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Searching for Evidence of Boy-Girl Discrimination in Household Expenditure Data: Evidence from Gansu Province, China[1]

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Previous economic studies have revealed that parents in developing countries often prefer boys over girls, resulting in differential treatment (e.g. Das Gupta 1987, Garg and Morduch 1997). These differences are manifested in high female mortality during childhood, skewed sex ratios and lower educational attainment of women. However, studies attempting to find evidence of this bias by examining household expenditure data have met with little success. Even in countries with known gender bias, such as Pakistan, researchers have failed to find significant effects of the children's gender on the good composition of household spending (Bhalotra and Attfield 1998). Deaton (1997) observed that "it is a puzzle that expenditure patterns so consistently [fail] to show strong gender effects even when measures of outcomes show differences between boys and girls."

Parental preferences for boys in China have been established in the literature. Arnold and Liu (1986) examine data from the One-per-Thousand National Fertility Sample Survey to show that couples with one daughter are less likely to use contraception and resort to abortion than are couples with one son. Furthermore, sex ratios at birth are skewed grossly in favor of males. Recent estimates vary between 1.16 and 1.23, with some provinces reaching a high of 1.30, but the consensus is that the male-to-female ratio at birth significantly exceeds 1.07, which is the upper limit of what is considered normal (Sen 2003; Hesketh, Li, and Zhu 2005; Ding and Hesketh 2006). This gender imbalance might be due to sex-selective abortion, female infanticide and abandonment, and underreporting of female births (Zeng et al. 1993). The high female mortality and male-to-female ratio persist among adults as well. For example, Klasen and Wink (2002) estimate the overall population sex ratio to be 1.067, which is considerably above the expected value of 1.001.

Empirical studies looking for within-household discrimination in China have yielded mixed results. Using household expenditure data from the provinces of Sichuan and Jiangsu, Burgess and Zhuang (2001) discover some bias against girls in health and educational spending. Similarly, Gong et al. (2005) discover that Chinese families have lower educational spending for girls than for boys of similar age, conditional on school attendance. Lower enrollment rates of females in China (Brown and Park 2002) provide further evidence of the education inequality. However, none of these studies discovers bias in other spending and the uncovered differences are too small to account for any part of the significant sex ratio difference in China.

The main method employed in the literature is called *outlay equivalent analysis* (Deaton 1989). It examines the effect of an additional child in the household on spending of certain adult goods such as alcohol and tobacco. If boys of a given age decrease these expenditures more than girls of the same age, then intrahousehold distribution is clearly biased against girls. A similar technique has been employed for food expenditure by looking at whether boys increase spending on certain foods more than girls do. Both methods have met with little success (Deaton 1997, Gibson and Rozelle 2004).

[1] This paper benefited from comments by Prof. Philip Brown, Po Yin Wong, and two anonymous referees, to whom I am very grateful. All remaining errors are solely mine.

In this study, I use the outlay equivalent analysis to test for gender bias in expenditure patterns of rural households in Gansu Province, China. I discover that there is very little evidence of unequal intra-household resource distribution. Section I presents the employed methodology. Section II presents the data. Section III presents the results. Section IV discusses the findings and surveys some possible explanations for the results. Section V concludes.

I. Methodology

Since intra-household resource distribution decisions are not directly observed, we need to find an alternative method of estimating the relative resource endowments of different household members. If we are interested in discrimination against female children, one way to look for it is to examine the effect that each additional child has on spending on adult goods such as adult clothing and shoes, alcohol, tobacco, and opiates.

This method follows Rothbarth (1943), who suggested that children have an unambiguously negative effect on adult good consumption when measured as part of the total budget. Since children do not consume those goods and need other sorts of specialized consumption, their effect on adult good spending can be modeled as a pure negative income effect. Deaton (1989) used this technique to estimate whether the effect of children on adult good consumption differs by gender to look for evidence of discrimination. In particular, a boy decreasing adult good spending more than a girl suggests a preference for male children.

Another way to look for gender discrimination within the household is to examine the effect that every additional child has on spending on goods that are usually consumed exclusively by the children or by the entire household such as food, education, and children's clothing. Here, logic opposite to Rothbarth's intuition applies: if spending on a good such as education is greater in the presence of an additional boy relative to an additional girl, there is evidence for anti-girl discrimination[2].

