SSA but a negative one in South Asia. Fourth, one variable other than women's status exhibits a greater impact in South Asia than in SSA: latrine use. Use of a pit latrine has a much stronger impact in South Asia than in SSA, with the coefficient being almost six times higher in the former.

To give a sense of the magnitudes of the contributions of these "effect differences" on the nutritional status gap, Table 7.2 presents results of a regression in which data from both South Asian and SSA countries are included. All variables in the region-specific regression models presented in Table 4.4 of Chapter 4 are included. Additionally, the interaction of each variable with a South Asia indicator dummy variable is included, which allows for slope differences between the regions. Note that this technique gives roughly the same coefficients as those presented in Table 7.1 when evaluated at the sample mean.[44]

The partial derivative of the empirical regression equation with respect to the South Asia dummy variable gives the "South Asia effect" on *waz*. The third column of Table 7.2 reports the portion of this effect associated with each variable, evaluated at the sample mean. Clearly, among those included in the model, the women's status variables contribute by far the most to the *waz* difference between the two regions. Their combined contribution is on the order of 0.454 Z-scores. Slope differences in the education, water use, and economic status variables make very little difference. Well water use, pit latrine use, and location in an urban area do make a fairly substantial difference, but still lower than that of the women's status variables.

Based on this information, it seems that the following socioeconomic factors, among those considered in this study, contribute to the gap between South Asia's and SSA's child malnutrition rates.

Women's Status

Both women's decisionmaking power relative to men's and societal gender equality are lower in South Asia than in SSA. And their effects are much stronger in South Asia than in SSA—the strongest effect difference among the variables considered. Not only is women's status lower in South Asia, it evidently has a much more powerful effect on child nutritional status. This means that inequality in the status of women and men has much higher costs in malnutrition in South Asia than in SSA.

State of Sanitation

The use of toilet facilities is much lower in South Asia than in SSA. Moreover, the effect of toilet facilities on child nutritional status, in particular the effect of pit latrine use, is substantially stronger in South Asia. And while access to safe water is higher in South Asia, the presence of well water lowers children's nutritional status there, while having no effect in SSA. Thus sanitation differences between the regions clearly contribute to the nutritional status gap as well.

Urban Location

Levels of urbanization are roughly on par in the regions. Yet living in an urban area has a negative impact on child nutritional status in South Asia, whereas it has a positive one in SSA. Thus urbanization must be added to the list as well.

Two other possible contributors are South Asia's slightly lower economic status and the stronger effect of men's education in South Asia than in SSA. However, since

[44]The only difference is that nonlinearities (quadratic) terms are not allowed for.

Table 7.2 Determinants of child weight-for-age Z-scores: South Asia and Sub-Saharan Africa model (OLS regression)

Variable	Base coefficient	South Asia interaction coefficient	Variable contribution to South Asia partial derivative at sample mean
Women's status			
Women's decisionmaking power	0.0054***	0.0108***	0.3771
Societal gender equality	0.0010	0.0014	0.0767
Child characteristics			
Child aged 1–2 years	–1.0563***	0.2184***	0.0725
Child aged 2–3 years	–0.9263***	0.1355***	0.0418
Child's sex (female = 1)	0.0848***	–0.0908***	–0.0446
Characteristics of woman and partner			
Woman's age	–0.0046***	–0.0108***	–0.2956
Man's age	0.0057***	0.0058***	0.2057
Woman's education: primary	0.0806***	0.0044	0.0013
Woman's education: secondary	0.0229***	–0.0207	–0.0033
Man's education: primary	0.0987***	0.0051	0.0017
Man's education: secondary	0.2386***	0.0285	0.0085
Household characteristics			
Household size	–0.0070***	0.0023	0.0181
Percent females 15–55	0.0004	0.0022**	0.0527
Percent females 55+	0.0009	0.0003	0.0008
Percent males 0–15	–0.0005	0.0010	0.0259
Percent males 15–55	0.0013**	0.0004	0.0088
Percent males 55+	–0.0033**	0.0051***	0.0130
Well water used	–0.0040	–0.0876**	–0.0443
Piped water used	–0.0352*	–0.0495	–0.0155
Pit latrine used	0.0407**	0.2015***	0.0831
Flush latrine used	0.1773***	–0.0059	0.0007
Urban location	0.0964***	–0.1774***	–0.0476
Poor	0.1069***	–0.0332	–0.0136
Middle	0.2290***	–0.0593*	–0.0107
Rich	0.3899***	0.0214	–0.0022
Country effects (reference country: Benin)			
Burkina Faso	–0.0004		
Cameroon	0.2844***		
Central African Republic	0.0842*		
Chad	–0.1213***		
Comoros	0.1027		
Côte d'Ivoire	0.1558***		
Ghana	–0.0349		
Kenya	0.1588***		
Madagascar	–0.2538***		
Malawi	0.2165***		
Mali	–0.3087***		
Mozambique	0.0587		
Namibia	0.0076		
Niger	–0.3925***		
Nigeria	–0.1847***		
Rwanda	0.0635		
Senegal	0.3024***		
Tanzania	–0.0944**		
Togo	0.0560		
Uganda	0.1207***		
Zambia	–0.0129		
Zimbabwe	0.3420***		
India	–1.1832***		
Bangladesh	–1.0057***		
Nepal	–0.8960***		
Pakistan	–0.7395***		
Number of observations	88,818		
R-squared	0.217		

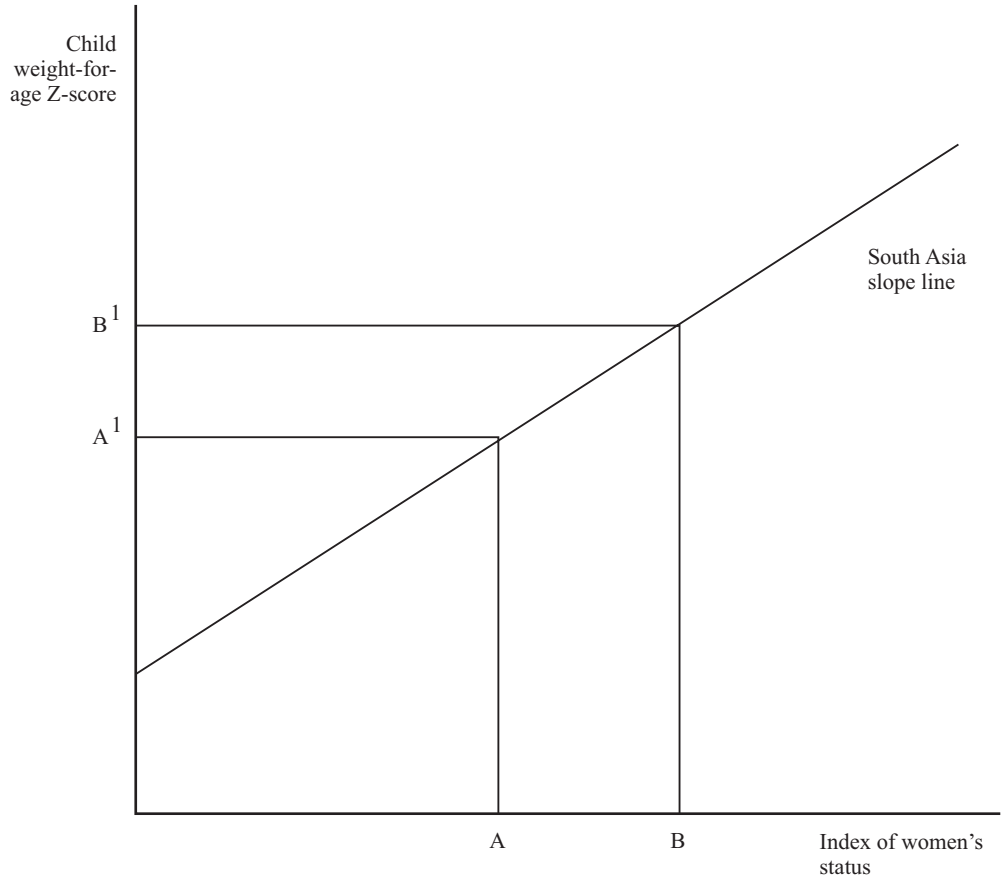
Notes: The t-statistics are based on White-corrected standard errors and are robust to intra-cluster correlation. * Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

the difference in both the levels and effects of economic status between the regions is small, economic status is likely a minor factor. Given that schooling rates of males are higher in South Asia than in SSA and the effects difference between the regions is not large, education can safely be ruled out as a major contributor to the regions' nutritional status gap as well.

The Role of Women's Status

What are the relative contributions of "levels" differences and "effects" differences in women's status to the nutritional status gap between South Asia and SSA? Is the gap mostly because women's status is lower in South Asia or because of its greater impact there? Here the regression results are used to get a sense of this.

Figure 7.1 Contribution of level difference in women's status to the child nutritional status gap between South Asia and Sub-Saharan Africa: A hypothetical graphical illustration

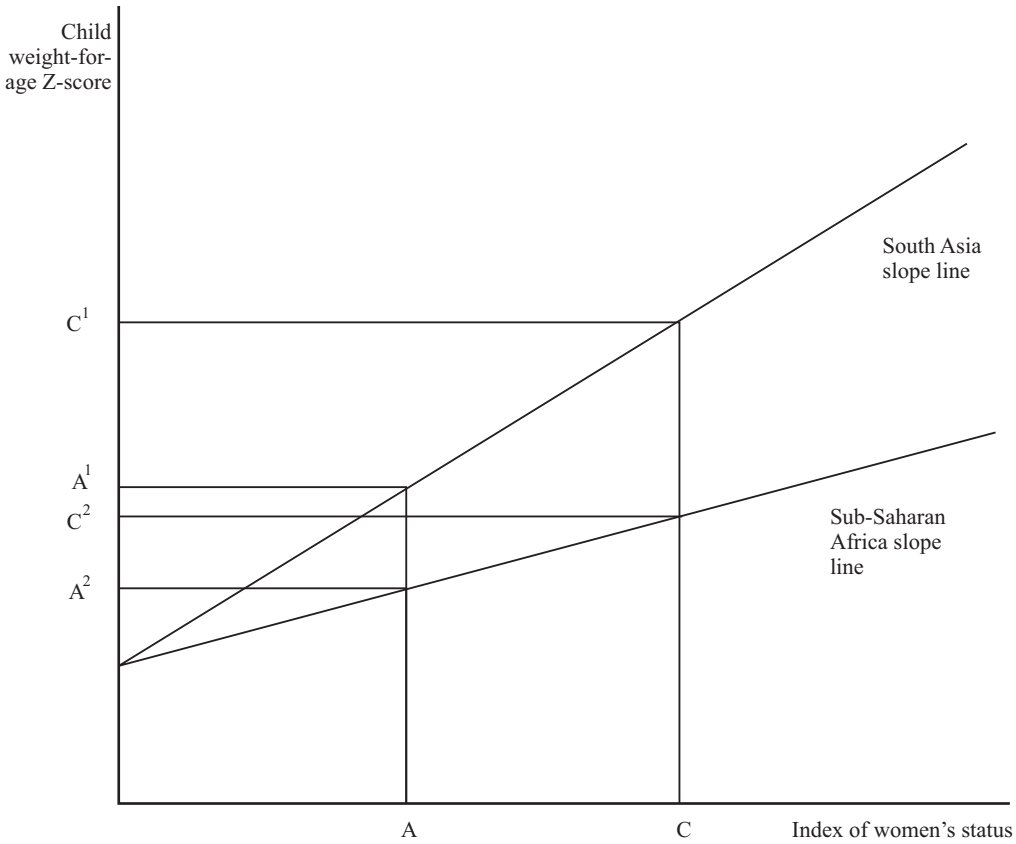


Notes: Point A on the horizontal axis is South Asia's current women's status index value, and point A^1 on the vertical axis is its current mean weight-for-age Z-score. Point B is Sub-Saharan Africa's current women's status index value. If South Asia's index value were raised to Sub-Saharan Africa's, the corresponding increase in South Asia's weight-for-age Z-score would be B^1–A^1, the levels difference contribution to the regions' child nutritional status gap.

The magnitude of the contribution of levels differences can be estimated by looking at how much the gap would be closed if the level of women's status in South Asia were raised to that of SSA. This is estimated by the difference in the levels of the women's status indexes in the regions multiplied by South Asia's slope, as illustrated in Figure 7.1. The contribution of the regions' differences in women's relative decisionmaking power is 0.0125 Z-scores (0.0156 *[34.8 – 34]). That of societal gender equality is 0.0285 (0.0046*[56.7 – 50.5]). The total contribution is approximately 0.041 Z-scores, which is 7.2 percent of the gap. In Figure 7.1 this number is shown as [B^1- A^1] on the vertical axis.

