A Geography of Children's Vulnerability: Gender, Household Resources, and Water-Related Disease Hazard in Northern Pakistan*

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Water-related diseases continue to pose major threats to children's survival and well-being in many places in the developing world. This article develops a theoretical perspective on the ways in which children's vulnerability to water-related disease hazard is produced within the everyday circumstances of livelihood and child care. Central to this analysis is the role that household resources play in mediating or shaping particular microenvironments of health risk. Further, the effects of local geographies of gender on how household resources are accessed and on how child care is structured are examined. Children's vulnerability is evaluated in a community in the District of Gilgit in northern Pakistan, a region presently undergoing tremendous social and economic transformation. The case study highlights household-level response and adaptation to child health risks associated with diarrheal disease transmission and infection in this mountain environment. The case study draws from ethnographic fieldwork involving qualitative household microstudies and interviewing to elicit mothers' resource and risk-response strategies in the context of changes in livelihood systems and household dynamics. **Key Words: gender, household resources, northern Pakistan, vulnerability, water-related diseases.**

> *In the future, how can we give our children a good upbringing? All of the time we are stuck in our work and are busy. How can we protect their health? In the morning we only have time to wash their faces and hands. We do not have time to keep them from sitting in the dirt and to keep them clean. [My] children are often sick with colds, diarrhea, and pain in their stomachs.*
>
> — Afsana Begum[1]

Introduction

Diarrhea and other water-related diseases[2] continue to prevail as leading causes of mortality and morbidity among children under the age of five in the developing world (UNICEF 1997). In recent decades, reducing the severe impacts of these diseases—among the most preventable in the world—has been a high priority for national governments, international organizations, and research institutes (Fauveau 1994; Huttly, Morris, and Pisani 1997). The impacts of water-related diseases are concentrated and absorbed, often silently and unremarkably, into the spheres of life and work of households and individuals who are usually the poorest and least powerful in the world. In the Northern Areas of Pakistan (Figure 1), the setting of this study, the factors of risk and exposure to water-related diseases are complex;[3] however, the identification and quantification of them is beyond the scope of this article. I focus here on the everyday challenges and complexities of prevention and mitigation, as underscored in the above quotation from a mother in northern Pakistan. Specifically, this article addresses these questions: (1) What are the particular resources at the household and local scales that are relevant in mediating or shaping the microenvironment of diarrheal disease risk? (2) How do local geographies of gender affect how household resources are accessed and how risk responses are structured?

In examining these questions, I draw on literature within hazards research and critical gender studies that are concerned with the ways

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Figure 1 *Map showing the study area in the District of Gilgit, Northern Pakistan.*

in which gender, age, class, caste, ethnicity, religion, and socioeconomic standing structure people's vulnerabilities, defenses, and survival capacities (Blaikie et al. 1994; Hewitt 1997). Feminist scholarship on hazards reconceptualizes the processes structuring vulnerability, drawing particular attention to constructions of gender, household politics, and gendered relationships that perpetuate inherent inequalities and differences between men and women and within and between social groups (Cutter 1995; Enarson and Morrow 1998). The relationship between gender and access to household resources and its implications for women's capacity to mitigate water-related disease risk in the mountainous Hindu Kush-Karakoram-Himalaya (HKH) have been largely neglected. Furthermore, policies and programs to reduce children's vulnerability—to make child survival more secure—in northern Pakistan are not the same ones addressing the gendered aspects of household resources and poverty. Nor do they address the gender and generational politics and structures of power within households that are central in shaping how individuals and families respond to and cope with child-health risk and crisis.

In this article, I bring the place-based realities of northern Pakistani mothers and households[4] to bear on the relationship between the resources of child care and the social domain in which risk is produced and/or mitigated. In this research, the "household" is both a geographic space for assessing children's vulnerability and a level of analysis. This geographical analysis assesses where the resources influencing child-health outcomes coincide with household dynamics and women's roles in local livelihood systems to build an understanding of children's vulnerability to diarrheal disease hazard as a socially constructed phenomenon.

The findings presented in this article draw upon ethnographic fieldwork undertaken in a rural community in the District of Gilgit, Pakistan, in 1996 and from 1997 to 1998 (see Table 1 for a summary of methods and data sources). The primary methodological strategy employed in this study consisted of house-hold microstudies, in which in-depth

Table 1 *Summary of Methods and Data Sources Employed in Oshikhandass, District of Gilgit, Pakistan, 1996–1998*

