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Household strategies in the face of resource scarcity in coastal Ghana: are they associated with development priorities?

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Abstract

In many developing regions, women and young girls spend several hours daily in the collection of natural resources. Still the link between these household resource strategies and stakeholder perceptions of development priorities remains unexplored. This project examines this association with survey data representative of the adult population from Ghana's Coastal Region. Although natural resource scarcity and the sustainability of resource use represent key development challenges, there are others (e.g., energy, sanitation, employment, and educational opportunities). As such, even in the face of natural resource scarcity, individuals may place greater importance on other dimensions of development, especially if household resource strategies are perceived as relatively efficient. The analytical focus here is on water and the results suggest that gender roles shape household water collection strategies, while also shaping these strategies' perceived opportunity costs. Specifically, Ghanaian adults more often see drinking water provision as their primary development need when water sources are distant and/or when male household members collect water (particularly male heads). In the end, I argue that social science inquiry benefits by contextualizing social dynamics within environmental context, particularly within cultural settings in which human subsistence is intimately tied to the state of the natural environment.

Keywords

Development needs; Ghana; Household strategies; Perceptions of stakeholders; Time allocation; Water

Introduction

The UNEP (2002) estimates that two-thirds of the world's population will live in water-stressed regions by the year 2025, with water stress defined as an excess of demand over supply with growing conflict between users, declining standards of reliability and service, and increased potential for harvest failures and food insecurity (Falkenmark & Widstrand, 1992). In Africa alone, by 2025, 25 nations are projected to experience stress with regard to water resources (UNEP, 2002). Indeed, many developing regions already feel the pressures resulting from such shortages, with women and young girls often spending several hours daily collecting the natural resources necessary for household maintenance (e.g., Crow & Sultana, 2002).

Both social and environmental contexts shape the ways in which households deal with resource scarcities. Household composition, the social capital of household members, and cultural norms—particularly with regard to gender roles—influence resource collection strategies, as does the time required to collect the resources in scarce supply. Further, these household strategies reflect coping mechanisms in the face of resource shortages and the effectiveness of these strategies shape perceptions of household needs.

This project examines household strategies with regard to water collection, and the association between these strategies and perceived development priorities. While other social science research examines household strategies in the face of resource scarcity (e.g., Kumar & Hotchkiss, 1988), to my knowledge, the link to perceptions of development needs has not been explored. Such a link is important since natural resource scarcity is just one of many development challenges. As such, individuals may place greater importance on other dimensions of development, even in the face of resource scarcity, especially if household strategies are perceived as relatively efficient. I aim to illustrate the association between household behaviors and individual attitudes, with the study region offering an informative location since it represents one of many developing settings where contemporary development and environment tensions play out.

The present analyses are framed by several areas of background literature. First, the work is linked to the broader demographic agenda through a review of household decision-making processes, then narrowed to a particular focus on decision-making within the context of resource scarcity. Following this, stakeholder perceptions of development needs are explored. Within the context of these reviews, two research questions are presented. A description of the research setting and an overview of the data collection are provided next, followed by a brief overview of analytical methods. The two research questions are used to frame presentation of findings, with the paper's conclusions exploring general lessons learned and potential future research directions.

Background literature

In 1997, Anne Pebley, then-President of the Population Association of America, reviewed work on demography and the environment, concluding that demographers' involvement was "remarkably thin" (Pebley, 1998:378). Subsequent progress has been made, although much remains to be done. A good deal of this area's existing research focuses on the linkages between population dynamics and environmental change (e.g., Hunter, White, Little, & Sutton, 2003; Wust, Bolay, & Du, 2002; Nanu-Fabu, 2001; Bartlett, Mageean, & O'Connor, 2000; Cramer, 1998; Entwisle, Walsh, Rindfuss, & Chamrathirong, 1998) or environmental context (e.g., Hunter et al., 2003; Ness & Low, 2000; Hunter, 1998). Important contributions have also been made in understanding environmental degradation's human health consequences (e.g., Mishra, 2003). Although these arenas represent relatively new domains for demographic researchers, another perspective from which to consider the population-environment relationship fits nicely within the rich economic and demographic traditions exploring household decision-making processes.

In the 1960s, Mincer (1962; 1963) and Becker (1965) put forth the "New Household Economics" (NHE), which posits that families differentially allocate members' time between market work, home production, and leisure according to expected payoffs. This time allocation is shaped by each individual's education, employment experience, and other human capital traits (Parrado, 2002). Demographic traditions in this vein include exploration of the ways in which household decision-making shapes various demographic processes such as migration (e.g., Haberfeld, Menaria, Sahoo, & Vyas, 1999; Massey & Espinosa, 1997), socioeconomic processes such as labor market participation (e.g., Duncan, Edwards,

Reynolds, & Alldred, 2003; Delap, 2000; Tiefenthaler, 1999) and education (e.g., Brown & Park, 2002; Delap, 2000; Tiefenthaler, 1999; Burki & Fasih, 1998).

This research explores task allocation as associated with water scarcity in a developing context. As such, I review two key literatures; the first relates household dynamics and decision-making to sociodemographic processes generally, and then to natural resources more specifically. Second, I review work on perceptions of development needs. Linking the two, I am especially interested in the possibility of behavior, as reflected in adaptive household coping strategies, shaping individual perception of local needs. Such an association has important policy implications since it suggests the necessity of critically engaging stakeholders in development dialogue.

Household decision-making

Originally applied to labor supply decisions, the new household economics framework emphasizes the family context of labor supply decisions. Specifically, NHE emphasizes that time *not* spent in the labor force includes time devoted to household production, child care, and education, in addition to leisure (Grossbard-Shechtman, 2001). As such, this perspective allows more accurate consideration of non-market labor value, and the framework became central to future analyses of labor supply, health economics, and demographic and consumer economics (Grossbard-Shechtman, 2001).

Early work emphasized the rationality of household decision-making processes, whereby the “household production function” shapes human capital investments such that they maximize a household’s well-being (“utility”) (Berk & Berk, 1983). Vital tasks take place within the household (e.g., cooking, cleaning, childrearing) and task allocation is determined by maximizing utility given two constraining factors: time and money (Berk & Berk, 1983).

Most relevant to the work presented here are studies of time allocation (e.g., Dessing, 2002). Within these examinations, it is argued that women’s work at home can be valued in ways similar to market work, and is, therefore, expected to respond to economic incentives (e.g., changes in market wages, unearned income, and productivity of labor efforts). In essence, this approach extends neoclassical labor supply models of consumption and leisure by incorporating home production as another activity requiring human labor (Ilahi & Grimard, 2000).

