2017

An Outlay Equivalence Analysis of South African Households

Samuel Peevey

AN OUTLAY EQUIVALENCE ANALYSIS OF SOUTH AFRICAN HOUSEHOLDS

By

SAMUEL ROGER PEEVEY

Bachelor of Arts in Economics and Environmental Studies, Western Washington University, Bellingham, Washington, 2014

Thesis

presented in partial fulfillment of the requirements
for the degree of

Master of Arts
in Economics

The University of Montana
Missoula, MT

May 2017

Approved by:

Scott Whittenburg, Dean of The Graduate School
Graduate School

Amanda Dawsey, Chair
Economics

Jeff Bookwalter
Economics

Kimber McKay
Anthropology

Peevey, Sam, Master of Arts, Spring 2017 Economics

Abstract

Chairperson: Amanda Dawsey

A significant amount of evidence suggests that gender inequality in the developing world negatively impacts women and girls' health, education and future wage potential. This thesis investigates whether households in South Africa discriminated against their girl children, in favor of their boy children. Additionally, I will investigate whether household heads favored children matching their own sex. Using the 1st wave of the National Income Dynamics Study and Angus Deaton's outlay-equivalence ratio method, I will estimate the impact, 8 age and sex categories have on their household's adult goods expenditure. I found statistically significant but practically insignificant evidence, from a sample of poor female headed households, suggesting a preference for 0-4 year old boys over 0-4 year old girls.

Table of Contents

List of Tables

1 Introduction

Historically, girls in the developing world do not always receive an equitable share of household resources (Saha 2013 Kingdon 2005 Parpiev et. al. 2012 and Gibson and Rozelle 2004). Research has also found that a lack of equitable household resource distribution has a significant impact on women and girls, affecting their health, education and future earning potential (Baliamoune-Lutz et. al. 2009 Garg et. al. 1998 Agbodji et. al. 2013 and Dickerson et. al. 2013). Unfortunately, few datasets have directly examined how household heads apportioned resources amongst all their households' residents. Without information, directly on how households allocated their resources, it is difficult to evaluate whether there is any evidence suggesting that those household discriminated against their girl children. However, Angus Deaton circumvented that data gap with the outlay-equivalence ratio methodology he proposed in Deaton (1989).

Angus Deaton's outlay-equivalence ratio methodology works by evaluating the impact different types of residents have on their household's adult goods expenditure. Adult goods are goods, like alcohol and cigarettes, which an adult consumes but a child would not. Depending on the gender of their children, the changes in that household's adult goods expenditure, produced by their addition to that household, are considered indirect evidence, suggestive of discrimination. The outlay-equivalence ratio method proposed in Deaton (1989) presents an opportunity to exploit existing datasets and look for evidence of household level discrimination against girl children.

The National Income Dynamics Study (NIDS), a panel data survey examining the urban, rural and suburban conditions of South African life, does not contain information directly on how household heads divided resources amongst their household's residents. However, combined with the method proposed in Deaton (1989), this dataset provides an opportunity to research whether South African households discriminated against their girl children. Using the 1st wave, administered in 2008, and the outlay-equivalence methodology, I investigated whether South African households discriminated against their girl children in favor of their boy children. Additionally, I investigated if there was any evidence, suggesting that a household head favored children matching their sex.

The paper is organized in the following manner: Section 2 describes the background of economic and gender inequality in South Africa, Section 3 presents a review of relevant literature, Section 4 describes the data and samples used for my analysis, Section 5 provides a description of the econometric method, Section 6 presents the results from the analysis, Section 7 contains a discussion on the significance of my results and Section 8 presents the conclusions I drew from them.

2 South African Gender and Economic Inequality

With a 2016 GDP estimated at $736.3 billion, South Africa has one of the largest economies in Sub-Saharan Africa.[1]However, while they are part of one of the largest economies in Sub-Saharan Africa, the South African people still face significant economic inequality. Research by Orthofer (2016) portrays South Africa as a nation with

[1] https://www.cia.gov/library/publications/the-world-factbook/geos/sf.html

stark wealth and income inequality. She found that the top 10% of South Africans own 90-95% of all wealth and 50-55% of all labor income in South Africa. Additionally, South Africa has an unemployment rate of 26.8% and has 36% of its population living below the poverty line.[2]Despite living in one of the wealthiest countries in Sub-Saharan Africa, much of South Africa's population live impoverished lives.

In addition to their issues with wealth and income inequality, South African society still struggles with their attitude towards gender equality. It is official national policy for the South African state to prevent discrimination based on gender. Chapter 2, Section 9, Subsection 3 of the South African constitution states "The state may not unfairly discriminate directly or indirectly against anyone on one or more grounds, including race, gender, sex… and birth".[3] Furthermore, the South African constitution also declares "No person may fairly discriminate directly or indirectly against anyone on one or more grounds in terms of subsection (3)."[4] Despite these official protections, a strong current of sexism runs through South African society. A 2016 IPSOS poll found that 40% of South African adults strongly agreed with the statement that "a women's place is in the house", up from 33% in 2015 (Ipsos 2016). Additionally, that IPSOS poll found that in 2016, 25% of South African adults strongly agreed that "a boy has more rights to education than a girl", up from 21% in 2015 (Ipsos 2016). Despite official protections, discrimination against women and girls is still pervasive in South African society.

[2] https://www.cia.gov/library/publications/the-world-factbook/geos/sf.html
[3] http://www.gov.za/documents/constitution/chapter-2-bill-rights#9
[4] http://www.gov.za/documents/constitution/chapter-2-bill-rights#9

3 Literature Review

3.1 Theory of the Household

Exploring whether South African households had significant preferences for their boys or girls requires a discussion on the relevant economics literature of how households operate and make decisions. Economists, Paul Samuelson and Gary Becker contributed significantly to the foundational literature on how households make resource decisions.

Samuelson (1956) rejected the conventional notion that all households operated under a single, sovereign head, making decisions they thought best for all their residents. However, neither did Samuelson (1956) believe that households consistently operated through unanimous consent. He supposed that households practically operated somewhere between a sovereign dictatorship and unanimous consent. He advanced the belief that residents within households worked together altruistically. Every household member's preferences blend with each other's through a social welfare function, accounting for the merits of each resident's level of consumption. Theoretically, as households seek to maximize their utility, through those social welfare functions, each resident's required consumption will be satisfied, without the need for a dictatorship or unanimous consent.

Like Samuelson (1956), Becker (1974) also contributed to literature on household decision making. Becker (1974) advanced a model where a household's interactions operate through an individual's social income. Social income is the sum of a person's monetary income with the value of their social environment, multiplied by

some shadow price. Becker's (1974) model includes the value of actions, which affect an individual's self-perceived social status, into that person's utility function.

In Becker's (1974) model of the household, a single head, who cares enough about all the residents of their household, transfers resources to all the persons under their care. However, the head of the household does not act dictatorially. They are so concerned with the welfare of their household, that they incorporate every resident's utility functions into a single "family's" utility function, restraining their potential to act arbitrarily. All other residents of the household, considering their own social income, strive to maximize their family's utility to improve or maintain their transfer of household resources.

3.2 History of Measuring Child Costs

Investigating individual consumption within households is an invasive and disruptive task. Because of those difficulties, nearly all household surveys just have information on general household consumption. That lack of direct data on individual consumption within households and a concern that women and girls in the developing world were not receiving an equitable share of household resources, prompted Angus Deaton to develop his outlay-equivalence ratios methodology.

Before Angus Deaton used outlay-equivalence ratios as a tool to evaluate whether households discriminated against their girl children, others came before him, laying the groundwork for his research. Ernst Engel, a 19th century German economist and statistician, most famously known for having developed the Engel curve, was the earliest developer of an empirical method capable of measuring the costs children

impose on their households. Assuming that household food expenditure accounted for household welfare, Engel used data from Ducpétiaux's 1855 survey of Belgian households, observing that increases in a household's income lead to disproportionately smaller increases in that household's food expenditure. Later coined as "Engel's Law", this phenomenon asserted that increases in household size do not always lead to declines in welfare (Chai and Moneta 2010). Using this phenomenon and the assumption that household food expenditure accounted for household welfare, as theoretical underpinnings, Engel inferred that the cost of children could be calculated by estimating the amount of money required to move a household back to pre-child levels of food expenditure (Deaton 1986).

In addition to the work by Ernst Engel, Erwin Rothbarth was another early contributor in developing a tool which could measure the cost children impose on their households. Like Ernst Engel, Erwin Rothbarth was also a German economist and statistician, but of the 20th century. Most famously known for his collaboration with John Maynard Keynes, Rothbarth developed a method for measuring the costs children impose on their households. Assuming a household's expenditure on adult goods was a welfare measure for that household's adults, Rothbarth's method relies on observing the impact children have on their household's adult goods expenditure. Adult goods are any goods, like alcohol and cigarettes, which an adult consumes but a child will not. His method works by calculating the amount of money needed to restore a household to its' pre-child levels of adult goods expenditure. That sum of money is the cost that Rothbarth assumed children impose on their household (Deaton 1986). The work done

by Ernst Engel and Erwin Rothbarth was instrumental in helping Angus Deaton develop his outlay-equivalence ratio methodology.

Using Erwin Rothbarth's theory of the demographically separable adult good, Angus Deaton initially tested his approach, examining whether households in Thailand and Cote d'Ivoire discriminated against their girl children. However, while his analysis could not find evidence of discrimination in Thai and Ivorian households, he had developed a novel method for evaluating evidence of gender bias, at the household level (Deaton 1989).

3.3 Gender Inequality

Research by Baliamoune-Lutz et. al. (2009) and Pallitto et. al. (2004) on the effects of gender inequality has reached a similar conclusion; gender inequality generates significant negative costs wherever it exists. Using a logistic regression analysis, Pallitto et. al. (2004) looked for evidence suggestive of an association between gender inequality, unintended pregnancies and intimate partner violence in Colombian municipalities. They found that women living in areas with high rates of patriarchal control faced a significantly higher risk of having an unintended pregnancy. In addition, Pallitto et. al. (2004) found that women living in regions with high rates of intimate partner violence had a significantly higher risk of having an unintended pregnancy than women who did not live in areas with high rates of intimate partner violence. Examining data from Sub-Saharan African and Arab countries, Baliamoune-Lutz et. al. (2009) attempted to determine whether gender inequality had a negative impact on those countries' economic growth. Using the ratio of 15-24-year-old literate women to men as

their measure for gender inequality, they found that inequalities in the Arab countries' literacy rates had a significantly higher negative impact on economic growth than it did in the Sub-Saharan African countries. In addition to the findings from Baliamoune-Lutz et. al. (2009) and Pallitto et. al. (2004), research by Chaudhry (2007), Umesh (2012) and Kaya et. al. (2012) also concluded that gender inequality persists around the world and poses significant consequences to all affected women and girls.

Research into the gender discrimination experience of Sub-Saharan African women and girls (Agbodji et. al. 2013 Dickerson et. al. 2013 and Garg et. al. 1998) has concluded that they do face significant and consequential discrimination. Agbodji et. al. (2013) examined whether men and women in Togo and Burkina Faso, had equitable access to credit, employment, education, housing, assets and basic utilities. They found that women had significantly worse access than men, for every item examined. Looking at data from the 1988-1989 Ghana Living Stands Survey, Garg et. al. (1998) wanted to determine to what extent Ghanaian households favored boys over girls. They used several health indicators, including stunting, height-for-age and weight-for-age, as measures to indicate whether boys received a greater share of household resources than girls did. They found that on average, households with a boy child who only had sisters fared significantly better than households where the boy only had brothers. Garg et. al. (1998) explained how the discrimination operated, asserting that in countries where society favors boys, boys benefit from having only sisters and no brothers because they draw household resources away from girl children. Looking at data covering 19 Sub-Saharan African nations, Dickerson et. al. (2013) attempted to find

evidence suggesting a gender gap in boy's and girl's performances on primary school math tests. In every country, including South Africa, Dickerson et. al (2013) found significant gaps between boy's and girl's performances on primary school math tests. Dickerson's et. al. (2013) findings, that a gap exists in math performance between boys and girls, in context of Curi et. al. (2014) who found evidence in Brazil suggestive of the positive impact academic performance has on future wages, suggests that a girl's future wage potential in those Sub-Saharan African countries will be worse than a boy's. There is significant additional research (Agesa et. al. 2013 Senadza 2012 and Hakura et. al. 2016) in line with Garg et. al. (1998), Dickerson et. al. (2013) and Agbodji et. al. (2013), concluding that gender inequality persists in Sub-Saharan Africa and poses significant consequences.

Besides the moral necessity of ensuring equal opportunity for persons from every gender, research by Mitra et. al. (2015), Wu et. al. (2016) and Melander (2005) has shown that pursuing gender equality benefits society. Examining data from a panel of 101 countries, Mitra et. al. (2015) looked at the impact gender equality has on a nation's economic growth. They found evidence suggesting that gender equality has positive impact on a country's economic growth. Additionally, Mitra et. al. (2015) found that depending on a country's stage of economic development, countries potentially benefited more from policies aimed at achieving equality of opportunity or equality of participation. Developing countries experienced more benefits when pursuing policies that aimed to achieve equality of opportunity and developed nations saw greater gains from policies aimed at achieving equality of economic and political participation. Wu et.

al. (2016) examined Chilean manufacturing firms, looking for evidence on gender equality's impact on firm productivity. They found that greater gender equality within firms did have a positive impact on a firm's productivity. Specifically, they found among firms with less than 50 employees that higher gender equality amongst their high-skill employees improved productivity, and among firms with more than 50 employees, higher gender equality amongst their low-skill employees improved productivity. Analyzing data collected from the Uppsala Conflict Data Project, Melander (2005) attempted to determine if gender equality was associated with a decline in intrastate armed conflict. Using whether a state had a female political leader, female representation in government and the ratio of women to men's higher educational attainment as measures for gender equality, Melander (2005) found that his measures were negatively associated with the level of intrastate armed conflict in a nation. In addition to the research conducted by Melander (2005) Wu et. al. (2016) and Mitra et. al (2015), findings by Caprioli (2005), Lakshmi et. al. (2012) and Dollar et. al. (2001) all found evidence suggesting that gender equality has a beneficial effect on society.

3.4 Discrimination at the Household Level

Research into household level gender discrimination, when evaluated with direct methods, has found strong evidence that male headed households, in the developing world, discriminate against their girl children. Direct examinations of households in India and Mexico (Antman 2015 Kingdon 2005 and Saha 2013) have all had the same findings; a child's gender does have a significant impact on their share of household resources. Antman (2015) utilized difference-in-differences along with fixed effects, to examine

possible evidence of discrimination in Mexico's migrant households. When the male household head migrated, their wife decided how household resources were allocated in their stead. Antman (2015) found that when their wife had this power, they directed a larger share of resources towards girl children. However, when the male household head returned from migration, their wife lost their newly held decision making power and the share of resources directed to girl children were allocated back to boy children.

Similarly, in India, Saha (2013) examined household discrimination in the context of education expenditure in Indian households. Applying the Oaxaca-Blinder decomposition method, he found evidence, suggestive of widespread household level discrimination with the amount of education expenditure that girl children received. The Oaxaca-Blinder decomposition method works by dividing the wage differences between two groups into a part explained by characteristics associated with productivity, such as education and work experience and a part that cannot be accounted by characteristics typically with productivity. The portion of wage differences that cannot be accounted for characteristics typically associated with productivity is assumed to have been caused by a gender bias (Jann 2008). While Saha (2013) found significant discrimination in every Indian state, the lowest levels of gender discrimination for household spending on education were found amongst the tribal communities of rural and urban India. Saha (2013) explains these findings by asserting that many of the tribal communities of India have matriarchal systems, which potentially look more favorably on their girl children. As evidenced by Saha (2013) and Antman (2015), the head of a household's gender can have a significant impact on the patterns of household resource allocation.

When evaluated with outlay-equivalence ratios, studies into household level discrimination have had mixed results. Research by Parpiev et. al. (2012) and Gibson and Rozelle (2004) all found evidence suggesting households discriminated against their girl children. Gibson and Rozelle (2004) examined discrimination in Papua New Guinea, finding in rural communities that additional boy children significantly reduced their household's adult goods expenditure while additional girl children did not. Parpiev et. al. (2012) found evidence suggestive of discrimination inside of Uzbek households. They found, through household consumption of alcohol and tobacco, evidence of discrimination against girl children. However, studies by Deaton (1989), Haddad and Reardon (1993) and Subramanian et. al. (1991), using the same outlay-equivalence ratio methodology, could not find evidence supporting household level discrimination against girl children.

Research, specifically into the Sub-Saharan African experience with household level discrimination, when evaluated with the outlay-equivalence ratio methodology, has also had mixed results. Angus Deaton tested his outlay-equivalence ratio approach in Deaton (1989), examining evidence of household level discrimination in Cote d'Ivoire. He found no evidence to suggest that Ivorian households discriminated against their girl children. Haddad and Reardon (1993) advanced Deaton's (1989) outlay-equivalence ratio approach in their own study on Burkina Faso, disaggregating along urban and rural settings. However, they could not find evidence suggesting Burkinabe households favored boys over girls. Arndt et. al. (2006) applied the same outlay-equivalence ratio method in Mozambique, examining whether household heads discriminated against

non-biologically related child residents. In poor households, they found evidence suggesting discrimination against children not biologically related to the household head, in urban and rural settings. The mixed experience researchers have had with Deaton's (1989) outlay-equivalence ratio methodology, in Sub-Saharan African countries, suggests an opportunity for additional research.