The magnitude of the contribution of the effects differences is estimated by comparing South Asia's current child nutritional status to that which would be attained if it reached some normative standard of adequate status for women, under two different scenarios. The first scenario assumes South Asia's own women's status index coefficients (its own effect). The second assumes the women's status index coefficients of SSA (SSA's effect). The reason that a nor-

Figure 7.2 Contribution of effect difference in women's status to the child nutritional status gap between South Asia and Sub-Saharan Africa: A hypothetical graphical illustration



Notes: Point A on the horizontal axis is South Asia's current women's status index value. Point C is the mean level of the women's status index in Norway (the normative standard). The increase in South Asia's weight-for-age Z-score if its women's status index value were raised to that of Norway using South Asia's slope line is C^1–A^1. The same increase using the Sub-Saharan slope line is C^2–A^2. The difference between C^1–A^1 and C^2–A^2 is the effects difference contribution to the regions' child nutritional status gap.

mative standard is employed is that it allows us to evaluate the full cost (to children's nutritional status) of women's lower than optimal status under the two scenarios. The standard employed is the level of women's status in Norway, where women and men are deemed to have the most equal status in the world. Norway's *dm_index* value is 59.2 (point A in Figure 7.2) and its *ge_index* value is 59.5 (see Chapter 3)

The increase in South Asia's *waz* if women and men had roughly equal status, using the South Asia coefficients, is 0.414 Z-scores. That same increase using SSA's coefficients is 0.116 Z-scores.[45] The difference gives the contribution to the current gap. It is 0.298 Z-scores, which is 52 percent of the gap. In Figure 7.2, this number is shown as the difference between $[C^1 - A^1]$ and $[C^2 - A^2]$.

These calculations tell us that the main reason why women's status leads to greater child malnutrition in South Asia than in SSA is that status has a much greater positive influence on child nutrition in South Asia. While women's status is lower in South Asia than in SSA, the difference is not that large. The estimated contribution of level difference in women's status to the difference in nutritional status in South Asia and SSA (on the order of 7 percent) is much lower than that of the effects difference (on the order of 50 percent).

Proximal Determinants Contributing to the Nutritional Status Gap

This study did not examine the effect of the proximal determinants on child nutritional status (a structural form analysis) due to a lack of appropriate data. However, as laid out in Chapter 2, strong evidence exists that all of the determinants considered in this study have a positive influence on nutritional status. Assuming that they have roughly the *same* effect on nutritional status in South Asia and SSA, we can focus on differences in the levels of the proximal determinants in identifying which contribute to the regions' nutritional status gap.

Table 7.3 compares the levels of the proximal determinants across the regions. Women's nutritional status is much lower in South Asia than in SSA. While the numbers seem close, they result in a very large difference in underweight rates: 43 percent of women in South Asia are underweight versus only 12 percent in SSA. Use of prenatal and birthing care for women is also substantially lower in South Asia than in SSA. The percentage of women receiving any prenatal care is 79 percent in SSA but only 63 percent in South Asia. Similarly, the percentage of women giving birth in a medical facility is 41 in SSA, but only 31 percent in South Asia. Therefore, we can surmise that women's nutritional status and care for women during pregnancy and childbirth, both of which are critical to children's nutritional status, especially birth weight, are major contributors to the nutritional status gap of the regions.

In terms of care for children, vast differences in the quality of feeding practices between the regions are apparent. Feeding practices tend to be more favorable in SSA than in South Asia. In SSA, breastfeeding is initiated within one day of birth for 70 percent of the children, while in South Asia it is only 42 percent. Breastfeeding duration is three months longer in SSA than in South Asia. Further, 81 percent of children 6–12 months old in SSA receive complementary foods, while only 45 percent do in South Asia. The nutrient quality of foods also appears to be inferior in South Asia. An exception is the extent of exclusive breast-

[45]These numbers are calculated as follows: (1) using South Asia's slope: 0.0156*[59.2 – 34] for the increase in *dm_index* plus 0.0023*[59.5 – 50.5] for the increase in *ge_index*; (2) using SSA's slope: 0.0046*[59.2–34] plus 0*[59.5 – 50.5].

Table 7.3 Comparison of proximal determinants of child nutritional status: South Asia and Sub-Saharan Africa

Proximal determinant	South Asia	Sub-Saharan Africa	Difference
Women's nutritional status			
Body mass index (mean)	19.33	21.64	–2.31
Prenatal and birthing care for women			
Percent of women receiving any prenatal care	63.30	79.00	–15.70
Percent who had at least three visits during pregnancy	65.30	82.50	–17.20
Months into pregnancy of women's first visit	5.04	4.20	0.84
Percent of women who gave birth in a medical facility	31.20	40.50	–9.30
Breastfeeding			
Percent of children for whom breastfeeding was initiated within one day of birth	42.00	69.70	–27.70
Percent of 0- to 4-month olds who are exclusively breastfed	60.70	31.09	29.61
Percent of 0- to 4-month olds who do not receive anything in a bottle	87.00	82.80	4.20
Average number of months of breastfeeding	14.00	17.20	–3.20
Complementary feeding			
Percent of 6- to 12-month olds who have received complementary foods	45.40	80.90	–35.50
Percent of > 6-month-olds receiving a high quality food in the last day (Nepal only)	19.00	51.00	–32.00
Number of times per day > 6-month-olds eat (Nepal only)	3.10	3.00	0.10
Health-seeking practices			
Percent of children with diarrhea who received any treatment	85.00	82.82	2.18
Percent of children ever vaccinated	82.55	77.65	4.90
Percent of children receiving the recommended vaccinations	42.90	46.50	–3.60
Child caretaker			
Percent of children with an adult caretaker while mother is working	83.70	80.50	3.20

feeding among children younger than four months old, which is much higher in South Asia (61 percent versus 31 percent in SSA). While little regional difference can be found in health-seeking practices, it seems likely that the quality of care for children, then, is also a key contributor to South Asia's higher child malnutrition rate.

Role of Unobservable Region-Specific Factors

As has been shown in previous chapters, country-specific effects, that is, the effects of factors that are not controlled for explicitly in the regression analyses but that are influencing nutritional status in individual countries, are very important determinants of child nutritional status in both South Asia and SSA. However, as the regression results in Table 7.2 show, these country-specific effects are much larger in South Asia. Relative to the reference country, Benin, the average SSA country's *waz* is 0.025 Z-scores higher. By contrast, the average South Asian country's Z-score is 0.956 lower. Such a large negative region-specific effect for South Asia has been found in a number of studies using cross-country regression analysis (ACC/SCN 1993; Osmani 1997; Smith and Haddad 2000). It means that, in addition to women's status, much of the difference in child nutritional status between the two regions can be attributed to factors specific to South Asia as a region, factors that have a *negative* impact on child nutritional status. These factors may be related to climate, population densities, or political and cultural factors that have not been accounted for explicitly in the regression analyses.

Conclusion

In summary, the gap between nutritional status of children in South Asia and SSA

can be partially explained by the lower level of women's status in South Asia. However, the fact that women's status has a stronger influence in South Asia than in SSA makes a far greater contribution to the gap. Among the factors explicitly considered in the study, others that widen the regions' nutritional status gap are sanitation and urbanization. The proximal determinants of child nutrition considered that are responsible for the gap include women's nutritional status, prenatal and birthing care for women, and some aspects of breastfeeding and complementary feeding of children. Further, factors specific to the South Asian region that have not been measured in this study but have a negative impact on child nutrition further widen the wedge between the regions' child malnutrition rates. While this study has thus been able to clarify part of the origins of the gap, it remains an enigma in need of further investigation.

CHAPTER 8

Conclusions and Policy Implications

The results of this study leave no doubt that women's status has a positive influence on children's nutritional status in all three of the included regions. Women with greater status have more control over resources in their households; are less time constrained; have greater access to information; have better mental health, self-confidence, and self-esteem; and live in areas with greater availability of health services that cater to women's health needs. Evidently, some or all of these factors work to improve children's dietary intakes or health, thus improving their nutritional status.

The study has also shown that where women's status has its strongest positive effect on child nutritional status, it also has its strongest positive effect on the nutritional status of women themselves and on many caring practices for women and children that are vital to children's growth and development. This is strong supporting evidence that one of the reasons why increases in women's status lead to improvements in children's nutritional status is that women with greater status have better nutritional status, are better cared for and, for the most part, provide higher quality care for their children.

The influence of women's status—both women's decisionmaking power relative to men's and societal gender equality—differs widely across the regions. In general, it has the strongest effect in South Asia, followed by Sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC). The specific pathways of influence—women's nutritional status and the various caring practices—also differ. This chapter first summarizes the main findings for each region individually and then summarizes the findings on the Asian Enigma. After considering the policy implications of the study's empirical findings, it concludes with a discussion of public policy options for improving women's status.

Research Findings

South Asia

Both women's decisionmaking power relative to men's within households and the degree of gender equality at the community level have positive effects on the nutritional status of children one to three years old in South Asia. Improvements in women's relative decisionmaking power have a strong influence on both long-term and short-term nutritional status, leading to reductions in both stunting and wasting. Gender equality at the community level only influences children's long-term nutritional status. It has a considerably weaker effect than relative decisionmaking power in households.

The malnutrition costs of inequality in the status of women and men in the region are high. The study estimates that, holding all other factors constant, if such status were equalized, the

percentage of underweight children under three years old would drop by approximately 13 percentage points, from 46 to 33 percent; the number of underweight children would drop by 13.4 million. Why do increases in women's status lead to improvements in children's nutritional status? The empirical results demonstrate that in this region, where more than 40 percent of women are underweight, increases in women's decisionmaking power relative to their husbands' lead to improvements in women's own nutritional status. Because women's nutritional status is in turn closely linked with children's birth weights and the quality of care for children, this finding verifies that women's own health and nutritional status is one of the pathways through which women's status influences child nutrition in the region.

The study also finds that increases in women's decisionmaking power relative to men's have a powerful positive effect on child nutritional status because they improve a wide range of caring practices for women and children. These include

- prenatal and birthing care for women;
- complementary feeding of children, including timely introduction, food quality, and feeding frequency;[46]
- timely initiation of breastfeeding;
- treatment of illness of children;
- immunization of children; and
- quality of substitute caretakers for children.

Evidently, the more decisionmaking power a women has relative to her husband, the more actions are taken to improve care for the woman herself and for her children. There is one important exception, however. Women's relative decisionmaking power has a negative effect on breastfeeding practices in the region, including the degree of exclusive breastfeeding in a child's first four months and the duration of breastfeeding.

It is not only at the household level that women's status influences the nutritional status of children in South Asia. As noted, increased gender equality at the community level also improves child nutritional status. Its pathways of influence include the following care practices:

- prenatal and birthing care for women,
- timely initiation of breastfeeding,
- timely introduction of complementary foods to children,
- treatment of illness of children, and
- immunization of children.

It is notable that most of these are related to the use of services provided at the community level.

Strong differences in the impact of women's status on child nutritional status between poor and rich households are found. When women's status is raised in poorer households, it has a greater positive impact on child nutritional status than when women's status is raised in rich households. Women's ability to influence decisions over the allocation of economic resources is apparently more important for children's nutrition when those resources are scarce.

Sub-Saharan Africa

In SSA, as in South Asia, women's decisionmaking power relative to men's has positive effects on both long- and short-term nutritional status of children. The costs of inequality between women and men in the region are not as high as those in South Asia, but they are still substantial. It is estimated that an equalization of status of the genders would reduce the region's underweight rate for children under three years old from 30.0 to 27.2 percent, representing a reduction in the number of underweight children of 1.7 million.

[46]Recall that the results on the latter two practices are based only on data from Nepal.

In SSA, women's nutritional status is far better than in South Asia. Only 12 percent of women are underweight. A woman's decisionmaking power relative to her husband's is found to improve her nutritional status, but only up to a point. As this power rises, it begins to exert a slightly negative influence, one that has little consequence for women's and, most likely, children's nutritional health. Women's nutritional status may thus be a pathway through which increases in women's status lead to improvements in child nutrition in SSA, but only for women with very low decisionmaking power relative to their husbands. Societal gender equality does not appear to be associated with women's nutritional status in the region.

