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## The unequal burden of poverty on time use

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## Working Paper No. 572

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### **The Unequal Burden of Poverty on Time Use**

by

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and

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**ABSTRACT**

This study uses the first time-use survey carried out in South Africa (2000) to examine women's and men's time use, with a focus on the impacts of income poverty. We empirically explore the determinants of time spent on different paid and unpaid work activities, including a variety of household and individual characteristics, using bivariate and multivariate Tobit estimations. Our results show asymmetric impacts of income poverty on women's and men's time use. Time-use patterns of South African women and men reveal the unequal burden of income poverty among household members. While being poor increases the amount of time women spend on unpaid work, we do not see any significant impact on men's unpaid work time. For example, women in poor households spend more time than men collecting water and fuel, as well as maintaining their homes.

**Key words:** Unpaid Work; Time Use; Gender-based Inequality.

**JEL Classifications:** D31, D63.

## I. INTRODUCTION

Widespread income poverty has been a major challenge in post-apartheid South Africa<sup>1</sup>. In 2000, the proportion of individuals living below the poverty line corresponds to approximately 59 percent country-wide<sup>2</sup>. The poverty figures have been unchanged from the late 1990s. However, households living in poverty have sunk deeper into poverty (HSRC 2004). Exploring the nature of poverty, many studies have discussed its close association with regional disparities as urban–rural divide, poor education, racial segregation and lack of employment (Klasen 1997 and 2000). However, not much attention has been paid to the linkages between poverty and time-use patterns i.e., how people spend their time on daily activities. In fact, time is one of the most important resources we have and inequalities in time use within a household might provide important insights on the impact of poverty, which would help understanding poverty and its dynamics better. The current study argues that time-use survey data can relate untold stories about the impact of poverty on peoples’ lives. Revealing the significance and the characteristics of the non-market unpaid work, time use data can be utilized to explore the impacts of poverty on time spent on unpaid work activities, which would not be observed otherwise. In this study, we explore the determinants of time spent on different paid work and unpaid work activities by South African women and men focusing on the impact of income poverty.

Conventional analysis of poverty assumes that resources are equally shared within a household, yet, in poverty and intra-household allocation of resources literature, studies have shown that individuals holding the same household characteristics can be treated in a dissimilar way. Sen (1984) presents the outcomes, which argue that girls are discriminated against relative to boys living in the same household. Harriss (1986) provides evidence of calorie intake inequality among the household members. Haddad and Kanbur (1990) warn us about the serious consequences of ignoring intra-household inequality in the measurement and decomposition of inequality and poverty. These empirical findings point to the insufficiency of unitary approaches to household and intra-household allocation (Chayanov 1986; Becker 1965; Alderman et al. 1995). Hence in this study, taking into account existing inequalities within the households, we use individuals as our unit of analysis and estimate the determinants of time use, taking women and men separately given major gender based inequalities in time-use patterns.

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<sup>1</sup> Income poverty conceptualizes poverty in a rather narrow context, which centers on the lack of income resources. A multidimensional conceptualization of poverty focuses on the resources people can access rather than the resources they lack. Although we are aware of the limitations of the concept, our analysis here is based on income poverty due to data availability.

<sup>2</sup> Authors’ calculation using South African Time Use Survey conducted in 2000.

In an analysis of poverty and time-use patterns, it is important to consider the close association of poverty and gender-based inequalities. As Cagatay (1998) points out, women, compared to men in general have a higher incidence of poverty and women's poverty is more severe than men's. The relationship of gender and poverty is clearly characterized by the expression "feminization of poverty." It corresponds to the fact that women, compared to men, have a higher incidence of poverty; women's poverty is more severe than men's and over time the incidence of poverty among women is increasing compared to men:

"...Gender inequalities in the distribution of income, access to productive inputs such as credit, command over property or control over earned income, as well as gender biases in labour markets and social exclusion that women experience in a variety of economic and political institutions form the basis for the greater vulnerability of women to chronic poverty... (Cagatay, 1998, p.8)"

Regarding the relationship between time use and gender inequalities, women spending more time on unpaid work (non-market work) activities, while men spending more on paid work (market work) is a well-established stylized fact across the globe (Antonopoulos 2008; Antonopoulos and Memis 2009). Differences in women's and men's time use patterns may get sharpened or lessened with the impact of poverty. If the former effect is observed it would signify the persistence of the poverty situation of women as they get trapped in doing unpaid work. Whether due to poverty or not, the association of unpaid work disproportionately with women places them in a disadvantaged situation in the paid work sphere as well as in terms of the distribution of income within the household. It is by now well known that employment patterns show inequalities among women and men in the paid sphere. Evidence suggests that women who participate in paid work are more likely than men to have jobs that are part-time, irregular or less secure jobs where unionization to voice their claims as a group is more difficult. Women are less likely to be salaried or wage workers than men (ILO 2007). The informal sector is more of an employment source for women than men and women constitute the lower end of a segregated labor market concentrated in a few occupations (UN 2000).

The consequences of gender-based inequalities in time use go far beyond deprivation of income or low payment issues. These factors not only compel women to receive less pay than men but may also have serious impacts on the power relations within the households and/or social community (Kabeer 1994). There is ample evidence suggesting that the decision-making process within households depends highly on the bargaining power of the members and bargaining power is usually measured with access to income resources. Further to that, contributing to household income is a regulating factor how unpaid work time itself is distributed among different tasks.

Persistence of an existing gender-based division of labor has a lot to do with the latter and poverty might have a major impact on that.

The main objective of our study is to analyze the impacts of income poverty on time-use patterns of women and men living in South Africa. Specifically, we want to provide a picture of the poverty status of South Africans. Then, we aim to provide our empirical analysis and the results we obtain. Our results suggest that gender inequalities in time-use patterns should be taken into account in developing strategies and programs to eradicate poverty as well as to promote gender equality in South Africa. Similar patterns might be observed in other developing countries where we observe widespread income poverty, so South Africa might be a case in point.