Like in Saha (2013), Kingdon (2005) also evaluated evidence of child gender discrimination in the context of education expenditure, but used both a direct and indirect methodology. With fixed effects, a direct methodology, Kingdon (2005) found evidence suggesting that Indian girls received significantly less of their household's expenditure on education than Indian boys did. Discrimination typically manifested itself through non-enrollment of girl children, implying zero household expenditure on their education. However, using an indirect methodology, Kingdon (2005) could not find the same results.

Kingdon (2005) noted several flaws in the indirect Engel curve approach, which she used in her own study. She noted that the Engel curve approach, similar to Angus Deaton's outlay-equivalence ratios, suffered from a functional form error, limiting the impact household gender composition has on the decision to enroll and how much to spend on schooling. Kingdon (2005) also noted that the aggregation of household data prevented accurate measurement of gender bias. She recommended that aggregated household expenditure data can still be of use if one was to model the hurdle. Hurdle models work by estimating an equation for whether someone will commit to a purchase and in the instances where they've committed to the purchase, thus clearing the hurdle,

a separate independent equation for how much they'll spend on that purchase. Kingdon (2005) used a hurdle model to create an equation for whether Indian households spent money on education and a separate equation which models how much expenditure those households, which cleared the hurdle, will spend on education.

3.5 Differential Parental Investment

Through studying the experiences of women and girls in developing nations, economists Antman (2015), Kingdon (2005) and Saha (2013), among many others have made significant contributions towards the research on gender inequality in the developing world. However, research is a communal activity, incorporating many different perspectives and economics is just one of the frameworks researchers have used to answer questions on gender inequality. Evolutionary biologists and psychologists have also examined gender inequality, laying much of initial groundwork and generating a theoretical explanation for why household level gender inequality happens.

Trivers and Willard (1973) advanced a general model, potentially explaining why some households in the developing world, do not equitably invest in their children. Typically tested on non-human mammals, when applied to humans, the strength of two assumptions is examined. Triver's and Willard's hypothesis (TWH) assumes that a child's sex is determined by the social, health and resource status of their parents and that parents will differentially invest in their children, depending on those metrics. Specifically, Trivers and Willard (1973) assumed that poorer parents will have more girl children and will invest more in their girls, while richer parents will have more boy

children and will invest more in their boys. Other researchers (Hopcroft 2005 Davis et. al. 2007 Guggenheim et. al. 2007 and Pollet et. al. 2009) have empirically tested these assumptions.

Research by Hopcroft (2005) and Davis et. al. (2007) empirically tested the strength of the assumptions of TWH, when applied to parental investment decisions in the United States. Davis et. al. (2007) looked at a sample of 103 Southwestern United States six-month-old babies and their mothers. To test TWH, they measured the mother's attitude towards ideal baby size, the number of weeks they breast fed and the child's weight at six months. Davis et. al.'s (2007) analysis found that poor mothers preferred heavier baby girls while rich mothers preferred heavier baby boys, providing some evidence in favor of TWH. However, they also found while poor Hispanic mothers had heavier baby girls, that poor Caucasian mothers had heavier baby boys, violating an assumption of TWH. Using the U.S. General Social Survey, Hopcroft (2005) investigated through educational attainment, whether the assumptions for TWH held. They found evidence suggesting that the sons of high-status fathers had higher educational attainment than their daughters. Hopcroft (2005) also found the complement, finding evidence to suggest that the daughters of low-status fathers had higher educational attainment than their sons. Their research also found evidence suggesting that high-status men had, on average, more sons. When applied to the United States, Hopcroft (2005) and Davis et. al. (2007) found moderate evidence, suggesting that the assumptions for TWH do hold.

Studies (Guggenheim et. al. 2007 and Pollet et. al. 2009) which applied Triver's and Willard's hypothesis specifically to Sub-Saharan African countries, have had mixed results. Studying the Demographic and Health Surveys program, administered in 35 developing countries, of which 21 were Sub-Saharan African countries, Guggenheim et. al. (2007) empirically tested the assumptions for TWH. Using the mother's socioeconomic and health status and their last child's health seeking and prenatal care as metrics to measure whether mothers differentially invested amongst their children. However, they ultimately found no evidence suggesting that TWH applied to the maternal investment decisions in any of 35 countries examined for the Demographic and Health Surveys program. Pollet et. al. (2009) examined whether TWH's sex ratio assumption applied to a sample of about 95,000 Rwandan mothers. Specifically, they tested whether a wife's social ranking, within a polygamous marriage, biased the sex ratio of their children. Within a polygamous marriage, a wife's ranking affects their share of household resources, meaning each additional wife receives progressively less resources than the women before them. They found evidence suggesting that 3rd or lower ranked wives had significantly more daughters, than monogamously married women or 1st or 2nd ranked wives did. The research (Pollet et. al. 2009 and Guggenheim et. al. 2007) done, in Sub-Saharan Africa, to test the assumptions for TWH a is generally mixed, casting some doubt but not entirely discounting its' ability to explain sex ratios and parental investment choices.

However, the different perspectives, from economists and evolutionary biologists on household level discrimination, reached mutually exclusive conclusions.

The assumptions in TWH and research by Pollet et. al. (2009), Hopcroft (2005) and Davis et. al. (2007) all seem to suggest that poor women will invest more in their sons than they do in their girls. However, the economist Francisca Antman found, in Antman (2015), evidence to suggest that poor women invest more in their girls than in their sons. I believe, from the difference in results, there are numerous opportunities for future research into household level discrimination.

Studies by Garg et. al. (1998), Gibson and Rozelle (2004), Kingdon (2005), Saha (2013) and Parpiev at. al. (2012) suggest that nations with patriarchal social systems, like Ghana, Paupa New Guinea, India and Uzbekistan, favor boys over girls. In addition, research by Antman (2015) directly examined an instance, in Mexico, where women, who had influence or authority over household decisions in a similarly patriarchal society, appeared to favor their girls over their boy children. In my thesis, I assumed that South African women, with some measure of authority over household decisions, know a societal gender bias exists, affecting their quality of life. I believe that these women might have favored their girls over their boys to provide them a resource surplus because they know being a woman put them at a severe financial and social disadvantage, relative to their male peers.

I propose to use the 1st wave of the NIDS and Deaton's (1989) outlay-equivalence ratio methodology to evaluate whether South African households discriminated against their girl children in favor of their boy children. Additionally, I will disaggregate my analysis along the household head's gender, to uncover if they preferred children who matched their sex. To control for the significant wealth and income inequality in South

Africa I will create additional samples for both poor and rich households. Findings from both Antman (2015) and Saha (2013) support my hypothesis that a household head preferred children matching their sex. However, unlike Antman (2015) and Saha (2013), my study will directly disaggregate along the household head's gender in a country where women head a significant number of households.

4 Data and Sample Description

The National Income Dynamics Study (NIDS) is a panel data survey conducted by the Southern African Labour and Development Research Unit (SALDRU) examining the urban, rural and suburban conditions of South African life. Initially administered in 2008, the NIDS consists of multiple survey waves, conducted every two years. Presently they've finished and published a 4^{th} wave and have begun administering a 5^{th} wave.

In my analysis, I will only use 1 of 4 possible waves from the NIDS. The outlay-equivalence ratio methodology is a cross-sectional tool, requiring just a single wave's worth of information to evaluate whether South African households discriminated against their girl children. Specifically, I will use the 1^{st} wave of the NIDS. Administered in 2008, Wave 1 contains information on approximately 28000 individuals, across 7300 households. Since the NIDS is a panel survey, questionnaires were reissued on every subsequent wave to the initial participants. Per the Wave 2 User Manual, surveyors found that between Wave 1 and Wave 2, participation had declined by 21.26%. (Brown et. al. 2012). Because I wanted as a large sample size as possible for my analysis, I decided to use Wave 1.

When questioned, respondents were asked to list every resident of their household. To qualify as a resident, an individual must have lived in a household for at least 15 days during the past 12 months and share from their household's stock of resources. Multiple questionnaires were issued to households who agreed to participate in NIDS. Issued to the oldest women of a household, the *Household* questionnaire captured information on the overall welfare of their household. Questions included anything from what material their household was built of to whether the main income provider had in the past, experienced positive or negative income shocks. Issued to any household resident 15 years or older, the *Adult* questionnaire captured information on their general welfare. *Adult* questionnaires typically asked about the condition of their employment and economic status. Given to a caregiver, the *Child* questionnaire captured information on the status of household residents, aged 14 years or younger. Their questionnaire typically asked for information on the health and education status of children in the respondent's household. A *Proxy* questionnaire was offered in instances where household residents were not available to participate in NIDS. In their place, an available household resident answered questions on the missing resident's behalf. Despite its sound construction, the NIDS does have some quality issues.

Overall, the NIDS does an excellent job of capturing life in South Africa. However, there are significant gaps in in the survey's non-food expenditure data. For instance, in Wave 1, 2148 households reported tobacco consumption but only 1882 households reported how much they spent. Levinsohn et. al. (2009) reported that the NIDS used expenditure imputation to compensate for instances where a gap existed between a

household's reported consumption and their expenditure on non-food items. Overall, in the 1st wave of the NIDS, 191 missing non-food values were fully imputed and 2227 missing non-food values were partially imputed.

In the NIDS, assumptions were made for how they would impute missing values. For instance, if the number of imputations accounted for more than 40% of the observations of an item, no imputation would take place. When a non-food item required imputation, the NIDS implemented two techniques, cell median and regression. In regression imputation, a model is run with a series of independent and demographic variables to predict for the missing value. In cell median imputation, the median expenditure on a non-food item from a subgroup of the survey's population is taken. That median is applied as the imputed value for any of the subgroup's missing non-food expenditure values.

From the 1st wave of the NIDS, I include information on race, gender, marital status, education, age, region and the number of household residents, to control for differences across households. After cleaning up missing values in the data and selecting for the households that had children, my sample had 3528 households. Table 1 provides the mean values for those factors.

Table 1: Summary Statistics – All Households, Demographics

	Mean	Std. Dev.	Min	Max
African	0.804	0.397	0.00	1.00
Coloured	0.140	0.347	0.00	1.00
Asian/Indian	0.015	0.122	0.00	1.00
White	0.041	0.198	0.00	1.00
Married	0.429	0.495	0.00	1.00
Living with Partner	0.102	0.302	0.00	1.00
Widow/Widower	0.218	0.413	0.00	1.00
Divorced/Seperated	0.042	0.200	0.00	1.00
Never Married	0.209	0.407	0.00	1.00
Urban Formal	0.412	0.492	0.00	1.00
Tribal Authority Areas	0.431	0.495	0.00	1.00
Urban Informal	0.063	0.244	0.00	1.00
Rural Formal	0.093	0.291	0.00	1.00
Age	49.584	15.356	15.00	101.00
Male	0.459	0.498	0.00	1.00
Female	0.541	0.498	0.00	1.00
Number of household residents	5.213	2.459	2.00	25.00
Observations	3528			

Observing whether household discriminated against their girl children, requires a list of adult goods to examine changes in household expenditure with. I chose personal care, alcohol, jewels, gambling, sports, entertainment and cigarettes as a set of goods I infer will pass Deaton's (1989) adult goods test, qualifying as goods demographically separable from child consumption. A median South African household allocated just 1.89% of their total household income to the above listed adult goods. Table 2 gives the mean and median values, in Rands, for a South African household's monthly income and expenditure.

The extreme standard deviations for the expenditure and income variables, suggest that the median provides a more accurate measure of the distribution than the mean does. In addition, the median values for income and expenditure are significantly lower than their respective mean value, implying significant inequality amongst all the South African households. It appears that only the South African households near the

top of the distribution, with respect to expenditure and income, spent the most on adult goods. Given that expenditure on goods like alcohol, cigarettes, entertainment, sports, personal care, jewels and gambling is disposable, it is sensible that only the richest South African households did spend the most on their consumption.

Table 2: Summary Statistics – All Households, Expenditure

	Mean	Median	Std. Dev.	Min	Max
Personal Care Past 30 Days	53.357	10.000	101.998	0.00	2000.00
Alcohol Past 30 Days	24.602	0.000	94.982	0.00	2000.00
Jewels Past 30 Days	3.712	0.000	52.652	0.00	1999.00
Gambling Past 30 Days	4.086	0.000	29.933	0.00	750.00
Cigarettes Past 30 Days	30.475	0.000	117.606	0.00	2000.00
Sports Past 30 Days	6.427	0.000	68.991	0.00	2000.00
Entertainment Past 30 Days	22.289	0.000	144.110	0.00	5000.00
Monthly Expenditure - Full Imputations	3739.703	1663.357	7118.124	211.47	135596.28
Monthly Adult Goods Expenditure	144.948	40.000	342.801	0.00	5450.00
Monthly Income - Full Imputations	4383.112	2117.599	7748.690	0.00	130000.00
Observations	3528				

Table 3 details the 8 age and sex categories needed to estimate outlay-equivalent ratios. Children made up 42% of the composition of a typical South African household in the pooled sample and adults made the remaining 58%. South African households, with children, had, on average, more women between the ages 15 and 55 than it did men between the ages 15 and 55.

Table 3: Summary Statistics – All Households, Age and Sex Categories

	Mean	Std. Dev.	Min	Max
Boys 0-4	0.069	0.118	0.00	0.67
Girls 0-4	0.071	0.117	0.00	0.67
Boys 5-14	0.145	0.158	0.00	0.75
Girls 5-14	0.137	0.156	0.00	0.80
Men 15-55	0.189	0.160	0.00	0.75
Women 15-55	0.297	0.158	0.00	0.75
Men 56-101	0.029	0.075	0.00	0.50
Women 56-101	0.063	0.112	0.00	0.67
Observations	3528			

South Africa has an intricate education system, best defined by milestones. Table 4 details the different levels of education achieved by South African household heads. In South Africa, completion of the 9th grade is the end of compulsory education. However, more than half of South African household heads either never attended school or stopped attending after the 7th grade.

Table 4: Summary Statistics – All Households, Education

	Mean	Std. Dev.	Min	Max
No Schooling	0.238	0.426	0.00	1.00
Grade 0 - 3 Completed	0.073	0.261	0.00	1.00
Grade 4 - 7 Completed	0.249	0.432	0.00	1.00
Grade 8 - 9 Completed	0.119	0.324	0.00	1.00
Grade 10 - 11 Completed	0.132	0.338	0.00	1.00
Grade 12 Completed	0.094	0.292	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.070	0.255	0.00	1.00
Bachelor's degree or Honour's degree	0.018	0.133	0.00	1.00
Masters or Doctorate	0.005	0.073	0.00	1.00
Other	0.002	0.041	0.00	1.00
Observations	3528			

In addition to the sample of South African households with children, I created two others, one with households headed exclusively by men and another with households headed exclusively by women. I made those two additional samples to examine whether household heads in South Africa favored children matching their sex. Tables 5-6 display summary statistics on the expenditure, household makeup, demographics and education characteristics for households headed by men or women.

