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# Women's Autonomy and its Relationship to Children's Nutrition Among the Rendille of Northern Kenya

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## Abstract

This study explores the effect of women's autonomy on children's health. Research was conducted among the Rendille, a traditionally nomadic pastoralist population living in northern Kenya. Using data collected from 435 women and 934 of their children, we tested the hypothesis that women with higher levels of autonomy would have children with better nutrition. Results of our study indicated that while women's autonomy had no effect on younger—ages 0–35 months—children's nutrition as measured by WHZ scores, greater levels of women's autonomy were significantly associated with improved nutrition among older—ages 3–10 years—children. These results suggest that women's autonomy is an important factor in relation to children's health in some circumstances. In addition to exploring the applied aspects of our findings, we also suggest how considering the concept of women's autonomy may add to the existing literature on parental investment.

A growing body of literature is focusing on women's autonomy—the ability of women to control household and societal resources. Early research on this topic focused primarily on the effect that this variable had on fertility and the fertility transition. More recently, however, research has also begun to examine the role that women's autonomy might play in determining the health and well being of women and their children.

At the core of this research is the idea that within households men and women often have conflicting priorities for resource use. This supposition is supported by several different theoretical perspectives, including parental investment (Trivers, 1972), as well as through empirical research. In particular, previous studies have found that while men tend to make investments in themselves or the overall worth of their households, women are more likely to invest in the basic food and health care needs of their children and to prioritize these needs above all other needs (Caldwell, 1986; Engle, 1993; Guyer, 1988; Holomboe-Ottesen and Wandel, 1991; Quisumbing and Maluccio, 2000; Roushdy, 2004). This raises the question of how important women's abilities to control household and societal resources are to the health and well-being of their children.

## PREVIOUS RESEARCH ON THE RELATIONSHIP BETWEEN WOMEN'S AUTONOMY AND CHILDREN'S HEALTH

Research examining the effects of women's autonomy on children's health to date has provided mixed results. Some studies suggest that women with greater control in deciding



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how household resources are used are more capable of maintaining and improving the nutrition and health of themselves and their children than are women with lower levels of autonomy, who must defer to the interests of their husbands or extended family members (Caldwell, 1986; Caldwell and Caldwell, 1993; Hindin, 2000; Hossian et al., 2007; Koenen et al., 2006; Morgan et al., 2002; Shen and Williamson, 1999). In their study of women living in Jordan, for example, Miles-Doan and Bisharat (1990) found that children of women who are household heads—women who have high levels of autonomy—are healthier and die less often than other children, regardless of economic status. Similarly, in a study of Indian women residing in Uttar Pradesh, Bloom et al. (2001) found that women with greater levels of autonomy are more likely to get antenatal and safe delivery care compared with women with low levels of autonomy.

In contrast to these findings, however, other research has suggested that women's autonomy has negligible effects on children's health, and that in some circumstances increases in women's autonomy may even produce adverse health consequences for women. Aden et al. (1997) in Somalia, Bradley (1995) in western Kenya, and Koenig et al. (2003) in Bangladesh, for example, found that increases in women's autonomy caused destabilizing effects on household power relations, which subsequently led to increases in violence against women and a decreased ability of these women to care for their children.

In other studies, the effect of women's autonomy on health is less clear. Kennedy and Peters (1992) found in their study of households from Kenya and Malawi that the nutritional status of young children was significantly better in *de facto* households—female-headed households due to divorce or death of the husband—than it was in *de jure* households—female-headed households due to the husband being absent for six or more months in a year. And Obermeyer (1993) found in her study comparing women's health care in Morocco and Tunisia that cultural norms, status, nor education—all commonly used as proxy measures for autonomy—could fully explain the differences in health care between these two countries.

A possible reason for these conflicting and inconclusive findings is that many researchers do not determine whether buying more food, taking sick children to visit medical professionals, or purchasing medicine is a matter of conflict within households. If no intra-household conflict of interest exists, greater amounts of women's autonomy would have little effect on how resources are used (Sen, 1990; Ghuman et al., 2002). If, however, disagreements between women and their husbands or extended family members do exist, women's autonomy may indeed play an important role in how household resources are used, and through this in the nutrition and health of these women's children.

## Defining autonomy

Another possible reason for the conflicting results in these studies is how autonomy has been defined and measured by different researchers. Almost without exception, researchers use different definitions of autonomy, as well as different methods to measure this concept in their studies. For instance, while Caldwell (1986) defines autonomy as relating to the opportunities for women to receive an education and work outside the home, Miles-Doan and Bisharat (1990) define autonomy as a woman's position within household power relations—in other words, her bargaining power. Alternatively, Mason (1986) defines autonomy as control over household and societal resources, while Jejeebhoy and Sathar (2001) suggest that autonomy consists of five interrelated components: autonomy conferred by knowledge or experiencing the world; decision-making authority; physical autonomy, including freedom of movement; emotional autonomy; and economic and social autonomy, which includes access to and control over resources. In addition to these and the many other definitions that exist, the idea of autonomy has been further confused by comparison with or

interchangeability with related concepts including empowerment, power, locus of control, agency, and most especially status.