In what is to follow, we first describe our data and document the social structure of income poverty in South Africa categorized with respect to household size, number of children, employment status, marital status, and residential location in Section 2, where we also explain how we derive who is income poor. Next, we present the empirical method used and present the determinants of time use in Section 3. In Section 4 we discuss our empirical results. Finally we conclude in Section 5 pointing to the need for further research on the analysis.

## **II. DATA AND THE CHARACTERISTICS OF INCOME POVERTY IN SOUTH AFRICA**

### **Data**

The data we use in this study come from the South Africa Time Use Survey that was conducted in 2000 (TUS 2000). A maximum of two individuals aged 10 or older were interviewed from each household. The survey provides time diaries of 14,296 individuals living in 8,330 households. We use the data for 11,277 individuals, 5,249 men and 6,028 women, who are age 16 or older.

We grouped households together based on the location of the household and poverty status. Households were first categorized by urban and rural divide. Urban households were further divided into two, as formal and informal. Formal urban residential areas include traditional residential suburban areas and city or town centers, and those residing within these areas are typically middle-income or wealthy households. Informal areas, on the other hand, include shantytowns and slums. Most of the families in the sample live in formal urban areas (42.2 percent) followed by families living in informal urban areas (23.8 percent). The rest of the population is settled in rural areas, either in rural commercial or rural ex-homeland areas (19.2 percent and 14.8 percent respectively). Rural commercial areas are rural areas in which commercial landholdings predominate and rural ex-homeland areas are other rural areas, which largely correspond to

previous “homelands” (Budlender et al. 2001). Homelands were established as “reservations” for Africans as an apartheid policy.

Living conditions of families are as follows. Of all the families in the sample, 53.3 percent live in houses or brick structures on a separate stand. Only 35.4 percent have piped water in their dwelling and 30 percent have piped water on site. Availability of electricity seems to be rather widespread: 68.4 percent use electricity for lighting, heating, or cooking. Use of machines at home is also prevalent to some extent: 63.6 percent of the families have at least a washing machine, or a vacuum cleaner, or a refrigerator or a stove.

We grouped households also according to their poverty status using household income level as a criterion. TUS 2000 contains only one categorical variable on the usual monthly income of the household. Respondents were asked to indicate their monthly income based on a range of ten values, and for the purposes of this study, the mid-point value for each category was allocated as the actual monthly income per household<sup>3</sup>. Mid-point levels obtained were compared with income poverty line (table 1) based on the Bureau of Market Research’s Minimum Living Level derived using Oxford equivalence scale for different household sizes.

**Table 1. Poverty Income by Household Size**

Household Size	Rand per month
1	587
2	773
3	1028
4	1290
5	1541
6	1806
7	2054
8+	2503

Source: South African Regional Poverty Network (SARPN) 2004.

<sup>3</sup> The categories were as follows (with mid-point shown in brackets):

- R0 – R399 (R200)
- R400 – R799 (R600)
- R800 – R1 199 (R1000)
- R1 200 – R1 799 (R1 500)
- R1 800 – R2 499 (R2 150)
- R2 500 – R4 999 (R3 750)
- R5 000 – R9 999 (R7 500)
- R10 000 or more (R15 000)
- Don’t know
- Refusal

Individuals in the sample have 7.8 years of schooling on average, approximately equal for women and men. The majority of the individuals are wage or salary earners (35.4 percent of the women and 48.3 percent of the men). This is followed by people with no personal income (25.1 percent of the women and 19.7 percent of the men) and money from other household members (14.4 percent of the women and 11.2 percent of the men).

### **Characteristics of Income Poverty in South Africa**

In the year 2000, 59 percent of the population was living in poverty in South Africa. Poverty is distributed unevenly among nine provinces. The provincial rate is lowest in Western Cape (39.7 percent) whereas in Free State (73.5 percent) and Eastern Cape (70.9 percent) the figures are highest (table 2).

**Table 2. Provincial Poverty Rates**

Western Cape	39.7
Eastern Cape	70.9
Northern Cape	59.1
Free State	73.5
KwaZulu-Natal	59.6
North West	61.1
Gauteng	46.9
Mpumalanga	68.4
Northern Province	58.8
<b>South Africa</b>	<b>59.0</b>

Source: Authors' calculation using TUS 2000.

Among the total poor population, 56.3 percent are women; men comprise 43.7 percent of the total. More women are poor when compared to men. Among women 62.2 percent of them are poor, whereas among men 55.4 percent of them are poor.

Observations on poverty rates also reveal a deep divide according to residential settlements. While 42 percent of the people living in urban formal residential areas are living in poverty, this figure is as high as 82.3 percent in ex-homeland areas (table 3). Looking at the column percentages, we see that around 60 percent of the total population who are poor live in urban areas.



**Table 3. Poverty Rates According to Area of Residence**

<b>Residential Area</b>	<b>Row Percentage</b>	<b>Column Percentage</b>
Urban formal	42.0	30.1
Urban informal	71.8	29.0
Rural ex-homeland	82.3	20.6
Rural commercial	62.6	20.3
<b>Total</b>	<b>59.0</b>	<b>100</b>

Source: Authors' calculation using TUS 2000.

Similar to anywhere else in the world, in South Africa we observe an association between poverty and unemployment. When we categorize South Africans according to their employment status we see that 76.3 percent of unemployed people are poor. Among economically inactive people the poverty rate is as high as 68.5 percent. Interestingly many people are poor even though they have jobs to do: among the employed people the proportion of poor people corresponds to 50.8 percent. Among the poor and employed we observe that 56 percent report that their primary source of income is wages/salaries. This figure is 39 percent among the ultra-poor and employed people. This raises a serious issue with regard to the sufficiency of wage levels in South Africa.