Data Source	Scope of Method	Analysis
Household microstudies[a]	In-depth interviews and observations with thirty households on details of household structure, perceptions of risk and health, recent illness events, household decision-making, divisions of labor, livelihood strategies, and childcare	Analysis of the role of household dynamics, resources, and livelihood systems in disease-hazard response and mitigation
Oral history interviews	Semistructured interviews with thirty mothers. Interviews focused on personal histories, health-knowledge acquisition, relations of support and assistance, control over resources, and impacts of health and development interventions	Analysis of perceptions of diarrheal diseases, women's position within the household, experience of mothering, and the systematic analysis of social networks
Specialized interviews	Structured interviews with twenty-five key informants on details of traditional and modern medical approaches, present individual action, and circumstances of child death due to diarrheal diseases	Analysis of experience of hazard impact, structure of coping strategies, and decision making
Focus-group interviews	Semistructured interviews with eight focus groups. Discussions focused on local definitions of health and well-being, perceptions of environmental and health changes, and present collective action	Analysis of community history, socioeconomic transformations, social networks, and collective hazard mitigation
Participant observation	Structured and unstructured observations in sites of household and livelihood activity, public spaces of exchange, and sites of healing (e.g., homes, clinics, hospitals)	Analysis of the contextual factors bearing on subjective experiences of research subjects

[a] *Sample selected through stratified random sampling using household health data drawn from the Aga Khan University/Aga Khan Health Services Pakistan Oshikhandass Diarrhea and Dysentery Research Project (Aga Khan University and Aga Khan Health Services Pakistan, 1997).*

interviews and structured household observations were used to elicit information about household composition, household assets and sources of income, division of work and responsibilities, mothers' life histories, social networks, and child illness histories. The study households were selected on the basis of a random sample stratified into "low-frequency" disease (i.e., relatively low incidence of diarrhea and dysentery) and "high-frequency" disease (i.e., relatively high incidence of diarrhea and dysentery) categories, using an epidemiological database of household water-related disease incidence.[5] Central to this analysis was a systematic comparison of the two groups of sampled households in order to identify key similarities and differences in patterns of mothers' resource access and how these might have influenced children's susceptibility and exposure to pathogens present in the local environment. There were fifteen households in each of the two categories for a total of thirty sampled households. In the paragraphs that follow I employ the terms "low-frequency" and "high-frequency" to distinguish between the sampled households.

In the following section, I outline the theoretical framework of the research, arguing that a focus on access to resources is critical because it sheds light on important intrahousehold dynamics and gender relations that have a powerful bearing on disease risk and child-health outcomes. I then provide an overview of the regional and local background on diarrheal-disease hazard, deprivation, and livelihood changes in northern Pakistan and the study site before describing the processes of risk response evident in mothers' access to resources and in relations of gender. The concluding section argues that these insights are significant to building an understanding of the role of livelihood and gender transformations such as those occurring in northern Pakistan in shaping disease risk, children's vulnerability, and household resilience.

Theoretical Framework: Engendering Children's Vulnerability

Substantial work has been done in geography on vulnerability in the field of hazards research. However, relatively few empirical studies

examine the specifics of children's vulnerability to risks and hazards. Vulnerability is defined here as the state of being prone or susceptible to harm or loss in the face of a potentially damaging perturbation in nature or society.[6] A vulnerability perspective has rarely been applied to the situational realities of children, in part because, until recently, children as a social group were not considered suitable for social science research (Roberts, Smith, and Bryce 1995). This picture is beginning to change in geography, with new directions of research "defin[ing] an agenda for the geography of children" within the discipline (Matthews and Limb 1999, 61). While the inherent susceptibilities of children as a social group have been noted (Roberts, Smith, and Bryce 1995; Valentine and McKendrick 1999), attention to children under five and the social construction of their vulnerabilities in the developing world has not been apparent in the geographical literature.

How can the concept of vulnerability be reconceptualized to explain young children's vulnerability to health hazards in the specific context of a community in northern Pakistan? My approach is to focus on the resources of livelihood and caregiving that might shape, in part, the differential exposure and susceptibility of children to diarrheal-disease hazard. Here I draw on Blaikie and colleague's (1994) model of "access to resources" to investigate the varying maternal capacities to reduce and/or mitigate environmental health risk. The premise is that a lack of access to and control over certain resources can constrain individuals (e.g., mothers) and families in effective caregiving and physical support, thereby predisposing children to health risks. Since access to resources varies between households and mothers, it is vital to identify in detail the importance of individual/household "access profiles"[7] for dealing with risk and uncertainty.

"Resources," in this research, are broadly defined as "the physical and social means to gaining a livelihood" (Blaikie et al. 1994, 62). Building on this model, and also borrowing from Kabeer (1999) and Swift (1989), two categories of resources—tangible and intangible resources—are analyzed. Tangible resources refer to resources that are material in nature and include income and productive assets that help to satisfy basic needs for food, water, and shelter. Intangible resources refer to human and social resources or capital that serve to enhance the capacity of mothers to provide for livelihood and child-care needs. The category of intangible resources includes the assets of human capital (e.g., knowledge, education, skill, and social status) and social capital (e.g., social networks or systems of support based on reciprocity, trust, and/or sense of obligation) that are employed to mobilize tangible resources.