Estimating the effect of household members of different ages and gender on expenditure on different goods is accomplished by analyzing the aggregate Engel curve for the good in question[3]. Following the Working (1943) specification[4]:

(1) $$w_i = \alpha_i + \beta_i \ln(x/n) + \eta_i \ln n + \sum_{j=1}^{J-1} \gamma_{ij}(n_j/n) + \delta_i \cdot z + u_i \,,$$

where w_i is the share of expenditure on the ith good, x is total value of consumption, n is the number of household members, and n_j represents the number of members belonging to the age-sex class indexed by j. The vector of control variables (z) includes village-fixed effects, dummies for the education (1 if

[2] Incidentally, these goods would allow testing for differential treatment of elderly across genders as goods such as children's allowance relate to the elderly the same way adult goods do to children. We can also compare the effect of an additional elderly male to the effect of an additional elderly female using expenditure on food.
[3] An Engel curve describes how the purchases of a certain good differ based on variation in the income and other characteristics of the consumer.
[4] Working assumes linearity between log of income and spending share. See Deaton (1997) and Gong (2005) for discussions addressing the appropriateness of this assumption.

completed elementary school), the minority status (1 if non-Han) and the occupation classification (1 if non-farmer) of the father of the sampled child, who is usually also the head of the household.

I distinguish between six age classes: preschoolers (0 to 5 years old), children of elementary school age (6-12), middle-schoolers (13-15), children of high school age (16-18), working-age adults (19-55), and elderly (55+). Each class is further divided into two categories – males and females. Note that one age-sex category (elderly females) is excluded from the specification since the structure of the household can be described by *J-1* ratios and including all categories will cause perfect multicollinearity as their sum is uniquely 1.

Since the independent variables are identical across the different specifications, the regressions are jointly estimated using Zellner's (1962) seemingly unrelated regressions (SUR) technique. This method increases the efficiency of the coefficient estimates while remaining asymptotically equivalent to ordinary least squares[5]. The sign of β indicates whether the good is a necessity or a luxury (it is a luxury if $\beta > 0$ and a necessity if $\beta < 0$), while γ measures the effect of the addition of people in each age-sex class.

The method for testing for gender bias consists of an F-test for the equality of the γ_j versus γ_k where j and k correspond to boys and girls of the same age group. With H_0: $\gamma_j = \gamma_k$, we test whether the inclusion of an additional male child of a certain age (group j) has the same effect as the inclusion of an additional female child of the same age (group k)[6].

Previous studies using outlay equivalent analysis (Deaton 1989, Subramanian and Deaton 1991, Haddad and Reardon 1993, Browning and Subramaniam 1994, Subramaniam 1996, Bhalotra and Attfield 1998, Burgess and Zhuang 2001, Case and Deaton 2002, Gibson and Rozelle 2004, Park and Rukumnuaykit 2004, Gong et al. 2005, Kingdon 2005) have almost universally failed to discover bias commensurate with the expected magnitude given the heavily-skewed sex-ratios in the countries of study. These studies have looked at countries as diverse as Bangladesh, Burkina Faso, China, Cote d'Ivoire, India, Pakistan, Papua New Guinea, Taiwan, and Thailand (see Gibson and Rozelle 2004 for an exhaustive survey). The only study that discovered the expected significant bias is Gibson and Rozelle (2004), who use data from Papua New Guinea, a country with extremely high gender bias.

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[5] No previous study using outlay equivalent analysis employs the SUR framework. This is surprising given the gains in efficiency that the SUR method can provide.

[6] Deaton, Ruiz-Castillo and Thomas (1989) develop an alternative test for gender bias in this framework. It requires the calculation of outlay-equivalent ratios, i.e. the fraction by which household per-capita expenditure would have to be decreased to cause the same decrease in (for example) alcohol and tobacco expenditure as would an additional person of age-sex category *j*. To test for discrimination, the variances and covariances corresponding to these ratios are computed and a Wald test for the equality of these ratios is conducted. I choose the F-test method due to its computational tractability.

II. Data

The dataset used in this paper comes from the Gansu Survey of Children and Families (GSCF). The GSCF was a survey of 2000[7] families with children aged 9-12 administered in July 2000 in the northwestern Chinese province of Gansu. Gansu is a largely agrarian province with low income and education levels. Thus, it is broadly representative of other western provinces in China (Brown 2006). Twenty counties were randomly sampled out of the 79 non-predominantly Tibetan counties in Gansu. One hundred villages were further sampled from these counties and then families of children in the relevant age range (9-12) were interviewed with equal probability from each village. Instruments were administered to household heads, children, their mothers, teachers and school principles, and village leaders. The instrument relevant to this study is the household information questionnaire which was answered by the household head. It included questions on household composition, expenditure and consumption as well as socio-demographic characteristics of the household members.