Like autonomy, status has been defined in myriad ways. Status can mean prestige, as can be gained with increasing age or number of children (Balk, 1994), or it can be defined as access to resources based on the social or economic stand in the community (Mason, 1986). Often definitions of status include the concept of autonomy, defined as control over one's self or one's surroundings. For instance, Cain's (1984) definition of status includes participation in domestic decision-making and freedom of movement. Interchanging the terminology in this way—using the word status to describe autonomy, or autonomy to describe status—obscures important differences between the two concepts.

To differentiate autonomy from status and the other terms often associated with women's decision-making abilities, we suggest that autonomy be defined as the ability to make decisions on one's own, to control one's own body, and to determine how resources will be used, without needing to consult with or ask permission from another person. Defined this way, autonomy denotes control. In contrast, we believe that status implies standing within the community or prestige as is conferred upon individuals through birth, long life, economic standing, or through conformity to expected modes of behavior, for instance having a large number of children. Although status can offer *access* to resources in the form of physical resources such as food or social resources such as respect; alone it does not allow the individual to *control* these resources (Mason, 1986). We believe that this distinction between access and control is the central difference between status and autonomy.

## Study population

In order to assess the effect of women's autonomy on children's health—measured through children's nutrition—research was conducted among the Rendille, a northern Kenyan group that has been studied for a number of years as part of a multidisciplinary research project (the Rendille Sedentarization Project) initiated and coordinated by anthropologists Elliot Fratkin and Eric Roth. The Rendille are traditional nomadic pastoralists who inhabit the Kaisut desert in northern Kenya. Politically, the area is known as Marsabit District, and it is the largest, most arid, and least populated district in all of Kenya. Mt. Marsabit, after which the district is named, is an extinct volcano that rises from the desert floor to an altitude of 1865 meters. It receives significantly higher rainfall than the surrounding desert (Fratkin, 1991). Its south slope is covered by semitropical forest that, with declining elevation, grades into scrub brush before turning to desert. The district capital, Marsabit town, is located atop Mt. Marsabit and smaller towns have emerged along the slopes (Fig. 1).

Traditionally, the Rendille subsisted in the lowland desert region almost exclusively as nomadic pastoralists, herding mostly camels, but also cattle and small stock. Moving with their animals, Rendille lived in patrilineal, patrilocal, and clan-based settlements. They were entirely dependent upon their animals for subsistence, consuming the direct animal products of milk, blood, and meat, or exchanging animals, animal products, or skins for farm goods such as sugar, tea, and cornmeal. Roles in pastoral production were sharply delineated by age and gender: married women were responsible for milking animals, cooking, fetching water and firewood, and caring for children, while married men were responsible for overseeing herds of animals as well as the affairs of the larger community (Smith, 1998; Fratkin and Smith, 1995).

The settlement and production system of the Rendille began to change in the beginning of 1960s with the advent of the *shifta* (bandit) war and a series of droughts that began in the 1970s (Fratkin and Smith, 1995). After the particularly severe 1971 drought, which wiped

out more than half of the Rendille livestock, impoverished nomads congregated alongside mechanized waterholes that were also the sites of mission-sponsored famine relief, and later, development projects. Displaced nomads were also relocated to agricultural settlements located on Mt. Marsabit during this time. Today, over half of the estimated 22,000 Rendille are permanently settled in towns that emerged around these waterholes or agricultural schemes (Fratkin, 1991; Roth, 1991).

In the process of settlement, the Rendille have adopted a wide range of alternative subsistence strategies that are shaped and constrained by factors including rainfall and vegetation, market access and integration, and existing infrastructure, such as roads and irrigation systems. With these changes, changes in social practices have also occurred, including changes in the traditional roles of men and women. Although Smith (1998) found that in some instances traditional roles carried over to the settled sector of the population, reliance on new production systems, including farming, milk marketing, petty trade of items such as tobacco and sugar, and wage employment has caused women's roles to no longer be sharply defined by tradition. In addition, and in some instances in place of their traditional roles, women are able to participate in all phases of farming, including working the soil and harvesting; selling produce in local markets; and even participating in wage labor (Smith, 1998).