Some argue that household labor deployment theories emphasizing economic rationality cannot explain task allocation across all cultures. Working in Bangladeshi slum households, Delap (2000) finds that task allocation is shaped by cultural norms, whereby children are allocated low-status collecting tasks due to community beliefs favoring children’s subordination. In addition, gender bias in time allocation tends to benefit men at the expense of women and children (Delap, 2000; Rose, 2000), with norms often regulating women’s economic activities (Kevane & Wydick, 2001).

Household decision-making and natural resource scarcity

Much existing research on population–environment interactions has focused on aggregate population size and/or growth rates while neglecting to consider other important demographic dynamics (e.g., number of households, household composition). Indeed, some have argued that the household is, in fact, the most appropriate analytical unit given its primacy in resource acquisition and consumption (e.g., Liu et al., 2001).

In the Ghanaian context studied here, home labor is a “pervasive component” of women’s time allocation (Higgins & Alderman, 1997:584) and, in developing contexts more generally, women’s productive and reproductive roles are often intricately linked with

environmental resources such as land, water, and forest products (Ardayfio-Schandorf & Kwafo-Akoto, 1990:86). Indeed, women often bear the primary responsibility for resource collection (e.g., Bour, 2004; Crow & Sultana, 2002; Ardayfio-Schandorf & Kwafo-Akoto, 1990), with these responsibilities impacting women's health (Buor, 2004; Higgins & Alderman, 1997) and also lessening the potential for time spent elsewhere (e.g., market activities, agricultural production, and cooking) (Kumar & Hotchkiss, 1988).

Time allocation as related to resource scarcity has not been specifically examined in Ghana, although work in other developing regions suggests that women's employment shifts household burdens. In Ecuador, for example, increases in female labor force opportunities have been associated with increases in male participation in housework as a result of women's improved bargaining capacity (Newman, 2002).

In Africa, two critical resources have become focal in rural development: water and energy; household water collection is examined here. Water procurement remains a daily challenge for most rural households (Perez de Mendiguren & Mabelane, 2001), and as such, is likely a central component of household task allocation. Based upon the research reviewed above, the first objective of the work presented here is to address the following research question: *Within Ghana's Central Region, how are household water collection strategies associated with household composition, SES, and natural resource context?*

Resource scarcity and development needs

As mentioned in the introduction, exploration of household strategies for water collection is not, however, my final objective. Rather, I also link household strategies to perceived development priorities (e.g., electricity, drinking water, toilet facilities) to provide insight into the association between these strategies and perceived local needs.

Many case studies examine the integration of stakeholders into development and environmental policy decision-making (e.g., Friedlander et al., 2003; Lahtela, 2003; Videira, Antunes, Santos, & Gamito, 2003; Colvin, 2002), and the lessons regarding complexities associated with choosing between development options are especially relevant to the analyses herein. Research near the Senegal River in West Africa's Sudano-Sahelian zone illustrates these lessons in that both humans and the environment have suffered due to lack of consideration of stakeholder perceptions and needs (Lahtela, 2003). Still, developing regions pose particular challenges to participatory approaches due to stringent social stratification and disparities in urbanization and literacy levels. Gupte (2002:328) suggests these factors raise the question of "whether a more bottom-up policy approach can succeed in developing societies."

When considering development priorities, sustainability of natural resource use is a central issue, but as noted above, many other aspects of the social and economic context are extremely important. As such, priorities must be set, and strategies developed, to address critical needs. Indeed, some scholars suggest that the examination of population, resources, and welfare at spatially localized levels has been relatively neglected by experts, with such neglect potentially the reason why this nexus has attracted much popular discourse (Dasgupta, 2000). I contend that a more nuanced understanding of the ways in which local household-environment dynamics shape development perceptions will aid in the design of regionally-appropriate and stakeholder-validated development efforts.

Based upon research needs in this area, the second objective of the work presented here is to address the following research question: *Within Ghana's Central Region, is there an association between household water collection strategies and perceived development priorities?* Relatively effective household strategies may allow for the perceived reduction

of opportunity costs associated with resource scarcity, thereby placing greater importance on other social and economic factors for household well-being. Stated simply, even in the face of water scarcity, such shortages may *not* be perceived as the most important need if a satisfactory collection strategy is in place.

Research setting

Coastal Ghana is the research setting, and the population universe is defined by the six coastal administrative districts within the Central Region (Komenda-Edina-Eguafo-Abirem, Cape Coast, Abura-Asebu-Kwamankese, Mfantseman, Gomoa, and Awutu-Efutu-Senya; see Fig. 1). The Central Region is 1 of 10 regions in Ghana, with the six study districts comprising approximately 800,000 persons, or about half, of the Central Region's population (GSS, 2002).

As for socioeconomic and environmental context, the Central Region is the third most urbanized region in Ghana, following neighboring Greater Accra (87.7% urban) and Ashanti (51.3%) (GSS, 2002:17). The area is primarily inhabited by those of Fante ethnicity (an Akan subgroup linguistically related to the Ashanti), as well as other smaller ethnic groups (e.g., Ewe, Ga-Dangme). Nationally, the Fante comprise about 10% of Ghana's total population. As for economic activity, although Ghana's major sources of foreign exchange are gold, timber, and cocoa, opportunities in the study area primarily include fishing, small-scale farming, salt production, and some tourism concentrated around the former slave trading castles, now museums. Key environmental issues are related to the region's variable precipitation and its consequences for local economic activity, water pollution, and public health. Similar concerns face the Western, Greater Accra, and Volta coastal regions of the nation as well. With regard to drinking water, inefficient public systems have severely hampered access to clean water for millions of Ghanians. In 2001, the nation's government agreed to privatize some local water systems as a condition for an IMF loan. Private water distribution has been plagued by increasing prices, and some families spend as much as 20% of their average daily income on water, with many, particularly the urban poor, worried that the crisis will worsen if the government moves to completely privatize water distribution (Hartill, 2003). In all, the study setting of coastal Ghana offers an important and informative location for these research questions as the nation represents precisely the kind of developing setting where contemporary tensions related to environmental conditions and development priorities are played out.

Data and analytical approach

The analyses are undertaken with data from the 2002 Population & Environment Survey undertaken with a multistage, clustered and stratified sample from Ghana's coastal Central Region. Weights are used to provide representative descriptive statistics, although regression results are presented unweighted. The analyses make use of data from a household questionnaire as well as individual questionnaires specific to both men and women. I eliminated from consideration households with only one member (therefore suggesting no possibility of task allocation) and those with in-home access to water. In all, approximately 700 households are incorporated in the examination of household water collection strategy, while 1,624 individuals are incorporated in the examination of perceived development priorities.