Figure 1 illustrates the average age-sex household composition of the surveyed families. Males outnumber females in the youngest two age groups. After age 12, however, women tend to comprise a bigger part of the household. The two largest age groups are adults (about 50% of all members of the surveyed households were between the ages 19 and 54) and elementary school children (31%). The average household is comprised of five people, of whom two are children – one boy and one girl.

To capture the possible changes in food production and consumption within the household, a way to monetarily measure the consumption of foods grown within the household must be devised. The household survey includes questions on the quantity of domestically-grown produce as well as on the quantity of and price paid for produce that was bought. In order to estimate the value of the former, an average price is imputed based on the ratio of the average price to the average purchased quantity of each individual food category[8]. The inclusion of this measure is crucial since most of the surveyed individuals are farmers and they rely significantly on food that they grow: consumption from self-production comprises 64.1% of the total value of consumed food and 43.9% of the total family expenditure[9].

Figure 2 reports the detailed breakdown of the consumption of an average household. The adult goods that this study focuses on are alcohol and tobacco, parents' clothing, and restaurant meals. While alcohol and tobacco, and parents' clothing are not consumed by children, meals out might be. In the inclusion of restaurant meals as an adult good, I follow most previous studies' approach (Deaton 1989, Gibson and Rozelle 2004 etc.) [10]. The non-adult goods used are children's allowance, children's clothing, spending on culture and education, and seven food categories: rice, flour, other grains and grain products, beans and bean products, potatoes and sweet potatoes, vegetables, and meat. Children's allowance and children's

[7] Forty-two of the sampled households did not give answers to variables crucial for this study, decreasing the sample size to 1958 observations.
[8] For this imputation, I use province-wide data. It is impossible to use data from individual villages since there were villages where no one made any purchases in some of the food categories. I also tried using county-wide data but this created some wildly unrealistic prices which also varied improbably between different counties.
[9] These shares are consistent with Gong et al. (2005) who, using consumption data for rural households from 19 Chinese provinces, estimate that the average share of the value of self-produced food is 66.9% of all food and 37.6% of all expenditure.
[10] Tests for whether a good is exclusively consumed by adults have been developed. See Gibson and Rozelle (2004) for two examples. Since the GSCF has only three plausible adult good candidates, I omit the testing and use all three.

clothing are exclusively consumed by children while culture and education, and food are consumed by the entire household. Food tends to be the biggest part of families' consumption, comprising 67.3% of annual consumption. The mean consumption shares of the non-food goods we are interested in are not particularly large – they range from 0.3% for alcohol and tobacco to 4.5% for culture and education. Descriptive statistics of all the variables used in this study are reported in table 1.

The family consumption variable includes all spending on food, both purchased and self-grown, as well as 19 categories of non-food consumption. It includes the answers to all the questions in the survey that inquire about expenditure[11].

III. Results

The results for the effect of household composition on non-food goods are presented in table 2. The top part of this table and table 3 shows the coefficient estimates of the SUR framework for each good category we are examining. The bottom part contains the results (test statistic and significance) of the F-tests with null hypothesis being that the coefficients for males and female of each age category are equal. The "55 up" row reports whether the coefficient corresponding to elderly males is statistically significant. Since the omitted category is elderly females, this reveals if there is any difference in their consumption preferences.

The significant positive coefficient associated with the log expenditure per person in alcohol and tobacco regression suggests that this class of goods is a luxury. Children's clothing and, puzzlingly, meals out seem to be necessities. The characteristics of the household head (ethnicity, education, and occupation) seem to be largely unrelated to the household consumption decisions. Other unexpected findings include the suggestion that most household members consume less alcohol and tobacco than elderly women[12]. Conversely, in comparison to elderly women most age/sex groups have a preference for more culture and education, and children's clothing.

The F-tests indicate little discrimination. All the statistically significant results indicate that girls are actually preferred to boys. Girls between the ages of 0 and 12 decrease the share of household spending on alcohol and tobacco more than boys of similar ages do. Similarly, girls between 13 and 18 increase spending on children's clothing more than boys do. Finally, girls of middle-school age increase spending on education and culture more than boys of this age do.

Additionally, the F-tests for the equality of the coefficients of male and female adults suggest that adult women in the household have stronger preferences for children's clothing than men do. Further, men prefer restaurant meals more than women. While these results are not surprising, the finding that the presence of adult males decreases the spending share on alcohol and tobacco more than adult females is unusual. Previous studies (e.g. Deaton 1989, Subramanian and Deaton 1991) discover the opposite effect.

[11] There are two separate questions that seek to measure health expenditure. One includes all medical fees and was asked together with the other consumption questions. The other asks about medical expenditure for each member of the household. To keep the consumption variable consistent and avoid possible double counting, I include only the former measure of health expenditure.
[12] Case and Deaton (2002) derive similar results using outlay equivalent analysis and Indian data.