The caring practices for women and children that women's status improves include

- prenatal and birthing care for women;
- complementary feeding of children, including timely introduction and feeding quality and quantity;
- immunization of children; and
- quality of substitute caretakers for children.

As in South Asia, increases in women's relative decisionmaking power reduce the duration of breastfeeding. Such increases have no effect on breastfeeding initiation or the likelihood of exclusive breastfeeding among infants 0- to 4-months old.

Clues as to the origins of the insignificant effect of societal gender equality on child nutritional status in SSA can be found by looking at its effects on caring practices for women and children. It has no statistically significant effect on birthing care, breastfeeding and complementary feeding practices, treatment of illness in children, or substitute caretaker quality. While it has a positive effect on immunization of children, it has a negative effect on prenatal care for women.

As for South Asia, the effect of women's relative decisionmaking power on child nutritional status in SSA is strongest among the poorest households.

Latin America and the Caribbean

LAC exhibits quite a different pattern from South Asia and SSA. Women's decisionmaking power relative to men's has a positive effect only on children's short-term nutritional status. This effect is strong only for households in which women's relative decisionmaking power is very low. Gender equality at the community level has no influence on children's nutritional status. While inequality in the status of women and men is likely to have malnutrition costs where such inequality is very high (in the form of child wasting), it has no measurable costs when considered at the aggregate regional level.

In LAC, very few women are underweight and, in fact, a substantial percentage is overweight. Increases in women's relative decisionmaking power are associated with reductions in women's body mass index (the measure of nutritional status), which likely reflects the greater tendency to "weight watch" among women with higher status and is not harmful to children's nutritional status.

The list of caring practices that women's relative decisionmaking power improves, which is shorter than that of the other regions, includes

- prenatal and birthing care for women,
- frequency of child feeding,
- immunization of children, and
- quality of substitute caretakers for children.

As for the other regions, women's relative decisionmaking power has a negative effect on the duration of breastfeeding, which combined with the absence of positive effects for many of the other determinants of child nutritional status may explain the weak overall effect of decisionmaking power on child nutritional status. Gender equality at the community level has a posi-

tive influence on prenatal care for women and immunization of children.

Following the same pattern as South Asia and SSA, the effect of women's relative decisionmaking power on child nutritional status in LAC is strongest among the poorest households.

The Asian Enigma

This study identifies three broad socioeconomic factors contributing to the large child nutritional status gap between South Asia and SSA. The first, and the one that makes by far the greatest contribution, is women's status. Women's status contributes to the gap for two reasons. First, it is slightly lower in South Asia than in SSA. The estimated contribution of this difference between the regions to the gap is on the order of 7 percent. The second reason is that the costs in child malnutrition of women's status being lower than men's are higher in South Asia than SSA because its positive influence is stronger in the former. The estimated contribution of this difference to the nutritional status gap is on the order of 50 percent. Thus the differential *costs* factor contributes far more to the gap than the differential *levels* factor; the latter is the subject of Ramalingaswami, Jonsson, and Rhode's (1996) Asian Enigma hypothesis.

The other behavioral factors that contribute to the nutritional status gap are differences between the regions in sanitation and urbanization. The use of toilet facilities is much lower in South Asia than in SSA, yet the importance of such use for improving child nutritional status is much greater in South Asia. Additionally, the use of well water is actually found to be harmful to child nutritional status in South Asia. Urbanization, contrary to current thought, is also found to have a negative effect on child nutrition in South Asia.

The study identifies several proximal determinants that are known to contribute positively to child nutritional status in both regions but that are lower in South Asia. These are women's nutritional status, prenatal and birthing care for women, and the quality of feeding practices for children (with the exception of the extent of exclusive breastfeeding, which is higher in South Asia). Women's own nutritional status, and important aspects of the quality of care for women and children, must also be added to the list of factors that place a wedge between child nutritional status in South Asia and SSA.

Finally, factors specific to the South Asian region that have not been measured in this study but that have a negative impact on child nutrition further widen the gap between the region's malnutrition rates. These may be related to climate, population densities, or culture, for example.

While this study has helped to solve the Asian Enigma, its full origins remain a mystery in need of further investigation. An area that still needs clarification is why the influence on child nutrition of women's status is so much stronger in South Asia than in SSA. Another area is the roles sanitation and urbanization play in widening the wedge between the regions' malnutrition rates. Finally, the national-level factors that drive child malnutrition rates in South Asia so much higher than those in SSA need to be identified. Research on these subjects would inevitably require interdisciplinary collaboration.

Policy Implications

This study clearly shows that, in the interest of bringing about sustainable improvements in child nutritional status, women's status should be increased in all regions, but this is especially urgent for South Asia, followed by SSA. In South Asia, not only is women's power relative to men's extremely low, this inequality has much higher costs in terms of child malnutrition than in the other two regions. The next section discusses policy options for improving women's status.

The only caring practice that women's status has a consistently strong *negative* ef-

fect on is breastfeeding duration. This effect is independent of whether women work or not, signifying that women *prefer* not to breastfeed, and when they gain power, they exercise it by choosing to breastfeed less. Yet continued breastfeeding into the second year of a child's life is very important for her or his growth and development. It is thus vital that efforts to promote women's status be accompanied by simultaneous efforts to protect, support, and promote breastfeeding. Such efforts should include education on the benefits of breastfeeding and workplace support for it, but they must also incorporate actions to improve the image and attitudes associated with the breastfeeding woman, perhaps through media campaigns.

In areas where efforts to increase women's status are met with resistance, strategies to promote children's nutritional status could include actions to mitigate the negative effects of power inequalities in favor of men in areas where women's status is known to be low. For example, knowing that in areas of South Asia where women's status is low and introduction of complementary feeding of children is likely to be late, governments and NGOs can target these areas for child feeding interventions. Similarly, in all three regions where women's status is low and the quality of children's substitute caretakers is likely to suffer, policy interventions could focus on helping women find quality childcare. This study has also shown that it is primarily through reducing the use of health services for women and children that gender inequality at the community level influences child nutrition. Thus it is not only household decisions that reduce women's access to such services but also their *availability* in communities. Efforts to protect child nutrition can include targeting of health services to areas where women's status is known to be low. Such strategies provide an opportunity to break the link between women's status and child nutrition where improvements in women's status are particularly difficult to bring about.

The influence of women's status on two important underlying determinants of child nutritional status, food security and health environment quality, was not examined in the study. Yet, as noted in Chapter 2, it is likely that women's status also influences child nutritional status through these pathways. Thus any strategy to promote child nutrition by mitigating the negative effects of women's status should consider these areas as well.

The study finds that in all three regions women's relative decisionmaking power has a stronger positive influence on child nutritional status in poorer households than in rich households. Efforts to improve child nutritional status through the means of improving women's status are likely to be most effective when directed at poor households. It makes sense to target the poorest households for improvements in women's status in any case because it is in these households that both child nutritional status and women's status are the lowest. However, this finding gives an even stronger rationale for doing so.

Finally, it should be noted that the overall regional effect of improved women's status on child nutrition in South Asia appears to reflect a positive influence for all countries in the region.[47] However, in SSA and LAC the overall effect appears to reflect wide variation across countries, with some countries exhibiting positive effects and a few even negative effects. The latter may be the result of a particularly large

[47]While a significant effect for Bangladesh, the country with both the lowest nutritional status and women's status in the sample, could not be estimated, this is most likely because of limited variability in the data rather than the absence of an influence.

negative influence on the duration of breastfeeding. While aggregating to the regional level to identify broad regional differences has been illuminating, in matters of policy it is important to treat each country individually, especially in SSA and LAC. More knowledge about the effect of women's status on child nutrition and its underlying determinants must be acquired for each country in these regions before policy can be devised.

Public Policy to Improve Women's Status

There are many actions that public policy can take to improve women's status relative to men's. The specific set of actions that are most appropriate in a given situation will be—not surprisingly—context specific. This section outlines some that have proved successful, as summarized in Table 8.1, and gives some examples of their implementation. They are organized by level of nutrition determinant—whether women's status is a basic or underlying determinant. The more basic the level, the less likely it is that the nutrition community can influence policy reform, but the nutrition community in that country should at least be aware of the gender context within which it works. The actions are also cross-referenced in terms of the degree to which they passively eradicate gender discrimination or proactively pro-

Table 8.1 Examples of public policy to improve women's status

Action level	Eradicate discrimination	Proactively promote catch-up in women's status
Basic	Reform legislation to equalize civil, political, economic, social, and cultural rights ● Voting ● Land inheritance and ownership ● Employment, unemployment, benefits laws ● Membership in savings and credit organizations ● Mobility to promote social capital	Monitor efforts to review gender bias in public policy (for example, South Africa) Target access to new resources to women ● Credit programs to poor women (for example, Bangladesh) ● Affirmative action programs to actively recruit women in formal employment ● Ensure women's equal representation in formal and informal institutions
Underlying	Reform service delivery ● Equalize access to education (quantity and quality) ● Equalize access to agricultural extension services ● Equalize access to water and sanitation services ● HIV/AIDS prevention programs ● Equalize immunization rates ● Increase availability and access to reproductive health services, including family-planning information ● Equalize access to preventative and curative health care	Implement cash transfer programs that promote the entry of girls into education and health care systems ● Food for schooling of young girls (for example, Bangladesh) ● Cash transfers to women in return for health and education behaviors favoring girls (for example, Mexico) Introduce labor-saving technologies when investing in new water and fuel technology (save women's time and energy in water and firewood collection) Subsidies to encourage the promotion of childcare crèches to allow working women to provide their children with good childcare substitutes (for example, Guatemala City)
	Introduce legislation to enforce the international code on breast milk substitutes	Child benefits targeted to women (for example, the United Kingdom)
	Introduce flexible working hours, crèches for working parents, and maternity and paternity benefits paid by state	Nutrition programs to improve the nutrition status of adolescent girls and young women

mote the "catch-up" of women's status to men's. A good review can be found in World Bank (2001a).

The indicators used in this study to create an index of women's status at the household level are whether a woman works for cash, her age at first marriage, and the age and education differences between the woman and her husband. At the community level, they are male–female differences in education, child nutritional status, and immunizations. Recognizing that these measures do not capture all aspects of women's power relative to men's, the following discussion points to some actions that can be taken to enhance them.

Eradicating Discrimination

Policy reform to eradicate gender discrimination promotes gender neutrality by creating a level playing field for women and men. While it is a passive approach to improving women's status, it is a necessary foundation for any lasting increase in women's power, both inside and outside households.

At a basic level, improving women's *political voice and participation* is vital to any fundamental shift in women's status. Women's human rights—political, civil, economic, social, and cultural—need to be respected, protected, and fulfilled. The strengthening of democratic institutions via legislation, the rewriting of constitutions so that they explicitly disavow discrimination, and the reform and enforcement of an anti-discriminatory rule of law are important steps toward this goal.

Also at a basic level, policies and legislation must not discriminate against women when it comes to *access to employment and economically productive assets.* Access to paid employment is at the root of economic independence and thus bargaining power. The ability to own and have access to various types of assets must also be independent of gender. For example, the ability to inherit land (natural capital), the ability to join a credit and savings club (financial capital), the ability to join a water users group (social capital), the ability to access extension advice (human capital), the ability to start up a small enterprise (with physical capital), and the ability to survive in the event of a family breakdown must be equal for women and for men. Strides in the latter area have been successfully taken in Canada, where a change in state law regarding the dispensation of income and assets upon divorce improved the likelihood of women receiving a larger share of such resources. Hoddinott and Adam (1998) showed that this change subsequently led to a significant drop in female suicide rates in the country.

Social protection programs that minimize the probability of facing risks and mitigate the impacts of shocks are often male biased. Folbre's (1995) review of the literature for the United States, Northwest Europe, LAC, and SSA revealed distinct patterns of gender bias in public policy in this area, particularly in the area of child support and social entitlements, such as pensions. Maternity benefits and childcare costs are often stipulated by public regulation to be the responsibility of the employer, despite the International Labour Organization's Maternity Prevention Convention. Some employers are therefore discouraged from hiring women and some require a certificate that they are not pregnant. Women are less likely to be employed in formal sector jobs with benefits such as social security. When they are, they pay the same taxes as men, but the receipt of survivor benefits for widows of employed men are much easier to obtain than benefits to widowers of employed women. Further, retirement benefits are lower for women. Family allowances give benefits to employed men with dependent wives, but not benefits to employed women with dependent children. Moreover, sex discrimination laws, if they exist, may be enforced in the public sector, but typically they are not in the private sector. Such male bias in social protection programs must be eliminated if women are

to have any hope of enjoying equal status with men.