The specific opportunities that are available to women; however, vary according to the specific community in which they live. Each Rendille settlement represents a diverse spectrum in terms of economic development, market integration, and educational opportunities. Data for this study were collected across five Rendille settlements:

1. The nomadic community, *Lewogoso*, is a large nomadic encampment subsisting off of camels and small stock production in the Kaisut Desert 120 km from Marsabit Town.
2. *Korr* is a lowland community in the Kaisut Desert located 120-km west of Marsabit town. It was originally a camel satellite camp, but developed into a permanent settlement following the arrival of Catholic missionaries who drilled a mechanized water hole and distributed famine relief. Today Korr has a population of approximately 8,000; with several thousand more living within a 15-km perimeter. As the region is too arid to support agriculture, residents live by various means including running shops, selling firewood collected from distant locations, brewing alcohol, milk marketing, or working for the schools, development agencies, or churches.
3. *Karare* is a sedentary highland community (population 2,500) on Mt. Marsabit located along a grated road ~30 km from Marsabit Town. The main production systems in this community include sedentary cattle-keeping, involving animal and milk marketing in Marsabit Town, and dryland agricultural production of maize.
4. *Songa* is a settled community of about 2,000 people on the southern slopes of Mt. Marsabit, located 15-km south of the district capital. In 1971, the African Inland Church Mission established an irrigation scheme, relocated formerly nomadic Rendille to this location, and provided training on farming maize and beans. Residents now grow diverse crops, and have access to Marsabit markets for selling vegetables.
5. *Marsabit town* (population 11,113) is the capital of Marsabit District, and is inhabited by many different ethnic groups, including Boran, Burji, Samburu, Gabra, Somali, as well as a minority of Rendille. This town serves not only as the administrative center for the District but also the headquarters for numerous non-

governmental organizations, and has developed into an active trade center for meat and livestock. There are several hotels and restaurants, dozens of small shops, as well as a large open air market selling fruits and vegetables and diverse household goods.

This setting is ideally suited for studying the range and pattern of women's autonomy and its impact on children's nutrition in that it involves a single ethnic group with a common genetic, linguistic, and cultural background living under conditions of resource constraint. By conducting a systematic analysis of a sociodemographic survey, collected by Shell-Duncan in 1995–1996, we attempt in this article to assess the impact of women's autonomy on the nutritional well-being of their children. For our study, we hypothesized that as the level of women's autonomy increased so would the nutritional status of their children.

## MATERIALS AND METHODS

Data for this study were drawn from a large-scale cross-sectional survey conducted in Marsabit District from November 1995 through February 1996. The survey instrument was created by Bettina Shell-Duncan and Walter Obiero, modeled after the Kenyan Demographic and Health Survey, but modified for the Rendille cultural context, and extended to include further information on women's autonomy and children's health and nutrition. The survey was carried out by three teams, each composed of three or four female Rendille enumerators and a field editor who cross-checked items in the survey instrument and checked the surveys for completeness. All field editors and enumerators were trained by Dr. Obiero.

In each of the five locations, subjects were drawn randomly from household lists created with the assistance of community maps, and—in the case of settled communities—compared with the household rosters of local chiefs. From selected households, all ethnically Rendille women of ages 15 and over were interviewed. An attempt was made to sample 200 women from each community; however, fewer than 200 women lived in the nomadic community of Lewogoso, and we were unable to find 200 ethnically Rendille women in Marsabit during the study period. Sociodemographic data were collected from 149 women in Lewogoso, 232 women in Korr, 204 women in Karare, 199 women in Songa, and 130 women in Marsabit town, for a total of 914 women.

All participants were informed about the purposes of this research and were given the opportunity to ask questions. Oral consent was obtained from women prior to interviews taking place. In addition to parental consent for children being measured, oral assent was collected from all children over the age of 3 years prior to them being measured. The protocol and procedures of this research were reviewed and approved by the University of Michigan IRB and the IRB of the government of Kenya.

### Autonomy measures

Female autonomy was measured using an 11 item Rendille culture-specific questionnaire, structured after decision-making questions used by Balk (1994). More specifically, we employed three questions that centered on money, food procurement, and distribution; three questions that concerned the care, control, and sale of livestock; and five questions that centered on access to medical care and birth control for mothers and medical care and schooling for their children (Table 1). We initially speculated that answers to these questions may have segregated along gender lines, with decisions regarding spending husband's income and animals generally falling in the male domain, and decisions regarding food purchases and health care generally falling in the female domain. However, a principal components analysis of the autonomy survey did not reveal a consistent pattern of

intercorrelation. A measure of reliability for this index was calculated using Chronbach's alpha. Results of this analysis gave an alpha of 0.83, indicating that the 11 items in the survey reliably measure a single construct. Therefore, we determined it was reasonable to weight all questions equally and average them into a single autonomy index.