Descriptive and multivariate analyses are presented for each research question; results from the first question provide input for the second. Household water collection strategy is reflected by the primary water fetcher's relationship to the household head, and I examine these strategies as related to household composition, socioeconomic status, and natural resource context. Based on preliminary analyses, four compositional characteristics are

included in the final model: household size, presence of male head, number of older children (age 6–14), and number of younger children (age 5 and under). Socioeconomic status is reflected by two variables. First, a possessions index indicates household ownership of 11 assets that reflect status and household economic well-being (i.e., radio, television, video deck, telephone, stove, refrigerator/freezer, clock, sofa or bed with foam, bicycle, vehicle). Second, two dummy variables reflect market involvement indicating if the male and/or female head earn cash outside the home for labor. Finally, resource context is represented by distance (in minutes) to drinking water; Table 1 provides descriptive profiles of both the individual and household samples.

For the first research question, bivariate results shed light on variation in household water collection strategies by household compositional factors, socioeconomic status, and resource context. All factors come together within a multinomial logit model that estimates a set of coefficients ($\beta^{(1)}$, $\beta^{(2)}$, $\beta^{(3)}$, etc.) corresponding to each of eight outcome categories. The reference category represents households in which the primary water fetcher is the female head ($n=115$), or female partner of head ($n=186$). The model takes the following form where $y=1$ represents households in which the female head/partner acts as the primary water fetcher.

$$\begin{aligned} \Pr(y=1) &= \frac{1}{1+e^{\beta^{(2)}}+...e^{\beta^{(7)}}} \\ \Pr(y=2) &= \frac{e^{\beta^{(2)}}}{1+e^{\beta^{(2)}}+...e^{\beta^{(7)}}} \\ &\downarrow \\ \Pr(y=7) &= \frac{e^{\beta^{(7)}}}{1+e^{\beta^{(2)}}+...e^{\beta^{(7)}}} \end{aligned}$$

Given that the reference category represents households in which the female head/partner is primary water fetcher, the estimated coefficients measure the change relative to this group. Within this manuscript, the relative risk ratios are presented. As an example, the relative probability of a $y=2$ outcome relative to the base category ($y=1$, female head/partner fetcher) is:

$$\frac{\Pr(y=2)}{\Pr(y=1)} = e^{\beta^{(2)}}.$$

As such, the exponentiated value of a coefficient is the relative risk ratio for a one-unit change in the corresponding variable as measured relative to the base category (Stata Corporation, 1999).

The second research question examines household collection strategies as associated with perceived development needs. Here, I draw upon the following series of survey questions; respondents were asked: “Now I’d like to talk about development programs in your community. In your opinion, what development programs are most needed here in this community?” Interviewers recorded all of the following possibilities: electricity, drinking water, toilet facilities, waste/refuse disposal, health services, roads, schools, and markets, with additional responses recorded within a category “other.” Within “other,” many respondents noted “jobs” or “employment” and I, therefore, created an additional category to reflect these concerns. Respondents were then asked: “Which of your choices is the *most important*?” Responses to this question serve as the outcome variable for the second research question examined here. Importantly, due to their predominance, only four priorities are included in the analyses presented here (i.e., toilet facilities, health services, employment, and drinking water).

Individual-level data ($n=1624$), with some household-level indicators, are used for the second research question. Again, descriptive results offer insight into variation in perceived development needs, especially regarding household water fetching strategy. Following this, a multinomial logit model predicts development priority while incorporating individual age, gender, marital status, and market activity, as well as the same variables reflecting household compositional factors, SES, and resource context as used to address research question one. The primary predictor of interest is household water collection strategy; dummy variables are included to reflect the household's primary water fetcher's relationship to head, with female head/partner again used as the reference category. Based on preliminary modeling efforts, the results shown include interaction terms allowing simultaneous consideration of household fetcher and distance to water resources. The dependent variable's reference category indicates a respondent's citing drinking water as the main perceived development need. Importantly, robust standard error estimates are obtained by incorporating consideration of nonrandom clustering within households.

Findings

First, a series of descriptive figures are presented reflecting associations of particular interest as outlined in the first research question: *How are household water collection strategies associated with household composition, SES, and resource context?* In general, female household members are substantially more likely than male household members to be the primary water fetcher (see Fig. 2). In over two-thirds of the study households, primary water fetchers are either the female head, wife or female partner, or daughter. The figures also reflect household size, SES, and resource context as associated with water collection. Regarding household size, while few male household heads are the household primary water fetchers regardless of household size, the likelihood of the female head or female spouse/partner being the fetcher decreases in larger households (details not shown); in approximately 50% of the households with 3–4 members, the female head/partner is the primary water fetcher; yet the female head/partner is responsible for water collection in only 10% of very large households (those with 9+ members). In addition, daughters, and some sons, are more likely than household heads to bear the responsibility for water collection in larger households, thereby providing early evidence of the important role of children in household maintenance and daily chores. With regard to SES, no clear pattern emerges for household water fetching strategy, although households ranking highest on the possessions index tend to have male water fetchers. The measures of resource context, however, suggest that women generally hold primary responsibility for water collection when water is more distant.

Next, household composition, SES, and resource context are incorporated into multinomial logit models predicting household primary water fetcher (see Table 2). As suggested by the bivariate associations, female heads and wives/partners are much less likely to collect water in larger households. As an example, net of the other incorporated factors, odds that a daughter is the household water fetcher as opposed to a female head/spouse increase by nearly 200% for each additional household member. Further, the association between household size and water collection is consistently statistically significant. Another important household compositional factor is the number of young children present. Additional children increase the odds of female head/spouse being the household water collector as evidenced by the statistically significant relative risk ratios of less than unity for all other household members.

With regard to economic activity, it was originally anticipated that a negative tradeoff may be apparent between women's involvement in cash-generating activity and resource collection. The multivariate results counter this, with coefficients suggesting that in

households with a cash-earning female head, odds are greater that the female head will also be the primary water fetcher. Again, this is evidenced by the statistically significant relative risk ratios of less than unity for all other household members. Further examination of the data reveals that many women who act as primary water fetchers also earn cash through farming activities ($n=127$), trading ($n=100$), and as fish mongers ($n=39$). Several other female water fetchers act as seamstresses or hairdressers. Finally, neither SES nor resource context exhibit a consistent multivariate association with household water collection strategies. Figure 3 provides clarification of the logit results through presentation of predicted values, with the strong estimated effects of household size and female economic activity clearly apparent.