At the level of the underlying determinants of child nutrition, men and women, girls and boys should have equal access to public service provision, both in terms of quantity and quality. As discussed in this report, education confers on its holder increased opportunities for employment, increased knowledge and skills, as well as increased social contacts outside of the home, all of which are sources of power. Providing equal access to schools of good quality is vitally important to improving women's status. Equal access to curative and preventive health facilities and information, for example, childhood immunizations, condoms and education to prevent HIV/AIDS, and gender-appropriate reproductive health care are also important. In the area of food security, in addition to having equal access to agricultural advice and extension, women should be unconstrained from growing the kinds of crops on their plots of land that they think are important for their food security and the nutrition status of their family. This may involve the revision of formal rules of access, the inclusion of more women in the design and implementation of outreach programs, and the actual delivery of public services.

Promoting Catch-up in Women's Status

The promotion of catch-up in women's status is a more controversial proposition. It is widely recognized that if such efforts are to survive politically and administratively, they need to have the support of men as well as of women. From the perspective of self-interest, the following examples illustrate that this support should be forthcoming in the sense that boys and men often gain more when programs are targeted to women than when they are not. Males may get a smaller share of the pie, but the increase in the overall size of the pie more than compensates.

A first step is to raise the profile of gender issues. One method for doing this is to track the different implications of public budgetary allocations for men and women. Budlender (1997) described the Women's Budget Initiative (WBI), an ambitious and seemingly successful attempt to do just that in South Africa. Launched in the mid-1990s, the WBI is a collaboration of the parliamentary Joint Standing Committee on Finance and several South African NGOs. Examples include education (If much of the education budget goes to tertiary education, does this shortchange women because they are underrepresented at this level?), service provision (If services are available only at certain outlets, what are the implications for women who tend to have less access to transport than men?), public-sector employment (Will affirmative action be extended to women?), childcare provision (Will government services target women who spend the highest amount of time in these activities?), and employment benefits (What happens to informal-sector employers—mostly women—when they become unemployed or ill?). Even if no immediate action emerges from these activities, they raise consciousness and they develop an empirical base for further advocacy. Another way to do this is through national education and advocacy campaigns to raise the value that society places on women and girls. An example of this is Bangladesh's National Girl Child Day on September 30 (Hunger Project 2000).

Beyond these consciousness-raising efforts, actual policies can be redesigned so that they target females. Here are four examples of successful attempts to do so; two from Bangladesh, the country in which women have the lowest status in the world, and one each from Mexico and Guatemala.

Example: Targeting credit to women in Bangladesh. A number of NGOs in Bangladesh have attempted to improve women's status and the well-being of children in their households by directing credit

to women. How well have these programs worked? Hashemi, Schuler, and Riley (1996) showed that Grameen Bank and Bangladesh Rural Advancement Committee programs have had significant effects on a variety of measures of women's empowerment, including mobility, economic security, control over income and assets, political and legal awareness, and participation in public protests and political campaigning. Pitt and Khandker's (1998) study on the impacts of three NGO microcredit programs tested for the differential impact of male and female borrowing on eight outcomes: boy's and girl's schooling, women's and men's labor supply, total household expenditure, contraception use, fertility, and value of women's nonland assets. They find that female borrowing had a significant effect on seven out of eight of these. By contrast, male borrowing was significant in only three out of eight. One of the implications of their results is that household consumption increases by 18 taka for every 100 taka lent to a woman and 11 taka for a man (Morduch 1997). Kabeer (1998), using participatory evaluation techniques, finds that despite increased workloads due to receipts of credit, women feel empowered by it, clearly feeling more self-fulfilled and valued by other household members and the community.

Example: Food to Bangladeshi families to encourage girls to attend school. The Food for Education Program (FFE) in Bangladesh is a program designed to address household food insecurity and low levels of female education. The Bangladesh government launched the FFE program in July 1993 on a large-scale pilot basis, covering about 5,000 primary schools spread all over the country. Most children from the poorest families in Bangladesh do not attend school because they cannot be spared from contributing to their family's livelihood. The FFE food ration (wheat) becomes the income entitlement that enables a poor family to release children from household obligations so they can go to school. In terms of its education impact, Ahmed (1999) found that attendance increases for both boys and girls, but increases in attendance are about 10–15 percent higher for girls. The benefits from such a program could be far reaching in terms of the status of women by equalizing women's and men's human capital. There is some evidence that it may delay marriage (Arends-Kuenning and Amin 1998), which is believed to strengthen women's power by increasing their opportunity to complete schooling and develop an income-earning career. Delayed marriage also tends to reduce the age difference between women and their husbands, which gives a more egalitarian setting for decisionmaking within households.

Example: Targeting cash to women: The case of PROGRESA in Mexico. In Mexico, a large new countrywide program called PROGRESA[48] began operation in August 1997 to fight "extreme poverty" in Mexico's rural areas. This multisectoral program provides an integrated package of health, nutrition, and educational services to poor families (Gomez de Leon et al. 1997). With a budget of $500 million, PROGRESA is one of the Mexican government's primary weapons against poverty. The program provides monetary assistance, nutritional supplements, educational grants, and a basic health package to its beneficiaries for at least three consecutive years. One of the innovative aspects of the program is its attempt to transfer monetary assistance to women. The literature on the differential

[48]Programa Nacional de Educación, Salud y Alimentación.

impacts of male and female income was influential in this aspect of the program's design. An impact evaluation shows that the program has empowered women by putting additional resources under their control, giving them greater control over their movements, educating them on health and nutrition issues, providing new spaces in which to communicate with other woman, educating girls to improve their position in the future, and increasing their self-confidence and self-esteem (Adato et al. 2000; Skoufias and McClafferty 2001).

Example: Support to child day care groups in Guatemala for poor mothers who need to work. The government-sponsored Community Day Care Program (Programa de Hogares Comunitarios PHC) in Guatemala, created in 1991, provides care and affection, hygiene, food, and early stimulation to close to 10,000 preschoolers throughout the country. It is operated as a nontraditional childcare alternative whereby a group of parents select a woman from the neighborhood and designate her as the *madre cuidadora* (care provider). Her task is to receive and care for up to 10 children in her home, 12 hours a day, five days a week. On a monthly basis the program gives approximately $1 per child per day to the *madre cuidadora* for purchasing food, gas, and educational material. The program also gives her an incentive of $3 per child per month, which is complemented by a $5 per child contribution from the parents. An impact evaluation (Ruel et al. 2001) shows that the overall benefits of the program on children's diet are positive and large. Comparison of beneficiary mothers with a random sample of working mothers from the same area indicates that the program is reaching more vulnerable and at-risk women: participating women tend to be younger, be less educated, have fewer assets, and, more important, be much more likely to be single mothers and sole family income earners than mothers using other childcare arrangements. Because the program provides low-cost, reliable care for extended hours, vulnerable mothers receive respite from their childcare responsibilities and are able to engage in formal employment. Evidence from the evaluation suggests that the government-sponsored day care program in Guatemala relieves an important constraint to women's labor force participation in urban areas.

What can stand-alone nutrition programs do to promote catch-up? It is unreasonable to expect stand-alone nutrition interventions to be able to overcome the effects of long-standing economic, social, and cultural discrimination against women. Nevertheless, there is a growing consensus that nutrition interventions must place greater emphasis on care for women. The Bangladesh Integrated Nutrition Program (BINP) and the Tamil Nadu Integrated Nutrition Program (TINP) are two examples of large-scale nutrition programs doing just this. The BINP is based on community nutrition promoters, who help mothers identify the causes of malnutrition in their children, with a focus on care practices to prevent malnutrition before, during, and after pregnancy. The nutrition promoters work with the women to help them recognize and overcome gender asymmetries such as intrahousehold allocations of food that mean women get served last and least (UNICEF 1998). In addition, Village Women's Groups prepare food for malnourished women that is sold to nutrition centers, thus supporting the women's groups, building social capital among women, and empowering the decisionmaking of women via small but important sources of cash. Similarly, the TINP involves women in program implementation, primarily through the support of local women's groups.

There is also a growing consensus that nutrition interventions should focus more on improving the nutritional status of young girls, both for their own benefit and for the benefit of their unborn children (Allen and Gillespie 2001). Two recent review papers

focused on the effectiveness of specific interventions in reducing low birth weight at term resulting from intrauterine growth retardation (de Onis, Villar, and Gulmezoglu 1998) and maternal morbidity (Kuiler et al. 1998). The review by de Onis, Villar, and Gulmezoglu (1998) of 136 randomized, controlled trials evaluating 36 prenatal interventions aimed at reducing intrauterine growth retardation is discouraging in that it identifies only balanced protein/energy supplementation as increasing birth weight and then only marginally. Data and evidence on other interventions such as nutrition advice and a range of micronutrient supplementations are too weak to recommend for routine supplementation programs. Kuiler et al. (1998) found more positive evidence with regard to nutrition interventions for the prevention of maternal morbidity. They conclude that for populations with a high incidence of nutritional anemia, iron and folate supplementation should be routine during antenatal care. Pregnant women in low calcium areas should be encouraged to increase their consumption of this element via their diet. The effectiveness of other micronutrient interventions, such as zinc, magnesium, and calcium, is less conclusive.

The most effective (and cost-effective) ways to improve women's status will differ by context. A menu of options is suggested in this report. A number of tactical decisions have to be made if there is a conscious policy decision to improve women's status. Is it enough to eliminate discrimination—something that cannot be done at the stroke of even the most enlightened pen—or is it necessary and feasible to promote active catch-up in women's status? What is the most appropriate level at which to act: basic, underlying, or both? The answers to these questions will depend on the location of the decisionmaker and the political economy of the decisionmaking environment.

What this study has shown is that there are significant benefits to taking the policy decision to improve women's status. Not only does a woman's own nutritional status improve but so too does the nutritional status of her young children. Improving women's status today is a powerful force for improving the health, longevity, capacity, and productivity of the next generation of young adults.

APPENDIX A

Models of Household Decisionmaking

Mathematical models of household decisionmaking are limited in their ability to capture the true complexity of the process of child nutrition provisioning in households. However, they help us to understand how power differentials within households affect such provisioning by clearly specifying what decisions are being made, who participates in them, who controls resources, and the constraints that are faced (Smith 1995). They are also useful in identifying the forces, both external and internal to the household, that influence the decisionmaking process. In this way they aid in identifying the appropriate variables to include in empirical analysis.

In these models household members' preferences, represented by utility functions, guide decisionmaking. The constraints faced are production functions for goods and services utilized and consumed by the household as well as members' time and income constraints. They may be of the "unitary" type, whereby household decisions are taken with respect to one utility function and household members' resources are assumed to be pooled. Or they may be of the "collective" type, whereby each member is assumed to have a distinct utility function and perhaps separate resource constraints. There is sufficient evidence that people in multiple-member households do not behave according to the unitary type of model to rule it out (Haddad, Hoddinott, and Alderman 1997; Quisumbing and Maluccio 2003).

The question then becomes, what form of collective model is appropriate? In "cooperative" game-theoretic models, household members are assumed to make decisions over resource allocation jointly and pool their resources (McElroy and Horney 1981). In "noncooperative" game-theoretic models, members take decisions separately and control separate sets of resources (for example, Ulph 1988). Some models combine both (Lundberg and Pollak 1993; Carter and Katz 1997; Smith 1997). The form of the model employed should depend on decisionmaking patterns in the particular location being studied. Two examples are described here to illustrate (1) a cooperative model (Model 1) and (2) a model in which resource allocation decisions are modeled as a noncooperative game but resource control decisions are modeled as a cooperative game (Model 2). While the two models generate the same reduced-form equations, their structural forms give insight into the types of power differentials among household members and their role in determining child nutritional status.

To simplify, we assume that household adults receive income from wage employment rather than home-based, self-employment and that goods entering the household are all

purchased on the market rather than home produced.[49] Additionally, it is assumed that the household is made up of two adult decisionmakers, a woman and her husband or partner, and the child in their care. The dependence of the child's nutritional status on her or his mother's nutritional status is not explicitly modeled. The fallback positions for the cooperative bargaining games are assumed to represent the man's and woman's maximum utility in the event of divorce.[50]

Consider a household made up of a woman (indexed $i = f$) and a man ($i = m$), who is her live-in husband or partner, and their child. The woman and man spend their time in three activities: (1) income generation, T_{iw}, for which wage wi is received; (2) care for household members, T_{ic}; and (3) leisure, T_{il}. Household income comes from the income they generate and other exogenous sources (denoted E_i) and is allocated between two types of goods: (1) those directly consumed, X_O, having prices p_O; and (2) those used in the provisioning of nutrition for household members, X_N, having prices p_N.