Table 5: Summary Statistics – Male Headed Households

	Mean	Median	Std. Dev.	Min.	Max.
Expenditure					
Personal Care Past 30 Days	69.790	20.000	123.740	0.00	2000.00
Alcohol Past 30 Days	41.626	0.000	121.417	0.00	2000.00
Jewels Past 30 Days	6.111	0.000	73.547	0.00	1999.00
Gambling Past 30 Days	7.475	0.000	42.790	0.00	750.00
Cigarettes Past 30 Days	49.444	0.000	157.564	0.00	2000.00
Sports Past 30 Days	10.130	0.000	85.345	0.00	2000.00
Entertainment Past 30 Days	40.527	0.000	199.040	0.00	5000.00
Monthly Expenditure - Full Imputations	5186.383	2139.372	9221.544	237.34	135596.28
Monthly Adult Goods Expenditure	225.104	76.000	448.042	0.00	5450.00
Monthly Income - Full Imputations	6122.607	2861.879	9691.132	0.00	102033.33
Age and Sex Classes					
Boys 0-4	0.070	0.000	0.115	0.00	0.60
Girls 0-4	0.067	0.000	0.110	0.00	0.50
Boys 5-14	0.134	0.125	0.147	0.00	0.67
Girls 5-14	0.123	0.077	0.142	0.00	0.60
Men 15-55	0.250	0.250	0.143	0.00	0.75
Women 15-55	0.268	0.250	0.130	0.00	0.71
Men 56-98	0.055	0.000	0.096	0.00	0.50
Women 56-98	0.033	0.000	0.074	0.00	0.40
Demographics					
African	0.717	1.000	0.451	0.00	1.00
Coloured	0.184	0.000	0.387	0.00	1.00
Asian/Indian	0.025	0.000	0.157	0.00	1.00
White	0.074	0.000	0.262	0.00	1.00
Married	0.723	1.000	0.448	0.00	1.00
Living with Partner	0.172	0.000	0.378	0.00	1.00
Widow/Widower	0.038	0.000	0.191	0.00	1.00
Divorced/Seperated	0.011	0.000	0.102	0.00	1.00
Never Married	0.056	0.000	0.230	0.00	1.00
Urban Formal	0.470	0.000	0.499	0.00	1.00
Tribal Authority Areas	0.342	0.000	0.475	0.00	1.00
Urban Informal	0.059	0.000	0.235	0.00	1.00
Rural Formal	0.129	0.000	0.335	0.00	1.00
Age	48.085	46.000	14.321	18.00	98.00
Number of household residents	5.341	5.000	2.355	2.00	23.00
Education					
No Schooling	0.197	0.000	0.398	0.00	1.00
Grade R/0 - 3 Completed	0.065	0.000	0.246	0.00	1.00
Grade 4 - 7 Completed	0.238	0.000	0.426	0.00	1.00
Grade 8 - 9 Completed	0.122	0.000	0.328	0.00	1.00
Grade 10 - 11 Completed	0.124	0.000	0.329	0.00	1.00
Grade 12 Completed	0.124	0.000	0.330	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.091	0.000	0.288	0.00	1.00
Bachelor's degree or Honour's degree	0.029	0.000	0.168	0.00	1.00
Masters or Doctorate	0.010	0.000	0.099	0.00	1.00
Other	0.002	0.000	0.043	0.00	1.00
Observations	1618				

Table 6: Summary Statistics – Female Headed Households

	Mean	Median	Std. Dev.	Min.	Max.
Expenditure					
Personal Care Past 30 Days	39.436	0.000	76.348	0.00	1000.00
Alcohol Past 30 Days	10.180	0.000	61.050	0.00	1400.00
Jewels Past 30 Days	1.679	0.000	23.047	0.00	600.00
Gambling Past 30 Days	1.216	0.000	9.299	0.00	200.00
Cigarettes Past 30 Days	14.405	0.000	62.939	0.00	700.00
Sports Past 30 Days	3.290	0.000	51.019	0.00	1800.00
Entertainment Past 30 Days	6.839	0.000	65.511	0.00	1800.00
Monthly Expenditure - Full Imputations	2514.191	1418.953	4278.507	211.47	83618.70
Monthly Adult Goods Expenditure	77.045	18.000	192.398	0.00	2530.00
Monthly Income - Full Imputations	2909.550	1699.866	5161.619	0.00	130000.00
Age and Sex Classes					
Boys 0-4	0.069	0.000	0.120	0.00	0.67
Girls 0-4	0.074	0.000	0.123	0.00	0.67
Boys 5-14	0.154	0.143	0.167	0.00	0.75
Girls 5-14	0.149	0.125	0.166	0.00	0.80
Men 15-55	0.137	0.111	0.154	0.00	0.67
Women 15-55	0.321	0.333	0.175	0.00	0.75
Men 56-101	0.008	0.000	0.039	0.00	0.33
Women 56-101	0.089	0.000	0.131	0.00	0.67
Demographics					
African	0.879	1.000	0.327	0.00	1.00
Coloured	0.103	0.000	0.304	0.00	1.00
Asian/Indian	0.006	0.000	0.079	0.00	1.00
White	0.013	0.000	0.111	0.00	1.00
Married	0.181	0.000	0.385	0.00	1.00
Living with Partner	0.042	0.000	0.200	0.00	1.00
Widow/Widower	0.370	0.000	0.483	0.00	1.00
Divorced/Seperated	0.068	0.000	0.252	0.00	1.00
Never Married	0.339	0.000	0.474	0.00	1.00
Urban Formal	0.363	0.000	0.481	0.00	1.00
Tribal Authority Areas	0.506	1.000	0.500	0.00	1.00
Urban Informal	0.068	0.000	0.251	0.00	1.00
Rural Formal	0.063	0.000	0.244	0.00	1.00
Age	50.854	50.000	16.075	15.00	101.00
Number of household residents	5.105	5.000	2.539	2.00	25.00
Education					
No Schooling	0.274	0.000	0.446	0.00	1.00
Grade R/0 - 3 Completed	0.081	0.000	0.272	0.00	1.00
Grade 4 - 7 Completed	0.258	0.000	0.437	0.00	1.00
Grade 8 - 9 Completed	0.117	0.000	0.321	0.00	1.00
Grade 10 - 11 Completed	0.139	0.000	0.346	0.00	1.00
Grade 12 Completed	0.068	0.000	0.252	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.052	0.000	0.222	0.00	1.00
Bachelor's degree or Honour's degree	0.009	0.000	0.094	0.00	1.00
Masters or Doctorate	0.002	0.000	0.040	0.00	1.00
Other	0.002	0.000	0.040	0.00	1.00
Observations	1910				

Relative to a median female headed household, a median male headed household had a significantly higher income and allocated slightly more of their budget, 2.66%, towards adult goods than the 1.06% that the median female headed household spent on adult goods. In addition, female heads were married less often and widowed more often than male heads. Female heads also had lower levels of educational attainments than male heads did. Overall, female headed households had less financial and social resources at their disposal to run households as large those in the sample of male headed households.

The same kind of extreme standard deviations and low median values, relative to the mean, seen in the sample of all South African households' income and expenditure values repeat for the sample of households headed exclusively by men and the sample of households headed exclusively by women. However, in the case of male headed households, median personal care expenditure was slightly more in line with the mean than expenditure on any other adult good.

To control for the severe income and wealth inequality in South Africa I also created samples for poor households, headed by men or women and rich households, headed by men or women. Poor households accounted for the bottom 90% of income earners and rich households, the top 10%. This breakdown is sound, when considering the research by Orthofer (2016), which found that the top 10% of South Africans owned 90-95% of the wealth and 50-55% of the labor income in South Africa. Tables 7-10 provide summary statistics on the demographic, household makeup, expenditure and

education characteristics for poor households, headed by men or women and rich households, headed by men or women.

Table 7: Summary Statistics – Poor Female Headed Households

	Mean	Median	Std. dev.	Min	Max
Expenditure					
Personal Care Past 30 Days	34.349	0.000	65.807	0.00	800.00
Alcohol Past 30 Days	7.827	0.000	39.851	0.00	700.00
Jewels Past 30 Days	1.460	0.000	22.404	0.00	600.00
Gambling Past 30 Days	1.123	0.000	9.099	0.00	200.00
Cigarettes Past 30 Days	10.996	0.000	48.742	0.00	700.00
Sports Past 30 Days	1.466	0.000	25.570	0.00	1000.00
Entertainment Past 30 Days	3.543	0.000	55.533	0.00	1800.00
Monthly Expenditure - Full Imputations	1968.354	1360.738	2442.037	211.47	55599.70
Monthly Adult Goods Expenditure	60.764	15.000	135.378	0.00	2100.00
Monthly Income - Full Imputations	2136.359	1617.498	1693.618	0.00	9132.83
Age and Sex Classes					
Boys 0-4	0.071	0.000	0.122	0.00	0.67
Girls 0-4	0.075	0.000	0.124	0.00	0.67
Boys 5-14	0.153	0.143	0.166	0.00	0.75
Girls 5-14	0.150	0.125	0.166	0.00	0.80
Boys 15-55	0.135	0.100	0.153	0.00	0.67
Women 15-55	0.319	0.333	0.176	0.00	0.75
Men 56-101	0.008	0.000	0.039	0.00	0.33
Women 56-101	0.091	0.000	0.132	0.00	0.67
Demographics					
African	0.892	1.000	0.311	0.00	1.00
Coloured	0.102	0.000	0.302	0.00	1.00
Asian/Indian	0.004	0.000	0.062	0.00	1.00
White	0.003	0.000	0.052	0.00	1.00
Married	0.177	0.000	0.382	0.00	1.00
Living with Partner	0.043	0.000	0.204	0.00	1.00
Widow/Widower	0.370	0.000	0.483	0.00	1.00
Divorced/Seperated	0.063	0.000	0.242	0.00	1.00
Never Married	0.346	0.000	0.476	0.00	1.00
Urban Formal	0.346	0.000	0.476	0.00	1.00
Tribal Authority Areas	0.520	1.000	0.500	0.00	1.00
Urban Informal	0.069	0.000	0.254	0.00	1.00
Rural Formal	0.065	0.000	0.246	0.00	1.00
Age	50.989	50.000	16.164	15.00	101.00
Number of household residents	5.084	5.000	2.492	2.00	23.00
Education					
No Schooling	0.284	0.000	0.451	0.00	1.00
Grade R/0 - 3 Completed	0.083	0.000	0.276	0.00	1.00
Grade 4 - 7 Completed	0.266	0.000	0.442	0.00	1.00
Grade 8 - 9 Completed	0.119	0.000	0.324	0.00	1.00
Grade 10 - 11 Completed	0.140	0.000	0.347	0.00	1.00
Grade 12 Completed	0.060	0.000	0.238	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.041	0.000	0.199	0.00	1.00
Bachelor's degree or Honour's degree	0.004	0.000	0.066	0.00	1.00
Masters or Doctorate	0.001	0.000	0.023	0.00	1.00
Other	0.002	0.000	0.041	0.00	1.00
Observations	1820				

Table 8: Summary Statistics – Poor Male Headed Households

	Mean	Median	Std. Dev.	Min	Max
Expenditure					
Personal Care Past 30 Days	46.693	10.000	83.014	0.00	1000.00
Alcohol Past 30 Days	25.518	0.000	68.491	0.00	1000.00
Jewels Past 30 Days	2.934	0.000	58.229	0.00	1999.00
Gambling Past 30 Days	5.451	0.000	37.050	0.00	750.00
Cigarettes Past 30 Days	32.269	0.000	103.798	0.00	2000.00
Sports Past 30 Days	2.658	0.000	34.656	0.00	1000.00
Entertainment Past 30 Days	13.338	0.000	127.261	0.00	4000.00
Monthly Expenditure - Full Imputations	2697.856	1741.136	3198.360	237.34	63284.98
Monthly Adult Goods Expenditure	128.861	50.000	240.356	0.00	4000.00
Monthly Income - Full Imputations	2972.423	2391.036	2052.456	0.00	9323.42
Age and Sex Classes					
Boys 0-4	0.071	0.000	0.115	0.00	0.60
Girls 0-4	0.069	0.000	0.111	0.00	0.50
Boys 5-14	0.136	0.125	0.147	0.00	0.67
Girls 5-14	0.121	0.077	0.139	0.00	0.60
Men 15-55	0.243	0.250	0.146	0.00	0.75
Women 15-55	0.264	0.250	0.132	0.00	0.67
Men 56-98	0.060	0.000	0.098	0.00	0.50
Women 56-98	0.035	0.000	0.075	0.00	0.33
Demographics					
African	0.788	1.000	0.409	0.00	1.00
Coloured	0.184	0.000	0.388	0.00	1.00
Asian/Indian	0.011	0.000	0.105	0.00	1.00
White	0.016	0.000	0.126	0.00	1.00
Married	0.688	1.000	0.463	0.00	1.00
Living with Partner	0.198	0.000	0.398	0.00	1.00
Widow/Widower	0.040	0.000	0.196	0.00	1.00
Divorced/Seperated	0.008	0.000	0.090	0.00	1.00
Never Married	0.066	0.000	0.249	0.00	1.00
Urban Formal	0.397	0.000	0.489	0.00	1.00
Tribal Authority Areas	0.397	0.000	0.490	0.00	1.00
Urban Informal	0.066	0.000	0.249	0.00	1.00
Rural Formal	0.139	0.000	0.346	0.00	1.00
Age	48.863	47.000	14.851	18.00	98.00
Number of household residents	5.445	5.000	2.393	2.00	23.00
Education					
No Schooling	0.233	0.000	0.423	0.00	1.00
Grade R/0 - 3 Completed	0.076	0.000	0.265	0.00	1.00
Grade 4 - 7 Completed	0.271	0.000	0.445	0.00	1.00
Grade 8 - 9 Completed	0.133	0.000	0.340	0.00	1.00
Grade 10 - 11 Completed	0.130	0.000	0.336	0.00	1.00
Grade 12 Completed	0.097	0.000	0.297	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.052	0.000	0.221	0.00	1.00
Bachelor's degree or Honour's degree	0.005	0.000	0.072	0.00	1.00
Masters or Doctorate	0.000	0.000	0.000	0.00	0.00
Other	0.001	0.000	0.038	0.00	1.00
Observations	1356				

Table 9: Summary Statistics – Rich Female Headed Households

	Mean	Median	Std. Dev.	Min	Max
Expenditure					
Personal Care Past 30 Days	142.289	100.000	159.041	0.00	1000.00
Alcohol Past 30 Days	57.767	0.000	212.332	0.00	1400.00
Jewels Past 30 Days	6.111	0.000	33.375	0.00	200.00
Gambling Past 30 Days	3.100	0.000	12.594	0.00	84.00
Cigarettes Past 30 Days	83.344	0.000	177.108	0.00	700.00
Sports Past 30 Days	40.167	0.000	202.549	0.00	1800.00
Entertainment Past 30 Days	73.500	0.000	155.916	0.00	600.00
Monthly Expenditure - Full Imputations	13552.235	10238.999	11893.740	1163.00	83618.70
Monthly Adult Goods Expenditure	406.278	215.000	551.710	0.00	2530.00
Monthly Income - Full Imputations	18545.184	13749.083	15918.348	9333.33	130000.00
Age and Sex Classes					
Boys 0-4	0.033	0.000	0.083	0.00	0.50
Girls 0-4	0.057	0.000	0.100	0.00	0.33
Boys 5-14	0.174	0.134	0.185	0.00	0.75
Girls 5-14	0.132	0.076	0.162	0.00	0.75
Men 15-55	0.184	0.183	0.172	0.00	0.50
Women 15-55	0.360	0.333	0.161	0.00	0.75
Men 56-84	0.010	0.000	0.044	0.00	0.33
Women 56-84	0.050	0.000	0.094	0.00	0.50
Demographics					
African	0.611	1.000	0.490	0.00	1.00
Coloured	0.122	0.000	0.329	0.00	1.00
Asian/Indian	0.056	0.000	0.230	0.00	1.00
White	0.211	0.000	0.410	0.00	1.00
Married	0.244	0.000	0.432	0.00	1.00
Living with Partner	0.011	0.000	0.105	0.00	1.00
Widow/Widower	0.367	0.000	0.485	0.00	1.00
Divorced/Seperated	0.178	0.000	0.384	0.00	1.00
Never Married	0.200	0.000	0.402	0.00	1.00
Urban Formal	0.700	1.000	0.461	0.00	1.00
Tribal Authority Areas	0.233	0.000	0.425	0.00	1.00
Urban Informal	0.033	0.000	0.181	0.00	1.00
Rural Formal	0.033	0.000	0.181	0.00	1.00
Age	48.133	45.500	13.953	23.00	84.00
Number of household residents	5.533	5.000	3.339	2.00	25.00
Education					
No Schooling	0.078	0.000	0.269	0.00	1.00
Grade R/0 - 3 Completed	0.033	0.000	0.181	0.00	1.00
Grade 4 - 7 Completed	0.078	0.000	0.269	0.00	1.00
Grade 8 - 9 Completed	0.067	0.000	0.251	0.00	1.00
Grade 10 - 11 Completed	0.122	0.000	0.329	0.00	1.00
Grade 12 Completed	0.222	0.000	0.418	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.267	0.000	0.445	0.00	1.00
Bachelor's degree or Honour's degree	0.100	0.000	0.302	0.00	1.00
Masters or Doctorate	0.022	0.000	0.148	0.00	1.00
Other	0.000	0.000	0.000	0.00	0.00
Observations	90				

Table 10: Summary Statistics – Rich Male Headed Households

	Mean	Median	Std. Dev.	Min	Max
Expenditure					
Personal Care Past 30 Days	189.332	150.000	204.862	0.00	2000.00
Alcohol Past 30 Days	124.996	0.000	242.185	0.00	2000.00
Jewels Past 30 Days	22.553	0.000	124.840	0.00	1500.00
Gambling Past 30 Days	17.947	0.000	63.919	0.00	500.00
Cigarettes Past 30 Days	138.336	0.000	297.340	0.00	1800.00
Sports Past 30 Days	48.805	0.000	192.611	0.00	2000.00
Entertainment Past 30 Days	181.248	0.000	371.005	0.00	5000.00
Monthly Expenditure - Full Imputations	18065.938	14820.685	16584.270	2115.00	135596.28
Monthly Adult Goods Expenditure	723.218	500.000	804.091	0.00	5450.00
Monthly Income - Full Imputations	22426.613	16808.770	15543.284	9373.09	102033.33
Age and Sex Classes					
Boys 0-4	0.062	0.000	0.114	0.00	0.50
Girls 0-4	0.056	0.000	0.104	0.00	0.40
Boys 5-14	0.124	0.000	0.143	0.00	0.60
Girls 5-14	0.134	0.077	0.152	0.00	0.60
Men 15-55	0.285	0.250	0.123	0.00	0.67
Women 15-55	0.290	0.250	0.117	0.00	0.71
Men 56-82	0.027	0.000	0.074	0.00	0.40
Women 56-82	0.022	0.000	0.069	0.00	0.40
Demographics					
African	0.347	0.000	0.477	0.00	1.00
Coloured	0.179	0.000	0.384	0.00	1.00
Asian/Indian	0.099	0.000	0.300	0.00	1.00
White	0.374	0.000	0.485	0.00	1.00
Married	0.905	1.000	0.294	0.00	1.00
Living with Partner	0.042	0.000	0.201	0.00	1.00
Widow/Widower	0.027	0.000	0.162	0.00	1.00
Divorced/Seperated	0.023	0.000	0.150	0.00	1.00
Never Married	0.004	0.000	0.062	0.00	1.00
Urban Formal	0.851	1.000	0.357	0.00	1.00
Tribal Authority Areas	0.057	0.000	0.233	0.00	1.00
Urban Informal	0.019	0.000	0.137	0.00	1.00
Rural Formal	0.073	0.000	0.260	0.00	1.00
Age	44.057	42.000	10.301	26.00	82.00
Number of household residents	4.805	4.000	2.073	2.00	17.00
Education					
No Schooling	0.008	0.000	0.087	0.00	1.00
Grade R/0 - 3 Completed	0.008	0.000	0.087	0.00	1.00
Grade 4 - 7 Completed	0.065	0.000	0.247	0.00	1.00
Grade 8 - 9 Completed	0.065	0.000	0.247	0.00	1.00
Grade 10 - 11 Completed	0.092	0.000	0.289	0.00	1.00
Grade 12 Completed	0.263	0.000	0.441	0.00	1.00
Certificate or Diploma Std 10 completed or NTC	0.298	0.000	0.458	0.00	1.00
Bachelor's degree or Honour's degree	0.153	0.000	0.360	0.00	1.00
Masters or Doctorate	0.061	0.000	0.240	0.00	1.00
Other	0.004	0.000	0.062	0.00	1.00
Observations	262				

The differences observed in education, marital status, income and expenditure between male and female headed households repeat as a pattern in the samples separated by rich and poor incomes. Poor and rich male headed households still had more financial and social resources than their counterpart female headed households did. As expected, rich households had significantly more financial and social resources to apportion amongst their residents than poor households did. In addition, a median poor household allocated a smaller share of their budget, 1.56%, towards adult goods expenditure than a median rich household did, at 2.74%.