Regarding the marital status of South Africans, 64.5 percent of the single population are poor people while among married or cohabiting people, poor people correspond to 52.9 percent. Poverty rate increases with number of children (table 4). Similarly, poverty rates also rise in correlation with household size (table 5). Table 4 tabulates the distribution of poverty rates according to the number of children aged between 0 and 5 and number of children aged between 6 and 17. While 57.1 percent of the people who have no children aged under 5 are poor; all of the people who have 4 and 5 children within the same age range are poor.

**Table 4. Poverty Rates According to Number of Children**

<b>Number of Children Ages: 0-5</b>	<b>Poverty Rate</b>	<b>Number of Children Ages: 6-17</b>	<b>Poverty Rate</b>
0	57.1	0	59.0
1	71.2	1	61.3
2	70.8	2	67.3
3	79.1	3	76.3
4	100.0	4	83.6
5	100.0	5	86.7
-	-	6	100.0
-	-	7	100.0

Source: Authors' calculation using TUS 2000.

**Table 5. Poverty Rates According to Household Size**

<b>Household Size</b>	<b>Poverty Rate</b>
1	34.1
2	46.9
3	56.8
4	53.0
5	71.5
6	73.8
7	80.5
8	86.5
9	82.5
10	85.8
More than 10	94.2
<b>Total</b>	<b>59.0</b>

Source: Authors' calculation using TUS 2000.

## **Time-Use Data**

TUS 2000 consists of two sections, the first of which involves a household questionnaire with many standard questions used in Statistics South Africa (Stats SA) household surveys. This first section allows for comparison with the other surveys. One member per household was required to provide basic information about the household characteristics as a whole. In the second section, two people, aged ten years or above, from each household were selected and questioned about the activities they had performed the previous day. Each respondent was also required to provide basic demographic information about themselves, for example their age, gender, race, education level, and work status. The activities performed by each respondent were recorded in a 24-hour diary, which had been divided into half-hour slots. In each time slot three activities at most could be recorded.

Time-use data of women and men are summarized in Table 6. The categories used in the table are as follows. Paid work involves employment for establishments (wage employment, home-based work for an establishment, etc.) as well as primary production activities not for establishments (such as crop farming, hunting, and fishing). The unpaid work category consists of water and fuel collection, social care (care for children, the sick, elderly, and disabled, for own household plus community services and help to other households) and home maintenance (household maintenance, management, and shopping for own household). Non-work activities involve learning, social and cultural activities, mass media use (such as reading, watching television and video), sleep, necessary care (personal care and self-maintenance—such as eating, drinking and receiving medical care) and unclassified activities (See table A1 in Appendix for a list of activities included in each category).

Table 6 shows that women and men spend between 0 and approximately 20 hours of their day at work with a maximum number of people at 0 hours (65.7 percent of the women and 44.5 percent of the men). Average number of hours spent at work by women and men are 2.4 and 4.6 respectively. Contrary to paid work, women spend more time for unpaid work than men do. On average, hours spent for unpaid work is 4.4 for women and 1.5 hours for men. Hours spent on unpaid work by men peak at 0 hours: 35 percent of men spend 0 hours for unpaid work. The figure for women is only 6.5 percent. Time spent for non-work activities (learning, leisure, sleep and necessary care) is almost the same for women and men averaging 17.2 hours and 17.8 hours respectively.

**Table 6: Hours Spent on Paid Work, Unpaid Work and Non-Work in a Day**

	Mean	Standard Deviation	Minimum	Maximum
<b>Women</b>				
<b>Paid Work</b>	2.4	3.9	0.0	20.4
<b>Unpaid Work</b>	4.4	3.0	0.0	17.0
<i>Water and Fuel Collection</i>	0.2	0.6	0.0	8.5
<i>Social Care</i>	0.7	1.5	0.0	14.0
<i>Home Maintenance</i>	3.4	2.4	0.0	14.3
<b>Non Work</b>	17.2	3.8	3.6	24.0
<b>Men</b>				
<b>Paid Work</b>	4.6	4.8	0.0	20.1
<b>Unpaid Work</b>	1.5	1.9	0.0	14.5
<i>Water and Fuel Collection</i>	0.1	0.4	0.0	8.5
<i>Social Care</i>	0.1	0.7	0.0	10.4
<i>Home Maintenance</i>	1.4	1.8	0.0	14.5
<b>Non Work</b>	17.8	4.5	2.1	24.0

Source: Authors' calculation using TUS 2000.

### III. METHODOLOGY AND THE DETERMINANTS OF TIME USE

#### Empirical Method

In our estimation of the factors that affect time allocations of women and men, components of time use are regressed on a common set of explanatory variables. A large number of the respondents in our data set appear to spend zero time on specific activities. This is a common problem in the data provided by time-use surveys. As discussed in the literature, in order to deal with the data sets of this sort with truncation, one requires specific methods (Wooldridge 2009). Besides the usual technical problems in data collection, there are two sources of zero observations in time-use surveys (Ruuskanen 2004; Flood and Gräsjö 1998). Either individuals never participate in doing the work specified or, even though in general they do these activities, for some reason, they spend zero time on the day selected for the interviews.