Let the woman's and man's preferences, embodied in utility function U_i, be defined over child nutritional status, N, goods directly consumed, and the woman's and man's leisure time as follows:[51]

$$U^i(N, X_O, T_{fl}, T_{ml}) \quad i = f,\ m. \tag{5}$$

Note that the woman's and man's preferences are defined for the same set of variables. However, they may not have the same preferences over them and in fact may not play any role in choosing some of them.

Providing child nutrition requires inputs of time spent on caring practices, such as those listed in Figure 2.2, and purchased goods, such as food and medicines. Either the woman or the man can be the provider. Let this process be represented by

$$N(X_N, T_{fc}, T_{mc}, \Omega), \tag{6}$$

where

$$\Omega = (\Omega_{ch}, \Omega_{hh}, \Omega_{co}).$$

Nutritional status is also determined by the child's characteristics (Ω_{ch}), characteristics of the child's household and caretaker(s) (Ω_{hh}), and characteristics of the community in which the child's household is located (Ω_{co}). Child characteristics include age, sex, and genetic endowment. Characteristics of the household include household size, age-sex composition, health environment, and the age and education of the child's caretakers. Characteristics of the community include its location, infrastructure, and cultural norms that dictate patterns of gender equality in the community.

Model 1: Joint Decisionmaking and Resource Pooling

In this model, the woman and man are assumed to make all resource allocation decisions jointly subject to pooled household income. Joint decisions are seen as a bargaining process in which the woman and

[49]It is straightforward to extend the model to incorporate income generated through home production of both marketed and nonmarketed (own-consumed) products, often termed "agricultural household models" (Singh, Squire, and Strauss 1986). The different income-generating activities can be engaged in individually or jointly by household members, or both individual and joint activities can be going on simultaneously. When the collective approach is taken, these models have more complicated implications for intrahousehold resource control (Smith 1995).

[50]Fallback positions can also be modeled as a noncooperative equilibrium within marriage (see Lundberg and Pollak 1993). The divorce fallback is chosen here because this study emphasizes power differences between women and men exerted by their dependence on one another for access to resources through household formation.

[51]The utility and nutrition provisioning functions are assumed to be continuously differentiable, increasing in all arguments, and strictly quasi-concave.

man may have different degrees of power to influence the final decision. The endogenous choice variables of the model are

$$\xi = (X_O, X_N, T_{fw}, T_{fc}, T_{fl}, T_{mw}, T_{mc}, T_{ml}).$$

The woman and man together choose ξ to maximize a Nash objective function,

$$[U^f(N, X_O, T_{fl}, T_{ml}) - \phi^f(p, w^f, E^f, \alpha^f)] * [U^m(N, X_O, T_{fl}, T_{ml}) - \phi^m(p, w^m, E^m, \alpha^m)], \quad (7)$$

subject to the nutrition provisioning function (6) and

$$T_w^f + T_c^f + T_l^f = T^f; \quad (8)$$

$$T_w^m + T_c^m + T_l^m = T^m; \quad (9)$$

$$p_O X_O + p_N X_N = w_f T_w^f + w_m T_w^m + E^f + E^m; \quad (10)$$

$$(U_i - \phi^i) > 0, \quad i = f, m. \quad (11)$$

Equation (7) is the product of the woman's and man's gains from being members of the household, which must be positive (equation 11). The fallback positions here are derived from the maximization of the woman's and man's utility functions, given the time and income constraints they would face in the event of divorce. They are thus functions of the prices, wages, and exogenous incomes they would face, which are assumed to be the prices faced in the current married state. They are also functions of other nonmonetary factors influencing the agents' fallback positions, denoted α^i, including their human capital (for example, education) and social capital (for example, ability to rely on natal family). While these are often referred to as "extra-household environmental parameters" (McElroy 1990), they may also reflect the individual characteristics of household members.

Equations (8) and (9) equate the woman's and man's time allocated among work, care, and leisure to their time endowment (24 hours a day). Equation (10) is the household budget constraint. It equates the household's expenditures to its income, which is derived from the employment incomes of the woman and man and their exogenous incomes.

The reduced-form equations for the inputs into the nutrition provisioning function when substituted into equation (6) give the following reduced-form equation for child nutritional status:

$$N^*(p_O, p_N, w^f, w^m, E^f, E^m, \alpha^f, \alpha^m, \Omega). \quad (12)$$

This is a function of the prices faced, the woman's and man's income-generating potentials as embodied in their wages, their exogenous incomes, factors influencing their situation in the event of divorce, and child, household, and community characteristics, including the degree of gender equality.

In this model, the decisionmaking power of a woman relative to her husband's affects child nutritional status by affecting the degree of influence the woman has over (1) the allocation of her time and her husband's time to care of the child and (2) the allocation of household income to purchased goods that enhance the child's nutritional status. The first-order necessary condition for optimal allocation of household income to purchases of goods that are inputs into child nutrition provisioning, for example, is

$$\frac{\partial N}{\partial X_N}\left[\frac{\partial U^f}{\partial N}(U^m - \phi^m) + \frac{\partial U^m}{\partial N}(U^f - \phi^f)\right] = \lambda p_N, \quad (13)$$

where λ is the household's shadow value of income.

At the optimum, the household member with the most favorable fallback position, that is, having the least to gain from membership in the household (the lowest $U_i - \phi^i$), has the most influence over how income is

allocated among the purchase of nutrition inputs and other goods. If the woman cares more about child nutrition $\left(\frac{\partial U^f}{\partial N} > \frac{\partial U^m}{\partial N}\right)$, then a balance of power in favor of the man means that less of household resources will be allocated to nutrition provisioning than if there were a more equal balance of power. Relative power also enters into the model through the influence of gender inequality at the societal (community) level, which restricts the behaviors and opportunities of one household member more than the other and thus their ability to carry out actions and gather information needed to care for a child optimally.

Model 2: Individual Decisionmaking over Resource Allocation, Joint Decisionmaking over Resource Control

In this model, the woman and man are assumed to make all resource allocation decisions unilaterally, subject to the income and their own time that they control individually. They bargain over the distribution of household resources, that is, who controls their time and household income, in a joint decisionmaking process in which they may have different degrees of power to influence the final decision.

Social norms are assumed to determine who has "voice," that is, who participates, in various household decisions. In this case, only one member has voice in the choice of the level of a particular variable to the complete exclusion of the other. Thus assumptions must be made about who makes decisions on what. Here, one example is given. The choice variables of the model are broken up into three sets: those decided by the woman, those decided by the man, and those jointly decided, that is, the variables mediating resource control as follows:

$$\xi^f = (X_O^f, X_N^f, T_w^f, T_c^f),$$
$$\xi^m = (X_O^m, X_N^m, T_w^m, T_c^m),$$
$$\xi^J = (T_l^f, T_l^m, t).$$

In a first stage of the game, the woman and man are assumed to unilaterally choose some subset of both consumption goods and nutrition inputs as well as their own time spent in income generation and care. In the second, bargaining takes place over the time each spends in leisure and over a transfer of income, t, from the man to the woman. The leisure and transfer variables thus mediate their control over time and income. Note that in many developing-country households, men do not engage in caring activities and women do not engage in income-generating activities, in which case $T_{mc} = 0$ and $T_{fw} = 0$, due to either social norms or a household decision. The case in which a man decides independently how a woman's time is to be allocated and vice versa is not considered.[52]

The woman and man choose the variables in their decision sets, ξ^i, to maximize their individual utility, given their expectations of the choices the other agent makes and holding fixed the time and income they control. Below, the variables that are not chosen by the person but still enter into their unilateral decisionmaking process are barred.

The woman chooses ξ^f to maximize

$$U^f\,(N, X_O^f, \overline{X_O^m}, \overline{T_l^f}, \overline{T_l^m}), \tag{14}$$

subject to

$$N\,(X_N^f, \overline{X_N^m}, T_c^f, \overline{T_c^m}, \Omega), \tag{15}$$

$$T_w^f + T_c^f = T^f - \overline{T_l^f}, \tag{16}$$

[52]Of course, if a man or a woman has all of the decisionmaking power and the other has none in joint decisionmaking (he or she is a dictator), the situation would be as if he or she is making the decision alone.

$$p_O^f X_O^f + p_N^f X_N^f = w^f T_w^f + E^f + t. \quad (17)$$

Equation (16), the woman's time constraint, equates the total time she allocates among income generation and care to the portion of her time that she controls, that is, 24 hours a day minus her leisure time, which must be negotiated with her husband. Equation (17) equates her expenditures to the income she controls, that is, her wage income plus her exogenous income and the transfer from her husband.

Similarly, the man chooses ξ^m to maximize

$$U^m(N, X_O^m, \overline{X_O^f}, \overline{T_l^f}, \overline{T_l^m}), \quad (18)$$

subject to

$$N(X_N^m, \overline{X_N^f}, T_c^m, \overline{T_c^f}, \Omega), \quad (19)$$

$$T_w^m + T_c^m = T^m - \overline{T_l^m}, \quad (20)$$

$$p_O^m X_O^m + p_N^m X_N^m = w^m T_w^m + E^m - t. \quad (21)$$

Unique levels of the woman's decision variables that are dependent on levels of the man's, and vice versa, solve their maximization problems. These "reaction functions" (R) take the form

$$R^f(p_O^f, p_N^f, w^f, E^f + t, T^f - T_l^f \mid \xi^m), \text{ and}$$
$$R^m(p_O^m, p_N^m, w^m, E^m - t, T^m - T_l^m \mid \xi^f).$$

The decisions the woman makes depend on the prices she faces and her wage and exogenous income. They are conditional on the decisions the man makes, and vice versa. Here no communication takes place between the agents; instead, each takes into consideration what the other is doing but makes a decision on his or her own. Mathematically, the solution is a Nash equilibrium generated through simultaneous solution of the reaction functions. The resulting conditional reduced-form equations for the woman's and man's purchases of nutrition inputs and time in care are

$$X_N^i(p, w, E^f, E^m, \Omega, t, T_l^f, T_l^m) \text{ and} \quad (22)$$
$$T_c^i(p, w, E^f, E^m, \Omega, t, T_l^f, T_l^m), \quad (23)$$

where p and w are vectors of all prices and wages. Their maximized utilities, V^i, given the current resource control situation, derived by substituting the conditional reduced forms (equations 22 and 23) into their direct utility functions, are

$$V^i(p, w, E^f, E^m, \Omega, t, T_l^f, T_l^m)\, i = f, m. \quad (24)$$

In the second stage of the game, the woman and man jointly choose optimal values of the resource control variables ξ^J by maximizing

$$[V^f(t, T_l^f, T_l^m) - \phi^f] * [V^m(t, T_l^f, T_l^m) - \phi^m] \quad (25)$$

subject to

$$(V^i - \phi) > 0 \qquad i = f,\ m. \quad (26)$$

Reduced-form equations for the resource control variables are given by

$$t^*(p_0, p_N, w^f, w^m, E^f, E^m, \Omega, \alpha^f, \alpha^m), \quad (27)$$
and
$$T_l^{i*}(p_0, p_N, w^f, w^m, E^f, E^m, \Omega, \alpha^f, \alpha^m). \quad (28)$$

The final reduced-form equation for child nutritional status is derived by substituting equations (27) and (28) into the conditional reduced-form equations for the purchased inputs into nutrition provisioning and the time the woman and man spend in care (equations 22 and 23). It takes the form

$$N^*(p_0, p_N, w^f, w^m, E^f, E^m, \alpha^f, \alpha^m, \Omega) \quad (29)$$

In this model, the decisionmaking power of a woman relative to her husband's influences child nutritional status indirectly by affecting the distribution of resource control in the household. The first-order necessary conditions for optimal allocation of household income to purchases of goods

that are inputs into child nutrition provisioning, for example, are

$$\frac{\partial U^f}{\partial N}\frac{\partial N}{\partial X_N^f} = \lambda^f p_O^f,$$
$$\frac{\partial U^m}{\partial N}\frac{\partial N}{\partial X_N^m} = \lambda^m p_O^m, \tag{30}$$

where λ^i, $i = f, m$ is the person's shadow value of income they control individually. However, further conditions that must be satisfied are

$$\frac{\partial V^f}{\partial t}(V^m - \phi^m) + \frac{\partial V^m}{\partial t}(V^f - \phi^f) = 0, \tag{31}$$

and

$$\frac{\partial V^f}{\partial T_l^i}(V^m - \phi^m) + \frac{\partial V^m}{\partial T_l^i}(V^f - \phi^f) = 0, \quad i = f, m. \tag{32}$$

This second set of conditions means that the household member with the most favorable fallback position has the most influence over who controls time and income in the household. In this case, if, for example, the woman is mainly responsible for providing time for care and for purchases of inputs into nutrition, and the woman cares more about child nutrition ($\partial Uf/\partial N > \partial Um/\partial N$), then a balance of power in favor of the man means that less resources will be controlled by the woman, and child nutrition will be lower. As in Model 1, relative power also enters into the model through the influence of gender inequality at the societal (community) level.

