

# *Development Economics and Public Policy*

## **WORKING PAPER SERIES**

*Paper No. 21*

### **A Gendered Analysis of ‘Time Poverty’ - The Importance of Infrastructure**

David Lawson

IDPM, University of Manchester

**May 2007**

ISBN: 978-1-904143-93-2

Further details:  
Published by: Institute for Development Policy and Management  
University of Manchester,  
Harold Hankins Building, Precinct Centre,  
Oxford Road, Manchester M13 9QH, UK  
Tel: +44-161 275 2814 Fax: +44-161 273 8829  
Email: [idpm@manchester.ac.uk](mailto:idpm@manchester.ac.uk) Web: [www.manchester.ac.uk/idpm](http://www.manchester.ac.uk/idpm)

# **A Gendered Analysis of ‘Time Poverty’ – The Importance of Infrastructure**

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## **Abstract**

This paper uses a combination of nationally representative individual level time use data combined with household and community data to further our understanding of time use, and how infrastructure impacts on gender disaggregated time poverty. With a common, and growing, perception in the empirical literature being that Sub Saharan African females are typically disadvantaged in market based activities because of the large time burden of having to undertake both formal work and domestic duties, it is important to understand some of these key processes and issues that underpin, and link with, poverty reduction. Using nationally representative from Lesotho we are able to provide unique insights into gender related, formal and informal, work allocations and specifically obtain insights regarding the main determinants of those who are ‘time poor’ and how key infrastructural elements impact on this.

*Key words:* Time Poverty, Time Use, Gender, Lesotho,

## **1. Introduction**

The analysis of concepts and applications of poverty, particularly from an economist's perspectives, are commonly limited to monetarily defined measures such as the use of consumption, income, or the construction of an asset index. Throughout the 1990's such measures have risen in popularity as the collection of nationally based household data has become more common. Although these approaches have extended our understanding of the complexity of the processes underlying poverty reduction (Moser and Felton 2006), they are almost always limited by the major drawback of only being able to disaggregate to the household level. Hence, such measures are restrictive in their capacity to analyse individual level poverty/welfare, intra-households activity, and other very important non monetary defined welfare based policy issues.

Considering the increasing emphasis to consider non income based measures of welfare (Gunther and Klasen, 2006), recent research (Hammersmith and Pfann, 2005) is increasingly noting the benefits of using time use data, and appropriate concepts that can arise from this. However, it should be noted that the use of such data is not solely limited to the application of welfare issues, but also a number of other areas of development. For example, time use data allows for particularly unique assessment of intra-household issues, limitations individuals have in their labour supply, and has provided, at least limited, findings on important policy issues such as how infrastructure impacts on time usage. For example the failure to provide adequate or affordable infrastructure facilities and services for low income users, has often been associated with negative social impacts of inappropriate provision (Masika and Baden 1997:1). Despite this increased focus however, to date this has rarely resulted in quantitative based investigations into such issues.

The aim of this paper is therefore to consider a different poverty concept, that has its origins in the same way monetary based poverty based welfare measures are calculated, but allows us to add to our understanding of deprivation and our non income based poverty knowledge. We achieve this by using time use data, from Lesotho, and

calculating a ‘time poverty’ measure. By adopting such an approach and combining this with infrastructure data, the paper provides a contribution to improving our ability to identify effective policy relevant interventions, focussing on gender differentials of time use, through infrastructure, and on the determinants of time poverty.

We approach the analysis of time use through two main methods. Firstly, we analyse the time spent on different types of activities, and disaggregate this by gender. However, because Lesotho’s latest Household Budget Survey (HBS), 2002, is particularly rich regarding infrastructure data, we are also able to provide a unique focus on the impact certain types of infrastructure has on individuals time use. The second, complementary method, adopts a concept of ‘time poverty’ similar to that adopted by Bardasi and Wodon (2006) which basically considers the time an individual spends on productive activities such as working, farming, domestic and other duties (collecting firewood etc.) from which an individual can then be defined as ‘time poor’.