Implicit in this analysis is the idea that resources—be they tangible or intangible—are, as Kabeer (1999, 437) states, "acquired through a multiplicity of social relationships conducted in the various institutional domains which make up a society (such as family, market, community)." Recent feminist scholarship has effectively demonstrated that these domains and the norms and rules that govern the distribution of and claims to resources within a community or a society are influenced by constructions of gender and gendered hierarchies (Kabeer 1999). As such, access to resources is a gendered process, with implications for the capacity of mothers to reduce and/or cope with risk within the wider context of livelihood in which children's vulnerability is embedded in northern Pakistan. Special consideration is given in this analysis to the ways in which mothers' resource access profiles—and especially their access to social networks—are negotiated in the two sets of study households in Oshikhandass, District of Gilgit. This key point will be returned to in the analysis.

Diarrheal Disease, Deprivation, and the Regional Context of Child-Health Insecurity

The District of Gilgit in the Northern Areas of Pakistan is located on the mountainous margins of a country that, according to human-development categories, is considered to be "low-income" (UNDP 2000).[8] The few efforts contributing to meeting basic needs in Northern Pakistan are incremental and poorly coordinated. Infant mortality rates for the mountainous northern part of the country (130–150 of every 1,000 live births) are higher than the national average (95 of every 1,000 live births) (Rasmussen et al. 1996; ul Haq and

ul Haq 1998). The causes of death are varied, but diarrhea, gastrointestinal diseases, pneumonia, and malnutrition are common killers throughout the region (Rasmussen and Hannan 1989; Directorate of Health Services Northern Areas 1995). Chronic diarrhea and dysentery account for 25 to 50 percent of mortality in children under the age of five in the region (Directorate of Health Services Northern Areas 1995; AKHSP 1997). These serious public-health problems are associated with unsafe drinking water, adverse environmental health, insufficient sanitation, inadequate food storage, and poor personal and domestic hygiene practices (WASEP 1998).

Provisions for maternal and child health have become more accessible in some mountain valleys and villages since the 1980s (Rasmussen et al. 1996; AKHSP 1997). New health technologies, such as oral rehydration therapy and other interventions, such as diarrheal-disease education, community-based primary health programs, improved water supplies, and sanitation, have been introduced and indicate the effects and linkages between this region and a global civil society. While these measures have given rise to new and important child-survival paradigms and practices, their local impacts on reducing children's vulnerability to disease hazards are not as apparent. Further, there is a conspicuous absence of debate about how social and economic transformations and policy orientations towards mountain development affect the intersecting factors of gender relations, livelihood, and child care that, in turn, have a bearing on water-related disease exposure and prevention.

Crosscutting the major deprivations in social, political, and economic realms are gender disparities. These disparities and the gender relations supporting them are institutionalized at every level of social activity and governance, from the household and the market to community and state policymaking. The public schools, the state-controlled PTV station, and the mosques all impart messages about women's *sharafat* (honor) and *izzat* (respectability) that uphold and reinforce men's powerful position within marital arrangements and in public life. These gender relations combine with poverty and other resource constraints to dramatically affect women's behavior, including their responses to diarrhea and other disease hazards in the region. Gender inequities and power issues associated with health-related decision-making within the family are often invisible to policymakers and health practitioners.

Gender, Livelihood Transformations, and Child Health in Oshikhandass

The points raised above about deprivations, gender disparities, and the implications for women's capacity to respond to disease risk apply to the study community. Oshikhandass is a Muslim community that consists of approximately five hundred households (Figure 2). Landholdings are relatively small and usually inadequate for meeting household food needs. The main source of domestic water is irrigation channels. A pipe system distributes filtered water to public spigots in one-third of the community; however, this water fails to meet World Health Organization water-quality guidelines (Raza et al. 1996). Some houses have traditional composting latrines (*chukung*) or pour-flush latrines, but the majority of households have no sanitation facilities.

Over the past two decades, one important factor affecting child health has been that the subsistence economies of previously isolated households are being transformed. In a process similar to trends identified throughout the HKH (Ives and Messerli 1989; Mehta 1994; Azhar-Hewitt 1999), these households are being rapidly integrated into the global economy and international development networks. Increasing pressure for cash, as well as widespread unemployment, has led many men and boys in the study site to take up employment outside of the community, either in the military or in the growing private and nonagricultural sectors. For example, thirty-two out of the total of forty-two (80 percent) teenage and adult male members of the thirty households sampled in this study were engaged in off-farm employment at the time of the research. Fourteen (47 percent) of the husbands of the study participants were working outside of the community and commuted on a daily or weekly basis. Five (17 percent) lived in Baltistan, Azad Kashmir, or Islamabad and returned on a seasonal or annual basis. All of the remaining husbands were engaged in off-farm activities of some kind, including small enterprise, business and trade, civil service, and casual labor.