In most households, both unilateral and joint resource allocation decisions are likely to be undertaken simultaneously. For example, a woman may make decisions about a major purchase of expensive medications to treat an illness jointly with her husband, but she may make a decision about whether to buy a tomato on her own. Bargaining about who controls which portions of household income or about how much leisure time the woman takes can be going on at the same time. Thus power differentials can influence child nutrition in four ways simultaneously: (1) by affecting who has influence over the allocation of resources to nutrition inputs; (2) by affecting who has influence over resource control distribution among household members, and thus their ability to allocate resources to nutrition inputs; (3) by determining who has voice in which decisions, and (4) by affecting the degree of gender inequality at the societal level.

The above models also underscore the foundational role of preference differences between women and men in determining household resource allocation and control. If no differences in preferences exist, then women and men will agree on every decision. Who controls which subsets of household resources will not matter. The models collapse to the unitary model where one set of preferences guide decisionmaking and resources are pooled. In this situation, even large bargaining power inequalities will make no difference for resource allocation and thus for outcomes such as child nutritional status.

APPENDIX B

Validation of Measure of Women's Relative Decisionmaking Power

In Chapter 2, a conceptual model of the relationship between women's status and child nutrition was developed. In Chapter 3, it was married to available data. In order to convincingly test the hypothesis that women's decisionmaking power relative to their male partners (as measured by the index constructed in Chapter 3) affects children's nutritional status, the index has to be associated with some measure known for sure to affect women's relative decisionmaking power. In other words, the index has to be validated. In this appendix, we undertake a validation analysis using measures of women's relative decisionmaking power that provide *direct evidence* of such power, termed the "validation variables." These measures are only available for some of the sample countries. Note that a validation analysis for the index of societal gender equality is not undertaken since the indicators employed to construct it are already direct evidence of the degree of equality between females and males in communities.

Table B.1 describes the validation variables and lists the countries and number of women for which the variables are available. The first three sets focus on decisionmaking over money, reproduction, and a number of other areas of women and children's lives. Most of the variables are dummy variables equaling 1 if the woman participates in the decision (either making it alone or jointly with her partner) or claims to have the greatest say in it,[53] and equal to zero otherwise. This is a simple but particularly stark measure of decisionmaking power, compared with one, say, that attempts to capture the degree of difference in women's and men's influence over a joint decision. For India, the validation variable equals 1 if the woman reports that she is "allowed to set money aside," an indication that she controls some part of her household's financial resources individually. An additional category of validation variable is mobility, which is an indicator of women's autonomy. The last column of the table reports the percentage of affirmative cases (= 1) for each variable.

It is quite possible that an indicator found to be weakly associated with a validation variable for an individual country is nevertheless found to be strongly associated with it for a larger sample containing data from multiple countries. This is because the range of and variation in the data for a larger sample containing heterogeneous cases are generally increased. Thus, further validation variables based on multicountry combinations of the individual country variables are constructed. These "combined validation variables" are constructed for decisionmaking over money (variable 5), decisionmaking over reproduction (variable 15), and

[53]In many cases the woman's partner was asked the same question. Because the answers from the woman and man were almost always the same, we used only the variables representing the woman's answer.

Table B.1 Description of validation variables used in validation analysis of the measure of women's relative decisionmaking power

Country	Question asked or variable description	Number of cases	Percent of cases equal to 1[a]
Decisionmaking over money			
(1) India	Whether allowed to set money aside	22,366	56.2
(2) Zimbabwe	Who in your household decides whether to purchase a major household item, such as a radio or television?	1,492	77.6
(3) Nicaragua	Who decides how to spend money?	3,425	68.4
(4) Egypt	Who has the last word in decisions on the household budget?	4,934	35.4
(5) All of the above	Whether woman participates in decisions over money	32,217	55.3
(6) 24 countries[b]	Who decides how the money the women earns is spent?	32,549	87.2
Decisionmaking over reproduction			
(7) Cameroon	Who makes the decision to use family planning?	1,263	46.0
(8) Tanzania	Who decides the number of children?	2,747	56.9
(9) Togo	Who makes the decision to use family planning?	862	77.5
(10) Zambia	Who should decide the number of children?	3,095	38.1
(11) Zimbabwe	Who in your household decides how many children you will have?	1,592	71.1
(12) Nicaragua	Who decides contraceptive use?	2,946	85.6
(13) Egypt	Who has the last word in decisions on either family planning or having a child?	5,066	70.4
(14) Turkey	Who decided to use current method?	1,616	80.8
(15) All of the above	Whether woman participates in decisions over reproduction	19,187	65.2
Other types of decisions			
(16) India	Who decides about respondent staying with family?	16,376	46.6
(17) India	Who decides on obtaining health care?	18,203	50.6
(18) Zimbabwe	Who in the household decides whether the woman should work outside of the home?	–1,531	25.3
(19) Nicaragua	Who decides children's discipline?	3,378	87.9
(20) Egypt	Who has the last word in decisions on child's education or marriage?	4,926	58.5
(21) Egypt	Who has the last word in decisions on wife's employment?	5,110	28.4
(22) Egypt	Who has the last word in decisions on visits to friends and relatives?	5,083	36.9
Mobility			
(23) India	Whether woman is allowed to both go to the market and visit relatives or friends	22,408	94.1
(24) Bangladesh	Whether woman goes outside place of residence alone, frequency of doing so, frequency of shopping, and whether she can go to health center alone (Dummy variable based on all four)	3,614	58.7
(25) Pakistan	Whether woman goes to hospital alone or with children (versus neither)	2,725	27.4
(26) Egypt	Whether woman is allowed out alone or with children (versus neither)	5,101	86.1
(27) All of the above	Whether woman goes out of residence alone or with child	33,848	83.7
Country-level validation variables			
India	Equals 1 if at least two among (1), (16), and (17) = 1, else zero	15,669	51.0
Zimbabwe	Equals 1 if at least two among (2), (11), and (18) = 1, else zero	1,427	69.3
Nicaragua	Equals 1 if all three of (3), (12), and (19) = 1, else zero	2,854	62.7
Egypt	Equals 1 if at least three among (4), (13), (20), (21), and (22) = 1, else zero	4,721	47.3
All of the above	Whether woman has "high" decisionmaking power	24,671	52.7

[a] For the questions beginning with "Who," the cases that are equal to 1 are those for which the woman reports that she participates in the decision, either alone or jointly with her husband. For the questions beginning with "Whether," the cases that are equal to 1 are the affirmative cases.

[b] This variable is only available for women who work for cash income. The countries are India, Nepal, Benin, Central African Republic, Chad, Comoros, Ghana, Kenya, Madagascar, Mali, Mozambique, Niger, Tanzania, Togo, Uganda, Zambia, Zimbabwe, Bolivia, Brazil, Colombia, Dominican Republic, Guatemala, Nicaragua, and Peru. While data are available for Bangladesh, they are excluded because all cases in the sample are equal to 1, giving perfect multicollinearity with country dummies in the regression analysis.

mobility (variable 27), as specified in the table. An additional "decisionmaking over money" variable combines the data for 24 countries giving the answer to "Who decides how the money you earn is spent?" (variable 6). Obviously, this variable is only available for women who earn money.

Further, for the four countries for which at least three validation variables are available, country-specific combined validation variables are constructed that are equal to 1 if a set of *multiple* conditions (specified in the table) are satisfied and zero otherwise. The countries, one from each region, are India, Zimbabwe, Nicaragua, and Egypt. Finally, an overall validation variable that is composed of the stacked data for these four country-specific variables is then constructed.

Table B.2 reports means of each of the four indicators of women's relative decisionmaking power used to construct the index (*workcash, agemar, agedif,* and *educdif*) across the negative (= 0) and affirmative (= 1) values of the validation variables. A positive and statistically significant ($p < 0.10$) difference (using a one-tailed test) in these means indicates that the indicator is positively associated with women's decisionmaking power.

Table B.3 reports the results of probit regressions with the validation variables as the dependent variable and each candidate indicator as a right-hand-side regressor. The goal is to determine whether the indicator is a significant and positive predictor of each validation variable while controlling for household characteristics. The household characteristics are household size, household age-sex composition, urban or rural location, economic status, and country of location (if multiple countries are included). A test of the joint significance of the four indicators when they are all included in the same regression equation is also undertaken. If the test statistic is significant ($p < 0.10$), the association is considered statistically significant and the indicators valid as a group. While the discussion below focuses on the combination variables for the interested reader, those for individual validation variables are also reported.

The country-combined validation variable for decisionmaking over money combines data from Egypt, India, Nicaragua, and Zimbabwe. Both descriptive and regression results suggest that all four indicators (listed across the top row) have statistically significant and positive associations with women's participation in decisions over the allocation of household income. The four indicators are individually significant and highly jointly significant ($F = 451.2$) in the probit regression. In the case of the validation variable for decisions over women's earnings (including data from 24 countries), while *educdif* does not exhibit a significant association, the other three indicators and the indicators as a group do ($F = 38.2$).

With regard to decisionmaking over reproduction, all indicators are positively associated with women's participation in decisions over the number of children to have and the use of contraceptives for the eight-country sample for which data are available. The eight countries are Cameroon, Egypt, Nicaragua, Tanzania, Togo, Turkey, Zambia, and Zimbabwe. While *workcash* does not exhibit a significant association with decisionmaking over reproduction in the descriptive analysis, it does so in the regression analysis, where household characteristics are controlled for.

In the case of women's mobility, the combined variable uses data from Bangladesh, Egypt, India, and Pakistan. Here all four indicators are significantly and positively associated with the probability of a woman going outside of her residence or being allowed to do so.

Table B.2 Validation of indicators of women's decisionmaking power relative to men's: Descriptive results