The focus of the second research question is the association between household strategies and development priorities; recall the question: *Is there an association between household water collection strategies and perceived development priorities?* In a descriptive sense, drinking water is perceived as the primary development priority by approximately 16% of male study respondents and 14% of female study respondents. Both men and women are more likely to note toilet facilities (28% and 24%, respectively) or health services (16% and 22%, respectively) as more pressing local needs.

With a focus on the association of particular interest, I examined the bivariate association between perceived development priorities and household water collection strategies (results not shown). An interesting pattern exists whereby individuals in households with male heads as water fetchers appear more likely to note the provision of drinking water as the most important development priority as contrasted with individuals in households with female water fetchers. Specifically, drinking water is noted as the top development need by 29% of individuals in households where the male head or male spouse fetches water, and 14% of individuals in households where the female head/spouse is the primary water fetcher.

Obviously, many additional factors need be considered to better understand these associations. In particular, gender and household size will obviously shape development perceptions and, as such, multinomial logit results are presented in Table 3. Estimates reveal that individual characteristics have little predictive power with regard to perceived development priorities, net of the other factors in the model. Younger individuals tend to slightly prioritize drinking water provision as compared to employment ($0.98, p < 0.05$), while married individuals prioritize drinking water over health services ($0.58, p < 0.05$). Individuals within larger households place relatively greater priority on drinking water than toilet facilities ($0.86, p < 0.05$) and health services ($0.84, p < 0.05$). On the other hand, greater numbers of children within a household are also associated with greater relative priority given toilet facilities ($1.39, p < 0.05$), and SES demonstrates a negative association with the likelihood of an individual prioritizing toilet facilities ($0.89, p < 0.05$) relative to drinking water.

Theoretically, my focus is on resource context as related to water collection strategies, and the relation of these to development priorities. Clearly, individuals in households in which the male head fetches water are substantially more likely to note drinking water as a priority, particularly as compared to health services ($0.00, p < 0.001$) and other development issues ($0.00, p < 0.001$). There is also prioritization of drinking water when the son is the primary water collector ($0.00, p < 0.001$ for health services). On the other hand, when daughters collect water, individuals are more likely to see employment ($8.54, p < 0.000$) or other development issues ($6.76, p < 0.000$) of primary importance. The outlier to this pattern is the coefficient of 25.15 ($p < 0.035$) estimated for individuals in households in which men, other than a male head or son, collect water. Here, 48 individuals drive this estimate, with 23

suggesting “other” development priorities. Unfortunately, the data provide little information through which to explore this further.

Of course, the interactions must also be considered for correct interpretations of the gender coefficients. Figure 4 provides clarification of the multinomial logit results through presentation of predicted values (for simplification, more detailed fetcher categories were collapsed to reflect gender categories in presentation of predicted values). In general, net of the models’ other factors, distance to water matters with regard to perceived development priority, with more distant households placing more emphasis on the need for provision of water resources. General patterns also suggest that drinking water receives relatively greater concern in households in which fetchers are male. The interaction between gender and distance is especially intriguing, as a gender difference is apparent only for households with water relatively close. Water is prioritized by individuals in households quite distant from drinking water sources regardless of the gender of the household’s primary water fetcher. On the other hand, individuals in households for which water resources are relatively close differentially prioritize water by fetcher’s gender; in these households, water is more likely to be prioritized if the primary fetcher is male.

Discussion

Global freshwater consumption rose sixfold between 1900 and 1995, more than twice the rate of population growth (WMO, 1997). Many African countries, with a combined population of nearly 200 million people, are facing serious water shortages, and by the year 2025, it is estimated that 460 million Africans will live in water-stressed countries (Falkenmark, 1989; 1991; 1994; Falkenmark & Widstrand, 1992). As such, the sustainable use of natural resources is a particularly critical development issue within this context. Still, there are other important dimensions of economic development and other pressing needs for residents within less developed regions (e.g., energy, sanitation, employment, and educational opportunities). Within this paper, I argued that stakeholder perceptions of development needs should be of major concern to policymakers. How those perceptions are shaped by individual, household, and environmental factors lends further insight into the ways in which needs are a product of households’ abilities to cope with contextual pressures. These analyses are designed to develop such insight, particularly since the link between household coping strategies and perceptions of development needs has been little explored.

As suggested by earlier research on resource collection in developing regions, water collection in the Coastal Region of Ghana is undertaken primarily by female household members. Household water collection strategies appear less influenced by resource context (distance to water) than by household compositional factors, particularly household size. Interestingly, women’s economic activity does not preclude water collection, nor does the presence of young children. Such findings coincide with earlier work suggesting that, in the Ghanaian context, home labor is a “pervasive component” of women’s time allocation (Higgins & Alderman, 1997:584). Resource collection, as a particular component of home labor, does not appear to impact time allocated to other tasks such as market activities (e.g., Kumar & Hotchkiss, 1988). Rather than guided by economic rationality, these results echo work in India that finds tasks are allocated according to gender and age roles within the wider culture. Indeed, it appears that, within the study context, gender bias in time allocation tends to benefit men at the expense of women and children (Delap, 2000; Rose, 2000).

The compatibility of various female household roles provides a potential explanation for results of analyses of development priorities. The provision of drinking water is more likely to be seen as the primary development need if male household members, particularly the male head or his son, are engaged in water collection. Given the compatibility of female

economic activity and resource collection, lesser opportunity costs are likely associated with female water collection. As such, other development needs receive greater priority. That said, these gender divisions are less apparent between individuals in households for which drinking water sources are quite distant. In these cases, water is more generally consistently prioritized, regardless of household collection strategy.

Two additional insights arise from this work. First, within the study area, there is general agreement on development priorities. The provision of toilet facilities, health services, drinking water, and employment opportunities are frequently noted as pressing local needs by both men and women. At the start, it was argued that stakeholder perceptions of development needs should be of major concern to policymakers since decisions must be made with regard to policy priorities. The results presented here suggest that culturally-appropriate task allocation does, indeed, shape individual perception of development priorities, although a fairly high degree of consistency also characterizes perception of development needs. Second, equitable stakeholder involvement in developing contexts has been problematic as a result of social stratification that hampers meaningful participation across groups. Specifically, fewer contributions are made by less empowered individuals, particularly rural women and those of lower class (Gupte, 2002). Inclusion of questions related to development priorities within surveys such as that undertaken here may represent an effective means by which to garner insight across a variety of social groups with regard to local perceptions.