Table 3 presents the results for the food categories which include both purchased and self-produced food[13]. The estimates suggest that meat and beans are luxury goods while the other food categories are necessities. Some of the household head characteristics seem to have an effect on food consumption. For example, households from ethnic minorities tend to consume more meat and vegetables but less non-rice grains. Households headed by someone with at least elementary education consume more rice but less flour and potatoes. Finally, non-farm households consume significantly less flour and "other grains." Very few of the coefficient estimates for the age-sex categories are significant and it is difficult to see any pattern there.

Once again, the evidence for discrimination is weak. Consumption of beans and bean products is significantly higher for girls of middle-school age while boys of pre-school age receive more grains and grain products. All the other F-tests across the remaining food and age-sex categories indicate equal treatment of boys and girls.

The results in tables 2 and 3 were estimated using village fixed effects. The regressions were estimated jointly without village fixed effects as well. Table 4 reports only the relevant F-tests for that estimation. I have indicated with "F" and "M" whether the good expenditure favors females or males of the corresponding age category. The results are slightly different but there are still only three significant tests. Girls aged 13-15 receive more children’s clothing while the consumption data on alcohol and tobacco, and grains and grain products indicate that boys of the same age receive preferential treatment. Among the adults, adult women cause higher expenditure on children’s allowance and both children’s and parents’ clothing, while the presence of adult men is associated with higher expenditure on restaurant meals and beans.[14]

Overall, based on the results in tables 2, 3, and 4, we can safely conclude that there is little evidence of systematic differential treatments between boys and girls. The differences in consumption among boys and girls of each age group seem to be randomly distributed among the good and age categories and one cannot talk of any well-defined pattern of discrimination, be it anti- or pro-girl.

IV. Discussion

In accordance with previous studies that use the method of outlay equivalent analysis, this paper did not find evidence for significant discrimination within rural households in Gansu province, China. This is supported by previous studies of China which discover none or very limited bias (usually limited to educational spending). Brown (2006), for example, using the GSCF as well but an unrelated technique, fails to detect any significant bias in the educational spending decisions of the household. Burgess and Zhuang (2001) discover bias against young girls in health spending and against older girls in educational spending in data from Sichuan, another poor province in Western China. Gong et al. (2005) also find evidence of bias against girls in educational spending. Their dataset comes from a survey administered in nineteen Chinese provinces. In a related study using data from eight Chinese provinces, Park and

[13] The regressions in table 3 were estimated jointly with the ones in table 2 using the seemingly-unrelated regressions technique.

[14] Similarly, there is no reason to believe that there is any discrimination against elderly women for any of the studied good categories either. In the only case where the household purchasing decisions differ significantly for elderly men and women, the presence of females is actually associated with higher spending on meat (both with and without village fixed effects).

Rukumnuaykit (2004) discover that the presence of a son decreases the fathers' nutrients intake more than the presence of a daughter. Mothers, however, do not exhibit similar preferences.

Most previous papers using the outlay equivalent method fail to explain the unequal outcomes of males and females in China and elsewhere. A variety of explanations have been advanced to explain why bias does not appear in household consumption data despite its suspected presence. For example Ahmad and Morduch (1993, quoted in Deaton 1997) suggest that boy bias might manifest itself through different quantities of time that parents spend taking care of the child. To examine this hypothesis, one might use the same regression framework with time allocation as the dependent variable. Since the GSCF contains such data, that would constitute a useful extension of the current study. It is, however, beyond the scope of this paper.

Another possibility (Kingdon 2005) is that families practice two-stage budgeting. That means that while parents might not change their buying habits when the gender composition of the household changes, they might allot unequal portions of the goods to their children based on gender. Such a hypothesis would be impossible to test without precise data on individual consumption.

Jensen (2005) further notes that families who prefer sons will make different fertility choices than those who do not. For example, they may have children until they have a son. In the presence of such fertility behavior, girls will tend to live in families with more children and thus fewer resources to go around. Even if parents do not discriminate against them in household resource distribution, on average, they will be worse-off than boys. Such differences would lead to the observed excess girl mortality and skewed sex ratios. This is one possible explanation for the results presented here since the One Child Policy generally allows a second child for rural families if the first one was a girl (Hesketh et al. 2005). Indeed, in the GSCF data only 2.15% of the families have both a young (0-5 years of age) daughter and an older son while 4.60% have both a young son and an older daughter.[15]

Another possibility (Deaton 1997, Gibson and Rozelle 2004) is that girls have higher resource needs than boys. In that case, even if they are not discriminated against during the household resource allocation process, they will end up worse off than their male siblings. Alternatively, while parents may treat boys and girls identically, when a health emergency requiring significant expenditure arises, parents might be more likely to pay to protect a son since males are the traditional providers of care for elderly parents. Rose (1999) provides evidence of such outcomes in that parents in rural India sacrifice their daughters' survival as an income smoothing mechanism. If female children are indeed used so that households can cope with adverse shocks, the sex ratios would be skewed towards males but resource allocation among the surviving children in the household might be equal. Once again, these hypotheses cannot be tested using the available data.