For each of the 11 questions, women were able to respond that their husbands or their husbands' families were solely responsible for making the decision; that their husbands were primarily responsible for making the decision; that they—the women—were primarily responsible for making the decision; or that they—the women—were solely responsible for making the decision. On the basis of these four possible answers, women received scores corresponding to increasing levels of autonomy, with one being the lowest and four the highest. Thus, for saying her husband was *solely* responsible for adopting birth control a woman received a score of one; for saying her husband was *primarily* responsible for adopting birth control a woman received a score of two; and so forth. For a woman's total autonomy score, individual scores corresponding to answers from all 11 questions were added together, then averaged so that the resulting autonomy scale ranged, once again, from one—minimal autonomy—to four—complete autonomy.

In some instances, questions on the autonomy survey were not answered. When one to three answers were missing, we used community-specific mean imputation to counter the nonresponse. Mean imputation is a conservative technique that reduces variation and if anything leads to a dilution of hypothesized effects. The study sample proportions of subjects with imputed items were zero items—no imputation—79.3%; one item, 3.8%; two items, 14.4%; and three items, 2.5%. When four or more of the autonomy questions were not answered, accurate imputation of missing values was less likely. When this occurred, we chose not to calculate overall autonomy scores, and consequently these women were dropped from further analyses.

### Socioeconomic and other indicies

Data were also collected on socioeconomic indices, including economic status—recorded as poor or not poor—maternal education—recorded as years of education, but recorded for this analysis as educated or not educated—maternal age, household size, marriage type—monogamous or polygamous—and gender of household head. Validations of these measurements were conducted and are described in detail in Shell-Duncan and Obiero (2000).

Information on marital status, whether a woman was married or widowed—divorce, as thought of in the western sense, did not exist among the Rendille at the time of the survey—was collected by asking women about their current marital situation. While information on all women was collected for the larger demographic survey, only information on currently married women is included in this study. This was done because widowed Rendille women were only able to give extreme answers—they were solely responsible for decisions, or more often their husbands' families were solely responsible for decisions—to the questions in our autonomy survey. Consequently, their responses showed a different distribution in comparison with married women, and therefore, data from widowed women were analyzed separately. Results from this analysis are reported elsewhere.

### Children's growth data

Anthropometric measurements were collected from all 934 children whose mothers were included in the survey and who were between the ages of 0 months and 10 years. Height was measured to the nearest millimeter with an anthropometer while subjects stood on a level platform; for subjects younger than 24 months of age, recumbent length was measured to the

nearest millimeter using a Shorr portable measuring board. Using a SECA electronic digital LED scale (Perspective Enterprises, Kalamazoo, MI), or for infants a hanging weighing scale, weight was measured to the nearest 0.1 kg. Each children's apparel was noted at the time of measurement, and nude weight was estimated by deducting amounts of test weights of clothing from the children's measured weight.

Ages for children were determined by asking mothers the current ages of their children. When possible, children's ages were cross-checked against clinic cards, which often record date of birth. When discrepancies arose, relative ranking against children with known ages was employed. Because of the differences in nutrition and morbidity that can result from children being breastfed as opposed to children eating solid foods, we decided to split the children into two groups for analysis, those above and those below the age of 36 months. We chose this cutoff based on the typical length of breastfeeding among the Rendille.

All anthropometric measurements and age estimates were entered into the EPI INFO software program of the Center for Disease Control and Prevention. The anthropometric module of this program was then used to calculate sex-specific weights for heights, expressed as standard deviations (Z-scores) above or below the median values of the National Center for Health Statistics (NCHS/WHO) international reference data. Weight for height measures body mass in relation to height; it is considered a short-term measure of nutritional stress as it is sensitive to recent bouts of inadequate nutrition, disease, or a combination of the two (WHO, 1995). Children whose standardized weight for height Z-scores—WHZ—were 2 standard deviations below the reference population median were considered to be "wasted."

In this analysis, we specifically chose to examine WHZ instead of other measurements of children's nutrition or growth because WHZ provides a recent measure of children's health. We hypothesize that women's autonomy, particularly the way that we measured it in this study, reflects the *current* ability of women to control household resources. While it is likely that women's autonomy has long-term impacts on children's nutrition and growth, we do not believe it is reasonable to use measures of women's autonomy collected in the present to infer how this variable impacted their children's health in the distant past. Research to date has not shown that levels of women's autonomy remain stable through time, and in fact, research on the related topic of status has shown that this variable can change dramatically throughout women's lifetimes (Mason, 1986). For this reason, we feel that the impact of women's autonomy on children's health can best be assessed using short-term measurements of children's nutrition and growth, such as WHZ scores.