In the end, appropriate cultural gender roles appear to shape household strategy with regard to resource collection, while also shaping perceived opportunity costs associated with such strategies. The present results suggest that increasing feminization of the labor force, such as is occurring in much of Africa (Casale & Posel, 2002), may increase women's labor burdens as the "second shift" (Hochschild, 2001) moves to coastal Ghana. Women already shoulder many of the demands of family life, child care responsibilities, and resource collection within developing regions (Crow & Sultana, 2002; Parrado, 2002; Rose, 2000). At the start, it was argued that improved drinking water access may *not* be perceived as a priority development need if a relatively satisfactory household collection strategy is in place. Indeed, the results suggest that the improved drinking water access is perceived as a less important development need if water sources are relatively close and if the cost of collection is borne by a household's women.

In a sense, these findings contrast with earlier work undertaken in Ecuador which suggested that women's increased participation in the labor force was associated with greater levels of male participation in housework with this shift attributed to a bargaining effect whereby women's wages enabled negotiation for a redistribution of housework (Newman, 2002). In Ghana, productive and reproductive roles of women are intricately linked with environmental resources such as land, water, and forest products (Ardayfio-Schandorf & Kwafo-Akoto, 1990:86). The discrepancy between these two contexts provides evidence for the importance of culturally-specific examination of household-environment dynamics.

Finally, it is hoped that the research topic and strategy employed here provide examples of relevant areas and modes of inquiry for social scientists interested in population-environment concerns. Integration of the natural environment as a contextual force shaping social dynamics is very much within the realm of social science inquiry. Indeed, it may be an essential element of research within cultural contexts characterized by resource-dependent human populations.

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References

- Ardayfio-Schandorf, E.; Kwafo-Akoto, K. *Women in Ghana: An annotated bibliography*. Accra, Ghana: Woeli Publishing Services; 1990.
- Bartlett JHG, Mageean DM, O'Connor RJ. Residential expansion as a continental threat to U.S. coastal ecosystems. *Population and Environment*. 2000; 21(5):429–468.
- Becker GS. A theory of the allocation of time. *Economic Journal*. 1965; 75(299):493–515.
- Berk RA, Berk SF. Supply-side sociology of the family: The challenge of the new home economics. *Annual Review of Sociology*. 1983; 9:37–95.
- Bour D. Water needs and women's health in the Kumasi metropolitan area. *Ghana. Health & Place*. 2004; 10:85–103. [PubMed: 14637289]
- Brown PH, Park A. Education and poverty in rural China. *Economics of Education Review*. 2002; 21(6):523–541.
- Burki AA, Fasih T. Households' non-leisure time allocation for children and determinants of child labour in Punjab, Pakistan. *Pakistan Development Review*. 1998; 37(4):899–912.
- Casale D, Posel D. The continued feminisation of the labour force in South Africa: An analysis of recent data and trends. *The South African Journal of Economics*. 2002; 70(1):156–184.
- Colvin RA. Community-based environment protection, citizen participation, and the Albany Pine Bush Preserve. *Society and Natural Resources*. 2002; 15(5):447–454.
- Cramer J. Population growth and air quality in California. *Demography*. 1998; 35(1):45–56. [PubMed: 9512909]
- Crow B, Sultana F. Gender, class, and access to water: Three cases in a poor and crowded delta. *Society and Natural Resources*. 2002; 15(8):693–724.
- Dasgupta P. Population and resources: An exploration of reproductive and environmental externalities. *Population and Development Review*. 2000; 26(4):643–689.
- Delap E. Child housework in urban Bangladesh: An exploration of intra-household labour deployment. *Journal of International Development*. 2000; 12:723–734.
- Dessing M. Labor supply, the family and poverty: The S-shaped labor supply curve. *Journal of Economic Behavior and Organization*. 2002; 49:433–458.
- Duncan S, Edwards R, Reynolds T, Alldred P. Motherhood, paid work and partnering: Values and theories. *Work, Employment and Society*. 2003; 17(2):309–330.
- Entwisle, B.; Walsh, SJ.; Rindfuss, RR.; Chamratrithirong, A. Land use/land cover (LULC) and population dynamics, Nang Rong, Thailand. In: Liverman, D.; Morgan, EF.; Rindfuss, RR.; Stern, PC., editors. *People and pixels: Using remotely sensed data in social science research*. Washington DC: National Academy Press; 1998. p. 121-144.
- Falkenmark M. The massive water scarcity now threatening Africa: Why isn't it being addressed? *Ambio*. 1989; 18(2):112–118.
- Falkenmark, M. Rapid population growth and water scarcity: The predicament of tomorrow's Africa. In: Davis, K.; Bernstam, M., editors. *Resources, environment, and population: Present knowledge and future options*. New York: Oxford University Press; 1991. p. 81-94.
- Falkenmark, M. Population, environment, and development: A water perspective. *Population, environment and development; Proceedings of the United Nations Expert Group Meeting on Population, Environment and Development, United Nations Headquarters; 20–24 January 1992; Convened as part of the substantive preparations for the International Conference on Population and Development; 1994. p. 99-116.*
- Falkenmark, M.; Widstrand, C. *Population Bulletin*. Vol. 47. Washington DC: Population Reference Bureau; 1992. *Population and water resources: A delicate balance.*