A similar theory, suggested by Udry (1997) and Gibson and Rozelle (2004), is that the lack of differential treatment of children within the household is due to sample truncation. In other words, girls that are discriminated against will have died before the sample is taken. A variation of this theory is the possibility that the unequal sex ratios in China are caused entirely by the large male-to-female sex ratios at birth.

[15] However, see Case and Deaton (2002) for some arguments against the suggested significance of such a behavior.

Finally, the lack of significant findings of gender bias in intrahousehold resource distribution might be due to survey issues such as poor identification and measurement of adult goods. It is suggestive that the only study (Scott and Rozelle 2004) that uses the outlay equivalent analysis with significant success employs data from a survey purposefully designed for the utilization of this technique. The authors also designed the survey and included a number of questions on a variety of different adult goods and trained the enumerators to take extra care when explaining which goods are included in which category.[16]

V. Conclusion

The results of this study do not present strong evidence for differential treatment of boys and girls in terms of household resource allocation. Examining several adult goods, spending on culture and education, children's allowance, children's clothing, as well as seven categories of foods, both purchased and self-grown, this study discovers that male children are not preferred in terms of household spending on these goods. In fact, girls are favored within several age categories. The persistent lack of evidence of intrahousehold discrimination in China suggests that the cause of the skewed sex-ratios is not female mortality caused by denial of necessary resources.

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16 Oster (2005) suggests that the skewed sex ratios may be partially due to the effects of hepatitis B. Using the fact that pregnant women infected with hepatitis B are much likelier to give birth to a boy, she demonstrates that higher hepatitis B prevalence is associated with higher male-to-female ratios. However, in recent working papers (Chen et al. 2008, Oster et al. 2008), she modifies her claim by demonstrating that hepatitis B has very little explanatory power for the sex ratios in China.

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VII. Appendix

Table 1: Summary Statistics

Variable	Mean	Standard deviation	Budget share of goods	Mean	p(0)
Log total expenditure	8.617	0.494	Alcohol/tobacco	0.003	0.657
Household size	5.048	1.557	Parents' clothing	0.030	0.132
Log expenditure per cap	7.040	0.525	Meals out	0.014	0.213
Father's ethnicity	0.021	0.142	Children's allowance	0.017	0.090
(1 if non-Han)			Children's clothing	0.032	0.018
Father's education	0.600	0.490	Culture and education	0.045	0.164
(1 if at least elementary school)			Food	0.673	0.000
Father's occupation	0.034	0.180	Meat	0.020	0.483
(1 if non-farmer)			Rice	0.017	0.114
Share males 0-5	0.014	0.055	Flour	0.282	0.003
Share females 0-5	0.007	0.040	Beans and bean products	0.011	0.266
Share males 6-12	0.173	0.142	Other cereals	0.112	0.007
Share females 6-12	0.140	0.144	Tubers	0.047	0.048
Share males 13-15	0.046	0.097	Vegetables	0.039	0.047
Share females 13-15	0.054	0.100			
Share males 16-18	0.012	0.049			
Share females 16-18	0.016	0.056			
Share males 19-54	0.241	0.059			
Share females 19-54	0.249	0.057			
Share males 55+	0.020	0.049			
Share females 55+	0.026	0.056			
Number males 0-5	0.070	0.258			
Number females 0-5	0.036	0.189			

Number males 6-12	0.822	0.636
Number females 6-12	0.696	0.720
Number males 13-15	0.218	0.443
Number females 13-15	0.279	0.507
Number males 16-18	0.058	0.235
Number females 16-18	0.085	0.300
Number males 19-54	1.197	0.448
Number females 19-54	1.248	0.485
Number males 55+	0.151	0.369
Number females 55+	0.191	0.407

Note: p(0) is the proportion of households reporting zero budget share of the good. (SP) indicates self-produced and (P) indicates purchased.