Even with separating the samples of male and female headed households by income, the extreme standard deviations and low median values reoccur. Apart from personal care spending, even amongst the top 10% of South African households, few of them spent much of anything on adult goods. It appears from the data that either a minority of South African households, poor and rich, did the most of the spending on adult goods, and/or, despite the imputations, the expenditure data in the NIDS still has some quality issues.

5 Methods

The 1st wave of the NIDS does not capture information directly on the level of expenditure South African households allocated to their children. Because of this, an indirect approach is needed to examine whether evidence exists to support my hypothesis that South African households discriminated against their girl children and/or that female headed households favored their girl children over their boy

children. In Deaton (1989), Angus Deaton developed an inferential method for use in determining whether households discriminated against their girl children in favor of their boy children.

Deaton's (1989) outlay-equivalence method works by simulating an additional household member and observing the impact they have on a household's demand for an adult good, based on the age and gender of that additional household member. Equation 1 details the ratio which captures the impact from a person of type *r* on the expenditure good of *i*.

$$\pi_{ir} = \frac{\delta(p_i q_i)/\delta * n_r}{\delta(p_i q_i)/\delta * x} * \frac{n}{x} \quad (1)$$

Specifically, an outlay-equivalent ratio is defined in this circumstance as the impact of an additional person of type *r* on the household demand for good *i*. The impact from an additional person of type *r* is accounted by equation (2):

$$(p_i q_i)/\delta * n_r \quad (2)$$

The household's income effect on good *i* is captured by their marginal propensity to spend on good *i*, shown here in equation (3):

$$(p_i q_i)/\delta * x \quad (3)$$

The size of a household and its total level of expenditure are captured here in equation (4):

$$\frac{n}{x} \quad (4)$$

However, before generating an outlay-equivalent ratio, several steps are required.

Deaton (1989) observed the simulated impact an additional child had on Thai and Ivorian households' demand for adult clothing, adult fabric, adult shoes, alcohol, tobacco, meals out and entertainment. Deaton (1989) defined this list as a class of demographically separate adult goods, or goods that only adults but not children would consume. Pure adult goods are used because it is simpler to observe the income effect an additional child has on a household's expenditure for a good that no child would consume. To generate a list of qualified adult goods, Deaton (1989) fashioned a test, equation (5), that would determine, based on available data, whether a good was not consumed by children.

$$p_i q_i = b_{0i} + b_{1i} x_G + \sum c_{ij} n_j + d_i z + u_i \qquad (5)$$

pi is the price of adult good *i* and *qi* is the quantity of adult good *i*, together they are symbolic of a household's total expenditure on adult good *i*. X_G is a household's total expenditure on all qualified adult goods, including good *i*. N_j is sum of all household residents who belong to previously defined age/sex classes, including children and adults. *Z* is a vector of control variables, containing information on a respondent's demographics and characteristics. U_i is an error term, capturing every demographic and characteristic variable not accounted for the vector of control variables, *z*. Under this test, an adult good qualifies as one if the children of the household have no significant impact on a household's demand for that good. Once a list of suitable adult goods is created, Engel curves for each qualified good must be generated.

Generally, Engel curves relate a household's income with the quantity of a purchased good. Deaton (1989) makes uses of an Engel curve specification developed by Working (1943), which supposes a linear relationship between the share of expenditure a household spends on each good and the log of that household's total expenditure:

$$w_i = \alpha_i + B_i ln\left(\frac{x}{n}\right) + \eta_i \ln(n) + \sum_{j=1}^{J-1} * \gamma_{ij}\left(\frac{n_j}{n}\right) + \delta_i z + u_i \qquad (6)$$

The budget share a household allocates to the purchase of good *i* is modeled by w_i. The parameter B_i is the natural log of *x*, total household expenditure divided by *n*, the total number of household residents. The natural log of *n* allows for circumstances where expenditure changes relative to the size of a household even though the model has controlled for household structure and household per capita expenditure. Y_{ij} captures the demographic composition of the household through n_j, the number of household residents in age/sex class *j* and *n*. The parameter δ stores additional information through *z*, a vector of control variables for household characteristics like region, education, race, age and marital status. U_i is an error term, collecting any circumstances not accounted for in the model. The parameters estimated in equation (6) can then be used to calculate an outlay-equivalent ratio, shown in equation (7):

$$\pi_{ir} = \frac{(n_i - B_i) + \gamma_{ir} - \sum_{j=1}^{J} \gamma_{ij}(n_j/n)}{B_i + w_i} \qquad (7)$$

The value of π_{ir} is interpreted as the impact of an additional person of type *r* on the demand for good *i*, equal to a percentage increase or decrease in expenditure on good *i* per each member of that household.

6 Results

Table 11 displays results from a plausibility test that I ran for a series of goods, from the sample of all South African households, which I inferred would qualify as adult goods. Results in Table 11, confirm for most goods that children did not have a statistically significant impact on their household's consumption of those goods. However, girls and boys aged 0-4 had a statistically significant impact on the consumption of gambling and entertainment, respectively, disqualifying them as adult goods.

Tables 12 and 13 provide results from the same plausibility test on the same set of goods, but for the samples of male and female headed households. The results from the plausibility test on the sample of male headed households indicate that every good, except entertainment, qualified as an adult good. In the sample of female headed households, Deaton's (1989) adult goods test indicate that except for alcohol, every good passed, qualifying them as adult goods.

Table 11: Results – Adult Goods Test, All Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	2.95	1.34	0.84	-0.98	4.01	-0.33	-7.83*
	(2.46)	(3.21)	(1.28)	(0.72)	(4.01)	(1.34)	(3.89)
Girls 0-4	-2.72	2.06	2.53	2.86*	0.77	0.16	-5.67
	(2.09)	(3.54)	(2.14)	(1.39)	(4.62)	(2.17)	(4.78)
Boys 5-14	0.68	-0.37	0.99	-0.15	5.37	1.81	-8.34
	(2.30)	(3.51)	(1.94)	(0.67)	(5.15)	(1.13)	(4.33)
Girls 5-14	-3.20	0.10	0.39	-0.42	-0.63	-0.57	4.33
	(1.86)	(2.68)	(1.26)	(0.69)	(3.19)	(1.46)	(4.91)
Men 15-55	2.54	1.59	-1.85	-0.43	5.66	-1.29	-6.23
	(1.51)	(3.60)	(1.13)	(0.55)	(3.21)	(0.89)	(3.97)
Women 15-55	-0.81	8.23*	-1.57	0.24	-7.71*	-1.39	3.00
	(1.63)	(3.59)	(1.52)	(0.55)	(3.18)	(1.14)	(4.13)
Men 56-101	1.58	11.90	-4.70	-0.94	5.54	5.63	-19.01
	(6.66)	(14.41)	(2.58)	(2.18)	(14.24)	(4.34)	(9.92)
Women 56-101	-0.81	2.72	-3.27	5.51*	-0.98	-2.88	-0.28
	(5.04)	(10.92)	(2.60)	(2.17)	(11.19)	(3.41)	(9.16)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: Results – Adult Goods Test, Male Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	6.08	0.68	0.61	-2.26	8.95	-0.83	-13.24
	(4.78)	(6.06)	(2.44)	(1.42)	(7.87)	(2.61)	(7.65)
Girls 0-4	-7.52	2.38	6.84	4.87	3.34	-0.07	-9.85
	(4.58)	(7.36)	(4.44)	(2.85)	(10.56)	(4.73)	(10.24)
Boys 5-14	1.84	-3.78	3.32	0.26	12.56	3.38	-17.58*
	(4.55)	(6.05)	(3.89)	(1.42)	(10.62)	(2.44)	(8.57)
Girls 5-14	-4.43	-2.72	2.17	-1.46	-2.22	-0.49	9.15
	(3.96)	(4.88)	(2.42)	(1.53)	(6.91)	(2.40)	(10.46)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 13: Results – Adult Goods Test, Female Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	-0.82	3.44	-0.45	0.09	-0.26	-0.42	-1.58
	(1.27)	(2.70)	(0.82)	(0.40)	(2.97)	(0.61)	(1.97)
Girls 0-4	1.21	2.61	-0.96	1.05	-2.01	-0.03	-1.87
	(1.42)	(3.16)	(1.12)	(0.61)	(2.07)	(1.04)	(2.69)
Boys 5-14	0.84	2.79	0.05	-0.00	-1.84	0.22	-2.04
	(1.61)	(2.65)	(0.46)	(0.37)	(2.00)	(0.79)	(2.98)
Girls 5-14	-2.40*	2.85	-1.70	0.34	-0.05	-0.89	1.84
	(1.12)	(2.00)	(1.02)	(0.36)	(1.59)	(1.85)	(2.57)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tables 14 contains a set of outlay-equivalent ratios for all South African households. The results in Table 15 are a test, determining whether there is a statistically significant difference between the coefficients for each age and sex class. A statistically insignificant difference in the coefficients suggests there is no evidence of discrimination. While it appears in Table 14, that households significantly reduced alcohol expenditure for 0-14 year old girls, the results in Table 15 suggest that no discrimination took place. There is no evidence, from this sample, to suggest that South African households discriminated against their girl children in favor of their boy children. Likewise, the results in Tables 16-19 suggest that male and female headed households did not have significant preferences for boys or girls.

Table 14: Results – Outlay Equivalent Ratios, All Households

	(1) Personal Care	(2) Alcohol	(3) Jewel	(4) Sport	(5) Cigarette
Boys 0-4	0.23	-0.08	-0.47	-0.87	-0.65
	(0.34)	(0.34)	(1.01)	(0.83)	(0.47)
Girls 0-4	-0.12	-0.66*	-0.70	-1.10	-0.43
	(0.32)	(0.31)	(1.12)	(0.72)	(0.43)
Boys 5-14	-0.33	-0.32	0.41	0.74	0.21
	(0.23)	(0.27)	(1.25)	(0.59)	(0.50)
Girls 5-14	-0.30	-0.50*	-0.44	-0.68	-0.43
	(0.23)	(0.23)	(1.23)	(0.74)	(0.34)
Men 15-55	-0.33*	0.13	0.08	-0.67	0.89**
	(0.16)	(0.15)	(0.86)	(0.44)	(0.28)
Women 15-55	0.31	-0.04	-0.66	-0.16	-0.49
	(0.19)	(0.20)	(1.28)	(0.69)	(0.33)
Men 56-101	-0.47	-0.01	-2.33*	0.89	0.26
	(0.40)	(0.66)	(0.99)	(1.98)	(1.08)
Women 56-101	0.10	-0.48	-2.81	-0.79	-0.33
	(0.35)	(0.39)	(2.08)	(1.25)	(0.65)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 15: Results – Differences, All Households

	(1) Alcohol
Differences 0-4	0.58
	(0.40)
Differences 5-14	0.19
	(0.24)
Differences 15-55	0.17
	(0.28)
Differences 56-101	0.47
	(0.71)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: Results – Outlay Equivalent Ratios, Female Headed Households

	(1) Gambling	(2) Personal Care	(3) Entertainment	(4) Jewel	(5) Sport	(6) Cigarette
Boys 0-4	-0.15	0.57	-1.13*	-2.21	-1.60	-0.35
	(0.41)	(0.39)	(0.52)	(1.73)	(0.92)	(0.38)
Girls 0-4	0.45	0.13	-0.78	-2.16	-0.66	-0.16
	(0.45)	(0.34)	(0.46)	(1.78)	(1.04)	(0.35)
Boys 5-14	-0.32	-0.11	-0.60	-1.02	0.53	0.04
	(0.39)	(0.27)	(0.47)	(0.92)	(0.52)	(0.51)
Girls 5-14	1.20	-0.12	0.32	-3.23	-0.42	-0.06
	(1.47)	(0.27)	(0.72)	(2.03)	(1.22)	(0.38)
Men 15-55	0.83	-0.24	-0.60	0.51	-1.16*	0.58*
	(0.73)	(0.18)	(0.58)	(1.50)	(0.52)	(0.24)
Women 15-55	-0.22	0.29	0.30	1.05	1.47	0.41
	(0.39)	(0.25)	(0.75)	(1.34)	(1.33)	(0.38)
Men 56-101	-2.00	-1.35*	-2.24*	-1.20	-1.33	-0.27
	(1.95)	(0.59)	(0.89)	(2.37)	(1.05)	(0.77)
Women 56-101	0.39	0.20	1.31	-1.37	3.13	0.14
	(0.63)	(0.43)	(1.20)	(3.10)	(1.64)	(0.41)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 17: Results – Differences, Female Headed Households

	(1) Entertainment
Differences 0-4	-0.35
	(0.28)
Differences 5-14	-0.92
	(0.96)
Differences 15-55	-0.90
	(1.31)
Differences 56-101	-3.54*
	(1.78)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 18: Results – Outlay Equivalent Ratios, Male Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewel	(4) Gambling	(5) Sport	(6) Cigarette
Boys 0-4	-0.05	-0.40	2.65	-1.95	-0.88	-0.32
	(0.71)	(0.56)	(2.14)	(1.25)	(1.42)	(0.99)
Girls 0-4	-1.53*	-0.81	1.65	0.92	-2.32*	-0.56
	(0.66)	(0.58)	(1.74)	(1.67)	(1.08)	(0.92)
Boys 5-14	-0.52	-0.98*	4.95	-0.78	0.62	1.19
	(0.57)	(0.43)	(5.21)	(1.01)	(0.99)	(1.14)
Girls 5-14	-1.03*	-0.72	4.21	-1.58	-0.93	-0.63
	(0.49)	(0.39)	(2.71)	(1.07)	(1.14)	(0.83)
Men 15-55	-0.17	-0.17	-1.39	-1.41*	-0.34	0.94
	(0.47)	(0.35)	(1.22)	(0.57)	(1.01)	(0.80)
Women 15-55	0.15	0.24	-2.96	-0.74	-0.90	-1.44
	(0.43)	(0.30)	(1.60)	(0.65)	(0.85)	(0.83)
Men 56-98	-1.46	0.09	-5.91	-2.14	0.82	-2.88
	(1.33)	(0.91)	(3.67)	(1.40)	(3.16)	(1.79)
Women 56-98	0.48	0.16	-3.94	2.91	-2.66	1.97
	(0.85)	(0.66)	(2.05)	(2.08)	(2.18)	(2.31)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 19: Results – Differences, Male Headed Households

	(1) Alcohol	(2) Personal Care	(3) Sport
Differences 0-4	1.48	0.40	1.44
	(0.76)	(0.67)	(0.82)
Differences 5-14	0.52	-0.26	1.55
	(0.57)	(0.44)	(1.44)
Differences 15-55	-0.32	-0.41	0.55
	(0.65)	(0.47)	(1.60)
Differences 56-98	-1.94	-0.07	3.49
	(1.54)	(1.15)	(4.14)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Initial results did not find any evidence to suggest that boys or girls, in South Africa, faced discrimination at the household level. However, research by Gibson and Rozelle (2004) and Arndt et. al. (2006) suggests that a sample stratified by income may yield different results, suggesting that South African household heads prefer children who matching their sex.

Tables 20-23 contain the results from an adult goods test on a series of goods from the samples of poor and rich female and poor and rich male headed households. In the sample of poor male headed households, every good except for alcohol qualified as an adult good. For rich female and male headed households, cigarettes and entertainment, respectively, did not qualify as adult goods.