Lesotho is a particularly interesting case to study the determinants of time poverty, and impact of infrastructure. Although the country is relatively small, with a population of approximately 2 million, a number of characteristics specific to Lesotho are relevant to a number of SSA countries. In particular, despite some very limited progress in reducing consumption based poverty, some parts of the country have had limited infrastructure investment, with for example very limited transport networks in remote rural areas, and the country also has one of the highest HIV/AIDS levels in the SSA (43% for women in their late 30’s, and 41% for men 30-34 aged) – a disease that places huge time, and economic, burden on individuals and families.

The paper is structured as follows. Section 2 outlines the models used to estimate the determinants of time poverty with the data and variables employed. Section 3 presents some descriptive statistics disaggregated by gender, and Section 4 reports on the results of the econometric analysis of the determinants of time poverty. Section 5 concludes.

## 2. Methods and Data

As stated by Vickery (1977) if one is to calculate the minimal level of consumption, then this requires both money and household production, of which time use is a major component of the latter. Time use analysis is well grounded in economic theory through the use of household models such as Becker's household production model (see Pitt and Rosenzweig, 1986), where the household maximises a utility function subject to consumption and labour supply etc., and is maximised subject to a time constraint. For example, the more time a person spends working or undertaking productive activities the less they spend on leisure time – i.e. an individual, chooses inputs to work, leisure and other activities as a function of a number inputs, one of which is time.

Despite some time use data being generated for developing countries (see Charmes 2006, for a review), most of the work, such as that by Newman (2002) for Ecuador tend only go as far as hinting at a time poverty concept, i.e. they find that there is an upper limit of hours that can be worked in total, for work and all other duties. In this case, they found that when women enter the labour market, that the number of hours spent on domestic and other duties decreased, hence their total labour time did not change. Wodon and Beegle (2006), for Malawi, also note evidence that would support this upper overall limit of time, and therefore support the 'time poverty' concept.

Only one prior paper on time use has adopted an approach that calculates a 'time poverty' line. Bardasi and Wodon (2006), determined the proportion of those time poor by computing the total amount of time spent by individuals in the labour market, in domestic chores and in collecting water and wood. However, an alternative to this could be to also add the amount of time spent helping other households and in undertaking community services. In the case of Lesotho we adopt the former of these approaches, where we analyse time poverty at the individual level.

As also outlined in Bardasi and Wodon (2006), for Guinea, there are no established practices in measuring time poverty, however one option is to use a time poverty line that

is a multiple of the median number of hours for the all individuals. An alternative is to use a more judgemental approach in setting a time poverty line would be to manually calculate what might be perceived to be a 'normal working day' e.g. adding the number of hours worked(including farming of own land)/schooled with home chores. Hence, although the definition of time poverty in this context may appear relatively broad, by incorporating domestic chores, it is supported both intuitively and by previous work (Ilahi, 2000). In line with this prior work we adopt, after undertaking sensitivity analysis, a multiple of 1.5 of the median hours worked.<sup>12</sup>

The data used to estimate our time model comes from the 2002 Lesotho Bureaus of Statistics. This was a nationally representative government survey which collected time use data for 8182 adults, in addition to socio-economic and living conditions survey. Although nationally based time use data is typically prone to measurement error in the response and recording, this is commonly driven by the questionnaire design, that usually adopts a format of asking respondents for the number of hours worked, slept etc., without much focus on the thought 'mental framing' for the respondent. The Lesotho time use survey adopts one of the better methods of collecting time use data by asking people to complete a time-diary during one day. The diary contains different pre-printed activities and pre printed time intervals of 15 minutes, for a 24 hour period. This diary is then completed by the respondent who draws a line, on the appropriate row in the diary, that reflects the specific activity undertaken, and during the hours when this was done. By adopting such an approach memory-problems are minimised, and the use of time diaries simplified. All of which increases the accuracy of the data.