In order to solve the problem of a large number of individuals reporting zero hours of work, three different estimation methods are introduced in the literature, these being the double-hurdle

model, Heckman's model and Tobit model. Different than Tobit model, Heckman and double-hurdle models consider the decision to participate in doing work as an independent process from the decision on the duration of work. For this reason, one needs a specific equation for the participation decision separate from the equation designed for the amount of work. Based on Flood and Grasjo (1998) where a comparison of the suitability of these three estimation methods within the context of labor supply estimation are presented, in the case of labor supply models since hours of work are only observed for the individuals with market wage, the zero observations are taken as an outcome of a well-defined participation decision process that creates selection bias. Given this fact, Heckman's or double-hurdle method is used to solve the problem of a large number of zeros. However, modeling the participation decision process of doing unpaid work is not as straightforward as in the case of the labor supply model. Furthermore, as pointed out by Flood and Grasjo (1998), introducing a misspecified participation equation in double-hurdle and Heckman's model can produce worse results than implementing a Tobit model. Therefore, we select the Tobit model for our estimations; that is, we treat zero observations as individuals' desired amount of unpaid and paid work. The empirical specification is

$$y_{ji}^* = \beta_j'x_i + \varepsilon_{ji} \quad (1)$$

where  $y_{ji}^*$  is the latent variable representing time allocated to activity  $j$  by individual  $i$ ,  $x_i$  is a vector of explanatory variables,  $\beta_j$  is a vector of parameters and  $\varepsilon_j$  is the error term. The observed time allocation ( $y_{ji}$ ) variables are related to the corresponding latent time allocation variables by

$$y_{ji} = y_{ji}^* \text{ if } y_{ji}^* > 0, \quad y_{ji} = 0 \text{ otherwise} \quad (2)$$

We estimate the model for paid and unpaid work using the empirical specification above. We also take into account the fact that time use in different activities are determined simultaneously i.e., the unobserved factors that influence time use in different activities might be correlated. Thus, the specification we use is a multivariate Tobit. This method provides statistical efficiency gains by using the full information about the error correlation. Apart from estimation efficiency, the multivariate specification allows one to analyze the correlations between error terms of the equations which reflect the correlations between time allocation to different activities not accounted for in explanatory variables.

In what follows, we first present the results obtained by a bivariate Tobit model where the dependent variables are paid and unpaid work. Next, we disaggregate the time spent on unpaid work into different housework categories and implement a multivariate Tobit model. The time-use

categories in this specification are paid work ( $j = p$ ), water and fuel collection ( $j = w$ ), social care ( $j = s$ ), and home maintenance ( $j = m$ ). The difficulty in estimating this model is in the evaluation of the four-dimensional multivariate normal integral<sup>4</sup>.

As a solution to this problem, a number of methods have been proposed in the literature that rely either on restrictive assumptions about the model structure and the disturbances or on numerical methods that are costly in terms of computing time (Stern 1997; Arias and Cox 2001; Hajivassiliou and Ruud 1994). An alternative method that outperforms these in terms of computing time and accuracy is the maximum simulated likelihood (MSL). This method consists in the evaluation of the integrals in the log likelihood function by simulation rather than calculation<sup>5</sup>. Reviewing several probability simulators using Monte Carlo methods, Hajivassiliou et al. (1996) found that the Geweke-Hajivassiliou-Keane (GHK) simulator performed better than other simulators in terms of robustness and accuracy. Based on these ongoing discussions in the literature, we employ in this paper the MSL method using the GHK simulator in estimating the model in equations (1) and (2).

### **Determinants of Time Use**

The explanatory variables in our study involve both household and individual characteristics. The household variables are dummy variables indicating the poverty status of the household (*poor* standing for being poor) as well as the residential location of the household (*urb\_f*, *urb\_i*, and *rur\_c* representing formal urban, informal urban, and rural commercial areas respectively). The variables that represent individual characteristics include a dummy indicating if the person is employed (*employed*), if the person is married or cohabiting with a partner (*married*), number of children in the 0-5 and 6-17 age groups (*child-5* and *child-17* respectively), age and the square of age of the person (*age* and *age*<sup>2</sup> respectively) and number of years of schooling (*school*).<sup>6</sup>

Given the close association of poverty, gender inequalities, and time-use patterns as discussed above, controlling for other variables we expect to obtain significant and positive impact of poverty status on unpaid work time which would mean a positive coefficient for the poverty status dummy (*poor*). For the paid work time, we expect to obtain negative coefficients as the conditions of poverty limit the access to regular full time job opportunities. Note that whether or

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<sup>4</sup> See Amemiya (1974).

<sup>5</sup> See Hajivassiliou and Ruud (1994) for alternative estimation methods that rely on simulation.

<sup>6</sup> Two other exogenous variables, wage of the individual and income of the other household members, should ideally be included in the equation. However, this could not be done here due to lack of continuous and consistent income variables in the data set.

not we get similar results both for women and men would determine the characteristic of the distribution of unpaid and paid work burden among the household members living under poverty.

With respect to unpaid work, negative for the residential location dummies would imply a lower amount of unpaid work time for the respondents living in urban and rural commercial areas when compared to South Africans living in the ex-homeland areas. Earlier evidence suggests the fact that peoples' engagement with unpaid work is quite varied with respect to residential settlements. This is particularly true for developing country cases where there are households that have to collect their water and fuel activities which are drudgery and highly time-consuming (Charmes 2006; Antonopoulos 2008). Given a higher amount of time spent on water-fuel collection in ex-homeland areas, coefficients for the residential dummies are expected to be negative.

In addition to these, time spent on home maintenance varies depending on the existence of time saving home appliances as well as on the access to public resources such as electricity as a prerequisite for holding such home appliances. Compared to ex-homeland areas, which are underserved areas in terms of public investment, probability of owning time saving home appliances is much higher in urban areas. Thus time spent for maintaining households is expected to be higher in ex-homelands, which would again imply negative coefficients for the residential dummies. Whether this would be the case both for women and men cannot be determined a priori. If the distribution of unpaid work burden is not egalitarian we might get asymmetric empirical results among women and men.