Table 20: Results – Adult Goods Test, Poor Female Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	-1.40	2.39	-0.89	-0.01	2.74	-0.31	-2.52
	(1.17)	(2.65)	(0.93)	(0.31)	(2.55)	(0.33)	(2.10)
Girls 0-4	-0.19	3.02	-1.34	0.84	-1.30	0.71	-1.74
	(1.01)	(3.24)	(1.28)	(0.59)	(1.18)	(0.82)	(2.69)
Boys 5-14	0.09	2.84	-0.03	0.22	-0.52	0.36	-2.96
	(0.83)	(2.40)	(0.50)	(0.34)	(1.41)	(0.41)	(2.37)
Girls 5-14	-1.37	2.34	-1.78	0.48	-1.27	-0.29	1.88
	(0.70)	(1.80)	(1.12)	(0.36)	(0.97)	(0.44)	(2.24)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 21: Results – Adult Goods Test, Poor Male Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	8.84*	-1.64	-0.03	-2.08	1.98	-0.65	-6.42
	(3.46)	(4.12)	(1.23)	(1.29)	(3.52)	(1.21)	(5.85)
Girls 0-4	-3.41	5.24	-0.23	1.32	0.48	-1.46	-1.94
	(3.00)	(4.93)	(1.45)	(1.62)	(3.81)	(0.96)	(5.72)
Boys 5-14	0.06	0.82	-0.61	0.09	3.33	-0.14	-3.55
	(3.00)	(4.67)	(0.73)	(0.94)	(5.51)	(0.86)	(5.92)
Girls 5-14	-3.12	-6.85	0.02	-1.26	-2.85	-1.29	15.35
	(2.62)	(4.73)	(0.95)	(1.18)	(4.07)	(0.93)	(10.14)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 22: Results – Adult Goods Test, Rich Female Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	-29.71	33.46	2.65	0.58	-18.95	2.75	9.22
	(18.82)	(21.70)	(3.04)	(3.64)	(23.09)	(20.84)	(24.23)
Girls 0-4	7.96	-5.72	-1.63	4.34	21.14	-13.38	-12.71
	(15.11)	(15.75)	(1.38)	(2.39)	(14.21)	(13.96)	(16.46)
Boys 5-14	6.67	4.44	2.75	-3.43	-49.55**	3.71	35.41
	(22.89)	(19.26)	(3.73)	(1.91)	(17.01)	(13.18)	(21.56)
Girls 5-14	-25.17	23.99	-3.41	-3.87	38.24	-47.61	17.83
	(18.15)	(24.69)	(2.78)	(2.07)	(19.79)	(50.02)	(27.68)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 23: Results – Adults Goods Test, Rich Male Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewels	(4) Gambling	(5) Cigarettes	(6) Sports	(7) Entertainment
Boys 0-4	-6.85	6.15	4.32	-2.40	44.48	6.06	-51.76
	(18.65)	(20.41)	(14.23)	(4.15)	(40.71)	(13.25)	(28.55)
Girls 0-4	-43.17	5.99	40.21	19.14	26.02	-0.60	-47.59
	(24.59)	(29.00)	(23.85)	(12.02)	(53.84)	(22.66)	(54.60)
Boys 5-14	2.14	-3.00	22.44	0.29	57.46	11.78	-91.11*
	(19.08)	(21.42)	(15.62)	(5.70)	(43.96)	(10.50)	(35.85)
Girls 5-14	-15.46	8.89	14.82	-0.56	22.47	5.84	-36.00
	(16.76)	(17.03)	(12.96)	(5.32)	(32.79)	(10.03)	(28.13)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tables 24, 26, 28 and 30 contain a series of outlay-equivalent ratios for the samples of poor female and male headed households and rich female and male headed households. There was no evidence to suggest that rich households and poor male headed households had significant preferences for boys or girls. However, from the results in Tables 24 and 25, there is statistically significant evidence to suggest that poor female headed households did reduce their expenditure on entertainment more so for 0-4 year old boys than they did for 0-4 year old girls, suggesting a preference for boys over girls.

Table 24: Results – Outlay Equivalent Ratios, Poor Female Headed Households

	(1) Alcohol	(2) Gambling	(3) Personal Care	(4) Entertainment	(5) Jewel	(6) Sport	(7) Cigarette
Boys 0-4	-0.35	-0.17	0.51	-1.26*	-2.40	-0.78*	-0.12
	(0.26)	(0.40)	(0.41)	(0.52)	(1.62)	(0.39)	(0.39)
Girls 0-4	-0.46	0.25	0.08	-0.68	-2.22	0.22	-0.12
	(0.26)	(0.42)	(0.35)	(0.48)	(1.63)	(0.56)	(0.35)
Boys 5-14	-0.34	-0.22	-0.08	-0.78	-1.05	0.45	0.23
	(0.18)	(0.38)	(0.27)	(0.46)	(0.93)	(0.42)	(0.56)
Girls 5-14	-0.48*	1.38	-0.14	0.25	-3.17	0.22	0.04
	(0.19)	(1.61)	(0.28)	(0.73)	(1.82)	(0.45)	(0.42)
Men 15-55	-0.11	0.84	-0.17	-0.50	0.38	-0.81*	0.61*
	(0.17)	(0.76)	(0.19)	(0.64)	(1.42)	(0.39)	(0.26)
Women 15-55	0.09	-0.24	0.29	0.27	1.16	0.41	0.45
	(0.22)	(0.44)	(0.27)	(0.82)	(1.39)	(0.64)	(0.40)
Men 56-101	2.08	-1.87	-1.39*	-1.63*	-0.95	-1.05*	-0.18
	(1.52)	(2.13)	(0.59)	(0.77)	(2.52)	(0.53)	(0.80)
Women 56-101	-0.31	0.27	0.23	1.55	-1.23	1.70	-0.17
	(0.29)	(0.75)	(0.46)	(1.29)	(3.08)	(1.12)	(0.36)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 25: Results – Differences, Poor Female Headed Households

	(1) Alcohol	(2) Entertainment	(3) Sport
Differences 0-4	0.11	-0.58*	-1.00
	(0.30)	(0.27)	(0.58)
Differences 5-14	0.14	-1.03	0.24
	(0.17)	(0.98)	(0.35)
Differences 15-55	-0.20	-0.77	-1.22
	(0.29)	(1.44)	(0.89)
Differences 56-101	2.39	-3.18	-2.75
	(1.64)	(1.69)	(1.45)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 26: Results – Outlay Equivalent Ratios, Poor Male Headed Households

	(1) Personal Care	(2) Jewel	(3) Gambling	(4) Sport	(5) Cigarette	(6) Entertainment
Boys 0-4	-0.34	0.70	-1.89	-1.30	-0.43	0.32
	(0.67)	(1.24)	(1.20)	(1.23)	(0.76)	(0.52)
Girls 0-4	-0.85	-0.57	0.72	-2.34*	-0.64	-0.03
	(0.66)	(1.27)	(1.64)	(1.03)	(0.75)	(0.72)
Boys 5-14	-1.17*	-0.68	-0.82	-0.92	0.36	-0.86*
	(0.50)	(1.07)	(0.91)	(0.92)	(0.74)	(0.42)
Girls 5-14	-0.87	1.64	-1.66	-0.85	-1.11	0.87
	(0.44)	(2.14)	(1.01)	(0.65)	(0.62)	(0.92)
Men 15-55	-0.21	-0.84	-1.08*	0.38	0.08	1.05
	(0.37)	(0.77)	(0.42)	(1.24)	(0.55)	(0.73)
Women 15-55	0.07	-0.60	-0.29	-0.76	-1.29*	0.50
	(0.30)	(0.56)	(0.49)	(0.94)	(0.63)	(0.63)
Men 56-98	-0.43	-2.48	-3.42**	2.41	-2.58	0.82
	(1.03)	(2.30)	(1.24)	(2.40)	(1.38)	(0.96)
Women 56-98	0.18	-1.22	0.38	-0.59	2.00	-1.78*
	(0.75)	(1.18)	(1.18)	(2.30)	(1.53)	(0.70)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 27: Results – Differences, Poor Male Headed Households

	(1) Personal Care	(2) Sport	(3) Entertainment
Differences 0-4	0.51	1.04	0.35
	(0.75)	(0.80)	(0.85)
Differences 5-14	-0.30	-0.06	-1.73
	(0.55)	(0.97)	(1.16)
Differences 15-55	-0.29	1.14	0.55
	(0.49)	(1.92)	(0.74)
Differences 56-98	-0.61	2.99	2.61
	(1.30)	(4.21)	(1.40)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 28: Results – Outlay Equivalent Ratios, Rich Female Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewel	(4) Gambling	(5) Sport	(6) Entertainment
Boys 0-4	-2.50	-0.20	2.11	1.27	29.82	5.92
	(1.45)	(0.96)	(2.36)	(1.75)	(202.00)	(4.80)
Girls 0-4	1.54	0.49	-0.54	3.14	52.34	-3.41
	(1.18)	(0.83)	(1.15)	(1.65)	(366.77)	(3.18)
Boys 5-14	-1.47	-0.86	-0.29	-1.56	-8.94	0.30
	(0.97)	(0.58)	(1.17)	(1.11)	(65.09)	(1.96)
Girls 5-14	-1.77	-1.37*	-1.68	-2.70*	116.58	0.28
	(1.08)	(0.68)	(1.18)	(1.37)	(830.29)	(1.83)
Men 15-55	0.03	-0.86*	0.38	0.35	-15.61	-1.51
	(0.47)	(0.38)	(1.82)	(0.57)	(119.17)	(1.61)
Women 15-55	-0.56	0.36	-0.44	-0.15	-103.18	-0.71
	(0.80)	(0.54)	(2.07)	(1.11)	(736.05)	(2.01)
Men 56-84	2.10	1.16	-1.78	2.14	-33.86	-14.92
	(2.26)	(2.13)	(2.81)	(3.60)	(228.71)	(9.20)
Women 56-84	-0.78	-0.13	0.01	-0.67	23.70	-1.84
	(0.98)	(1.33)	(1.58)	(0.89)	(178.46)	(3.74)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 29: Results – Differences, Rich Female Headed Households

	(2) Personal Care	(4) Gambling
Differences 0-4	-0.70	-1.87
	(1.13)	(2.64)
Differences 5-14	0.51	1.13
	(0.59)	(0.79)
Differences 15-55	-1.21	0.50
	(0.66)	(1.27)
Differences 56-84	1.29	2.81
	(2.94)	(4.04)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 30: Results – Outlay Equivalent Ratios, Rich Male Headed Households

	(1) Alcohol	(2) Personal Care	(3) Jewel	(4) Gambling	(5) Sport	(6) Cigarette
Boys 0-4	-1.14	-0.05	-8.77	-0.41	1.11	2.56
	(0.94)	(0.63)	(18.43)	(1.76)	(4.03)	(5.85)
Girls 0-4	-1.92*	-0.27	-11.78	1.62	-2.42	2.38
	(0.89)	(0.59)	(23.45)	(2.55)	(3.37)	(5.38)
Boys 5-14	0.07	0.17	-34.69	1.27	3.53	7.04
	(0.77)	(0.51)	(47.69)	(3.36)	(2.83)	(12.06)
Girls 5-14	-1.01	0.11	-13.11	-0.30	0.60	3.86
	(0.77)	(0.41)	(24.43)	(1.64)	(3.06)	(5.49)
Men 15-55	-0.44	-0.12	3.88	-2.29	-3.40	8.09
	(0.58)	(0.37)	(7.51)	(2.73)	(2.30)	(12.63)
Women 15-55	0.02	0.94	19.50	-2.19	-2.79	-1.97
	(0.70)	(0.62)	(30.12)	(3.56)	(1.84)	(5.06)
Men 56-82	-1.70	2.13	-0.36	3.13	-6.76	-0.83
	(1.33)	(1.36)	(15.32)	(6.11)	(6.87)	(9.56)
Women 56-82	0.12	-0.91	24.92	7.83	-5.50	0.74
	(0.88)	(0.81)	(38.74)	(9.38)	(4.15)	(8.11)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 31: Results – Differences, Rich Male Headed Households

	(1) Alcohol
Differences 0-4	0.79
	(1.14)
Differences 5-14	1.08
	(0.63)
Differences 15-55	-0.46
	(0.91)
Differences 56-82	-1.82
	(1.58)

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7 Discussion

Using the 1st wave of the NIDS and the outlay-equivalence ratios methodology, proposed in Deaton (1989), I investigated whether South African households discriminated against their girl children. Additionally, I investigated whether household heads favored children matching their sex. In a sample of South African households disaggregated by gender and income, I did find statistically significant but practically insignificant evidence, suggesting a preference for 0-4-year-old boys over 0-4-year-old girls. Out of the sample of poor female headed households, my analysis found that an additional 0-4-year-old boy reduced entertainment expenditure by as much as 126%, per household member, while girls of the same age had a statistically insignificant impact on their household's entertainment expenditure.

However, an issue arises when practically interpreting my results. I've stated emphatically that the median more accurately reflects a South African household than the mean does. The median entertainment expenditure for poor female headed households is 0 rand, implying significant inequality amongst their households. Using the mean, for practical interpretation, would result in something that is non-generalizable, further diminishing the practical significance of my results. Additionally, given the several adult goods examined, entertainment was the only 1 of 7 possible pathways that discrimination was observed through. Putting my results in practical context significantly diminishes the weight of my findings, making it difficult to state with any certainty whether gender discrimination took place in poor female headed households and likely suggesting that no discrimination took place.

In addition, my analysis found no evidence, in the sample of all South African households, suggesting that an average South African household discriminated against its girl children. My analysis also found from the samples of rich male, rich female and poor male headed households, no evidence suggesting that they significantly favored either their boy or girl children.

8 Conclusion

I assumed, for my thesis, based on evidence about South African attitudes on gender equality (Ipsos 2016) that a household level gender bias could exist, wherein parents favored children matching their own sex. In the developing world, a significant amount of research (Garg et. al. 1998 Gibson and Rozelle 2004 Kingdon 2005 Saha 2013 and Parpiev at. al. 2012) suggests a household level gender bias exists in Ghana, Papua New Guinea, India and Uzbekistan. However, there was no research to suggest that the gender bias in South Africa is so ingrained that it significantly affects the quality of life for South African boys and girls, at the household level. Based on my findings and South Africa's context with gender inequality, it's very likely I didn't find significant evidence of a gender bias, because South Africa doesn't have a household level gender bias, in favor of boys or girls.

Additionally, the lack of significant results may come down to the quality of the expenditure and income data in the NIDS. The 1st wave of the NIDS has a significant number of missing values for both non-food expenditure items and income. To account for those missing values, the NIDS used two techniques, cell median imputation and regression imputation. However, it's the construction of the regression imputation

technique which potentially affected the quality of my analysis, which, per Argent (2009) and Levinsohn et. al. (2009) was used for every missing non-food expenditure and income value. Regression imputation works by using a set of demographic and independent variables to construct a model which predicts for what the missing expenditure values would have been. An issue arises, in that many of the same demographic controls used for the regression imputation technique, I also make use of for my analysis. Using expenditure and income variables, with full imputations and the same demographic controls used for those imputations, resulted in double controlling for the demographic differences between households. That over-controlling limits the explanatory power of my analysis, reducing its overall quality. There may be value in doing the same analysis with expenditure and income variables that don't have full imputations. Unfortunately, the number of missing income and non-food expenditure values would significantly diminish the sample sizes for an approach that did not use variables with imputations.

I believed that creating samples separated by income would appropriately capture the different contexts for poor and rich households. Although, research by Arndt et. al. (2006) suggested that disaggregating by income *and* region may have better controlled for a household's wealth, relative to where they live, providing a more accurate depiction of households in South Africa, I did not do that for my thesis. In context of my own research, I was concerned that applying an additional to layer to samples already separated by gender and income would over-control for differences between households, resulting in non-generalizable results.

I hypothesized that a South African household head's gender could bias how they apportioned resources amongst their children. There were limitations in the data and approach I used, impacting the quality of my analysis. Ultimately, using Deaton's (1989) outlay-equivalence ratio methodology and the 1st wave of the National Income Dynamics Study, I did not find any practically significant evidence supporting that South African households discriminated against their girl children or that South African households headed exclusively by men or women preferred children matching their own sex.