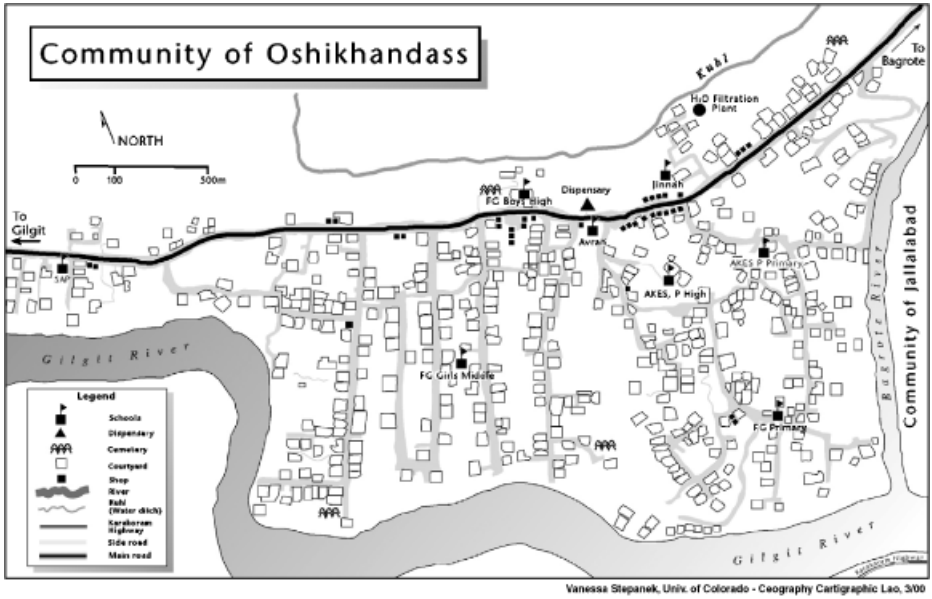

Figure 2 *Map of the study site.*

On a local level, these trends toward male off-farm employment and male out-migration have had two significant effects: one, a dramatic change in the social dynamic of rural households; and two, an increase in women's agricultural responsibilities. Reconfigurations in family structures are apparent. My observations suggest that women—especially mothers-in-law and senior wives in extended families—become the de facto heads of their households while male family members are working off-farm. Furthermore, evidence from this study suggests that some extended families are breaking up into smaller nuclear units, as was the case in thirteen (43 percent) of the sampled households. The women and men I spoke to in the community indicated that the breaking up of extended families is one of many adaptive strategies adopted to deal with the increasing costs of living, land divisions, and/or a growing disinterest in having to subsidize non-income-earning family members. These changes have had important consequences for women's agricultural work. Women in Oshikhandass have traditionally made a large contribution to agricultural production. Yet today, women farmers' roles in feeding families, managing irrigation water, tending to livestock, and maintaining the environmental health of households have become even more visible and salient.

Complicating the local realities of women's child care and health work is the tightening of control over women's mobility and freedom that has been brought about by religious conservatism and stricter adherence to seclusion ideologies manifested in the practice of *purdah* (female seclusion). Purdah defines the parameters of women's behavior and access to geographical sites and spaces that are necessary for the achievement of many responsibilities related to child health. In order to cope with the pressures on time, workload, and mobility, women in Oshikhandass rely heavily upon social resources—namely, kinship and friendship networks—to address the extent and intensity of household demands and restrictions on their activities. As the economic geography of the region changes, access to these social resources, which help mothers to cope with uncertainty and illness, is critical.

Resources and the Micropolitics of Risk Response

Empirical evidence shows that access to certain tangible and intangible resources helps to

Table 2 *Tangible and Intangible Resources Relevant to Children's Vulnerability*

Tangible Resources	Intangible Resources
Income	Maternal capital: education, skills, knowledge
Productive assets (land, orchards, gardens)	Time
Housing	Social status and position within the family structure
Livestock fencing and pens	Intrahousehold relations of child care and resource exchange
Preventive assets (water and food storage containers, latrine, water filter, tools for the disposal of animal and human feces, soap)	Interhousehold relations of child care and resource exchange

explain some of the differences in children's vulnerability to diarrheal-disease hazard in the households sampled in this study. Table 2 summarizes the tangible and intangible resources that I found to be relevant in influencing children's vulnerability in this community. Each mother had different access to various types of tangible and intangible resources, depending upon the everyday circumstances of her farm and family life.