Variable type/country	Whether woman works for cash		Woman's age at first marriage		Percent age difference between woman and partner		Education difference between woman and partner		Index of women's relative decisionmaking power	
	Negative	Affirmative	Negative	Affirmative	Negative	Affirmative	Negative	Affirmative	Negative	Affirmative
Decisionmaking over money										
India	0.158	0.170***	16.92	18.17***	–17.90	–17.02***	–3.49	–2.64***	34.16	36.97***
Zimbabwe	0.305	0.459***	18.09	18.43*	–23.51	–21.58***	–1.25	–1.16	36.32	37.81***
Nicaragua	0.109	0.309***	16.52	17.43***	–14.42	–11.68***	–0.54	–0.32**	36.45	39.20***
Egypt	0.094	0.212***	16.52	17.40***	–19.15	–17.74***	–2.70	–2.04***	35.90	39.83***
All of the above	0.143	0.211***	18.01	19.82***	–18.05	–16.68***	–3.04	–2.18***	34.77	37.60***
24 countries[a]	0.922	0.912	17.15	18.07***	–18.96	–16.86***	–2.09	–1.72***	37.03	39.27***
Decisionmaking over reproduction										
Cameroon	0.724	0.716	16.39	17.61***	–25.70	–24.17**	–2.09	–1.75**	33.50	36.04***
Tanzania	0.544	0.505	17.84	17.75	–21.11	–20.58	–1.18	–1.09	37.22	37.20
Togo	0.706	0.734	18.44	18.23	–19.80	–20.78	–3.11	–3.14	37.58	37.01
Zambia	0.374	0.464***	17.00	17.39***	–19.18	–18.53*	–2.40	–2.17**	35.22	36.36***
Zimbabwe	0.330	0.445***	18.16	18.45*	–22.93	–22.08	–1.13	–1.16	36.74	37.67**
Nicaragua	0.182	0.262***	16.61	17.30***	–13.83	–12.38*	–0.71	–0.23***	36.81	38.81***
Egypt	0.073	0.157***	17.57	19.05***	–18.62	–18.55	–3.03	–2.28**	35.10	38.11***
Turkey	0.283	0.290	19.21	19.24	–23.78	–21.82	–2.19	–1.88*	50.54	50.27
All of the above	0.363	0.347	17.42	18.23***	–18.00	–14.05***	–2.11	–1.59***	36.36	39.05***
Other types of decisions										
India (staying with family)	0.189	0.186	17.14	18.22***	–18.01	–17.19***	–3.08	–2.56***	34.83	37.09***
India (health care)	0.185	0.173	17.16	18.16***	–17.99	–17.11***	–3.21	–2.56***	34.77	36.99***
Zimbabwe (woman's work)	0.389	0.517***	18.32	18.38	–22.50	–21.29**	–1.12	–1.33	37.25	37.83*
Nicaragua (child discipline)	0.154	0.256***	16.41	17.18***	–13.37	–12.41	–0.83	–0.34***	36.48	38.53***
Egypt (child education/marriage)	0.074	0.174***	17.49	19.41***	–18.80	–18.44	–3.16	–2.02***	34.82	38.94***
Egypt (woman's work)	0.088	0.245***	18.15	19.74***	–18.73	–18.15*	–2.80	–1.75***	36.15	36.88***
Egypt (visits to friends/ relatives)	0.108	0.175***	18.08	19.50***	–18.55	–18.69	–2.74	–2.06***	36.18	38.97***
Mobility										
India	0.136	0.167***	16.38	17.70***	–19.32	–17.28***	–3.71	–3.00***	32.72	35.93***
Bangladesh	0.164	0.225***	14.48	14.17	–27.47	–25.35***	–2.12	–2.15	28.69	28.92
Pakistan	0.099	0.127**	17.67	18.61***	–17.15	–16.45	–4.20	–3.59***	34.90	37.05***
Egypt	0.047	0.146***	17.84	18.72***	–21.37	–18.11***	–2.96	–2.43***	34.72	37.60***
All of the above	0.119	0.167***	16.51	17.62***	–21.01	–18.00***	–3.36	–2.84***	32.67	35.70***
Country-level combination										
India	0.191	0.188	16.94	18.29***	–18.23	–17.18***	–3.17	–2.51***	34.41	37.25***
Zimbabwe	0.327	0.476***	18.09	18.46**	–22.84	–21.52**	–1.16	–1.18	36.62	37.90***
Nicaragua	0.150	0.315***	16.64	17.56***	–14.24	–11.44***	–0.48	–0.19**	36.82	39.62***
Egypt	0.079	0.202***	17.79	19.67***	–18.73	–18.59	–2.95	–1.92***	35.46	39.43***
All of the above	0.168	0.230***	17.14	18.44***	–18.14	–16.96***	–2.80	–2.00***	34.93	38.00***

[a] This variable is only available for women who work for cash income. See Table B.1 for a list of the countries.

* Difference is significant at the 10 percent level; ** difference is significant at the 5 percent level; *** significant at the 1 percent level.

Table B.3 Validation of indicators of women's decisionmaking power relative to men's: Probit regression results (marginal effects)

Variable type/country	Whether woman works for cash	Woman's age at first marriage	Percent difference in age between woman and partner	Education difference between woman and partner	Chi-square for joint significance	Index of women's relative decision-making power
Decisionmaking over money						
India	0.0465***	0.0167***	0.1302***	0.008***	286.0***	0.0072***
Zimbabwe	0.0966***	0.0026	0.1545*	0.000	21.4***	0.0029**
Nicaragua	0.1904***	0.0110***	0.2030***	0.0032	115.2***	0.0061***
Egypt	0.1736***	0.0147***	0.1900***	0.0043**	103.7***	0.0065***
All of the above	0.0857***	0.0156***	0.1674***	0.007***	451.2***	0.0072***
24 countries[a]	0.0123*	0.0023***	0.0584***	0.001	38.2***	0.0013***
Decisionmaking over reproduction						
Cameroon	0.0594*	0.0254***	0.2109**	0.0083**	34.4***	0.0096***
Tanzania	–0.0243	–0.0035	0.1292*	0.0015	8.18*	–0.0001
Togo	0.0111	–0.0027	–0.1273	0.000	1.82	–0.0018
Zambia	0.0833***	0.0081***	0.1372*	0.0062**	33.2***	0.0057***
Zimbabwe	0.0885***	0.0045	0.0719	–0.0017	16.6***	0.0027*
Nicaragua	0.0105	0.0042**	0.0599	0.0046**	10.6***	0.0021***
Egypt	0.1062***	0.0081***	–0.0213	0.0055***	50.6***	0.0034***
Turkey	0.0378	–0.0010	–0.0134	0.004	4.70	–0.0000
All of the above	0.0520***	0.0063***	0.0507**	0.0052***	88.8***	0.0032***
Other types of decisions						
India (staying with family)	0.0035	0.0205***	0.1394***	0.0064***	267.0***	0.0079***
India (health care)	–0.0113	0.0178***	0.1477***	0.0082***	250.6***	0.0074***
Zimbabwe (woman's work)	0.0999***	–0.0003	0.1673*	–0.0043	22.6***	0.0015
Nicaragua (child discipline)	0.0263*	0.0046***	0.0259	0.0041**	14.8***	0.0019***
Egypt (child education/marriage)	0.1579***	0.0145***	0.0062	0.0118***	114.3***	0.0066***
Egypt (woman's work)	0.2312***	0.0110***	0.0662	0.0090***	167.9***	0.0057***
Egypt (visits)	0.0812***	0.0110***	–0.0591	0.0055***	58.9***	0.0039***
Mobility						
India	0.0107***	0.0063***	0.0826***	0.0015***	154.0***	0.0026***
Bangladesh	0.0820***	–0.0026	0.3386***	0.0029	37.9***	0.0034**
Pakistan	0.0640**	0.0088***	0.1144*	0.0074***	28.9***	0.0049***
Egypt	0.0918***	0.0038***	0.2376***	0.0023**	71.6***	0.0032***
All of the above	0.0345***	0.0059***	0.1501***	0.0027***	204.4***	0.0034***
Country-level combination						
India	0.0174*	0.0231***	0.1717***	0.0075***	315.0***	0.0091***
Zimbabwe	0.1218***	0.0053	0.1343	–0.0021	26.7***	0.0037**
Nicaragua	0.1474***	0.0133***	0.2277***	0.0046*	68.8***	0.0068***
Egypt	0.2031***	0.0158***	–0.0307	0.0104***	140.7***	0.0067***
All of the above	0.0729***	0.0191***	0.1476***	0.0073***	447.4***	0.0080***

[a] This variable is only available for women who work for cash income. See Table B.1 for a list of the countries.
* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Finally, the results of the combined country-level validation (see the bottom panels of Tables B.2 and B.3) indicate that *workcash* is significantly and strongly associated with women's decisionmaking power relative to men's in all four countries except India, where the association is significant but weak. In Egypt, a woman who works for cash has a 0.20 greater probability of being of "high" status (as defined in Table B.1) than a woman who does not. While Zimbabwe shows no positive association for *agemar*, the overall validation vari-

able suggests a strong association for the four-country sample as a whole.[54] For example, a woman who marries at 26 years old has a 0.20 greater probability of having "high status" than one married at 16. The association for *agedif* is significant for the sample as a whole but not for Zimbabwe and Egypt. The four-country sample results indicate that large age differences have an influence on woman's relative decisionmaking power. For example, a woman who is 20 years old and whose husband is also 20 is almost 10 percent more likely to have high status than one whose husband is 25 years older than her. For education differences, only Zimbabwe shows an insignificant association.

Figure B.1 uses the regression results to plot the probability of a woman being of "high" status against the four indicators, each of which is placed on a scale of 0–10 for comparability purposes.[55] *Agemar* appears to have by far the strongest validity as an indicator of women's relative decisionmaking power for the four countries. Over its range the probability of a woman being of high status increases from 0.45 to 0.95. *Agedif* and *educdif* have the next strongest association with the validation variables, and *workcash* has the weakest.

The last column of Table B.3 gives the regression coefficient when the validation variables are regressed on the index of women's relative decisionmaking power itself. The index is positively associated with the validation variables, and the associations are strongly statistically significant. A 10-point increase in the index (which ranges from 0 to 100) is associated with a 0.07 increase in the probability that a woman participates in decisions over income allocation, a 0.032 increase in the probability that she participates in decisions over reproduction, and a 0.034 increase in the probability that she is able to leave her home. Finally, the overall validation variable suggests that for women in India, Zimbabwe, Nicaragua, and Egypt, a 10-point increase in the index raises the probability of having "high" decisionmaking power by 0.08. The strength of association between the index and the validation variables as a group is illustrated in Figure B.2, which gives the probability that a woman will have high status for each value of the index. Over the range of the index, the probability rises from 0.40 to 0.95, a very large increase.

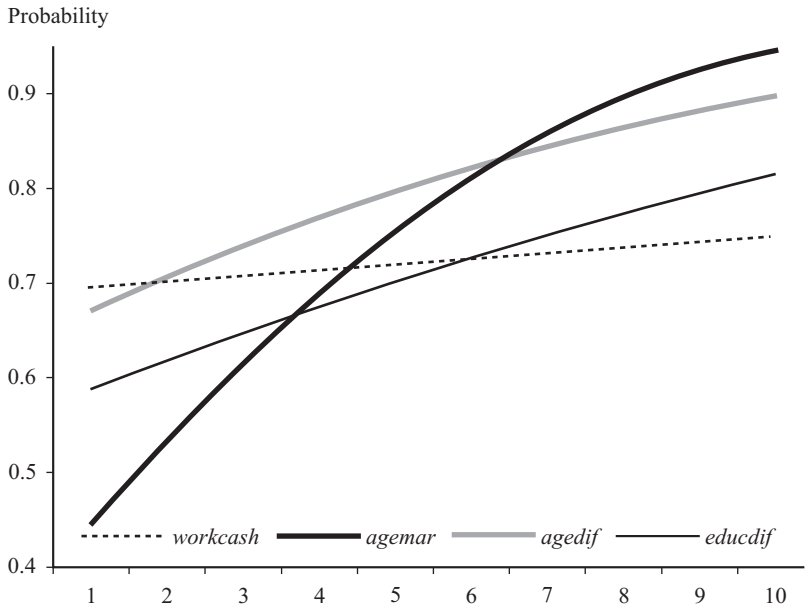
Another way to judge the validity of the four indicators is to see how well they correlate with an index based directly on the best predicting equation for the overall validation variable. Such an index is calculated using the predicted probabilities (between 0 and 1) derived from a probit regression of the overall validation variable on *workcash*, *agemar*, *agedif*, and *educdif*. The correlation coefficient between this index and *dm_index* is very high, at 0.84 ($p = .000$). Furthermore, the correlations for each individual country are also very high, at 0.89 for India, 0.87 for Zimbabwe, 0.82 for Nicaragua, and 0.92 for Egypt.

In summary, the results for the sample of countries having validation data suggest that both the index of women's relative decisionmaking power and the indicators employed to construct it are positively associated with women's participation in decisions over income allocation and reproduction and with their mobility, measures giving direct evidence of women's power relative to men's.

[54]Note that previous empirical studies for Egypt (Kishor 1999) and India (Jeejebhoy 2000) have not found strong associations between *agemar* and indicators of direct evidence of women's power relative to men's.

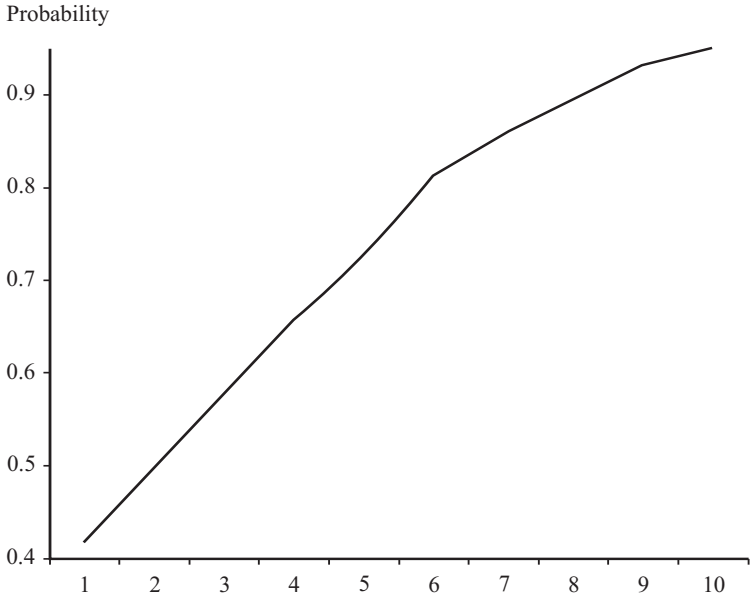
[55]Before being placed on a 0–10 scale, *workcash* is transformed from a dummy variable into a probability between 0 and 1.