Unlike unpaid work, in the case of paid work, we expect to get positive and significant coefficients for the residential dummies (*urb\_f*, *urb\_i*, and *rur\_c*). Compared to people living in ex-homeland areas, both the participation rate in paid work might be higher in urban and rural commercial areas and the duration of paid work time might be longer as well. Considering different employment and unemployment patterns of women and men, the significance and the sign of the coefficients might differ between the two equations for women and men.

The coefficients of *employed* dummy are expected to be statistically significant and positive for paid work equation whereas for unpaid work time the opposite is a highly likely result. This would suggest that employed South Africans spend a higher amount of time on paid work while spending less on unpaid work when compared to unemployed and economically inactive respondents.

Considering the coefficient for the marital status dummy variable, our expectations are toward getting different impacts on women's and men's time use. Earlier findings point to such an asymmetric impact of marriage. It has been shown that while married women do more housework than single women, men do less housework after they get married (Gupta 1999; Couprie 2007).

Given the traditional norms on the roles of women and men in a family, in the case of paid work we might get a positive and significant coefficient for men as they take the role of bread winner of the household when they get married. The opposite can be true for women as the homemakers.

In terms of unpaid work, coefficients of variables for the number of children in the 0-5 age groups (*child-5*) are expected to be positive and significant. The time spent for the care of children, which is a major component of unpaid work depends particularly on the number of children. Yet, we might only obtain this result for women as social care work has been stressed widely as being divided sharply among women and men. It is an activity which is mostly considered “women’s work.” Ilahi (2000) cites Brown and Haddad’s (1995) finding on the surveys, which are asking about male time in child care, that very few men report spending any time in this activity.

In addition, time spent on child care is usually pursued at the expense of other activities. For instance, number of children has been emphasized widely as a determining element in decisions of households participating in income generating work activities as well as on other unpaid work activities (Skoufias 1993; Connelly et al. 1996; and ECLAC 2007). Number of children, particularly number of preschool children (*child-5*), constitutes a major reason for women not to participate in the labor force. Thus, particularly for women, the impact of the number of preschool children in the household on their paid work time might be negative while it might be positive on their unpaid work burden.

The number of children does not always have a decreasing/increasing effect on the time spent on paid/unpaid work activities. The reverse is also pointed out by earlier research on children’s time use. Evidence shows that children also allocate significant amounts of time to household maintenance as well as care of younger siblings (Ilahi, 2000), which would have a decreasing effect on unpaid work time while enabling women particularly to be in the labor force and hence increase their paid work time. This impact might be observed on the coefficients of number of young children (*child-17*).

Regarding the age of the person, our results might reflect that as people get older they do more unpaid work and more paid work until they reach an age after which they start doing less. These expectations imply a positive coefficient for the age and a negative coefficient for the age-square variable.

Similar to the variables above, number of years of schooling might also exert an asymmetric influence on women’s and men’s time use. If the educational attainment of women is higher, the probability of her participation in the paid labor market is higher, while the amount of time she spends on unpaid work gets lower. On the other hand, with regard to men, one might expect to get a positive impact on unpaid work time in the case of better educated men. There tends to be a more



egalitarian division of labor at home, as better-educated men do more housework (Huber and Spitze 1983). Thus, we expect to get positive impacts of years of schooling on unpaid as well as paid work time in case of men, whereas, for women we might get a positive coefficient for paid work time, but a negative coefficient for unpaid work time.

#### IV. ESTIMATION RESULTS

Bivariate Tobit estimation results are presented in Table 7. The specification of the model is jointly highly significant for estimations for both women and men: The  $\chi^2$  statistics of 845.55 and 301.01 respectively indicate rejection of the null hypothesis that all slope coefficients are zero at the 1% level. The null hypothesis of independence of time use in different activities is also rejected as the correlation of errors (-1.07 and -0.61 for the estimations for women and men respectively) are significant at 1% level. This result indicates that individuals allocate their time to different activities concurrently rather than independently.

**Table 7. Bivariate Tobit Estimation Results for Time Use of Women and Men**

	Women		Men	
	Paid	Unpaid	Paid	Unpaid
<i>constant</i>	-746.89** (123.65)	358.45** (45.80)	-223.76 (132.84)	185.18** (52.84)
<b><i>Household Characteristics</i></b>				
<i>poor</i>	-68.81** (21.31)	37.89** (8.58)	-33.83 (18.64)	-5.18 (7.59)
<i>urb_f</i>	-15.01 (28.16)	-54.79** (10.97)	62.27** (31.55)	-20.19 (12.56)
<i>urb_i</i>	-37.62 (28.92)	-24.47** (11.19)	69.07** (32.42)	-13.61 (12.88)
<i>rur_c</i>	21.26 (30.35)	-9.63 (12.18)	143.95** (32.61)	-19.79 (13.08)
<b><i>Individual Characteristics</i></b>				
<i>emp</i>	552.61** (21.69)	-103.49** (7.51)	365.02** (25.97)	-42.01** (9.66)
<i>married</i>	7.88 (19.10)	38.02** (7.67)	50.81** (21.24)	-44.69** (8.48)

<i>child-5</i>	-43.79** (13.49)	61.61** (5.32)	9.38 (12.50)	-7.43 (5.18)
<i>child-17</i>	-18.60* (11.18)	3.73 (4.51)	11.83 (11.58)	-5.81 (4.77)
<i>age</i>	25.74** (6.96)	-2.74 (2.61)	5.41 (6.63)	-2.65 (2.64)
<i>age</i> <sup>2</sup>	-0.32** (0.10)	0.03 (0.04)	-0.07 (0.08)	0.05 (0.03)
<i>school</i>	-0.75 (2.77)	-1.45 (1.11)	1.57 (2.54)	0.02 (1.03)
<i>corr. of errors</i>	-1.07** (0.07)		-0.61** (0.05)	
<i>N</i>	2356		1859	
<i>H</i> <sub>0</sub> : $\beta_j = 0$				
<i>chi</i> <sup>2</sup> (11)	845.55		301.01	

Note: The dependent variables are paid work (*Paid*) and unpaid work (*Unpaid*). Robust standard errors in parentheses. \* significant at 10 %, \*\* significant at 5 % level.