When analysing the determinants of time poverty in this context we adopt a reduced form approach. As explanatory variables we consider the impact of socio-economic variables, such as education, age, martial status and provide dummy variables to represent the districts that people reside. The relevant policy variables for infrastructure are also

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<sup>1</sup> Variations of the multiple provided unrealistic working hours for the average working week of the average individual.

included, for example distance to water source, primary school, nearest public transport, and health centre all of which is provided at the individual/household level. As a unique Living Conditions Index (LCI) module also collected individuals opinions on different components of Lesotho's infrastructure, we are also able to extend the analysis by inter-linking this with the socio-economic questionnaire. By doing so we are not only able to see who is 'time poor' and how people use their time, but how this is related to their ability to take advantage of infrastructure and the quality of such infrastructure.

### **3. Descriptive Statistics**

The nationally representative survey for Lesotho reveals an interesting picture of men and womens time use. Background time use patterns of male and females in Table 1 show the average number of hours, per day, spent on work and other activities. Age, marital status, educational status, and dependency ratio are all disaggregated by gender. In addition and in line with the theoretical approach outlined above, we can also see the proportion of individuals that are time poor, across the same categories.

Analysing the 'time poor' category, in contrast with most prior SSA time based evidence, it would appear that in general Lesotho men are more time poor than women. On average 8.2% of Lesotho men are time poor compared with 6.8% of women. This is perhaps surprising given the other SSA based evidence (see Charmes, 2006 for summary), indicates women are more time poor. However, one must remember that such figures are always a function of the distribution of time poverty. In this case, a smaller proportion of women are time poor because their time distribution curve is flatter at the extremes, compared with that for males. If for example, we reduce the time poverty line by 10%, although the proportion of time poor men remains higher than women, the difference between the two is marginal. Hence, we need to look further than the simple time poverty incidence to establish clear patterns of time deprivation.

More enlightening are the characteristics associated with the hours spent in each type of activity, and time poverty. In Table 1 we can see that both males and females aged 25-34,

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<sup>2</sup> See Bardasi and Wodon (2006) for technical details of this approach.

and 35-44 are particularly time poor. This is of no surprise given that they are the most economically active. This is shown by the above average time spent, per day, in employment for both men (3.7) and women (2.6) of the 25-34 age group, compared with male/female overall averages of 2.1/1.6 hours. However, and what further explains the above mentioned gender differences in time poverty is that men, on average, work 5 times more hours than women on farming and livestock. This is an unusually high multiple relative to other SSA evidence, and reflects idiosyncratic features associated with Lesotho, where activities such as livestock and farming are almost completely dominated by men.<sup>34</sup> For cooking and domestic work, and firewood collection undertaken, the results are as expected, with women working far longer hours per day (3.73 and 0.56 hours per day, respectively) compared with men (1.48 and 0.23 hours per day).

Of the other individual level characteristics we find that education, up to the level of secondary school, increases the incidence of time poverty, for both men and women. Beyond secondary time poverty reduces primarily because individuals who have for example, university degrees undertake far more formal employment hours per day, but as expected they spend less time cooking and cleaning, and unsurprisingly hardly ever collect firewood.

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<sup>3</sup> Although cooking, domestic work etc. are equally as dominated by women, as livestock activities are by men, i.e. women (men) work 3.73 hours (1.48hours) on average per day, the disproportionate male farming activity outweighs that of domestic duties. The result, in this case – for what appears to be slightly skewed data, is that higher proportions of men than women are time poor.

<sup>4</sup> For Guinea, for example, total hours worked on productivity (livestock, employment etc.) by men was no more than two time more than women (Bardasi and Wodon 2006). Furthermore for a cross section of countries (Benin, South Africa, Madagascar, and Mauritius) the median multiple of SNA productive hours spent by men, compared with women, was just above the multiple of 2 (Charmes 2006).