A Appendix

A.1 Engel Curves – All Households

	(1) Per-Capita Jewel Spending	(2) Per-Capita Cigarette Spending	(3) Per-Capita Sport Spending	(4) Per-Capita Personal Care Spending	(5) Per-Capita Alcohol Spending
Log of Per-Capita Expenditure	0.0004	-0.0032***	0.0003*	0.0007	-0.0004
	(0.0002)	(0.0007)	(0.0001)	(0.0006)	(0.0006)
Log of Household Size	-0.0003	-0.0028*	-0.0002	-0.0006	-0.0018
	(0.0005)	(0.0011)	(0.0002)	(0.0018)	(0.0011)
Boys 0-4	0.0025	-0.0028	-0.0001	0.0024	0.0047
	(0.0017)	(0.0074)	(0.0019)	(0.0096)	(0.0063)
Girls 0-4	0.0022	-0.0008	-0.0004	-0.0039	-0.0020
	(0.0020)	(0.0070)	(0.0017)	(0.0085)	(0.0058)
Boys 5-14	0.0034	0.0048	0.0019	-0.0076	0.0019
	(0.0024)	(0.0071)	(0.0019)	(0.0072)	(0.0055)
Girls 5-14	0.0025	-0.0009	0.0001	-0.0071	-0.0002
	(0.0023)	(0.0070)	(0.0016)	(0.0074)	(0.0058)
Men 15-55	0.0031	0.0109	0.0002	-0.0077	0.0070
	(0.0026)	(0.0064)	(0.0017)	(0.0067)	(0.0048)
Women 15-55	0.0023	-0.0014	0.0008	0.0037	0.0050
	(0.0015)	(0.0061)	(0.0017)	(0.0056)	(0.0039)
Men 56-101	0.0005	0.0053	0.0021	-0.0101	0.0054
	(0.0020)	(0.0107)	(0.0031)	(0.0092)	(0.0082)
Coloured	0.0000	0.0129***	-0.0003	0.0012	0.0009
	(0.0005)	(0.0026)	(0.0003)	(0.0019)	(0.0018)
Asian/Indian	-0.0009	0.0115**	-0.0010*	0.0033	-0.0025
	(0.0006)	(0.0036)	(0.0004)	(0.0029)	(0.0017)
White	-0.0004	0.0211***	0.0010	-0.0005	0.0018
	(0.0008)	(0.0041)	(0.0010)	(0.0023)	(0.0017)
Living with Partner	-0.0007*	0.0025	0.0006	0.0017	0.0074**
	(0.0003)	(0.0019)	(0.0005)	(0.0029)	(0.0025)
Widow/Widower	0.0001	0.0012	0.0003	0.0027	-0.0005
	(0.0005)	(0.0017)	(0.0003)	(0.0019)	(0.0011)
Divorced/Seperated	0.0007	0.0013	0.0019	0.0005	-0.0007
	(0.0014)	(0.0026)	(0.0013)	(0.0023)	(0.0014)
Never Married	0.0003	-0.0004	0.0003	0.0018	0.0000
	(0.0005)	(0.0014)	(0.0002)	(0.0019)	(0.0013)
Tribal Authority Areas	-0.0000	-0.0042**	-0.0002	0.0022	-0.0001

	(0.0003)	(0.0016)	(0.0002)	(0.0015)	(0.0012)
Urban Informal	0.0004	-0.0030*	-0.0004	0.0066	-0.0005
	(0.0007)	(0.0015)	(0.0002)	(0.0035)	(0.0018)
Rural Formal	-0.0003	0.0029	0.0004	0.0023	0.0047*
	(0.0002)	(0.0022)	(0.0004)	(0.0022)	(0.0022)
Age	-0.0000	0.0001	0.0000	-0.0001	-0.0000
	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Gender	-0.0003	-0.0041***	-0.0003	-0.0023	-0.0048***
	(0.0004)	(0.0012)	(0.0002)	(0.0016)	(0.0014)
No Schooling	0.0001	0.0025	-0.0001	0.0024	-0.0016
	(0.0004)	(0.0017)	(0.0003)	(0.0019)	(0.0013)
Grade R/0 - 3 Completed	-0.0006	0.0051*	0.0001	0.0034	0.0029
	(0.0003)	(0.0021)	(0.0004)	(0.0025)	(0.0023)
Grade 8 - 9 Completed	-0.0006	0.0048*	-0.0003	0.0025	-0.0019
	(0.0005)	(0.0021)	(0.0002)	(0.0021)	(0.0019)
Grade 10 - 11 Completed	-0.0007	0.0031	-0.0001	0.0045	-0.0022
	(0.0005)	(0.0017)	(0.0003)	(0.0024)	(0.0017)
Grade 12 Completed	0.0003	-0.0016	0.0011	-0.0010	-0.0044**
	(0.0010)	(0.0015)	(0.0006)	(0.0023)	(0.0017)
Certificate or Diploma Std 10 completed or NTC	-0.0003	0.0001	0.0000	-0.0003	-0.0046**
	(0.0008)	(0.0025)	(0.0004)	(0.0023)	(0.0015)
Bachelor's degree or Honour's degree	-0.0017*	-0.0004	0.0012	0.0022	-0.0042
	(0.0008)	(0.0034)	(0.0010)	(0.0043)	(0.0021)
Masters or Doctorate	0.0008	-0.0145**	0.0036	-0.0087	0.0035
	(0.0008)	(0.0045)	(0.0027)	(0.0045)	(0.0032)
Other	-0.0011	0.0184*	-0.0011	-0.0009	0.0022
	(0.0007)	(0.0080)	(0.0008)	(0.0049)	(0.0115)
Constant	-0.0029	0.0291***	-0.0024	0.0186	0.0166*
	(0.0021)	(0.0085)	(0.0016)	(0.0097)	(0.0084)
R^2	0.011	0.110	0.044	0.025	0.049
Observations	3528	3528	3528	3528	3528

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.2 Engel Curves – Female Headed Households

	(1) Per-Capita Personal Care Spending	(2) Per-Capita Jewel Spending	(3) Per-Capita Gambling Spending	(4) Per-Capita Cigarette Spending	(5) Per-Capita Entertainment Spending	(6) Per-Capita Sport Spending
Log of Per-Capita Expenditure	0.0029*	0.0002	-0.0003	-0.0034*	0.0024*	0.0003
	(0.0012)	(0.0003)	(0.0005)	(0.0016)	(0.0011)	(0.0002)
Log of Household Size	0.0019	-0.0001	-0.0000	0.0006	0.0012	0.0006
	(0.0030)	(0.0008)	(0.0005)	(0.0019)	(0.0017)	(0.0003)
Boys 0-4	0.0102	-0.0009	-0.0009	-0.0071	-0.0147	-0.0078*
	(0.0182)	(0.0021)	(0.0012)	(0.0082)	(0.0111)	(0.0034)
Girls 0-4	-0.0019	-0.0009	0.0001	-0.0043	-0.0126	-0.0062
	(0.0158)	(0.0027)	(0.0013)	(0.0087)	(0.0105)	(0.0033)
Boys 5-14	-0.0083	0.0004	-0.0012	-0.0015	-0.0115	-0.0043
	(0.0140)	(0.0037)	(0.0012)	(0.0100)	(0.0105)	(0.0027)
Girls 5-14	-0.0087	-0.0021	0.0014	-0.0030	-0.0060	-0.0058*
	(0.0144)	(0.0023)	(0.0027)	(0.0087)	(0.0062)	(0.0029)
Men 15-55	-0.0119	0.0021	0.0008	0.0065	-0.0115	-0.0070*
	(0.0132)	(0.0044)	(0.0018)	(0.0074)	(0.0120)	(0.0032)
Women 15-55	0.0025	0.0027	-0.0010	0.0040	-0.0060	-0.0027
	(0.0097)	(0.0027)	(0.0009)	(0.0071)	(0.0058)	(0.0033)
Men 56-101	-0.0422*	0.0002	-0.0041	-0.0061	-0.0214	-0.0073*
	(0.0212)	(0.0032)	(0.0023)	(0.0136)	(0.0144)	(0.0035)
Coloured	0.0012	-0.0004	0.0009	0.0183**	-0.0018	0.0000
	(0.0032)	(0.0004)	(0.0009)	(0.0058)	(0.0025)	(0.0008)
Asian/Indian	0.0053	-0.0010	-0.0014*	0.0114	-0.0097	-0.0014
	(0.0066)	(0.0009)	(0.0006)	(0.0071)	(0.0054)	(0.0007)
White	0.0060	-0.0008	-0.0008	0.0253***	0.0000	0.0063
	(0.0073)	(0.0005)	(0.0005)	(0.0065)	(0.0042)	(0.0064)
Living with Partner	-0.0112**	-0.0001	-0.0011	0.0060	-0.0002	0.0006
	(0.0043)	(0.0007)	(0.0011)	(0.0069)	(0.0026)	(0.0006)
Widow/Widower	0.0029	0.0002	-0.0010	-0.0006	0.0000	0.0007
	(0.0031)	(0.0005)	(0.0007)	(0.0018)	(0.0017)	(0.0004)
Divorced/Seperated	-0.0014	-0.0004	-0.0008	0.0001	-0.0028	0.0023
	(0.0037)	(0.0004)	(0.0009)	(0.0036)	(0.0020)	(0.0018)
Never Married	0.0038	0.0006	-0.0011	-0.0044*	-0.0016	0.0003
	(0.0032)	(0.0008)	(0.0010)	(0.0019)	(0.0015)	(0.0004)
Tribal Authority Areas	0.0014	0.0002	-0.0005	-0.0063*	-0.0014	-0.0002
	(0.0027)	(0.0004)	(0.0006)	(0.0030)	(0.0019)	(0.0004)

Urban Informal	0.0021	0.0010	-0.0001	-0.0013	-0.0021	-0.0003
	(0.0044)	(0.0011)	(0.0003)	(0.0026)	(0.0023)	(0.0004)
Rural Formal	0.0025	-0.0001	0.0006	0.0024	0.0048	0.0001
	(0.0038)	(0.0003)	(0.0011)	(0.0039)	(0.0067)	(0.0005)
Age	-0.0001	0.0000	0.0000	-0.0000	0.0000	0.0000
	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)
No Schooling	0.0011	-0.0003	-0.0000	0.0059	-0.0016	0.0003
	(0.0033)	(0.0003)	(0.0003)	(0.0031)	(0.0030)	(0.0005)
Grade R/0 - 3 Completed	0.0022	-0.0006	0.0001	0.0055*	-0.0022	0.0004
	(0.0041)	(0.0003)	(0.0003)	(0.0024)	(0.0023)	(0.0003)
Grade 8 - 9 Completed	0.0058	-0.0001	0.0004	-0.0008	-0.0023	0.0000
	(0.0042)	(0.0007)	(0.0003)	(0.0017)	(0.0024)	(0.0002)
Grade 10 - 11 Completed	0.0015	-0.0002	0.0004	0.0004	-0.0022	0.0007
	(0.0037)	(0.0005)	(0.0003)	(0.0024)	(0.0019)	(0.0011)
Grade 12 Completed	-0.0044	0.0018	0.0025	0.0006	0.0019	0.0027
	(0.0040)	(0.0021)	(0.0019)	(0.0022)	(0.0043)	(0.0017)
Certificate or Diploma Std 10 completed or NTC	-0.0070	0.0003	0.0011	-0.0005	-0.0013	0.0005
	(0.0043)	(0.0011)	(0.0009)	(0.0025)	(0.0035)	(0.0011)
Bachelor's degree or Honour's degree	0.0188	-0.0007	0.0011	0.0128	0.0011	-0.0017
	(0.0147)	(0.0010)	(0.0011)	(0.0110)	(0.0059)	(0.0016)
Masters or Doctorate	-0.0345*	0.0013	0.0036	-0.0250	-0.0013	-0.0040
	(0.0165)	(0.0009)	(0.0025)	(0.0144)	(0.0057)	(0.0035)
Other	-0.0024	-0.0004	-0.0004	-0.0033	-0.0030	0.0002
	(0.0075)	(0.0008)	(0.0004)	(0.0029)	(0.0024)	(0.0010)
Constant	0.0076	-0.0021	0.0027	0.0247*	-0.0028	0.0014
	(0.0151)	(0.0033)	(0.0032)	(0.0106)	(0.0055)	(0.0031)
R^2	0.037	0.011	0.032	0.113	0.031	0.027
Observations	1908	1908	1908	1908	1908	1908

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.3 Engel Curves – Male Headed Households

	(1) Per-Capita Alcohol Spending	(2) Per-Capita Personal Care Spending	(3) Per-Capita Jewel Spending	(4) Per-Capita Gambling Spending	(5) Per-Capita Cigarette Spending	(6) Per-Capita Sport Spending
Log of Per-Capita Expenditure	-0.0017	-0.0019	0.0004	0.0002	-0.0061***	0.0003
	(0.0012)	(0.0011)	(0.0003)	(0.0003)	(0.0014)	(0.0002)
Log of Household Size	-0.0058	-0.0056	-0.0011	-0.0013	-0.0094**	-0.0004
	(0.0038)	(0.0046)	(0.0008)	(0.0008)	(0.0034)	(0.0006)
Boys 0-4	-0.0077	-0.0169	0.0066*	-0.0120	-0.0340	0.0061
	(0.0172)	(0.0204)	(0.0030)	(0.0062)	(0.0284)	(0.0047)
Girls 0-4	-0.0292	-0.0245	0.0058*	-0.0053	-0.0387	0.0036
	(0.0159)	(0.0195)	(0.0029)	(0.0068)	(0.0280)	(0.0045)
Boys 5-14	-0.0171	-0.0268	0.0092	-0.0090	-0.0192	0.0093
	(0.0159)	(0.0174)	(0.0060)	(0.0054)	(0.0234)	(0.0054)
Girls 5-14	-0.0218	-0.0217	0.0085*	-0.0118*	-0.0370	0.0058
	(0.0159)	(0.0178)	(0.0037)	(0.0059)	(0.0285)	(0.0044)
Men 15-55	-0.0147	-0.0096	0.0022	-0.0098	-0.0221	0.0074
	(0.0136)	(0.0165)	(0.0021)	(0.0053)	(0.0254)	(0.0045)
Women 15-55	-0.0064	-0.0014	0.0009	-0.0091	-0.0492	0.0063
	(0.0122)	(0.0148)	(0.0017)	(0.0056)	(0.0285)	(0.0048)
Men 56-101	-0.0340	-0.0025	-0.0025	-0.0122*	-0.0668*	0.0104
	(0.0229)	(0.0254)	(0.0033)	(0.0053)	(0.0322)	(0.0074)
Coloured	0.0012	0.0029	0.0002	-0.0015	0.0204***	-0.0005
	(0.0038)	(0.0039)	(0.0012)	(0.0009)	(0.0046)	(0.0006)
Asian/Indian	-0.0041	0.0056	-0.0006	-0.0028	0.0188***	-0.0015*
	(0.0030)	(0.0044)	(0.0012)	(0.0015)	(0.0054)	(0.0007)
White	0.0048	0.0025	-0.0001	-0.0035*	0.0388***	0.0001
	(0.0036)	(0.0045)	(0.0015)	(0.0017)	(0.0080)	(0.0008)
Living with Partner	0.0080*	0.0038	-0.0017*	0.0021	0.0070	0.0008
	(0.0039)	(0.0047)	(0.0007)	(0.0019)	(0.0037)	(0.0008)
Widow/Widower	0.0005	-0.0029	-0.0012	0.0001	0.0102	-0.0015**
	(0.0038)	(0.0042)	(0.0007)	(0.0009)	(0.0073)	(0.0005)
Divorced/Seperated	0.0087	-0.0003	0.0125	-0.0012	-0.0061	0.0079
	(0.0075)	(0.0053)	(0.0103)	(0.0008)	(0.0078)	(0.0065)
Never Married	0.0117	-0.0035	-0.0019*	0.0002	0.0096	-0.0002
	(0.0079)	(0.0055)	(0.0009)	(0.0009)	(0.0058)	(0.0004)
Tribal Authority Areas	-0.0010	0.0006	-0.0010	-0.0009	-0.0069*	-0.0005
	(0.0033)	(0.0033)	(0.0010)	(0.0007)	(0.0032)	(0.0005)

Urban Informal	-0.0059	0.0116	-0.0005	-0.0013	-0.0112**	-0.0007
	(0.0041)	(0.0081)	(0.0007)	(0.0013)	(0.0036)	(0.0005)
Rural Formal	0.0077	0.0019	-0.0013	-0.0008	0.0027	0.0005
	(0.0050)	(0.0046)	(0.0007)	(0.0009)	(0.0045)	(0.0007)
Age	0.0001	-0.0002	-0.0000	0.0000	0.0004*	0.0000
	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0002)	(0.0000)
No Schooling	-0.0054	0.0047	0.0004	-0.0005	0.0028	-0.0003
	(0.0035)	(0.0038)	(0.0013)	(0.0009)	(0.0036)	(0.0006)
Grade R/0 - 3 Completed	0.0007	0.0041	-0.0013	-0.0010*	0.0075	-0.0004
	(0.0057)	(0.0050)	(0.0012)	(0.0005)	(0.0050)	(0.0009)
Grade 8 - 9 Completed	-0.0004	0.0020	-0.0022	0.0005	0.0165**	-0.0007
	(0.0050)	(0.0043)	(0.0014)	(0.0008)	(0.0053)	(0.0005)
Grade 10 - 11 Completed	-0.0026	0.0099	-0.0014	0.0005	0.0099*	-0.0007
	(0.0040)	(0.0053)	(0.0014)	(0.0006)	(0.0044)	(0.0006)
Grade 12 Completed	-0.0062	0.0026	-0.0016	0.0018	-0.0001	0.0012
	(0.0038)	(0.0041)	(0.0017)	(0.0010)	(0.0038)	(0.0010)
Certificate or Diploma Std 10 completed or NTC	-0.0072*	0.0035	-0.0026	0.0037	0.0035	0.0001
	(0.0034)	(0.0043)	(0.0019)	(0.0027)	(0.0065)	(0.0007)
Bachelor's degree or Honour's degree	-0.0057	-0.0007	-0.0037*	0.0000	-0.0042	0.0035
	(0.0052)	(0.0045)	(0.0019)	(0.0009)	(0.0052)	(0.0021)
Masters or Doctorate	0.0027	-0.0065	0.0006	0.0012	-0.0212**	0.0050
	(0.0056)	(0.0045)	(0.0013)	(0.0017)	(0.0070)	(0.0040)
Other	0.0065	-0.0070	-0.0034	0.0012	0.0269***	-0.0014
	(0.0254)	(0.0074)	(0.0021)	(0.0017)	(0.0063)	(0.0008)
Constant	0.0445*	0.0567**	-0.0009	0.0103	0.0725*	-0.0088*
	(0.0186)	(0.0216)	(0.0029)	(0.0065)	(0.0281)	(0.0043)
R^2	0.040	0.045	0.054	0.035	0.141	0.095
Observations	1609	1609	1609	1609	1609	1609

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.4 Engel Curves – Poor Female Headed Households