- Friedlander A, Nowlis JS, Sanchez JA, Appeldoorn R, Usseglio P, McCormick C, Bejarano S, Mitchell-Chui A. Designing effective marine protected areas in Seaflower Biosphere Reserve, Colombia, based on biological and sociological information. *Conservation Biology*. 2003; 17(6): 1769–1784.
- Ghana Statistical Service (GSS). 2000 Population and Housing Census: Summary report of final results. Accra, Ghana: Ghana Statistical Service; 2002.
- Grossbard-Shechtman S. The new home economics at Columbia and Chicago. *Feminist Economics*. 2001; 7(3):103–130.
- Gupte M. Reexamining participatory environmental policy: Social stratification and the gender dimension. *Society and Natural Resources*. 2002; 16:327–334.
- Haberfeld Y, Menaria RK, Sahoo BB, Vyas RN. Seasonal migration of rural labor in India. *Population Research and Policy Review*. 1999; 18(5):473–489.
- Hartill L. A drinking water crisis divides Ghana: Privatization seen shutting out poor. *Boston Globe*. 2003 February 2.
- Higgins PA, Alderman H. Labor and women's nutrition: The impact of work effort and fertility on nutritional status in Ghana. *The Journal of Human Resources*. 1997; 32(3):577–594.
- Hochschild, A. *The time bind: When work becomes home and home becomes work*. NY: Owl Books; 2001.
- Hunter LM. The association between environmental risk and internal migration flows. *Population and Environment*. 1998; 19(3):247–277.
- Hunter LM, Gonzalez GMJ, Stevenson M, Karish KS, Toth R, Edwards TC, Lillieholm RJ, Cablk M. Population and land use change in the California Mojave: Natural habitat implications of alternative futures. *Population Research and Policy Review*. 2003; 22:373–397.
- Hunter LM, White MJ, Little JS, Sutton J. Environmental risk, migration, and equity. *Population and Environment*. 2003; 25(1):23–39.
- Ilahi N, Grimard F. Public infrastructure and private costs: Water supply and time allocation of women in rural Pakistan. *Economic Development and Cultural Change*. 2000; 49(1):45–76.
- Kevane M, Wydick B. Social norms and the time allocation of women's labor in Burkina Faso. *Review of Development Economics*. 2001; 5(1):119–129.
- Kumar, SK.; Hotchkiss, D. Research report 69. Washington DC: International Food Policy Research Institute; 1988. Consequences of deforestation for women's time allocation, agricultural production, and nutrition in hill areas of Nepal.
- Lahtela V. Managing the Senegal River: National and local development dilemma. *International Journal of Water Resources Development*. 2003; 19(2):279–294.
- Liu J, Linderman M, Ouyang Z, An L, Yang J, Zhang H. Ecological degradation in protected areas: The case of Wolong Nature Reserve for giant pandas. *Science*. 2001; 292:98–101. [PubMed: 11292872]
- Massey D, Espinosa KE. What's driving Mexico-US migration? A theoretical, empirical, and policy analysis. *American Journal of Sociology*. 1997; 102(4):939–999.
- Mincer, J. Labor force participation of married women: A study of labor supply. In: Lewis, HG., editor. *Aspects of labor economics*. Princeton NJ: Princeton University Press; 1962. p. 1-35.
- Mincer, J. Market prices, opportunity costs, and income effects. In: Christ, C., editor. *Measurement in economics*. Stanford CA: Stanford University Press; 1963. p. 36-52.
- Mishra V. Effect of indoor air pollution from biomass combustion on prevalence of asthma in the elderly. *Environmental Health Perspectives*. 2003; 111(1):71–79. [PubMed: 12515681]
- Nanu-Fabu S. High fertility and development in Cameroon. *Journal of Social Development in Africa*. 2001; 16(1):25–43.
- Ness, G.; Low, B., editors. *Five cities: Modelling Asian urban population-environment dynamics*. Singapore: Oxford University Press; 2000.
- Newman C. Gender, time use, and change: The impact of the cut flower industry in Ecuador. *The World Bank Economic Review*. 2002; 16(3):375–396.
- Parrado EA. Socioeconomic context, family regimes, and women's early labor market experience: The case of Colombia and Venezuela. *World Development*. 2002; 30(5):799–816.

- Pebbley A. Demography and the environment. *Demography*. 1998; 34(4):377–389. [PubMed: 9850464]
- Perez de Mendiguren, JC.; Mabelane, M. AWARD research report. South Africa: Acornhoek; 2001.
Economics of productive uses for domestic water in rural areas: A case study from Bushbuckridge, South Africa.
- Rose E. Gender bias, credit constraints and time allocation in rural India. *The Economic Journal*. 2000 July. 110:738–758.
- Stata Corporation. College Station TX: Stata Corporation; 1999. Stata statistical software: Release 6.0.
- Tiefenthaler J. The sectoral labor supply of married couples in Brazil: Testing the unitary model of household behavior. *Journal of Population Economics*. 1999; 12(4):591–606.
- United Nations Environmental Programme (UNEP). GRID Arendal: UNEP; 2002. Vital water graphics: An overview of the state of the world's fresh and marine water resources. Also available online, at <http://www.unep.org/vitalwater/>
- Videira N, Antunes P, Santos R, Gamito S. Participatory modelling in environmental decision-making: The Ria Formosa Natural Park case study. *Journal of Environmental Assessment Policy and Management*. 2003; 5(3):421–447.
- World Meteorological Organization (WMO). Geneva, Switzerland: WMO; 1997. Comprehensive assessment of the freshwater resources of the world.
- Wust S, Bolay JC, Du TTN. Metropolization and the ecological crisis: Precarious settlements in Ho Chi Minh City, Vietnam. *Environment and Urbanization*. 2002; 14(2):211–224.