Tangible Household Resources

A large body of work suggests that a family's socioeconomic standing and access to financial and material resources influences the health status of infants and young children (Fauveau 1994; Behrman 1998; Griffiths, Matthews, and Hinde 2002). Variations in the availability of tangible resources emerged as one of the most obvious differences between the households sampled in this study site (Table 3). In terms of tangible resources, incomes were found to be a critical factor in enhancing the capacity of low-frequency households to make investments in living arrangements with less crowding, provisions to separate livestock from the family living space, health services and food for family members, covered water and food storage containers, tools for the hygienic disposal of animal and human feces (e.g., shovels or spades), basins for washing babies' soiled nappies, and family sanitation facilities. A combination of these types of investments seemed to have a positive effect on reducing the overall diarrheal disease risk in the low-frequency households.

Economic security associated with male employment was mentioned by study participants as a critical factor in shaping capacities to satisfy basic needs and to acquire health-maintaining items such as those mentioned above. The low-frequency households had a higher average income based on the total incomes of all working adults. The for-market production of fruit and vegetables from household landholdings also factored in important ways into household incomes. Women in households with low socioeconomic status found themselves in a double bind, lacking both the land to meet fuel-wood and food requirements and the income to improve the quality of housing, family hygiene, sanitation, and so forth. The situation of Bano, living in a high-frequency household, was particularly telling in this respect. For Bano, her family's recent move to Oshikhandass cut her off from the productive resources (as well as networks of social support) that facilitated her livelihood and health strategies in her place of origin. Bano felt that the move had forced them into greater financial impoverishment, with negative implications for her two young children, who had had recurring cases of severe diarrhea. As she put it:

> Previously we were well-to-do. Then we left our extended family. The property was divided. The

Table 3 *Selected Household Data on Tangible Resources*

Tangible Resources	Low-Frequency Households	High-Frequency Households
Off-farm income	Rs. 6,067 ($129)	Rs. 4,233 ($90)
Incomes from fruit/vegetable sales	Rs. 10,413 ($222)	Rs. 7,960 ($169)
Housing		
Median no. of individuals	9.5	12.8
Median no. of rooms	2.6	2.7

Note: U.S.$1.00 = 47 rupees.

> cattle were divided. The land was divided. Everything was divided. So we became poor. We are now hand to mouth . . . We had land and my husband was home. Now my husband is not home but away looking for work and the children are more sick than before.

Of particular interest in this study was the relationship between tangible resources, size of family, and children's vulnerability. In high-frequency households, the number of adults and children dependent upon the available tangible resources was higher than in low-frequency households. The low-frequency households had, on average, fewer individuals ranging from age 5 to adulthood (median of 6.9 individuals) than did the high-frequency households (median of 9.9 individuals).[9] The low-frequency households had, on average, a lower number of dependent children: that is, 5.3 in low-frequency households versus 8.6 in the high-frequency households. These findings suggest that infants and young children residing in smaller families tend to be less vulnerable to diarrheal-disease hazard. Interviews with mothers revealed a widely held perception that the benefits from tangible resources are distributed thinly when there are many adults and children living within one house, thereby exacerbating the level of risk of children's exposure to disease pathogens. In addition, mothers from the nine extended high-frequency households pointed out that the tremendous work and domestic responsibilities associated with large numbers of family members greatly detracted from their time and ability to manage environmental health concerns.

To a certain extent, incomes and family size guided families' decisions to invest in health-related assets. At the time of interviewing, five of the low-frequency households and two of the high-frequency households were constructing new houses made of cement brick with cemented floors, screened windows, and separate rooms for food preparation. Three out of the thirty households—all low-frequency—had invested in pour-flush toilets. One of the most prosperous low-frequency households had also installed its own private water-filtration system. A few mothers mentioned the use of soap and Detol®, a disinfectant that is available in the bazaar, as preventive measures that had recently become affordable. Yet practical economic constraints on using soap on a regular basis were mentioned by women in low-income circumstances, such as Bina, a mother in a high-frequency household, who commented, "We sometimes use soap, but if we all wash our hands daily with soap, from where will we bring the soap?" Bina had knowledge about the role of soap in reducing diarrheal-disease transmission, but she was prevented from implementing her knowledge because of her lack of access to tangible resources.