## Statistical methods

The distribution of autonomy scores was approximately normal; therefore a transformation of the data was not required. Mean comparisons of autonomy scores, as well as children's WHZ scores were completed by analysis of variance (ANOVA) using the Sidak method to adjust for multiple comparisons. This approach was, however, inappropriate for examining the effects of autonomy on children's nutritional status since many mothers, each with a single autonomy score, had multiple children in the sample, each with their own WHZ scores. Hierarchical linear modeling (HLM) provided a framework for simultaneous estimations of effects that were specific to the children in our sample and effects that were common to their mothers. Multilevel models estimate unbiased coefficients and standard errors when observations are not independent by estimating second-level effects—maternal effects in this study—separately from primary-level effects—children's effects in this study (for a general discussion see Raudenbush and Bryk, 2002).

## RESULTS

While data were collected from a total of 914 women, 309 of these women had no living children between the ages of 0 months and 10 years, 89 had incomplete autonomy surveys—were missing more than four answers on the autonomy questionnaire—and 81 were widowed, leaving a total of 435 women that were included in this study. According to the community in which the women lived, sociodemographic characteristics of these women are summarized in Table 2.

Although the autonomy scale used in this study ranged from possible values of 1—no autonomy—to 4—complete autonomy—the observed data from the Rendille women ranged from 1 to 3.18. Measures of autonomy were highest among women from the small, highland town of Karare (mean = 2.23) and lowest among women from desert town of Korr (mean = 2.08; Table 3). Comparisons between all five communities showed that the autonomy scores from Karare and Korr were significantly different ($P < 0.05$), but that the differences in levels of autonomy between all other communities were not.

Of the 934 children in the sample, 628 were over the age of 36 months, while 306 were 35 months old or younger. The sociodemographic characteristics of these children are summarized in Table 4. In all communities, children sampled ranged in age from 0 months to 10 years, except for the nomadic community, where 9- and 10-year-olds were away with animals. Birth order in the sample ranged from 1 to 10, while the overall ratio of boys to the total was 0.49 for both the older and younger children. When comparing the five communities, no significant differences in age, birth order, or sex existed for either older or younger children.

WHZ scores in the sample ranged from −3.73 to 1.96 and averaged to −1.24 for older children and −0.55 for younger children (Table 5). Among the younger children, mean WHZ scores ranged from −0.38 in Songa to −0.73 in Korr; for older children, mean WHZ scores ranged from −1.03 in Marsabit to −1.28 in Korr. In order to determine whether community was associated with nutritional status, WHZ values of both older and younger children from each community were compared. The results showed no significant differences in WHZ scores between the five communities for either younger or older children.

When considered in terms of wasting, WHZ scores showed that 9.8% of younger children and 16.4% of older children would clinically be considered “wasted.” This is a fairly high percentage of wasting and it strongly suggests that the average nutritional and/or health status of Rendille children is considerably lower than that of the reference population, where only 2.3% of children would fall 2 or more standard deviations below the median. By community, percentages of wasting ranged from 0% in Marsabit to 15.45% in Korr for younger children and 13.51% in Lowogoso to 17.86% in Korr for older children.

In order to assess how and if a mother’s level of autonomy impacted the health and nutrition of her children, it was necessary to use hierarchical linear modeling, to account for the hierarchical nature of the data. Using HLM software (Scientific Software International 2000), a model including only autonomy and WHZ scores was run for both younger and older children (Table 6). For younger children, an increase of 1 point in a mother’s autonomy score resulted in a 0.11 decrease in her younger children’s WHZ score; however, this relationship was far from significant ($P > 0.6$). Among older children, an increase of 1 point in a mother’s autonomy score led to a corresponding increase of 0.23 in her older children’s WHZ score, and unlike the results for the younger children, this association was significant ($P < 0.05$). Additional models, including variables such as economic status and community did not change these results.

Pearson's correlations were also calculated to assess the degree of relatedness between mother's autonomy and children's nutritional status by community (Table 7). While this test does not take into account the non-independent nature of the data, it does provide a tentative measure of the association between mother's autonomy and children's WHZ scores. The results of this analysis suggested that the effect of autonomy was only strong and significant in Korr. Together with the HLM results, this suggests that mothers' autonomy can influence their older children's nutritional status, but that the effect of autonomy may vary according to local environmental and socioeconomic conditions.

## DISCUSSION AND CONCLUSIONS

The general lack of a strong and significant relationship between women's autonomy and their younger children's WHZ scores was not entirely surprising. Most, if not all, of the younger children received a significant portion of their nutrition from breast milk. This means that they were somewhat buffered against moderate changes in the food supplies of their households and that they were less likely to benefit from their mothers being able to provide additional food. Among older children, however, our results suggest that they were susceptible to changes in food availability and it was possible, therefore, for the level of their mother's autonomy to impact their nutritional status. In this way our findings reflect those of previous researchers including Koenen et al. (2006) and Hossain et al. (2007) who also found that women's autonomy was positively associated with measures of children's health.