**Table 1: Time Use Descriptive Statistics Disaggregated by Male and Female Categories**

	Working, Employment and Own Business	Farm, Live- stock & Fish	Fire- wood & Water	Cooking & Domestic	Social activites	School, TV & Read	Travel & Shop	Other (caring etc.)	% Time Poor
<b>All</b>	1.81	1.37	0.42	2.80	1.95	1.20	1.07	1.20	7.88
<b>Age</b>									
<b>Male (all)</b>	2.10	2.55	0.23	1.48	2.16	1.46	1.22	0.91	8.28
15-24	0.81	2.81	0.27	1.49	2.14	3.19	1.18	0.74	8.14
25-34	3.34	2.27	0.26	1.42	2.15	0.66	1.27	0.96	10.37
35-44	3.72	2.04	0.13	1.46	2.02	0.67	1.26	1.05	8.97
45-54	2.79	2.42	0.20	1.50	2.11	0.59	1.47	1.00	8.22
55-64	1.60	2.86	0.23	1.58	2.18	0.53	1.38	0.98	5.99
65 +	0.88	2.98	0.20	1.54	2.58	0.24	0.69	0.91	5.69
<b>Female (all)</b>	1.62	0.54	0.56	3.73	1.81	1.02	0.97	1.41	6.78
15-24	0.79	0.35	0.55	3.66	1.83	2.49	1.01	1.39	6.23
25-34	2.27	0.40	0.52	3.96	1.61	0.58	1.10	1.59	8.49
35-44	2.55	0.54	0.49	3.76	1.69	0.49	1.04	1.51	8.80
45-54	2.36	0.72	0.62	3.82	2.05	0.38	0.97	1.35	6.75
55-64	1.34	0.93	0.68	3.86	1.88	0.30	0.81	1.34	6.26
65 +	0.37	0.77	0.62	3.27	2.35	0.19	0.55	1.16	2.35
<b>Marital Status: Male</b>									
Never Married	1.22	2.56	0.25	1.52	2.20	2.82	1.13	0.80	7.69
Married/Living Together	2.89	2.60	0.17	1.35	2.06	0.55	1.31	0.98	8.85
Divorced	2.32	2.17	0.42	2.08	2.46	0.37	1.07	0.90	8.19
Widowed	1.42	2.50	0.36	1.90	2.55	0.39	1.17	1.00	7.59
<b>Female</b>									
Never Married	1.18	0.28	0.46	3.49	1.77	2.68	1.04	1.27	6.93
Married/Living Together	1.71	0.62	0.63	4.14	1.72	0.43	0.97	1.57	6.73
Divorced	3.17	0.48	0.49	3.41	1.71	0.36	0.91	1.52	8.77
Widowed	1.50	0.71	0.58	3.26	2.07	0.28	0.87	1.26	6.06
<b>Highest Education Level</b>									
<b>Male</b>									
None: can't read/write	0.73	4.32	0.33	1.71	2.31	0.20	0.89	0.77	7.93
None but can read/write	1.50	3.25	0.24	1.55	2.35	1.13	1.08	0.93	8.06
Primary	2.30	1.95	0.22	1.40	2.05	2.22	1.36	0.92	8.82
Secondary	3.89	0.66	0.13	1.28	1.96	2.13	1.61	0.94	10.36
Vocational	3.79	0.40	0.10	1.32	2.40	1.94	1.70	0.79	3.20
Teacher/technical training	5.15	0.34	0.13	1.38	1.34	1.88	1.30	0.97	3.19
University or higher	5.77	0.13	0.00	1.05	1.48	1.89	1.30	1.08	6.57
<b>Female</b>									
None: can't read/write	0.50	0.70	0.85	3.72	2.21	0.35	0.72	1.28	5.26
None but can read/write	0.88	0.67	0.77	3.96	1.99	0.73	0.81	1.40	5.67
Primary	1.58	0.57	0.49	3.82	1.72	1.21	1.01	1.45	7.59
Secondary	2.92	0.14	0.26	3.40	1.64	1.46	1.21	1.52	8.37
Vocational	3.93	0.17	0.09	3.14	1.36	1.14	1.39	1.55	10.46
Teacher/technical training	4.89	0.23	0.07	2.47	1.07	1.38	1.42	1.17	5.59
University or higher	5.84	0.02	0.01	1.98	1.11	1.69	1.49	1.25	4.83
<b>Dependency Ratio</b>									
<b>Male Headed Households</b>									
<0.5	1.36	1.56	0.48	3.00	2.05	1.06	1.07	1.18	6.97
0.5-1	1.41	1.55	0.49	2.81	2.14	1.19	0.98	1.16	6.76
1-2	1.36	1.47	0.47	2.85	2.18	1.19	0.95	1.19	6.90
>2	1.60	1.83	0.37	2.33	2.13	1.12	1.05	1.03	5.99
<b>Female Headed Households</b>									
<0.5	1.40	1.65	0.48	2.81	1.99	0.95	0.87	1.17	7.62
0.5-1	1.54	1.52	0.51	2.81	2.20	0.93	0.99	1.21	7.65
1-2	1.53	1.66	0.56	2.79	1.94	0.97	0.95	1.21	7.97
>2	1.74	1.12	0.46	3.27	1.93	1.29	1.18	1.21	11.05