Intangible Resources

The analysis of intangible resources reveals several important dimensions about the complex interrelationships between factors that influence children's vulnerability to diarrheal disease in the two groups studied. First, endowments in maternal capital—especially education levels—were greater among mothers in low-frequency households.[10] This finding echoes that of other studies postulating the importance of maternal education for child health and development (Cleland and Van Ginneken 1988; Barrett and Brown 1996; Glewwe 1997). Based on the data from this study, the low levels of education among mothers in the high-frequency category could potentially influence children's vulnerability in these households (Table 4). Interviews with study participants revealed that a lack of formal education has a bearing on the ability to understand diarrhea transmission and

Table 4 *Data on Maternal Education*

Education Level	Low-Frequency Households	High-Frequency Households	Totals
No education	7	12	19
1–5 years of education	3	0	3
6–10 years of education	1	1	2
Matriculation: the successful passing of the matriculation examination at the end of 10 years of education	4	2	6

prevention messages transmitted in Urdu—the lingua franca of Pakistan—by public-health posters, newspapers, doctors, or the radio. Furthermore, the majority of women I spoke to in the study site view education as a means of improving their autonomy and decision-making power within the household. As one junior wife put it:

> A woman's future will be good if she has been educated. If she is uneducated, her mother-in-law, father-in-law, and husband will not respect her, and they will scold her.

My observations suggest that education has a positive effect on women's authority and autonomy over child care and decisions affecting the health of their children.

Second, during the summer peaks in water-related disease incidence and agricultural work, women rely on their own agency as well as specific intangible resources—namely, relations of support—to meet both livelihood and child-care needs. The social relations within and outside the household that emerged as important to mitigating children's vulnerability included: (1) the *sass-bahu* (mother-in-law/daughter-in-law) relationship; (2) the role of daughters; and (3) interhousehold networks of resource exchange. Women believe these relationships provide much-needed holding and supervision of infants and young children, forms of care that have been found to be effective in reducing the risk of infectious diseases (Paolisso, Baksh, and Thomas 1989).

The relationship between *sass* and *bahu*, one of the most prevalent and problematic in South Asia (Mehta 1994), dominated women's interpretations of their childcare and risk-reducing strategies. This relationship has been associated with poor health outcomes for children when mothers-in-law are adverse to supporting junior women in their efforts to maintain the well-being of their children (Doan and Bisharat 1990; Griffiths, Matthews, and Hinde 2002). Among the low-frequency households, six mothers were living with their mothers-in-law at the time of interviewing. Interviews with these women revealed that their relationships with their mothers-in-law were viewed as tremendous assets in mitigating diarrheal-disease risk in their households. For Nahida, a 21-year old mother with two sons, her relationship with her mother-in-law, Abida, was essential to child-care provision when she was working in fields and gardens or tending to livestock. According to Nahida, what was perhaps the most important aspect of this relationship is that Abida respected her ideas and opinions about what was good or bad for her children's health. The cooperative nature of this relationship resulted in a favorable negotiation between the women over child-care responsibilities, risk-reducing efforts within the household, and philosophies of child rearing.

Like Nahida, Jahan, a mother of four children under the age of ten, felt that her relationship with her mother-in-law, Soni, had had positive effects on the health of her children. When I asked Soni what she thought her role was in maintaining the health of her grandchildren, she replied:

> We are afraid of the children or adults becoming sick. So we all watch to protect each other . . . If we are sick, then we have more expenses.

While she felt that her mother-in-law monitored her work schedule and behavior closely, Jahan viewed the instruction from Soni about disease prevention, hygiene, and sanitation to be crucial to the health status of her children and the family in general.

While frustrations with this relationship were common for mothers in both sets of households sampled, more mothers in the high-frequency group felt that the sass-bahu relationship had resulted in negative impacts on their child care because they were not able to negotiate or even challenge any decisions their mothers-in-law forced upon them. For instance, Noor, a 28-year old mother of six children in a high-frequency household, was strongly convinced that living with her mother-in-law contributed to her children's poor health and regular bouts with diarrhea. Not until Noor and her family separated from the in-laws did she start to observe noticeable improvements in her children's health. Noor said:

> Life is better now. Before I was working under my sass. Now it is my *marzi* [choice]. Before when we went to relatives we would be afraid to return because our mother-in-law would fight with us . . . My two youngest children had a lot of diarrhea. This is because I had a lot of work to do in the house with my in-laws. My mother-in-law would

> scold me to work. I would leave the children to do the work. They ate dirty things and got sick often. I was not able to take care of them . . . Now the land is divided, and I can work as I wish. And now my children are very fat.

In Noor's opinion, her mother-in-law did not adequately care for her infants while she was absent for work and domestic responsibilities. She was convinced that the joint family system favored the broad interests of the extended family at the expense of her children's health, her perceived rights to provide care to them, and her own mental anguish over their well-being.

Dil, another mother from a high-frequency household, expressed similar frustrations with the sass-bahu relationship:

> Before there was not a happy day. We were all living together, I had to work under my mother-in-law, and do everything she wanted. Since we separated, I can work as I want, do what I want. Every day is a happy one with my children now.