Table 2: Seemingly unrelated regressions framework Engel curve estimation and F-tests for the difference of the effects of males and females in each age group (non-food categories)

	Alcohol and tobacco	Parents' clothing	Meals out	Children's allowance	Children's clothing	Culture and education
Log exp per capita	0.003***	0.000007	-0.007***	0.001	-0.006***	-0.004
	(0.0003)	(0.001)	(0.0008)	(0.001)	(0.001)	(0.003)
Log size household	0.00006	-0.005	0.0006	-0.0002	0.008**	0.014**
	(0.0009)	(0.004)	(0.002)	(0.003)	(0.003)	(0.007)
M 0-5	0.0006	-0.002	-0.001	0.019	0.056***	0.076**
	(0.005)	(0.015)	(0.008)	(0.015)	(0.016)	(0.033)
F 0-5	-0.009*	0.0001	-0.006	0.019	0.053***	0.045
	(0.005)	(0.019)	(0.009)	(0.017)	(0.017)	(0.034)
M 6-12	-0.006	0.001	0.002	0.008	0.069***	0.091***
	(0.004)	(0.014)	(0.007)	(0.014)	(0.015)	(0.030)
F 6-12	-0.007*	0.005	0.003	0.007	0.065***	0.100***
	(0.004)	(0.016)	(0.007)	(0.013)	(0.015)	(0.032)
M 13-15	-0.007*	0.008	-0.001	0.009	0.067***	0.120***
	(0.004)	(0.018)	(0.007)	(0.014)	(0.015)	(0.032)
F 13-15	-0.006	-0.006	0.001	0.007	0.077***	0.147***
	(0.004)	(0.014)	(0.007)	(0.013)	(0.014)	(0.032)
M 16-18	-0.009*	-0.017	0.003	0.018	0.073***	0.166***
	(0.005)	(0.016)	(0.008)	(0.015)	(0.016)	(0.045)
F 16-18	-0.007*	-0.014	-0.003	0.010	0.092***	0.146***
	(0.004)	(0.015)	(0.008)	(0.016)	(0.017)	(0.037)
M 19-54	-0.009**	0.00009	0.023***	-0.017	0.045***	0.058*
	(0.005)	(0.017)	(0.008)	(0.014)	(0.015)	(0.030)

F 19-54	-0.004	0.015	-0.004	0.0008	0.080***	0.099*
	(0.005)	(0.021)	(0.010)	(0.017)	(0.024)	(0.056)
M 55+	-0.002	0.032	-0.019	0.00005	0.014	0.053
	(0.004)	(0.021)	(0.014)	(0.017)	(0.019)	(0.046)
Minority	-0.0006	-0.004	0.0007	0.005	0.004	0.006
	(0.0009)	(0.005)	(0.002)	(0.004)	(0.004)	(0.008)
Education	0.0005*	0.002	0.0002	0.003***	0.0007	0.002
	(0.0003)	(0.001)	(0.0006)	(0.0009)	(0.0009)	(0.002)
Occupation	0.0009	0.002	0.002	-0.00008	0.002	0.011*
	(0.0006)	(0.003)	(0.002)	(0.002)	(0.003)	(0.006)
Village Fixed FX?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1958	1958	1958	1958	1958	1958
F-tests of statistical difference of effect of males and females in each age group						
0 to 5	3.41*	0.01	0.60	0.00	0.07	1.84
6 to 12	2.76*	0.61	0.31	0.04	1.52	1.34
13 to 15	0.46	2.07	0.57	0.04	2.86*	3.88**
16 to 18	0.19	0.06	1.53	0.46	3.13*	0.32
19 to 54	3.10*	0.95	7.89***	2.16	4.73**	0.91
55 up	no	no	no	no	no	no

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3: Seemingly unrelated regressions framework Engel curve estimation and F-tests of statistical difference of the effects of males and females in each age group (food categories)