	(1) Per-Capita Alcohol Spending	(2) Per-Capita Personal Care Spending	(3) Per-Capita Jewel Spending	(4) Per-Capita Gambling Spending	(5) Per-Capita Cigarette Spending	(6) Per-Capita Sport Spending	(7) Per-Capita Entertainment Spending
Log of Per-Capita Expenditure	0.0009	0.0037**	0.0003	-0.0003	-0.0037*	0.0004	0.0023
	(0.0006)	(0.0013)	(0.0004)	(0.0005)	(0.0018)	(0.0002)	(0.0014)
Log of Household Size	0.0006	0.0032	0.0000	-0.0000	0.0006	0.0004	0.0015
	(0.0011)	(0.0032)	(0.0009)	(0.0006)	(0.0019)	(0.0003)	(0.0019)
Boys 0-4	-0.0006	0.0078	-0.0014	-0.0008	0.0006	-0.0043	-0.0167
	(0.0069)	(0.0198)	(0.0024)	(0.0014)	(0.0075)	(0.0027)	(0.0123)
Girls 0-4	-0.0026	-0.0044	-0.0012	-0.0000	0.0007	-0.0026	-0.0133
	(0.0071)	(0.0172)	(0.0031)	(0.0015)	(0.0079)	(0.0025)	(0.0117)
Boys 5-14	-0.0004	-0.0088	0.0002	-0.0008	0.0057	-0.0021	-0.0139
	(0.0058)	(0.0153)	(0.0041)	(0.0014)	(0.0098)	(0.0018)	(0.0116)
Girls 5-14	-0.0030	-0.0105	-0.0024	0.0019	0.0030	-0.0026	-0.0077
	(0.0061)	(0.0157)	(0.0026)	(0.0031)	(0.0082)	(0.0017)	(0.0069)
Men 15-55	0.0036	-0.0112	0.0020	0.0010	0.0112	-0.0043	-0.0122
	(0.0058)	(0.0145)	(0.0049)	(0.0020)	(0.0068)	(0.0027)	(0.0132)
Women 15-55	0.0071	0.0017	0.0029	-0.0009	0.0089	-0.0022	-0.0076
	(0.0040)	(0.0103)	(0.0029)	(0.0009)	(0.0068)	(0.0020)	(0.0062)
Men 56-101	0.0423	-0.0455*	0.0003	-0.0036	-0.0001	-0.0047	-0.0189
	(0.0294)	(0.0219)	(0.0033)	(0.0025)	(0.0132)	(0.0028)	(0.0141)
Coloured	0.0027	0.0002	-0.0006	0.0011	0.0196**	-0.0004	-0.0017
	(0.0020)	(0.0036)	(0.0004)	(0.0010)	(0.0065)	(0.0005)	(0.0025)
Asian/Indian	-0.0065*	-0.0031	-0.0012	-0.0010	0.0257**	-0.0014	-0.0106
	(0.0027)	(0.0065)	(0.0008)	(0.0007)	(0.0089)	(0.0009)	(0.0070)
White	0.0020	0.0157	-0.0001	-0.0001	0.0170	-0.0007	-0.0031
	(0.0029)	(0.0120)	(0.0008)	(0.0007)	(0.0119)	(0.0005)	(0.0031)
Living with Partner	0.0098*	-0.0118**	-0.0002	-0.0011	0.0068	0.0001	-0.0002
	(0.0048)	(0.0044)	(0.0007)	(0.0012)	(0.0069)	(0.0004)	(0.0027)
Widow/Widower	-0.0004	0.0031	0.0002	-0.0010	0.0008	0.0005	0.0003
	(0.0014)	(0.0033)	(0.0005)	(0.0008)	(0.0018)	(0.0004)	(0.0017)
Divorced/Seperated	-0.0016	-0.0019	-0.0006	-0.0010	0.0020	-0.0005	-0.0022
	(0.0017)	(0.0040)	(0.0005)	(0.0011)	(0.0042)	(0.0004)	(0.0021)
Never Married	0.0003	0.0032	0.0005	-0.0011	-0.0033	-0.0001	-0.0015
	(0.0015)	(0.0034)	(0.0008)	(0.0011)	(0.0017)	(0.0003)	(0.0016)
Tribal Authority	0.0009	0.0012	0.0002	-0.0005	-0.0062*	-0.0004	-0.0013

Areas							
	(0.0010)	(0.0028)	(0.0004)	(0.0006)	(0.0031)	(0.0004)	(0.0020)
Urban Informal	0.0027	0.0025	0.0010	-0.0001	-0.0010	-0.0004	-0.0021
	(0.0026)	(0.0046)	(0.0012)	(0.0004)	(0.0026)	(0.0004)	(0.0025)
Rural Formal	0.0045	0.0021	-0.0001	0.0006	0.0032	0.0001	0.0049
	(0.0032)	(0.0039)	(0.0003)	(0.0011)	(0.0040)	(0.0005)	(0.0068)
Age	-0.0000	-0.0001	0.0000	0.0000	0.0000	0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)
No Schooling	-0.0004	0.0006	-0.0004	-0.0000	0.0059	0.0001	-0.0020
	(0.0017)	(0.0034)	(0.0003)	(0.0003)	(0.0032)	(0.0005)	(0.0031)
Grade R/0 - 3 Completed	0.0051	0.0020	-0.0006	0.0001	0.0055*	0.0004	-0.0022
	(0.0036)	(0.0042)	(0.0004)	(0.0003)	(0.0025)	(0.0003)	(0.0023)
Grade 8 - 9 Completed	-0.0040**	0.0056	-0.0000	0.0005	-0.0011	0.0000	-0.0024
	(0.0015)	(0.0044)	(0.0007)	(0.0003)	(0.0017)	(0.0002)	(0.0025)
Grade 10 - 11 Completed	-0.0040*	0.0022	-0.0003	0.0004	-0.0001	0.0010	-0.0019
	(0.0018)	(0.0038)	(0.0005)	(0.0003)	(0.0024)	(0.0011)	(0.0019)
Grade 12 Completed	-0.0049*	-0.0063	0.0022	0.0024	-0.0015	0.0008	0.0010
	(0.0019)	(0.0043)	(0.0025)	(0.0022)	(0.0017)	(0.0005)	(0.0046)
Certificate or Diploma Std 10 completed or NTC	-0.0037	-0.0074	0.0005	0.0010	0.0007	0.0009	-0.0013
	(0.0020)	(0.0050)	(0.0013)	(0.0008)	(0.0026)	(0.0006)	(0.0036)
Bachelor's degree or Honour's degree	-0.0035	0.0343	-0.0007	0.0012	0.0328	-0.0002	0.0026
	(0.0027)	(0.0264)	(0.0011)	(0.0015)	(0.0248)	(0.0004)	(0.0101)
Masters or Doctorate	0.0018	-0.0513	-0.0001	0.0075***	-0.0312	-0.0016	0.0029
	(0.0028)	(0.0267)	(0.0010)	(0.0019)	(0.0249)	(0.0011)	(0.0094)
Other	-0.0062**	-0.0028	-0.0005	-0.0003	-0.0036	0.0004	-0.0031
	(0.0019)	(0.0071)	(0.0008)	(0.0004)	(0.0034)	(0.0006)	(0.0026)
Constant	-0.0031	0.0038	-0.0027	0.0023	0.0196	-0.0003	-0.0007
	(0.0070)	(0.0163)	(0.0038)	(0.0030)	(0.0106)	(0.0015)	(0.0058)
R^2	0.041	0.041	0.013	0.032	0.112	0.009	0.024
Observations	1818	1818	1818	1818	1818	1818	1818

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.5 Engel Curves – Poor Male Headed Households

	(1) Per-Capita Personal Care Spending	(2) Per-Capita Jewel Spending	(3) Per-Capita Gambling Spending	(4) Per-Capita Cigarette Spending	(5) Per-Capita Sport Spending	(6) Per-Capita Entertainment Spending
Log of Per-Capita Expenditure	0.0009	0.0004	0.0008**	-0.0030*	0.0005*	0.0042*
	(0.0015)	(0.0002)	(0.0003)	(0.0013)	(0.0002)	(0.0020)
Log of Household Size	-0.0056	-0.0006	-0.0013	-0.0101**	-0.0002	0.0073
	(0.0056)	(0.0005)	(0.0009)	(0.0033)	(0.0005)	(0.0055)
Boys 0-4	-0.0145	0.0030	-0.0063	-0.0353	-0.0013	0.0170
	(0.0285)	(0.0023)	(0.0054)	(0.0249)	(0.0046)	(0.0091)
Girls 0-4	-0.0272	0.0018	0.0002	-0.0406	-0.0032	0.0141
	(0.0259)	(0.0023)	(0.0065)	(0.0242)	(0.0047)	(0.0105)
Boys 5-14	-0.0329	0.0017	-0.0029	-0.0287	-0.0004	0.0072
	(0.0240)	(0.0026)	(0.0053)	(0.0218)	(0.0048)	(0.0068)
Girls 5-14	-0.0262	0.0040	-0.0063	-0.0462*	-0.0006	0.0210
	(0.0235)	(0.0036)	(0.0055)	(0.0234)	(0.0048)	(0.0142)
Men 15-55	-0.0079	0.0019	-0.0030	-0.0295	0.0019	0.0231
	(0.0226)	(0.0015)	(0.0036)	(0.0253)	(0.0051)	(0.0137)
Women 15-55	-0.0034	0.0017	-0.0014	-0.0496*	-0.0000	0.0197
	(0.0198)	(0.0013)	(0.0038)	(0.0253)	(0.0046)	(0.0124)
Men 56-101	-0.0127	-0.0006	-0.0101	-0.0697*	0.0055	0.0211
	(0.0333)	(0.0018)	(0.0055)	(0.0279)	(0.0079)	(0.0126)
Coloured	0.0030	0.0010	-0.0018	0.0212***	0.0002	0.0004
	(0.0055)	(0.0011)	(0.0010)	(0.0057)	(0.0007)	(0.0021)
Asian/Indian	0.0177	-0.0008	-0.0030*	0.0222	-0.0014	-0.0092
	(0.0096)	(0.0007)	(0.0014)	(0.0135)	(0.0007)	(0.0061)
White	0.0021	-0.0014	-0.0056**	0.0460*	0.0014	-0.0038
	(0.0118)	(0.0008)	(0.0019)	(0.0200)	(0.0021)	(0.0022)
Living with Partner	0.0035	-0.0012	0.0022	0.0054	0.0010	0.0005
	(0.0049)	(0.0006)	(0.0021)	(0.0036)	(0.0008)	(0.0010)
Widow/Widower	-0.0027	-0.0010	-0.0000	0.0116	-0.0010	-0.0001
	(0.0053)	(0.0005)	(0.0011)	(0.0089)	(0.0005)	(0.0022)
Divorced/Seperated	-0.0106	-0.0002	-0.0021	-0.0177	0.0188	0.0032
	(0.0076)	(0.0006)	(0.0012)	(0.0093)	(0.0140)	(0.0078)
Never Married	-0.0037	-0.0011	0.0005	0.0098	0.0001	0.0065*
	(0.0058)	(0.0007)	(0.0010)	(0.0060)	(0.0004)	(0.0032)
Tribal Authority Areas	0.0019	0.0001	-0.0009	-0.0055	-0.0003	0.0029
	(0.0037)	(0.0004)	(0.0007)	(0.0033)	(0.0005)	(0.0044)

Urban Informal	0.0127	-0.0002	-0.0015	-0.0107**	-0.0005	-0.0016
	(0.0086)	(0.0004)	(0.0013)	(0.0037)	(0.0005)	(0.0014)
Rural Formal	0.0015	-0.0007	-0.0008	0.0023	0.0006	0.0009
	(0.0051)	(0.0004)	(0.0012)	(0.0046)	(0.0008)	(0.0019)
Age	-0.0001	-0.0000	0.0001	0.0003	0.0000	0.0001
	(0.0002)	(0.0000)	(0.0000)	(0.0002)	(0.0000)	(0.0000)
No Schooling	0.0050	0.0012	-0.0002	0.0038	-0.0005	-0.0011
	(0.0040)	(0.0012)	(0.0009)	(0.0036)	(0.0007)	(0.0017)
Grade R/0 - 3 Completed	0.0035	-0.0002	-0.0012*	0.0071	-0.0006	-0.0024
	(0.0053)	(0.0004)	(0.0005)	(0.0049)	(0.0010)	(0.0013)
Grade 8 - 9 Completed	0.0010	-0.0006	0.0007	0.0148**	-0.0010	0.0065
	(0.0048)	(0.0003)	(0.0009)	(0.0057)	(0.0006)	(0.0079)
Grade 10 - 11 Completed	0.0084	-0.0008*	-0.0002	0.0048	-0.0010	-0.0004
	(0.0061)	(0.0004)	(0.0007)	(0.0041)	(0.0006)	(0.0013)
Grade 12 Completed	0.0015	0.0014	0.0023	-0.0026	0.0004	0.0017
	(0.0060)	(0.0011)	(0.0013)	(0.0039)	(0.0010)	(0.0020)
Certificate or Diploma Std 10 completed or NTC	0.0052	-0.0008	0.0069	-0.0046	0.0001	-0.0003
	(0.0067)	(0.0007)	(0.0054)	(0.0056)	(0.0010)	(0.0016)
Bachelor's degree or Honour's degree	-0.0079	-0.0020	-0.0028*	-0.0092	-0.0017	0.0185*
	(0.0108)	(0.0011)	(0.0012)	(0.0057)	(0.0010)	(0.0073)
Other	-0.0139	-0.0003	0.0022	0.0143	-0.0029	-0.0010
	(0.0129)	(0.0007)	(0.0021)	(0.0198)	(0.0021)	(0.0025)
Constant	0.0411	-0.0018	-0.0008	0.0686**	-0.0030	-0.0553
	(0.0274)	(0.0019)	(0.0043)	(0.0257)	(0.0043)	(0.0321)
R^2	0.043	0.024	0.054	0.123	0.067	0.036
Observations	1348	1348	1348	1348	1348	1348

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.6 Engel Curves – Rich Female Headed Households

	(1) Per-Capita Alcohol Spending	(2) Per-Capita Personal Care Spending	(3) Per-Capita Jewel Spending	(4) Per-Capita Gambling Spending	(5) Per-Capita Entertainment Spending	(6) Per-Capita Sport Spending
Log of Per-Capita Expenditure	-0.0021	-0.0010	0.0002	-0.0000	0.0023	-0.0017
	(0.0024)	(0.0025)	(0.0002)	(0.0003)	(0.0027)	(0.0027)
Log of Household Size	-0.0083	-0.0073	-0.0000	-0.0001	-0.0069	0.0068
	(0.0063)	(0.0065)	(0.0005)	(0.0008)	(0.0064)	(0.0064)
Boys 0-4	-0.0253	-0.0017	0.0023	0.0039	0.0461	-0.0023
	(0.0208)	(0.0400)	(0.0030)	(0.0037)	(0.0336)	(0.0411)
Girls 0-4	0.0341	0.0146	-0.0006	0.0076*	-0.0093	-0.0106
	(0.0230)	(0.0387)	(0.0012)	(0.0037)	(0.0241)	(0.0362)
Boys 5-14	-0.0103	-0.0171	-0.0003	-0.0018	0.0127	0.0121
	(0.0148)	(0.0330)	(0.0023)	(0.0025)	(0.0233)	(0.0464)
Girls 5-14	-0.0147	-0.0289	-0.0019	-0.0040	0.0126	-0.0345
	(0.0196)	(0.0333)	(0.0023)	(0.0026)	(0.0204)	(0.0198)
Men 15-55	0.0118	-0.0169	0.0004	0.0020	0.0020	0.0146
	(0.0129)	(0.0323)	(0.0034)	(0.0022)	(0.0225)	(0.0451)
Women 15-55	0.0031	0.0114	-0.0005	0.0010	0.0067	0.0471
	(0.0152)	(0.0312)	(0.0012)	(0.0021)	(0.0222)	(0.0790)
Men 56-101	0.0424	0.0302	-0.0020	0.0056	-0.0776	0.0214
	(0.0364)	(0.0681)	(0.0046)	(0.0076)	(0.0544)	(0.0564)
Coloured	-0.0005	0.0112	0.0012	0.0003	-0.0025	0.0099
	(0.0035)	(0.0066)	(0.0015)	(0.0008)	(0.0050)	(0.0052)
Asian/Indian	0.0021	0.0067	-0.0003	-0.0020	-0.0143*	-0.0076
	(0.0076)	(0.0119)	(0.0007)	(0.0011)	(0.0064)	(0.0099)
White	-0.0011	0.0111	-0.0003	-0.0008	0.0031	0.0128
	(0.0047)	(0.0073)	(0.0004)	(0.0007)	(0.0073)	(0.0121)
Living with Partner	0.0870***	-0.0122	0.0015	-0.0029	0.0030	-0.0146
	(0.0158)	(0.0192)	(0.0014)	(0.0031)	(0.0168)	(0.0175)
Widow/Widower	-0.0060	-0.0042	0.0005	0.0002	-0.0084	0.0055
	(0.0049)	(0.0065)	(0.0007)	(0.0009)	(0.0061)	(0.0076)
Divorced/Seperated	-0.0057	-0.0032	0.0002	0.0008	-0.0084	0.0289
	(0.0050)	(0.0073)	(0.0004)	(0.0009)	(0.0060)	(0.0204)
Never Married	-0.0081	0.0055	0.0010	-0.0014	-0.0016	0.0050
	(0.0060)	(0.0058)	(0.0010)	(0.0010)	(0.0055)	(0.0070)
Tribal Authority Areas	-0.0042	-0.0057	-0.0000	0.0005	-0.0064	-0.0026
	(0.0035)	(0.0056)	(0.0006)	(0.0007)	(0.0046)	(0.0054)