The way in which women's autonomy likely functioned to improve children's nutrition among the Rendille was through affording greater maternal control over limited household resources, including cash and animal products like milk that could be consumed directly or sold for cash. Greater control over these resources would have allowed women the opportunity to supplement the diets their children normally received, which in turn would have improved the nutrition and health of these children. However, the effect of women's autonomy did not seem to be independent of the availability of household resources.

The strongest correlation between women's autonomy and their older children's WHZ scores was found in Korr. Located in the lowland desert, Korr was relatively poor; its dry climate was not suitable for agriculture and its remote location resulted in very few opportunities for wage labor. In addition, through a combination of harsh environmental conditions and poverty, most Rendille living in this area were unable to maintain herds of camel or small stock. This further disadvantaged Rendille living in Korr because it limited access to animal products including milk, blood, and meat that historically had formed essential components of Rendille diets. Further evidence that conditions in Korr were generally difficult can be found in the WHZ data from this study—Korr boasted the lowest mean WHZ scores and the highest rate of wasting for both older and younger children. Further evidence that conditions in Korr were generally difficult can be found in the WHZ data from this study-Korr boasted the lowest mean WHZ scores and the highest rate of wasting for both older and younger children in our sample. So why then was the correlation of women's autonomy to their older children's WHZ scores strongest in this location? A likely possibility is that the impact of women's autonomy may be the strongest when conditions are poor.

This idea is further supported through the data from the highland communities, in particular Karare. The correlation of women's autonomy to their older children's WHZ scores was weakest in this area, although the levels of women's autonomy were the highest. Unlike Korr, environmental conditions in Karare were capable of supporting both agriculture and sedentary cattle keeping. In addition, the town's location—30 km from the district capital—

provided access to a stable market for milk and other goods. Resource availability was thus generally better in Karare than in Korr. This is also reflected in the WHZ data from our study, which showed that Karare had both higher mean WHZ scores and lower rates of wasting for both younger and older children in comparison with Korr. In consideration of the strong correlation between women's autonomy and their older children's WHZ scores in Korr, it seems probable that the weak correlation between these variables in Karare was the result of the greater resource availability in this area.

Previous researchers (Ghuman et al., 2002; Sen, 1990) have suggested that greater levels of women's autonomy would have a significant effect on children's health under conditions of resource constraint, but less of an effect on their children's health when resource availability was high. This appears to be the case for the Rendille. Strong correlations between women's autonomy levels and their older children's WHZ scores were found in both of the poorer, lowland communities. While the correlation was only significant in Korr, the correlation was high in Lewogoso and was likely only insignificant because of the small sample size that was obtained from this location. Weak correlations between women's autonomy levels and their older children's WHZ scores were found in the three wealthier, highland locations, including Karare, Songa, and the district capital of Marsabit. Because of this pattern—the impact of women's autonomy was only strong and significant under conditions of severe resource constraint—the results of our study seem to support the idea that women's autonomy is most important when resources are scarce.

## Applications for studying women's autonomy

The importance of studying women's autonomy and the effects that this variable has on women's lives is twofold. Firstly, autonomy provides a measure of empowerment among women, which is an issue of basic human rights. In many societies women are constrained in their freedom of movement, their decision-making abilities, and their freedom of expression among other things. In order for women's positions to be improved in these societies, it is essential for researchers, policy makers, and even the women themselves to understand their positions within society and how these in turn impact their ability to control their own lives. Assessing women's autonomy—within relevant cultural frameworks—can provide a first step towards accomplishing this goal (Coleman, 2004).

Secondly, studies of women's autonomy can provide insights into different theoretical perspectives, including theories on parental investment. Nearly 150 years ago, Darwin recognized that males and females could most effectively maximize their fitness by adopting different reproductive strategies. He suggested that a strategy focusing on producing additional offspring—offspring quantity—would be optimal for males while a strategy focusing on caring for current offspring—offspring quality—would be optimal for females (Darwin, 1871). This idea was further clarified by Trivers (1972) who theorized that while individuals can contribute to reproductive effort through either mating or parenting, under normal circumstances males should favor investments in mating while females should favor investments in parenting. Many research studies have been conducted to test this hypothesis, as well as related ideas pertaining to parental investment (see Bird, 1999; Hawkes et al., 1995; Hill and Kaplan, 1988; Kaplan and Hill, 1985; Marlowe, 1999 for a few examples), and the evidence generally seems to suggest that men and women do indeed utilize different reproductive strategies. A question that has not been addressed, however, is how these conflicting strategies play out within household where men and women are already members of socially sanctioned relationships such as marriages.