	Meat	Rice	Flour	Beans	Other grains	Potatoes	Vegetables
Log exp per capita	0.008***	-0.005***	-0.110***	0.003**	-0.018***	-0.013***	-0.015***
	(0.002)	(0.002)	(0.008)	(0.001)	(0.004)	(0.002)	(0.003)
Log size household	0.008**	0.004	0.009	-0.0005	-0.017	-0.006	-0.011**
	(0.003)	(0.008)	(0.018)	(0.004)	(0.010)	(0.006)	(0.004)
M 0-5	0.0002	0.030*	-0.015	-0.002	0.030	-0.014	0.024
	(0.015)	(0.018)	(0.076)	(0.015)	(0.045)	(0.026)	(0.019)
F 0-5	0.017	0.030	0.018	-0.019	-0.065	-0.040*	0.017
	(0.027)	(0.020)	(0.081)	(0.015)	(0.049)	(0.024)	(0.021)
M 6-12	-0.002	0.031	0.055	-0.019	-0.005	-0.028	0.011
	(0.012)	(0.020)	(0.070)	(0.013)	(0.043)	(0.022)	(0.017)
F 6-12	-0.006	0.028	0.044	-0.021*	0.016	-0.026	0.007
	(0.012)	(0.019)	(0.068)	(0.013)	(0.042)	(0.022)	(0.017)
M 13-15	-0.007	0.032*	0.077	-0.027**	0.016	-0.018	0.015
	(0.012)	(0.019)	(0.071)	(0.013)	(0.044)	(0.023)	(0.018)
F 13-15	-0.012	0.032*	0.058	-0.015	-0.001	-0.004	0.014
	(0.011)	(0.017)	(0.071)	(0.013)	(0.042)	(0.023)	(0.019)
M 16-18	-0.005	0.019	0.183**	-0.023*	0.029	-0.041	0.015
	(0.015)	(0.017)	(0.082)	(0.013)	(0.050)	(0.025)	(0.020)
F 16-18	-0.012	0.025	0.147*	-0.020	-0.012	-0.018	0.007
	(0.013)	(0.018)	(0.075)	(0.013)	(0.046)	(0.025)	(0.018)
M 19-54	0.004	0.039	0.138*	-0.010	0.009	-0.004	0.005
	(0.014)	(0.031)	(0.080)	(0.019)	(0.046)	(0.026)	(0.019)

F 19-54	-0.022	0.047	0.018	-0.018	-0.016	-0.042	0.015
	(0.014)	(0.030)	(0.100)	(0.018)	(0.061)	(0.031)	(0.025)
M 55+	-0.031*	0.007	-0.150	-0.025	0.036	-0.034	0.038
	(0.016)	(0.016)	(0.097)	(0.016)	(0.060)	(0.034)	(0.028)
Minority	0.026***	-0.002	0.027	-0.000002	-0.146***	0.015	0.019**
	(0.005)	(0.003)	(0.033)	(0.007)	(0.026)	(0.012)	(0.008)
Education	0.0009	0.002**	-0.011**	-0.0002	0.002	-0.005***	0.001
	(0.001)	(0.0008)	(0.005)	(0.0009)	(0.003)	(0.002)	(0.001)
Occupation	0.001	-0.0003	-0.027**	-0.0009	-0.014*	-0.008	0.002
	(0.003)	(0.002)	(0.013)	(0.002)	(0.007)	(0.005)	(0.003)
Village Fixed FX?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1958	1958	1958	1958	1958	1958	1958
F-tests of statistical difference of effect of males and females in each age group							
0 to 5	0.32	0.00	0.28	1.75	6.30**	2.06	0.20
6 to 12	0.79	1.34	0.30	0.29	2.62	0.04	0.49
13 to 15	0.48	0.00	0.33	4.18**	0.78	0.92	0.01
16 to 18	0.28	0.50	0.39	0.12	1.11	1.03	0.32
19 to 54	5.48**	0.63	2.71*	0.86	0.34	1.84	0.29
55 up	yes	no	no	no	no	no	no

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 4: Seemingly unrelated regressions framework and F-tests of statistical difference of the effects of males and females in each age group (no village fixed effects)

	Alcohol and tobacco	Parents' clothing	Meals out	Children's allowance	Children's clothing	Culture and education
0 to 5	1.53	2.11	0.36	0.49	0.41	0.07
6 to 12	0.31	2.49	0.06	0.05	0.87	1.85
13 to 15	3.69* - M	0.02	0.07	0.03	6.61** - F	0.95
16 to 18	0.03	0.08	0.38	0.41	2.25	0.13
19 to 54	2.53	2.76*- F	7.01*** - M	3.96** - F	6.11** - F	1.47
55 up	no	no	no	no	no	no

	Meat	Rice	Flour	Beans	Other grains	Potatoes	Vegetables
0 to 5	0.21	0.03	0.18	0.44	2.17	1.65	0.31
6 to 12	0.19	1.99	0.64	1.11	2.07	0.04	0.05
13 to 15	2.53	0.00	0.33	1.15	3.95** - M	0.30	0.10
16 to 18	0.03	1.39	0.44	0.57	1.23	1.09	0.15
19 to 54	2.26	0.13	1.18	5.73** - M	1.87	2.42	0.17
55 up	Yes* - F	no	no	no	no	no	no