Dil's memory of living with the extended family underscores the expectation that daughters-in-law work under the authority of mothers-in-law. While she was solely responsible for managing the day-to-day demands of farm and housework once her family became a nuclear unit, she felt that this was an acceptable tradeoff for having greater independence and autonomy over the household environment and the care of her children. Both Noor and Dil recognized the pervasiveness of the cash economy and the challenges of trying to meet family needs in a nuclear family situation, but both also expressed the perception that their children's health had improved as a result of their own personal initiatives and autonomy gained through a change in family structure.

A second set of intrahousehold social relations that influenced children's vulnerability was the relationship between mothers and their older children, especially daughters. Older siblings' holding of younger siblings has been found to help reduce the risk of diarrhea (Paolisso, Baksh, and Thomas 1989). This relationship played a critical role in the child-care strategies in the two study groups. Most mothers circumvented some of the limitations on their child care by relying on older daughters. Interestingly, the labor of daughters was utilized to a greater extent for child care in the low-frequency households than in the high-frequency category, with fewer daughters from low-frequency households enrolled in school.

A third social resource that influenced the microenvironment of risk and vulnerability lay in the social-support and resource-exchange networks that existed at the interhousehold and neighborhood scales. The development of informal child-care networks in Oshikhandass is one way in which we can see how social capital is cultivated and maintained, in part, out of considerations of risk, disease prevalence, and child-health concerns. A primary asset of the mothers of low-frequency households was their ability to rely on these types of kinship and/or friendship networks. In describing how she relied on an extensive support from women in her neighborhood to carry out much of her work, Zara said:

> In summer the harvesting, drying apricots on rooftops, bringing the ripened crops to the barn, and threshing are the most difficult and time-consuming tasks. In winter we harvest the maize and collect it in the storehouse. In doing all of this work, our other family members and relatives help us. If there is not a family member available at home, then we request some other relatives [to help us].

A main benefit of the labor exchanges was the safekeeping of young children that came about through the supervision provided by of all of the women participating. In contrast, five mothers of high-frequency households described themselves as being completely isolated from social networks of support, suggesting a lower capacity to utilize social resources as a means of reducing diarrheal-disease risk. Interviews with these women revealed a perception that these systems of practical and moral support were eroding as a result of shifts in cultural values and family structures. Others, such as Bano, felt that they had become dislocated from long-standing networks when they moved to Oshikhandass in search of wage-labor.

A final dimension regarding intangible resources that needs mentioning here is that women's status was found to be indirectly linked to children's vulnerability to diarrheal disease and women's risk response and behavior. In general terms, lower social status within the family, as in the case of junior wives and daughters-in-law, suggested less control

over time, labor, resources, and personal mobility. It was evident in several cases that the priorities and interests held by study respondents in high-frequency households were compromised by those of the collective whole. The importance of women having control over their workloads cannot be overemphasized. The relevance of this fact emerged poignantly during the planting and harvesting seasons, when mothers-in-law decided the work schedules of the seventeen study respondents living with extended families. An additional and complicating factor for these women was the ideological stance towards female dependency that legitimized the exploitation of junior women's labor within the boundary of their households. The sense of dependency and spatial limitation depended on the norms of the religious community to which the respondents belonged (i.e., Shiá or Ismáili) and on the particular ideologies of their respective families. Overall, status reflected a combination of factors influencing the capacity of respondents to obtain resources and/or exercise autonomy over risk responses.

Conclusion

This article has sought to identify the resources of livelihood and child care that are critical to mothers' ability to mitigate or respond to water-related disease risks in the District of Gilgit, northern Pakistan. Through a comparison between the resource circumstances of households with relatively low incidence of diarrheal diseases and those of households with relatively high incidence of diarrheal disease, I have illustrated the ways in which two types of resources—tangible and intangible—are relevant in mediating or shaping the particular microenvironment of health risk. In doing so, I have indicated the various ways in which household socioeconomic assets intersect with family structure and demographics to produce differences in diarrheal-disease risk, as well as the various ways in which gender reconfigurations brought about by broad changes in the regional economic geography have restructured women's livelihood and child-care work in ways that can affect child-health outcomes.

This study has several broad implications. First, it suggests that low-frequency households had better access to a range of tangible material resources than did high-frequency households. The fact that these tangible resources were spread over fewer family members helps to explain, in part, the lower vulnerability of infants and young children to diarrheal disease in these households. Second, what characterized risk-response strategies in low-frequency households was the diversity of resources and the combination of resource strategies that were utilized to develop stocks of health assets, knowledge about diarrheal-disease transmission and prevention, and quality care and supervision of young children. As the evidence from this study suggests, income itself is not enough, in the absence of social networks, to reduce children's vulnerability to diarrheal disease. Alternatively, in the case where income is lacking, social networks can be crucial in negotiating good health outcomes for children. The impact of the combinations of resources in low-frequency households was reduced vulnerability of children under the age of five to diarrheal disease. Exposure and susceptibility seemed to be reduced insofar as family members' interests in and capabilities regarding health-related assets or measures were realized.