Research in the field of economics provides some insight into this question. While early economic theory treated households as single entities—where all household members were assumed to share priorities for resource use, or where household heads, acting as

"benevolent dictators," were assumed to make decisions that benefited all household members equally—more recent work has shown that, in fact, household members often have their own priorities for resource use and that they tend to make decisions according to their own self interests (Apps and Rees, 1997; Chiappori, 1997; Manser and Brown, 1980; Urdy, 1996). Thus, resource distribution within households is directly impacted by the abilities of individual household members to make decisions about how such resources are used (Sen, 1990).

In light of the potential differences between males' and females' reproductive strategies, it seems likely that males and females living in the same household will have different priorities for resource use. This raises the question of how important women's control over household resources is to women's ability to invest in their children. Research into women's autonomy would shed light on this question and it could also address how increases in women's control over household resources might impact men's abilities to invest in reproductive efforts.

### Limitations

Although a sincere effort, our investigation into women's autonomy suffers from a number of limitations, and is best considered an initial, rather than definitive, study on the effect of autonomy on children's health. Our 11-item autonomy scale was modified from an inventory used to assess autonomy among Bangladeshi women (Balk, 1994). A more comprehensive and culturally appropriate scale would be created following in-depth ethnographic research on domains of decision making among the Rendille. Nonetheless, we believe that the data from this scale are an improvement over commonly employed proxy measures, such as education, which likely assess a dimension of status rather than autonomy.

Another limitation of this study was that only women were interviewed. While this is a common occurrence in studies of women's decision making, it overlooks the male perspective which can both support and refute claims made by women. Recent research (Ghuman et al., 2002) has suggested that measurements of women's autonomy change depending on whom—a woman or her husband—was interviewed. Obviously including a male perspective in assessments of women's autonomy is important, and like Ghuman et al., we suggest that this should be an integral part of future studies.

In conclusion, while our study does suggest that women's autonomy can affect their older children's nutritional status, we suggest that more research on women's autonomy and its effect on children's health and nutrition should be conducted. Like Mason and Smith (2001), we believe that ethnographic research, particularly participant observation and in-depth interviews with women and their husbands, would substantially contextualize the concept of autonomy and the role that this variable plays in relation to parental investment and children's health.

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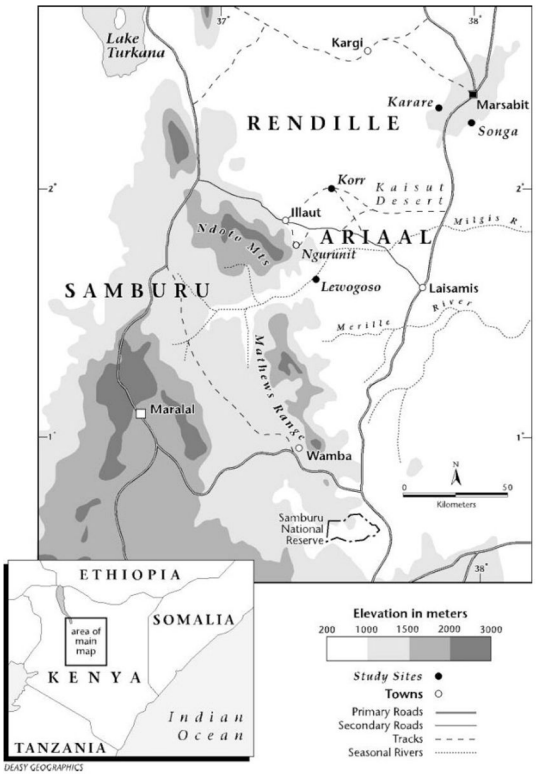


**Fig. 1.**
Map of study sites in Marsabit District, Kenya (map provided by Dr. Elliot Fratkin).

**TABLE 1**

Autonomy questionnaire

| | |
|---|---|
| **1** | Who makes the decision to purchase food? |
| **2** | Who makes the decision to go to the health center/healer when a children is sick? |
| **3** | Who makes the decision to go to the health center/healer when a you are sick? |
| **4** | Who makes the decision to purchase medicine for a sick children? |
| **5** | Who makes the decision to adopt birth control? |
| **6** | Who makes the decision on whether a children attends school? |
| **7** | Who makes the decision to spend money you earn? |
| **8** | Who makes the decision to spend money your husband earns? |
| **9** | Who makes the decision to sell animals? |
| **10** | Who makes the decision to slaughter animals for meat? |
| **11** | Who makes the decision to bleed animals? |