"M" indicates that the good expenditure favors males of that age group

"F" indicates that the good expenditure favors female of that age group

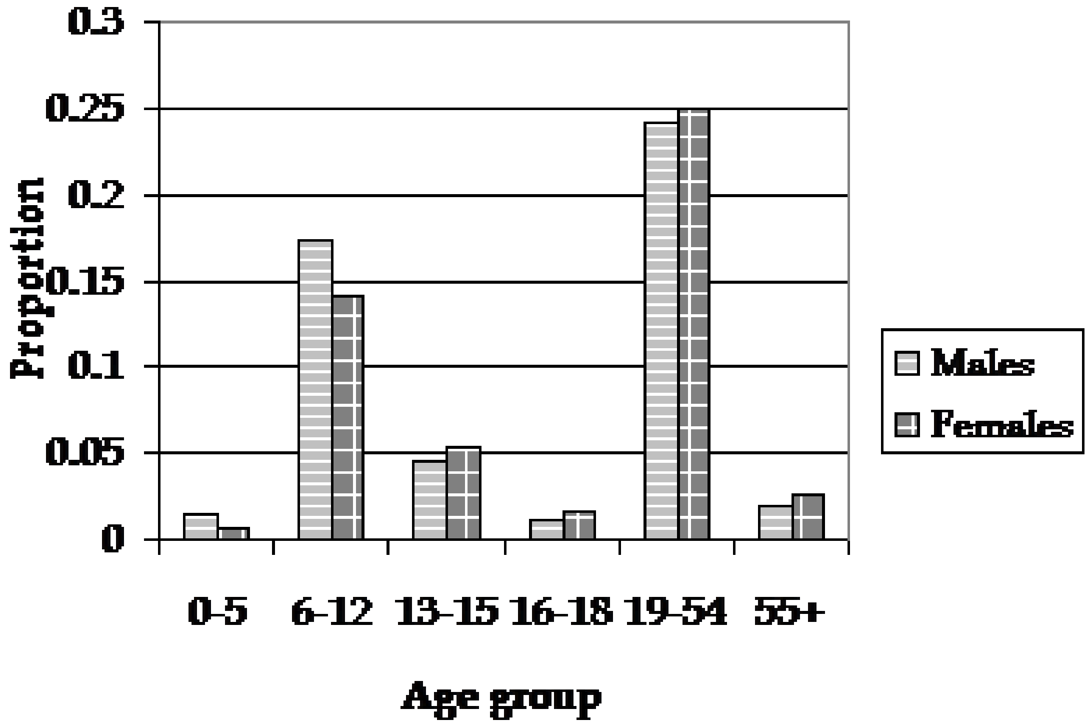

Figure 1: Household Composition

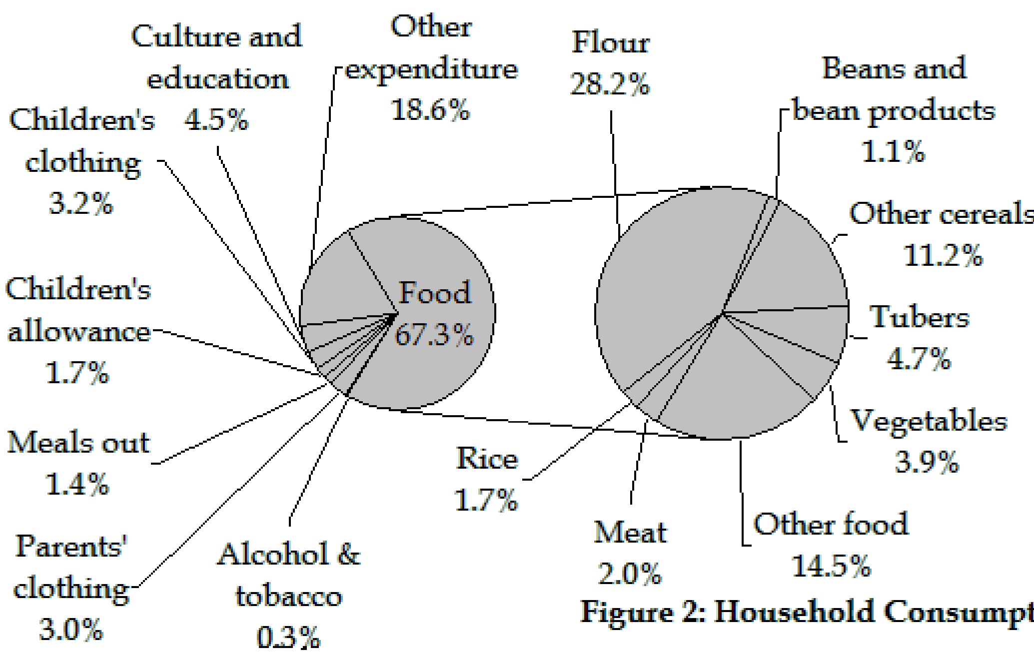

Figure 2: Household Consumption