Figure B.1 Predicted probability of a woman having "high" status, by indicators of women's relative decisionmaking power



Notes: Each indicator is placed on a scale of 0–10. "High" status is defined in the bottom panel of Table B.1.

Figure B.2 Predicted probability of a woman having "high" status, by index of women's relative decisionmaking power



Notes: The index is placed on a scale of 0–10 for comparison with the scaled indicators in Figure B.1. High status is as defined in the bottom panel of Table B.1.

APPENDIX C

Creation of Measure of Household Economic Status

In this appendix, the method used to construct the measure of households' economic status used in this report is described. In addition to the 36 countries included in the main study, four from the Near East and North Africa (NENA) are included for the purposes of constructing the measure. All households containing children under five (rather than three) years are included.

Various techniques have been employed to create economic status indexes or variables using Demographic and Health Survey data sets. The techniques have relied on combinations of variables available in all country data sets, including types of amenities present in households, for example, toilet facilities, and ownership of assets, for example, a radio or television. For a regression analysis, either individual dummy variables indicating the presence of each amenity or asset can be used as independent variables or a continuous variable index.[56] The goal is to create as closely as possible a proxy variable for either money income or households' ability to attain their needed or desired capabilities.

Two problems arise in following the above approach for this study. First, the amenity variables are often the very items that one wishes to employ for representing households' health environments, a variable that needs to be controlled for independently of its association with economic status (see Morris et al. 1999). Second, absolute and relative prices of assets can differ greatly across countries because scarcities, qualities, and exchange rates differ. Thus, while an index or set of variables based on asset ownership is appropriate in a single-country study, it is not for a multiple-country study.[57]

To avoid these two problems, for the measure employed in this study, households are classified into four economic status categories—destitute, poor, middle, and rich—distinguished by various combinations of two factors:

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[56]Past studies have used various techniques for creating index weights, including giving all items equal weight (not recommended), using the reciprocal of the proportion of households with the items as a proxy for their relative values (Morris et al. 1999), principal components analysis (Filmer and Pritchett 1998), and factor analysis (Sahn and Stifel 2000).

[57]Even within Sub-Saharan Africa, Sahn and Stifel (2000) found weights from factor analysis to differ widely across countries. Note, also, that cross-country comparability of asset ownership-based economic status measures is complicated by the fact that in countries where large numbers of both "rich" and "poor" households coexist, many poor households own assets that would normally be beyond their reach due to second-hand markets and the ability to continue using or to re-use items discarded by the rich (for example, the widespread ownership of televisions among the poor in Jakarta).

1. The degree to which the household has satisfied basic needs that generally require an investment of household (rather than public) resources,[58] and
2. the quantities of two different kinds of assets it owns. All assets are considered "luxuries" (that is, not needed for physical survival), but they are classified into two value categories, "cheap" and "expensive."

The goal is to create, given the variables common to the large majority of the country data sets, a set of four mutually exclusive and collectively exhaustive groups that clearly distinguish among households' economic positions. In doing so, the following simple logic is used: the lower a household's economic status, the fewer basic needs it will be able to satisfy and the fewer assets it will own, especially expensive assets.

The information on basic needs that is available in the DHS data sets is whether or not the household has

- a finished floor, which is a proxy for whether the house is finished overall, including a finished roof and walls. (Finished floors are made of materials such as tiles, cement, polished wood, or carpets [Ayad, Barrere, and Otto 1997]);
- a toilet facility;
- access to water piped into the home or use of bottled water.

The degree to which each of these is needed differs by climate and thus across countries and within them. For example, in colder climates, a finished home and a closed-in toilet facility are needed more than in warmer climates. To diminish this comparability problem, group distinctions are based on the number of these amenities available rather than being conditional on any specific one. Note that the information in the data sets allows clear-cut distinctions among the *qualities* of the different amenities for toilet and clean water access. These quality distinctions are reserved for construction of the health environment variables (see Chapter 3).

The assets for which ownership information is available in the majority of the data sets are listed in Table C.1. Also given is the percentage of households in the sample that own each asset and the number of countries for which data are available for each. The first three assets (radio, televi-

Table C.1 Availability of asset ownership data in DHS data sets

Type of assets	Number of countries data available for	Missing countries	Percent of households owning (included countries)
Cheap			
Radio	40	None	57.4
Television	38	Malawi, Rwanda	31.6
Bicycle	37	Bolivia, Brazil, Turkey	28.9
Expensive			
Refrigerator	37	Bangladesh, Nepal, Malawi	16.9
Motorcycle	35	Bangladesh, Nepal, Bolivia, Brazil, Turkey	8.5
Car	37	Bangladesh, Nepal, Bolivia	5.2

[58]Items that can be considered dependent in some way on public or community provisioning are, for example, those that require electricity. In many places safe water infrastructure is provided publicly (for example, in Bangladesh even the poorest households have access to clean water because tube wells are publicly provided). Thus, the focus is on water piped into the home, which is more likely to require an expenditure of household resources.

sion, and bicycle) are considered "cheap" assets and the last three (refrigerator, motorcycle, and car) are "expensive" assets, based on the percentages of households owning these items as a proxy for relative prices. Note that two of the items—television and refrigerator—require electricity and are thus dependent on public services. Some households may not have these items because of the absence of electricity rather than an inability to purchase them. In addition, in some areas, the climate or topography or even culture may not lend itself to the use of some items, for example, a bicycle. For these reasons, group distinctions are not made conditional on the basis of owning only one of the items within the "cheap" and "expensive" groups, but instead on ownership of a specific *number* of items.

For the few countries with missing data for only one of the items within a category, group classifications are based on the remaining two. For the other countries with missing data (Bangladesh, Bolivia, and Nepal), special assumptions using one asset or a combination of alternative asset variables are made.[59]

Note that in an effort to make clear distinctions among groups, fairly strict criteria for the destitute and rich groups that generally satisfy an intuitive idea of what being in such a group means in an absolute sense are established. The four groups and their definitions are as follows.

Destitute Owns no assets and satisfies either no basic needs or only one.

Poor Owns no assets but satisfies two basic needs; or owns only cheap assets and satisfies either no basic needs or only one.

Middle Owns only cheap assets and satisfies either two or three of the basic needs; or owns at least one expensive asset but satisfies either no basic needs or only one.

Rich Owns at least one expensive asset and satisfies two or three of the basic needs.

By these definitions, a "destitute" household owns no luxury items at all and has an unfinished floor, no toilet facility, and unpiped water, or has satisfied just one of these basic needs. By contrast, a "rich" household owns an expensive luxury asset, such as a refrigerator or motorized vehicle, and has satisfied all or almost all of the basic needs. The poor and middle groups fall in between. Figure C.1 gives the numbers and percentages of households falling into the asset ownership and needs satisfaction categories as well as their distribution across the four economic status groups.

Table C.2 reports the percentage of households falling into each economic status group by region and country. The country-level percentages are calculated using the household sample weights provided with the DHS data sets. The regional-level percentages are calculated using country population proportions. For the study sample as a whole, (which includes the four NENA countries), 28 percent of households are classified as destitute, 38 percent as poor, 18 percent as middle, and 17 percent as rich. South Asia has the highest percentage of destitute households, at 32 percent, followed closely by Sub-Saharan Africa. The region with the lowest percentage of destitute households by far is Latin America and the Caribbean (7 percent). South Asia

[59] *Bangladesh.* The categories used are defined as follows: No assets owned—owns no wardrobe, land, radio, TV, or bicycle; only cheap assets owned—owns less than six of the following: wardrobe, table, chair, or bench, watch or clock, cot or bed, land, radio, TV, bicycle; expensive assets owned—owns at least six of the above. *Nepal.* If a telephone is owned, the household is assumed to own an expensive asset. *Bolivia.* If both a refrigerator and a telephone are owned, the household is assumed to own an expensive asset.

Figure C.1 Creation of economic status groups: Destitute, poor, middle, and rich

a. Number of cases per category

	Number of needs satisfied			
Assets owned	**None**	**One**	**Two**	**Three**
None	20,793	15,389	4,681	1,298
Inexpensive	21,154	25,671	15,882	8,390
Expensive	1,757	4,603	9,334	17,123

b. Percent of cases per category

	Number of needs satisfied			
Assets owned	**None**	**One**	**Two**	**Three**
None	14.2	10.5	3.2	0.9
Inexpensive	14.5	17.6	10.9	5.7
Expensive	1.2	3.2	6.4	11.7

Legend	**Number of cases**	**Percent of cases**
Destitute	36,182	24.8
Poor	52,804	36.1
Middle	30,632	21.0
Rich	26,457	18.1
Total	**146,075**	**100.0**

Table C.2 Percentage of households falling into economic status groups, by country and region

Area	Destitute (%)	Poor (%)	Middle (%)	Rich (%)
All countries	27.6	38.1	17.7	16.6
South Asia	31.6	42.1	16.1	10.1
Sub-Saharan Africa	28.8	38.9	21.0	11.4
Latin America and the Caribbean	7.1	18.1	21.1	53.6
Bangladesh	49.3	29.0	15.8	6.0
India	28.9	44.6	16.1	10.4
Nepal	49.8	46.3	3.3	0.6
Pakistan	32.3	33.7	19.2	14.7
Benin	13.6	49.5	23.8	13.1
Burkina Faso	10.2	52.5	24.4	12.9
Cameroon	27.9	34.2	21.7	16.1
Central African Republic	35.1	46.7	12.0	6.2
Chad	55.5	34.5	6.8	3.3
Comoros	29.1	33.3	29.6	8.0
Côte d'Ivoire	15.3	36.0	29.9	18.8
Ghana	14.0	45.4	28.7	11.9
Kenya	23.3	48.2	24.1	4.4
Madagascar	59.3	31.1	8.7	0.9
Malawi	41.8	40.7	15.7	1.9
Mali	18.5	50.4	20.5	10.6
Mozambique	42.1	40.5	10.9	6.4
Namibia	19.1	42.5	19.5	18.9
Niger	57.4	32.1	5.8	4.8
Nigeria	21.0	28.6	28.0	22.4
Rwanda	62.7	28.9	7.0	1.3
Senegal	16.9	39.1	32.0	12.0
Tanzania	34.4	50.3	12.9	2.3
Togo	17.9	55.0	19.0	8.1
Uganda	35.5	53.0	9.8	1.6
Zambia	27.6	39.0	26.1	7.3
Zimbabwe	36.2	32.1	23.0	8.8
Bolivia	9.9	30.7	33.3	26.2
Brazil	5.1	12.8	16.3	65.9
Colombia	3.7	17.1	29.2	50.0
Dominican Republic	7.7	13.3	25.9	53.2
Guatemala	13.8	36.6	34.0	15.7
Haiti	50.4	24.1	19.3	6.1
Nicaragua	15.9	33.8	33.2	17.2
Paraguay	8.5	32.3	21.6	37.6
Peru	8.2	38.6	27.9	25.2

(10 percent) and Sub-Saharan Africa (11 percent) have similar shares of rich households. Latin America and the Caribbean has the highest percent of rich households, 54 percent. These regional rankings are consistent with poverty estimates derived from household income and expenditures survey data (see Ravallion and Chen 1997).

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About This Report

Until recently the role of women's social status in determining their children's nutritional health went largely unnoticed. That is, until researchers began to ponder the Asian Enigma—the question of why malnutrition is much more prevalent among children in South Asia than in Sub-Saharan Africa, even though South Asia surpasses Sub-Saharan Africa in most of the principal determinants of child nutrition. This report uses data from 36 countries in three developing regions to establish empirically that women's status, defined as women's power relative to men's, is an important determinant of children's nutritional status. It finds that the pathways through which status influences child nutrition and the strength of that influence differ considerably from one region to another. Where women's status is low, this research proves unequivocally that policies to eradicate gender discrimination not only benefit women but also their children.

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