Finally, this study illustrates that the increasing demands of women's on-farm work were also important components shaping the risk environment in both groups of study households, resulting in immense restrictions on mothers' time available for child care and thus a critical need for access to informal networks of child care. How much autonomy mothers had within the extended family was an important indicator of their capacity to obtain tangible or intangible resources and to make decisions about child care. Indeed, while mothers in extended families were portrayed as completely in control of the lives and well-being of infants and babies, they were themselves under the control of others, usually of mothers-in-law in the absence of husbands. Importantly, education seemed to affect women's status within households in ways that bolstered their position vis-à-vis other family members, giving them more control over their work schedules and the type of care they provided to their children. The role of intangible resources and the sets of power relations shaping their access indicates the need for a very different conceptualization of children's vulnerability to water-related

diseases, one that takes account of gendered and generational processes that create or break the livelihood and child-health linkages between individuals, their children, and households. ■

Notes

[1] In order to protect the confidentiality of the study participants, all subject names employed in this article are pseudonyms.

[2] The broad category of water-related diseases is comprised of many types of infections caused by the ingestion of bacterial, viral, and parasitic enteropathogens from water-borne and/or food-borne sources. Humans can be exposed to these diseases through oral-fecal modes of transmission (e.g., ingestion), water-related insect vectors, and the penetration of the skin.

[3] A large body of epidemiological and public-health literature points to a range of diarrheal-disease risk factors associated with environmental, geographic, social, and livelihood variables, including the unique characteristics of children's age and gender, nutritional status, position with regard to social and material life, the activities of the household setting in which they are born and raised, and the social position of their mothers (Paolisso, Baksh, and Thomas 1989; Fauveau 1994; Barrett and Brown 1996; Esrey 1996).

[4] For the purposes of this study, "household" includes the individuals—usually kin relations—who pool their resources (e.g., incomes, land, labor, support, etc.) together. It is important to recognize that the definition of what constitutes a household, how resources are allocated within a household, and how decisions are reached among household members are extremely complex issues and differ greatly depending upon social context.

[5] The data regarding diarrhea episodes in these households between 1993 and 1996 were drawn from the Oshikhandass Diarrhea and Dysentery Research Project database, which was assembled by the Faculty of the Department of Community Health Sciences at the Aga Khan University (AKU) in Karachi and the Aga Khan Health Services Pakistan (AKHSP) in Gilgit between 1989 and 1996. The database includes weekly records on the number of episodes of diarrhea, the symptoms, and details of case management in all households in which children under the age of five were present. In order to reduce the chances that cases would not be reported, a team of community-based field researchers visited households on a weekly basis to inquire about new or persistent cases.

During data collection for the AKU/AKHSP project, the standard definition of diarrhea employed by the Aga Khan Health Services Pakistan community-based field researchers, doctors, and respondents was two or more abnormally liquid or watery stools per day. The indigenous or local health beliefs held by the respondents about the etiology of diarrhea were certainly a crucial dimension in the larger dissertation project, but the presentation of these results is beyond the scope of this article.

For the period between 1993 and 1996, the median number of diarrhea episodes per household in the study population was 3.42. Households in this study were low-frequency diarrheal-disease households if they experienced one episode of diarrhea during this period. The high-frequency households experienced eight or more episodes of diarrhea during this period.

[6] This basic definition of vulnerability grows out of a large body of work devoted to defining and clarifying the meaning of vulnerability. For more detailed discussions of vulnerability and the vulnerability perspective, see Blaikie et al. (1994) and Hewitt (1997).

[7] I borrow this term from Blaikie et al. (1994).

[8] In a recent report published by the Human Development Centre in Pakistan, the region of South Asia (Pakistan, India, Bangladesh, Sri Lanka, Bhutan, and the Maldives) was rated as "the poorest, most illiterate, the most malnourished, and the least gender-sensitive region in the world" (ul Haq and ul Haq 1998, 14).

[9] When the number of male members who lived in these households seasonally or who returned to the community only on a temporary basis were subtracted from the total number of household members, the pattern remained the same: that is, 6.5 individuals in the low-frequency households as compared to 9.5 in high-frequency households.

[10] The differences in education levels among these women raises more general questions regarding the restrictions on and underfunding of the education of girls and women. In general, few adult women in northern Pakistan have had the opportunity to go to school. Mothers with no education either did not have access to schools because there were no girls' schools in their villages while they were growing up or else lived too far away from schools to travel there on foot. Another pattern that could explain the variations in education levels is a trenchant resistance among some communities to the education of girls. Even with the recent efforts of the Aga Khan Education Services Pakistan to promote girls' school in the Northern Areas, girls still lag far behind boys (Mitchell 1998).

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