Fig. 1.
Study area, Central Region of Ghana

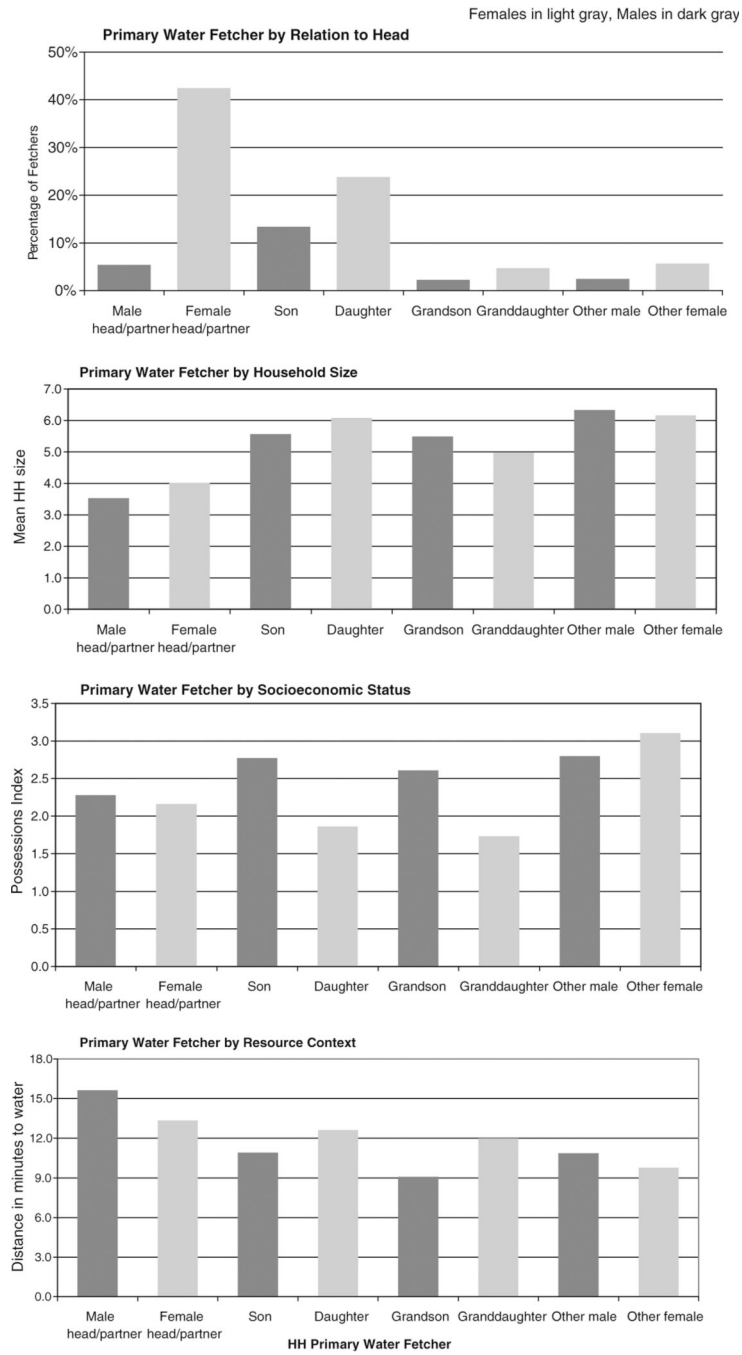


Fig. 2. Household and resource context characteristics as associated with primary water fetchers