The estimated coefficients confirm most of our a priori expectations. Being poor increases women's time spent on unpaid work whereas in men's unpaid work time we do not see any significant impact. This finding signifies the unequal burden of poverty in terms of unpaid work time borne by women. With respect to paid work time again we observe asymmetric impacts of poverty on women's and men's lives. While being poor decreases women's time spent on paid work time, it does not have a significant influence on men's paid work time. This result indicates that whether men are coming from poor households or not, they do not spend significantly different time on paid work.

Compared to women living in ex-homeland areas, women living in urban areas spend less time on unpaid work, which is a result we expected. Men's unpaid work time, however, does not show a variation among different residential locations. This finding also indicates unequal burden of unpaid work on South African women particularly women living in ex-homeland areas. On the other hand, we observe a significant and positive impact of living in urban and rural commercial areas on men's paid work time. Men living in ex-homeland areas spend less time on paid work

compared to residents in urban and rural commercial areas. This result indicates the urban/ ex-homeland and rural/ex-homeland divide in terms of job opportunities.

When compared to unemployed and economically inactive people, both women and men spend a longer time on paid work while they spend less time on unpaid work confirming our expectations.

Similar to poverty impact, other estimated coefficients also differ for women and men. While being married or cohabiting with a partner increases women's time for unpaid work, its effect on men's time is positive for paid work and negative for men's time spent on unpaid work. These results can be seen as the confirmation of traditional division of work at home in which women do the unpaid work and men perform the breadwinning role, which confirms earlier evidence (Gupta 1999; Couprie 2007).

The presence of children between ages 0 and 5 significantly increases women's unpaid work time while, decreasing their paid work time, validating our expectations. We do not observe any significant impact of number of preschool children on men's paid and unpaid work time. In a similar manner, the presence of children between ages 6 and 17 affects only women's time use, decreasing their time for paid work. Unlike our expectations, we do not observe any significant impacts of young children living in the household on adults' unpaid work time.

Regarding the coefficients of age variables our expectations are only confirmed for women's paid work time increasing by age but decreasing after reaching a level. No significant results are obtained for the age coefficients in other estimations. Furthermore, as distinct from what we expected, years of schooling has no impact on both women's and men's time use.

To summarize the results obtained by unpaid and paid work time estimations using bivariate Tobit model, we have found evidence for the unequal burden of poverty on time use patterns: (1) controlling for other factors, being poor increases women's unpaid work time; (2) living in ex-homeland areas increases women's unpaid work burden while decreasing men's paid work time; (3) being married/cohabiting with a partner has an increasing impact on women's unpaid work whereas we observe the opposite impact on men's unpaid work time; (4) number of pre-school children raises women's unpaid work burden while decreasing their time spent on paid work; (5) age has a determining impact on only women's paid work time; (6) number of years of schooling has no significant impact on women's and men's time use patterns in South Africa.

Bivariate analysis of time use considers different unpaid work activities in one basket. However, according to Gronau (1977), different time-use activities can only be combined into composite measures if each responds similarly to various socioeconomic factors. Kimmel and

Connelly (2006) show specifically that time spent on social care responds in a unique way to various explanatory variables. Thus they conclude social care must be modeled as distinct from household maintenance. Following these, we estimated paid work, water and fuel collection, social care and household maintenance using a multivariate Tobit estimation. Results are presented in table 8.

**Table 8. Multivariate Tobit Estimation Results for Time Use of Women and Men**

	Women				Men			
	Paid	Care	Home	Water	Paid	Care	Home	Water
<i>Constant</i>	-746.21** (187.10)	210.64** (56.91)	120.92** (51.55)	61.46 (92.24)	-216.60 (216.49)	168.52 (158.68)	93.69 (78.65)	-104.64 (177.82)
<i>Household Characteristics</i>								
<i>poor</i>	-82.72** (32.81)	-2.42 (10.06)	35.36** (9.98)	62.45** (20.91)	-41.15 (28.83)	-57.31** (26.91)	-16.92 (12.94)	14.18 (26.65)
<i>urb_f</i>	-58.86 (34.53)	18.72 (10.50)	-32.70** (10.47)	212.24** (24.85)	36.34 (38.53)	-46.56 (43.63)	-16.90 (17.71)	-154.43** (44.04)
<i>urb_i</i>	-84.34** (38.00)	20.57 (14.03)	-2.34 (13.27)	113.28** (17.54)	49.56 (41.07)	-13.52 (43.89)	8.82 (18.74)	-24.66 (32.14)
<i>rur_c</i>	-20.14 (38.73)	9.25 (13.40)	4.41 (14.28)	-70.26** (17.46)	85.81** (41.20)	-53.99 (41.25)	-6.78 (17.61)	-24.16 (29.84)
<i>Individual Characteristics</i>								
<i>emp</i>	534.27** (33.07)	-20.68** (9.03)	-84.76** (9.31)	-43.24** (16.06)	389.85** (51.67)	-41.79 (34.03)	-33.34 (17.37)	-22.40 (31.64)
<i>married</i>	9.07 (29.92)	28.06** (9.46)	16.41 (9.78)	11.21 (15.65)	62.93 (33.07)	24.57 (31.67)	-39.46** (16.07)	-30.39 (25.98)
<i>child-5</i>	-21.25 (22.34)	82.26** (7.66)	6.17 (6.87)	0.34 (10.75)	-2.74 (19.50)	49.27** (14.88)	-2.59 (10.78)	-16.69 (19.41)
<i>child-17</i>	-15.83 (17.17)	6.48 (6.24)	2.16 (5.53)	-4.68 (8.14)	33.68 (19.88)	13.93 (17.96)	-15.66 (9.64)	6.05 (9.77)
<i>age</i>	23.74** (10.96)	-14.08** (3.21)	7.06** (2.91)	-2.75 (5.01)	7.38 (10.26)	-24.95** (7.64)	0.43 (3.94)	-0.34 (8.97)
<i>age<sup>2</sup></i>	-0.26	0.15**	-0.09**	0.01	-0.11	0.31**	0.01	0.01