Urban Informal	-0.0013	-0.0245**	-0.0004	-0.0004	0.0057	-0.0193
	(0.0079)	(0.0088)	(0.0011)	(0.0014)	(0.0081)	(0.0237)
Rural Formal	0.0119	0.0127	0.0006	0.0028*	-0.0101	0.0044
	(0.0086)	(0.0150)	(0.0005)	(0.0012)	(0.0082)	(0.0084)
Age	-0.0002	-0.0001	-0.0000	-0.0000	0.0003	0.0001
	(0.0002)	(0.0003)	(0.0000)	(0.0000)	(0.0002)	(0.0004)
No Schooling	0.0103	0.0206	0.0002	0.0005	0.0210*	0.0184
	(0.0067)	(0.0108)	(0.0005)	(0.0010)	(0.0084)	(0.0125)
Grade R/0 - 3 Completed	0.0018	0.0069	-0.0007	-0.0003	0.0030	-0.0072
	(0.0047)	(0.0058)	(0.0009)	(0.0009)	(0.0043)	(0.0094)
Grade 8 - 9 Completed	-0.0013	0.0174*	0.0008	0.0012	0.0010	0.0196
	(0.0048)	(0.0083)	(0.0008)	(0.0015)	(0.0065)	(0.0184)
Grade 10 - 11 Completed	0.0004	0.0009	0.0010	0.0014	-0.0082	0.0172
	(0.0057)	(0.0093)	(0.0017)	(0.0012)	(0.0062)	(0.0166)
Grade 12 Completed	0.0134	0.0157*	0.0002	0.0041**	0.0045	0.0337
	(0.0068)	(0.0076)	(0.0006)	(0.0014)	(0.0061)	(0.0257)
Certificate or Diploma Std 10 completed or NTC	0.0008	0.0033	0.0005	0.0009	0.0018	0.0055
	(0.0046)	(0.0065)	(0.0007)	(0.0008)	(0.0052)	(0.0065)
Bachelor's degree or Honour's degree	-0.0008	0.0211*	-0.0000	0.0005	0.0018	0.0141
	(0.0059)	(0.0082)	(0.0005)	(0.0010)	(0.0066)	(0.0117)
Masters or Doctorate	0.0127	-0.0210	0.0020	0.0012	-0.0123	-0.0151
	(0.0121)	(0.0111)	(0.0017)	(0.0010)	(0.0083)	(0.0160)
Constant	0.0393	0.0368	-0.0015	0.0009	-0.0179	-0.0396
	(0.0279)	(0.0416)	(0.0017)	(0.0047)	(0.0332)	(0.0844)
R^2	0.521	0.435	0.067	0.459	0.315	0.231
Observations	90	90	90	90	90	90

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

A.7 Engel Curves – Rich Male Headed Households

	(1) Per-Capita Alcohol Spending	(2) Per-Capita Personal Care Spending	(3) Per-Capita Jewel Spending	(4) Per-Capita Gambling Spending	(5) Per-Capita Cigarette Spending	(6) Per-Capita Sport Spending
Log of Per-Capita Expenditure	-0.0023	-0.0057***	-0.0018	-0.0007	-0.0131**	0.0004
	(0.0014)	(0.0015)	(0.0012)	(0.0009)	(0.0049)	(0.0004)
Log of Household Size	-0.0077	-0.0022	-0.0096*	-0.0019	-0.0036	-0.0010
	(0.0063)	(0.0052)	(0.0048)	(0.0018)	(0.0116)	(0.0015)
Boys 0-4	-0.0174	0.0122	0.0155	-0.0135	-0.0097	0.0202
	(0.0200)	(0.0201)	(0.0099)	(0.0100)	(0.0576)	(0.0117)
Girls 0-4	-0.0242	0.0106	0.0250*	-0.0097	-0.0074	0.0118
	(0.0201)	(0.0198)	(0.0108)	(0.0097)	(0.0539)	(0.0087)
Boys 5-14	0.0033	0.0194	0.0359*	-0.0108	0.0164	0.0256*
	(0.0190)	(0.0162)	(0.0170)	(0.0084)	(0.0473)	(0.0103)
Girls 5-14	-0.0097	0.0170	0.0262*	-0.0126	-0.0029	0.0191*
	(0.0189)	(0.0161)	(0.0111)	(0.0093)	(0.0607)	(0.0090)
Men 15-55	-0.0119	0.0059	-0.0019	-0.0177	0.0138	0.0135*
	(0.0203)	(0.0167)	(0.0099)	(0.0112)	(0.0483)	(0.0056)
Women 15-55	0.0030	0.0320*	-0.0028	-0.0155	-0.0336	0.0132*
	(0.0138)	(0.0154)	(0.0071)	(0.0118)	(0.0563)	(0.0065)
Men 56-101	-0.0238	0.0517	0.0007	-0.0108	-0.0438	0.0117
	(0.0265)	(0.0268)	(0.0117)	(0.0089)	(0.0697)	(0.0070)
Coloured	0.0014	0.0075*	-0.0033	0.0002	0.0207**	-0.0017
	(0.0039)	(0.0030)	(0.0031)	(0.0008)	(0.0078)	(0.0015)
Asian/Indian	0.0009	0.0091*	-0.0021	0.0009	0.0249**	-0.0020
	(0.0032)	(0.0037)	(0.0029)	(0.0012)	(0.0082)	(0.0018)
White	0.0081	0.0095*	-0.0016	-0.0001	0.0414***	-0.0003
	(0.0043)	(0.0042)	(0.0024)	(0.0009)	(0.0098)	(0.0018)
Living with Partner	0.0186	-0.0042	-0.0054	-0.0002	0.0155	-0.0015
	(0.0114)	(0.0070)	(0.0032)	(0.0013)	(0.0162)	(0.0014)
Widow/Widower	-0.0000	-0.0083	-0.0027	-0.0012	-0.0098	-0.0008
	(0.0061)	(0.0074)	(0.0037)	(0.0011)	(0.0202)	(0.0013)
Divorced/Seperated	0.0141	0.0119	0.0173	-0.0010	0.0022	0.0007
	(0.0078)	(0.0068)	(0.0129)	(0.0012)	(0.0094)	(0.0031)
Never Married	-0.0073	-0.0148***	-0.0013	-0.0005	-0.0147	-0.0036
	(0.0047)	(0.0036)	(0.0031)	(0.0011)	(0.0147)	(0.0021)
Tribal Authority Areas	0.0233	-0.0048	-0.0056	0.0019	-0.0009	-0.0019
	(0.0131)	(0.0048)	(0.0039)	(0.0022)	(0.0042)	(0.0016)

Urban Informal	0.0113	-0.0124	-0.0084*	-0.0029	-0.0169	-0.0015
	(0.0108)	(0.0097)	(0.0042)	(0.0018)	(0.0131)	(0.0024)
Rural Formal	0.0122	-0.0013	-0.0026	-0.0016	0.0037	0.0002
	(0.0065)	(0.0055)	(0.0030)	(0.0012)	(0.0159)	(0.0011)
Age	-0.0001	-0.0002	-0.0001	0.0000	0.0010	0.0001
	(0.0002)	(0.0002)	(0.0001)	(0.0000)	(0.0006)	(0.0001)
No Schooling	-0.0141	-0.0048	-0.0027	-0.0030	-0.0222	0.0019
	(0.0135)	(0.0052)	(0.0053)	(0.0025)	(0.0188)	(0.0015)
Grade R/0 - 3 Completed	0.0117	-0.0072	-0.0098	-0.0050	-0.0127	0.0029
	(0.0134)	(0.0060)	(0.0076)	(0.0030)	(0.0131)	(0.0017)
Grade 8 - 9 Completed	-0.0076	0.0094*	-0.0062	-0.0005	0.0167	0.0005
	(0.0056)	(0.0046)	(0.0059)	(0.0012)	(0.0094)	(0.0011)
Grade 10 - 11 Completed	0.0076	0.0138*	-0.0023	0.0023	0.0244	0.0002
	(0.0090)	(0.0055)	(0.0079)	(0.0018)	(0.0164)	(0.0011)
Grade 12 Completed	-0.0038	0.0050	-0.0147	-0.0007	0.0081	0.0027
	(0.0051)	(0.0041)	(0.0086)	(0.0010)	(0.0091)	(0.0021)
Certificate or Diploma Std 10 completed or NTC	-0.0041	0.0050	-0.0129	-0.0003	0.0181	0.0012
	(0.0047)	(0.0041)	(0.0081)	(0.0011)	(0.0128)	(0.0012)
Bachelor's degree or Honour's degree	0.0015	0.0057	-0.0146	-0.0006	0.0094	0.0063*
	(0.0065)	(0.0051)	(0.0086)	(0.0011)	(0.0100)	(0.0027)
Masters or Doctorate	-0.0012	-0.0058	0.0020	-0.0010	-0.0177*	0.0037
	(0.0054)	(0.0043)	(0.0024)	(0.0019)	(0.0077)	(0.0038)
Other	-0.0070	0.0218***	-0.0091	0.0000	0.0452	0.0011
	(0.0064)	(0.0048)	(0.0079)	(0.0021)	(0.0233)	(0.0016)
Constant	0.0444	0.0425	0.0376	0.0234	0.0523	-0.0206*
	(0.0250)	(0.0238)	(0.0269)	(0.0169)	(0.0608)	(0.0094)
R^2	0.175	0.244	0.260	0.128	0.275	0.262
Observations	261	261	261	261	261	261

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

References

Agbodji, Akoete Ega, Batana, Yele Maweki and Ouedraogo, Denis. 2013. “Gender Inequality in Multidimensional Welfare Deprivation in West Africa: The Case of Burkina Faso and Togo.” *The World Bank, Africa Region, Poverty Reduction and Economic Management Unit* 6522: 2-37.

Agesa, Richard U., Agesa, Jacqueline and Dabalen, Andrew. 2013. “Sources of the Persistent Gender Wage along the Unconditional Earnings Distribution: Findings from Kenya.” *Oxford Development Studies* 41 (1): 76-103.

Antman, Francisca M. 2015. "Gender Discrimination in the Allocation of Migrant Household Resources." *Journal of Population Economics* 28 (3): 565-592.

Argent, Jonathan. 2009. “Household Income: Report on NIDS Wave 1.” *National Income Dynamics Study* Technical Paper no. 3: 1-20.

Arndt, Channing, Mikkel Barslund, Virgulino Nhate, and Katleen Van den Broeck. 2006. "Orphans and Discrimination in Mozambique." *American Journal of Agricultural Economics* 88 (5): 1279-1286.

Baliamoune-Lutz, Mina and McGillivray, Mark. 2009. “Does Gender Inequality Reduce Growth in Sub-Saharan African and Arab Countries?” *African Development Review* 21 (2): 224-242.

Becker, Gary. 1974. “A Theory of Social Interactions.” *Journal of Political Economy* 82 (6): 1063-1093.

Brown, M., Daniels, R.C., De Villiers, L., Leibbrandt, M., and Woolard, I. eds. 2012, “National Income Dynamics Study Wave 2 User Manual”, Cape Town: Southern Africa Labour and Development Research Unit

Caprioli, Mary. 2005. “Primed for Violence: The Role of Gender Inequality in Predicting Internal Conflict.” *International Studies Quarterly* 49: 161-178.

Chai, Andreas and Moneta, Alessio. 2010. "Retrospectives: Engel Curves.” *Journal of Economic Perspectives* 24 (1): 225-240

Chaudhry, Imran Sharif. 2007. “Gender Inequality in Education and Economic Growth: Case Study of Pakistan.” *Pakistan Horizon* 60(4): 81-91.

Curi, Andrea Zaitune and Menezes-Filho, Naercio. 2014. “The relationship between school performance and future wages in Brazil.” *Economia* 14 (3): 262-274.

Davis, Melinda, Guggenheim, Cordelia, Figueredo, Aurelio and Locke, Catherine. 2007. “Differential Parental Investment in the Southwestern United States.” *Journal of the Arizona-Nevada Academy of Science* 39 (2): 65-71.

Deaton, Angus S. and Muellbauer, John. 1986. “On Measuring Child Costs: With Applications to Poor Countries.” *Journal of Political Economy* 94 (4): 720-724.

Deaton, Angus S. 1989. "Looking for Boy-Girl Discrimination in Household Expenditure Data." *World Bank Economic Review* 3 (1): 1-15.

Dickerson, Andy, McIntosh, Steagven and Valente, Christine. 2013. “Do the Maths: An Analysis of the Gender Gap in Mathematics in Africa.” *Department of Economics, University of Bristol, UK, The Centre for Market and Public Organisation* 7174: 1-49.

Dollar, David, Fisman, Raymond and Gatti, Roberta. 2001. “Are women really the “fairer sex? Corruption and women in government.” *Journal of Economic Behavior & Organization* 46 (4): 423-429.

Garg, Ashish and Morduch, Jonathan. 1998. “Sibling rivalry and the gender gap: evidence from child health outcomes in Ghana.” *Journal of Population Economics* 11 (4): 471-493.

Gibson, John and Scott Rozelle. 2004. "Is it Better to be a Boy? A Disaggregated Outlay Equivalent Analysis of Gender Bias in Papua New Guinea." *Journal of Development Studies* 40 (4): 115-136.

Guggenheim, Cordelia, Davis, Melinda and Figuerdo, Aurelio. 2007. “Sons or Daughters: A Cross-Cultural Study of Sex Ratio Biasing and Differential Parental Investment.” *Journal of the Arizona-Nevada Academy of Science* 40 (2): 73-90.

Haddad, Lawrence and Reardon, Thomas. 1993. "Gender Bias in the Allocation of Resources within Households in Burkina Faso: A Disaggregated Outlay Equivalent Analysis." *Journal of Development Studies* 29 (2): 260-276.

Hakura, Dalia, Hussain, Mumtaz, Newiak, Monique, Thakoor, Vimal and Yang, Fan. 2016. “Inequality, Gender Gaps and Economic Growth: Comparative Evidence for Sub-Saharan Africa.” *International Monetary Fund* 1-29.

Hopcroft, Rosemary. 2005. “Parental Status and Differential Investment in Sons and Daughters: Trivers-Willard Revisited.” *Social Forces* 83 (3): 1111-1136.

“Ipsos.” 2016. *South Africans are firmly against sexual violence, but…*. Accessed January 12th, 2017. http://www.ipsos.co.za/_layouts/15/start.aspx#/SitePages/South%20Africans%20are%20firmly%20against%20sexual%20violence%2C%20but%20gender%20stereotyping%20is%20hardening.aspx

Jann, Ben. 2008. “The Blinder-Oaxaca decomposition for linear regression models.” *The Stata Journal* 8 (4): 453-479.

Kaya, Ezgi and Senesen, Umit. 2010. “Gini Decomposition By Gender: Turkish Case.” *Brussels Economic Review* 53(1): 59-83.

Kingdon, Geeta Gandhi. 2005. "Where has all the Bias Gone? Detecting Gender Bias in the Intrahousehold Allocation of Educational Expenditure." *Economic Development and Cultural Change* 53 (2): 409-451.

Lakshmi, Iyer, Mani, Anandi, Mishra, Prachi and Topalova, Petia. 2012. "The Power of Political Voice: Women's Political Representation and Crime in India." *American Economic Journal: Applied Economics* 4 (4): 165-193.

Levinsohn, Jim, Leibbrandt, Murray, Keswell, Malcolm, Franklin, Simon and Finn, Arden. 2009. "Expenditure: Report on NIDS Wave 1." *National Income Dynamics Study* Technical Paper no. 4: 1-33.

Melander, Erik. 2005. "Gender Equality and Intrastate Armed Conflict." *International Studies Quarterly* 49 (4): 695-714.

Mitra, Aniruddha, Bang, James T. and Biswas, Arnab. 2015. "Gender Equality and Economic Growth: Is it Equality of Opportunity or Equality of Outcomes?" *Feminist Economics* 21 (1): 110-135.

Orthofer, Anna. 2016. "Wealth Inequality in South Africa: Evidence from survey and tax data." *Research Project on Employment, Income Distribution & Inclusive Growth* Working Paper no. 15: 1-50.

Pallitto, Christina C. and O'Campo, Patricia. 2005. "Community level effects of gender inequality on intimate partner violence and unintended pregnancy in Colombia: testing the feminist perspective." *Social Science & Medicine* 60 (10): 2205-2216.

Parpiev, Ziyodullo, Kakhramon Yusupov, and Nurmukhammad Yusupov. 2012. "Outlay Equivalence Analysis of Child Gender Bias in Household Expenditure Data: Evidence from Uzbekistan." *Economics of Transition* 20 (3): 549-567.

Pollet, Thomas V., Fawcett, Tim W., Buunk, Abraham P. and Nettle, Daniel. 2009. "Sex-ratio biasing towards daughters among lower-ranking co-wives in Rwanda." *Biology Letters* (5): 765-768.

Saha, Amitava. 2013. "An Assessment of Gender Discrimination in Household Expenditure on Education in India." *Oxford Development Studies* 41 (2): 220-238.

Samuelson, Paul. 1956. "Social Indifference Curves." *The Quarterly Journal of Economics* 70 (1): 1-22.

Senadza, Bernardin. 2012. "Education inequality in Ghana: gender and spatial dimensions." *Journal of Economic Studies* 39 (6): 724-739.

Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2008, Wave 1 [dataset]. Version 6.1. Cape Town: Southern Africa Labour and Development Research Unit [producer], 2016. Cape Town: DataFirst [distributor], 2016

Trivers, Robert and Willard, Dan. 1973. “Natural Selection of Parental Ability to Vary the Sex Ratio of Offspring.” *Science, New Series* 179 (4068): 90-92.

Umesh, Rashmi. 2012. “Gender Inequality, Economic Development, and Globalization: A State Level Analysis of India.” *The Journal of Developing Areas* 46 (1): 147-164.

Wu, Ruohan and Cheng, Xueyu. 2016. “Gender Equality in the Workplace: The Effect of Gender Equality on Productivity Growth Among the Chilean Manufacturers.” *The Journal of Developing Areas* 50 (1): 257-274