**TABLE 2**

Sociodemographic characteristics of Rendille women and their households

| | Community | | | | | |
|---|---|---|---|---|---|---|
| | **Lewogoso** | **Korr** | **Karare** | **Songa** | **Marsabit** | **Entire sample** |
| Mothers | | | | | | |
| *n* | 59 | 137 | 104 | 98 | 37 | 435 |
| Median age | 27 | 30 | 29 | 30 | 27 | 29 |
| Median parity | 3 | 4 | 3.5 | 4 | 3 | 4 |
| Ever attended School (%) | 15.50 | 18 | 25 | 32 | 59 | 25.00 |
| Households | | | | | | |
| Median household size | 4 | 4 | 4 | 4 | 4 | 4 |
| Polygynous (%) | 52 | 29 | 39 | 43 | 33 | 38 |
| Female-headed Households (%) | 2 | 2 | 8 | 8 | 8 | 5 |

**TABLE 3**

Women's autonomy scores

| | Community | | | | | |
|---|---|---|---|---|---|---|
| | **Lewogoso** | **Korr** | **Karare** | **Songa** | **Marsabit** | **Entire sample** |
| *n* | 59 | 137 | 104 | 98 | 37 | 435 |
| Mean | 2.16 | 2.08 | 2.23 | 2.17 | 2.15 | 2.15 |
| Standard deviation | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 |

Significant pairwise differences: Korr-Karare, $P = 0.032$

**TABLE 4**

Sociodemographic characteristics of Rendille children

| | Community | | | | | |
|---|---|---|---|---|---|---|
| | **Lewogoso** | **Korr** | **Karare** | **Songa** | **Marsabit** | **Entire sample** |
| Younger children | | | | | | |
| *n* | 27 | 110 | 78 | 72 | 19 | 306 |
| Median age (in months) | 17 | 17 | 18 | 18 | 11 | 18 |
| Median birth order | 3 | 3 | 3 | 3 | 2 | 3 |
| Males (%) | 56 | 42 | 55 | 51 | 53 | 49 |
| Older children | | | | | | |
| *n* | 46 | 213 | 149 | 173 | 47 | 628 |
| Median age (in years) | 5 | 5 | 5 | 6 | 6 | 5 |
| Median birth order | 2 | 3 | 3 | 3 | 3 | 3 |
| Males (%) | 39 | 48 | 48 | 52 | 55 | 49 |

**TABLE 5**

Children's WHZ scores

| | Community | | | | | |
|---|---|---|---|---|---|---|
| | **Lewogoso** | **Korr** | **Karare** | **Songa** | **Marsabit** | **Entire sample** |
| Younger children | | | | | | |
| *n* | 27 | 110 | 78 | 72 | 19 | 306 |
| Mean | −0.71 | −0.73 | −0.42 | −0.38 | −0.47 | −0.55 |
| Standard deviation | 1.2 | 1.2 | 1.1 | 1 | 1.1 | 1.1 |
| Wasted (%) | 14.81 | 15.45 | 6.41 | 5.56 | 0.00 | 9.80 |
| Older children | | | | | | |
| *n* | 46 | 213 | 149 | 173 | 47 | 628 |
| Mean | −1.18 | −1.28 | −1.26 | −1.24 | −1.03 | −1.24 |
| Standard deviation | 0.8 | 0.8 | 0.9 | 0.8 | 0.8 | 0.8 |
| Wasted (%) | 13.51 | 17.86 | 16.30 | 15.94 | 14.63 | 16.45 |

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## TABLE 6

HLM analysis of children's WHZ and mother's autonomy

| | Younger children | Older children |
|---|---|---|
| Child-level equation | | |
| Intercept for WHZ | −0.22 | −1.7 |
| Mother-level equation | | |
| Autonomy (β) | −0.11 | 0.23 |
| Standard error | 0.21 | 0.11 |
| *P* | 0.63 | 0.04 |

**TABLE 7**

Pearson's correlations of women's autonomy and children's WHZ scores

| | Community | | | | | |
|---|---|---|---|---|---|---|
| | **Lewogoso** | **Korr** | **Karare** | **Songa** | **Marsabit** | **Entire sample** |
| Younger children | | | | | | |
| *n* | 27 | 110 | 78 | 72 | 19 | 306 |
| $R^2$ | 0.06 | −0.08 | 0.12 | 0.04 | 0.16 | 0.04 |
| Older children | | | | | | |
| *n* | 46 | 213 | 149 | 173 | 47 | 628 |
| $R^2$ | 0.2 | 0.17* | −0.02 | 0.01 | 0.04 | 0.05 |

*$P < 0.02$.

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