	(0.15)	(0.04)	(0.04)	(0.07)	(0.13)	(0.09)	(0.05)	(0.11)
<i>school</i>	1.93	2.26	-1.29	-10.77**	0.68	13.03**	-1.83	-4.14
	(4.33)	(1.44)	(1.33)	(2.61)	3.68	(4.23)	(1.77)	(3.57)
<i>Correlation of cross-equation error terms</i>								
<i>Care</i>	-0.20**				-0.22**			
	(0.04)				(0.05)			
<i>Home</i>	-0.48**	-0.01			-0.35**	0.05		
	(0.04)	(0.03)			(0.04)	(0.05)		
<i>Water</i>	-0.04	0.0006	0.10**		-0.03	0.06	0.10	
	(0.06)	(0.05)	(0.05)		(0.07)	(0.10)	(0.10)	
<i>N</i>	2356				1859			
<i>H<sub>0</sub>: β<sub>j</sub> = 0</i>								
<i>chi<sup>2</sup>(44)</i>	940.89				278.16			
<i>H<sub>0</sub>: independence of time spent at each activity</i>								
<i>chi<sup>2</sup>(6)</i>	3137.28				3000.37			

Note: The dependent variables are paid work (*Paid*), social care (*Care*), home maintenance (*Home*) and water and fuel collection (*Water*). Robust standard errors in parenthesis. \* significant at 10 %, \*\* significant at 5 % level.

It is observed that the specification of the model is jointly highly significant for both estimations. As in the bivariate model, the likelihood ratio test for the independence of time allocations imply that time allocation to different activities that not explained by the explanatory variables are correlated.

The estimation results imply that poverty status has a major impact on women's time use patterns. Compared to women who are coming from non-poor households, poor women spend more time on water and fuel collection as well as on home maintenance. This provides an explanation for the sources of a higher amount of unpaid work time spent by women as found in the results of our bivariate Tobit estimation. For men, except for the time spent on social care, we do not observe any significant impact of income poverty on paid and other unpaid work activities. These show us once more that the burden of poverty is not equally shared within a household.

Coefficients estimated for paid work are similar to the results obtained in bivariate Tobit analysis. With regard to social care time, besides the negative impact of poverty on men's caring

time, we observe that employed women compared to unemployed ones spend significantly less amount of time on caring activities. While married/cohabiting women do more social care work, there is no significant impact of marital status on men's time spent on caring activities. This result provides confirming evidence for the fact that caring is an activity, which is mostly considered as "women's work."

Similar to social care time, the homemaking burden, which rises under poverty conditions, falls also on the shoulders of women. For men, the only significant factor in determining the time spent on home maintenance is the marriage/cohabiting dummy. Married/cohabiting men spend a significantly less amount of time on home maintenance compared to their single counterparts confirming earlier evidence provided by Gupta (1999) and Couprie (2007).

Besides the finding suggesting that poor women spend more time on fetching water and collecting fuel, estimations of time spent on water and fuel collection presents that residential location plays an important role. For instance when compared to women living in ex-homeland areas women living in all other locations spend a lower amount of time collecting water and fuel. Similarly men living in urban formal areas spend a significantly lower amount of time on water and fuel collection compared to the ones living in ex-homeland areas.

Unlike the bivariate Tobit results, here, we observe that number of years of schooling has a significant negative impact on women's time spent on water and fuel collection, which might capture the positive relation between the level of education and probability of having a job. Interestingly, we also observe a positive and significant impact of years of schooling on men's time spent on caring activities, which supports earlier findings provided by Huber and Spitze (1983) that better educated men spend more time on unpaid work activities.

To conclude, multivariate Tobit estimation results show that, controlling for several household and individual factors: (1) the impact of poverty on time-use patterns demonstrate variations within a household; (2) being poor raises the unpaid work burden of women via increasing their time spent on water and fuel collection as well as on home maintenance; (3) being married/cohabiting has an increasing impact on time spent on unpaid work by women particularly by increasing their time spent on caring activities. On the other hand, married/cohabiting men spend less time on home maintenance compared to their single counterparts; (4) number of years of schooling decreases women's time spent fetching water and collecting fuel while years of schooling has an increasing impact on men's time spent on social care implying that better educated men care more.

## V. CONCLUSION

Widespread income poverty has been a major challenge in post-apartheid South Africa.

Understanding poverty involves understanding its dynamics creating different forms of inequalities among different social groups. Conventional analysis of poverty considers household as the unit of analysis assuming that resources are equally shared within a household, yet, in poverty and intra-household allocation of resources literature, studies have shown that individuals holding the same household characteristics can be treated dissimilar. There are many studies that discuss the impact of poverty on the distribution of income based resources. Unlike these studies in the literature, we consider the allocation of time a specific type of resource, within a household. Despite the fact that time is a special resource that we have, the impact of poverty on time-use patterns, has not however, been much discussed.