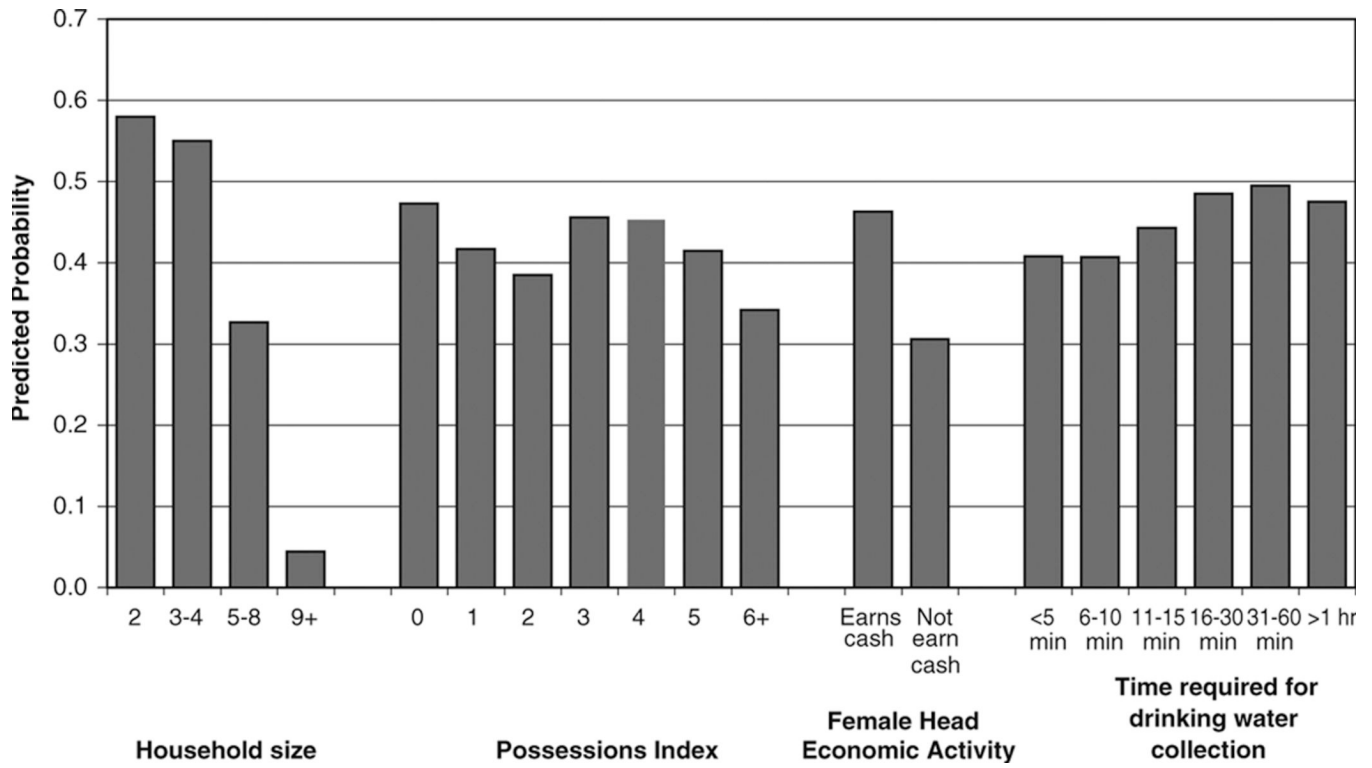


Fig. 3.
Predicted probabilities of female head/spouse being water fetcher

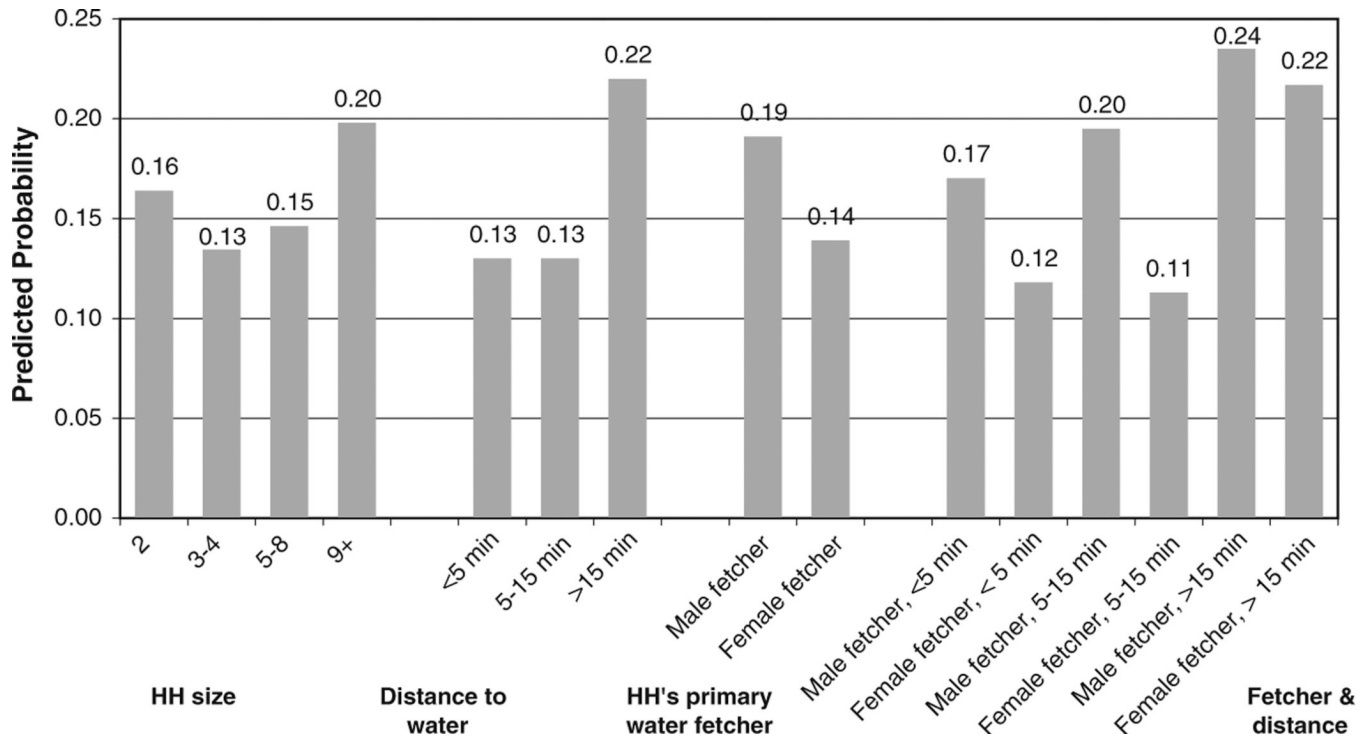


Fig. 4. Predicted probability of drinking water as most important perceived development need

Table 1

Descriptive profile of household and individual samples, Ghana

	Mean	Min	Max	SD
Research question #1: How are household water collection strategies associated with household composition, market involvement, and natural resource context?				
<i>n</i> =709 Households				
<i>Household composition</i>				
Household size	4.86	2	19	2.29
Male head present (1=yes)	0.52	0	1	0.30
Number older children (age 6–14)	1.31	0	8	1.27
Number younger children (age 5 and under)	0.96	0	6	0.95
<i>SES</i>				
Possessions Index	2.27	0	10	2.02
<i>Resource context</i>				
Drinking water access (distance in minutes)	13.34	1	180	14.85
Research question #2: Is there an association between household water collection strategies and perceived development priorities?				
<i>n</i> =1661 individuals				
<i>Individual characteristics</i>				
Age	34.56	15	100	16.66
Gender (1=female)	0.61	0	1	0.49
Marital status (1=married/partner)	0.60	0	1	0.49
Market activity (1=earn cash)	0.71	0	1	0.50
<i>Household composition</i>				
Household size	5.77	2	19	2.83
Male head present (1=yes)	0.58	0	1	0.49
Number older children (age 6–14)	1.45	0	8	1.33
Number younger children (age 5 and under)	0.98	0	6	1.01
<i>SES</i>				
Possessions index	2.40	0	10	2.11
<i>Resource context</i>				
Drinking water access (distance in minutes)	12.86	1	180	13.55

Data source: Ghana Population & Environment Survey, 2003

Table 2

Multinomial logit estimation of household water fetcher by relation to head

Reference category: Female Head/Partner, n=301, Relative risk ratios presented	Male Head/ Partner	Son	Daughter	Grandson	Grand- daughter	Other male	Other female
<i>Household composition</i>							
Household size	1.93*	2.60***	2.94***	2.38***	2.84***	2.95***	3.12***
Male head present	5.08**	0.72	0.66	0.59	0.57	0.51	1.39
Number older children (age 6–14)	0.43**	0.88	0.69*	0.84	0.67	0.88	0.57
Number younger children (age 5 and under)	0.26***	0.20***	0.22***	0.10***	0.15***	0.16***	0.26***
<i>Socioeconomic status</i>							
Male head earns cash	1.68	0.62	0.47*	0.39	0.08**	1.26	0.32*
Female head earns cash	0.18***	0.59	0.46**	0.39	0.20***	0.13***	0.49
Possessions index	1.00	1.06	0.97	1.20	0.96	1.02	1.17
<i>Resource context</i>							
Drinking water access (distance in minutes)	1.01	0.98	0.99	0.97	0.99	0.97	0.96
n	693	95	169	16	33	17	40
Log likelihood	-897.35						
Pseudo R ²	0.19						

*** p < 0.001;

** p < 0.01;

* p < 0.05

Table 3

Multinomial logit estimation of perceived development priorities

Reference category: drinking water, n=247, Relative risk ratios presented	Toilet facilities	Health services	Employment	Other
<i>Individual characteristics</i>				
Age	1.00	1.00	0.98**	0.99*
Gender (1=female)	1.04	1.24	1.10	1.12
Marital status (1=married or partner present)	0.84	0.57**	0.89	0.76
Market activity (1=earn cash)	1.06	1.20	1.36	1.11
<i>Household composition</i>				
Household size	0.86*	0.84**	0.83	0.91
Male head present	1.42	1.41	1.46	2.04**
Number older children (age 6–14)	1.19	1.13	1.11	1.07
Number younger children (age 5 and under)	1.39**	1.23	1.40	1.31*
<i>SES</i>				
Possessions index	0.89**	1.00	1.01	0.85**
<i>Resource context (reference category ≤ 5 min)</i>				
5–15 min	0.77	0.69	0.40*	0.54
> 15 min	0.47	0.66	0.28**	0.56
<i>Household primary water fetcher</i>				
Male head/spouse	0.51	0.19	0.38	0.00***
Son	0.95	0.62	0.78	5.92
Daughter	1.56	0.97	0.58	0.71
Other male	3.45	2.00	2.56	0.94
Other female	1.12	0.93	0.90	1.09
<i>Interactions (Fetcher * resource context)</i>				
Male head/spouse, 5–15 min	1.79	3.99	1.36	0.00***
Male head/spouse, >15 min	2.57	0.00***	1.24	0.00
Son, 5–15 min	1.04	1.12	0.63	1.68
Son, >15 min	2.73	0.00***	1.54	1.78

Reference category: drinking water, <i>n</i> =247, Relative risk ratios presented	Toilet facilities	Health services	Employment	Other
Daughter, 5–15 min	2.19	3.21	8.54**	6.76**
Daughter, >15 min	0.75	0.84	0.77	1.15
Other male, 5–15 min	2.95	4.17	7.15	25.15**
Other male, >15 min	0.52	0.16	0.30	0.19
Other female, 5–15 min	1.53	2.83	2.76	2.24
Other female, >15 min	0.64	1.30	0.74	0.52
<i>n</i>	1624	250	228	513
Log likelihood	-1442.12			
Pseudo R ²	0.05			

p < 0.01;

**
p < 0.05;

*
p < 0.10