Using the first time-use survey conducted in 2000 in South Africa in this study we estimated the impact of poverty on South African women's and men's time-use patterns. We used both bivariate and multivariate Tobit estimation methods. We have found that (1) poverty increases women's time spent on unpaid work by increasing their time spent on water and fuel collection as well as on home maintenance, whereas we do not observe any significant impact of poverty on men's unpaid work time. This shows that the unpaid work burden of poverty is not shared equally within a household; (2) marriage/cohabiting increases women's unpaid work time particularly by increasing their time spent on caring activities. On the other hand, married/cohabiting men spend less time on home maintenance compared to their single counterparts; (3) better educated men care more: years of schooling increases men's time spent on social care. Years of schooling, on the other hand, decrease women's time spent fetching water and collecting fuel.

Should these results be taken into account, they might prove to be useful in designing effective anti-poverty policies which are sensitive to the unequal burden of poverty on men and women in South Africa. Similar patterns might be observed in other developing countries where we observe widespread income poverty. In order to fully account for inequalities among household members including children, we need further research that explores the impacts of poverty on children's time use patterns.

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## Appendix

**Table A1. Activity List by Codes<sup>7</sup>**

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### Total Unpaid Work Activities

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#### 1. Water and Fuel Collection

- 236 Collecting fuel, firewood or dung
- 250 Collecting water

#### 2. Social Care

- 511 Physical care of children: washing, dressing, feeding mentioned spontaneously
  - 512 Physical care of children: washing, dressing, feeding not mentioned spontaneously
  - 521 Teaching, training and instruction of household's children mentioned spontaneously
  - 522 Teaching, training and instruction of household's children not mentioned spontaneously
  - 531 Accompanying children to places: school, sports, lessons, etc. mentioned spontaneously
  - 532 Accompanying children to places: school, sports, lessons, etc. not mentioned spontaneously
  - 540 Physical care of the sick, disabled, elderly household members: washing, dressing, feeding, helping
  - 550 Accompanying adults to receive personal care services: such as hairdresser, therapy sessions, etc.
  - 561 Supervising children and adults needing care mentioned spontaneously
  - 562 Supervising children and adults needing care not mentioned spontaneously
  - 580 Travel related to care of children, the sick, elderly, and disabled in the household
  - 590 Care of children, the sick, elderly, and disabled in the household not elsewhere classified
  - 610 Community organized construction and repairs: buildings, roads, dams, wells, etc.
  - 615 Cleaning of classrooms
  - 620 Community organized work: cooking for collective celebrations, etc.
  - 630 Volunteering with or for an organization
  - 650 Participation in meetings of local and informal groups/caste, tribes, professional associations, union, political, and similar organizations
  - 660 Involvement in civic and related responsibilities: voting, rallies, etc.
  - 671 Caring for non-household children mentioned spontaneously
  - 672 Caring for non-household children not mentioned spontaneously
  - 673 Caring for non-household adults
  - 674 Other informal help to other households
  - 680 Travel related to community services
  - 690 Community services not elsewhere classified
- 

#### 3. Home Maintenance

- 410 Cooking, making drinks, setting and serving tables, washing up
- 420 Cleaning and upkeep of dwelling and surroundings
- 430 Care of textiles: sorting, mending, washing, ironing, and ordering clothes and linen
- 440 Shopping for personal and household goods

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<sup>7</sup> Following activity groups are created with corresponding list of activities included in each group. A complete list of the activity codes based on the activity classification system used in TUS 2000 is accessible in SSA (2001) <http://www.statssa.gov.za/publications/TimeUse/TimeUse2000.pdf>.

**Table A1. Cont.**

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- 441 Accessing government services, such as collecting pension, going to post office
- 448 Waiting to access government service
- 450 Household management: planning, supervising, paying bills, etc.
- 460 Do-it-yourself home improvements and maintenance, installation, servicing and repair of personal and household goods
- 470 Pet care
- 480 Travel related to household maintenance, management, and shopping
- 490 Household maintenance, management, and shopping not elsewhere classified
- 491 Chopping wood, lighting fire, and heating water not for immediate cooking purposes

**Paid Work Activities**

- 111 Wage and salary employment other than domestic work
  - 112 Outworkers/home-based work for an establishment
  - 113 Domestic and personal services produced by domestic work
  - 114 Unpaid employment in establishment
  - 115 Work as employer/self-employed for an establishment
  - 130 Working in apprenticeship, internship, and related positions
  - 140 Short breaks and interruptions from work
  - 150 Seeking employment and related activities
  - 180 Travel to/from work and seeking employment in establishments
  - 190 Employment in establishments not elsewhere classified
  - 210 Crop farming and market/kitchen gardening: planting, weeding, harvesting, picking, etc.
  - 220 Tending animals and fish farming
  - 230 Hunting, fishing, gathering of wild products and forestry
  - 240 Digging, stone cutting, splitting, and carving
  - 260 Purchase of goods for and sale of outputs arising from these activities
  - 280 Travel related to primary production activities (not for establishments)
  - 290 Primary production activities (not for establishments) not elsewhere classified
  - 310 Food processing and preservation activities: grain processing, butchering, preserving, curing
  - 320 Preparing and selling food and beverage preparation, baking, confectionery, and related activities
  - 330 Making and selling textile, leather, and related craft: weaving, knitting, sewing, shoemaking, tanning, products of wood
  - 340 Building and extensions of dwelling: laying bricks, plastering, thatch, roofing, maintaining and repairing buildings; cutting glass, plumbing, painting, carpentry, electric wiring
  - 350 Petty trading, street/door-to-door vending, shoe-cleaning and other services performed in non-fixed or mobile locations
  - 360 Fitting, installing, tool setting, maintaining and repairing tools and machinery
  - 370 Provision of services for income such as computer services, transport, hairdressing, cosmetic treatment, baby-sitting, massages, prostitution
  - 380 Travel related to services for income and other production of goods (not for establishments)
  - 390 Services for income and other production of goods (not for establishments) not elsewhere classified
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