Source: Authors calculations

From a household head perspective, interestingly Female Headed Households (FHH) are

significantly more time poor than Male Headed Households (MHH). The differential between the MHH and FHH when considering dependency ratios is very stark. For example, the proportion of time poor FHH's that have a dependency ratio of two, or above, is almost double that of MHH's.<sup>5</sup> From Table 1 we can see that this appears to be primarily because the amount of time spent cooking and on domestic work is far higher than for MHH's. Intuitively, this would appear extremely logical and supports anecdotal, and qualitative evidence from Lesotho, where HIV/AIDS incidence levels of up to 40% (DHS, 2006) are having a huge impact on dependency ratios and family structures. As is common in a number of African countries, it appears that there are disproportionate numbers of young children in FHH's.

Having provided some simple background on the gender time issues we now complement this with by considering issues of infrastructure. As stated above, a unique feature of Lesotho HBS 2002 is that it contains in depth questions on infrastructure, collected from both the socio-economic questionnaire, but also from Living Conditions Index (LCI) information. This latter data in particular is interesting in that it enables us to cross match issues of time poverty with infrastructure quality, as perceived by the end users (Table 3).

Considering the time taken to reach public goods such as the nearest drinking water source, health care, primary schools, and health centre, there are some interesting gender differences - particularly associated with the distance to health centre (Table 2). For example, above average proportions of females (39%) compared to males (36.8%) have to travel more than 1 hour to get to the nearest health centre. Interestingly, almost half (two thirds) of both males and females in the lowest quintile (rural) are more than 1 hour away from a health centre. Time poverty incidence appears to increase the further individuals have to travel to a health centre. For example 31.6% (36.8%) of females (males) who are time poor have to travel for more than one hour to a health centre. The higher proportion of males than females is probably explained by the large numbers of herd boys who may not have any single base from which they travel to health centres.

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<sup>5</sup> Dependency ratio refers to the number of young (<15 years of age) + old (>60 years of age)/working aged individuals.

For distance to public transport (nearest primary school) more than 20% (30%) of rural households travel for more than 1 hour. Perhaps surprisingly there appears to be relatively few gender differences across both of these infrastructure categories. For example, one might expect greater proportions of women to be time poor as their daily duties may involve taking children to school. Perversely, if anything the reverse appears to be true, with 24.6% (18.7%) of time poor men (women) being more than 45 minutes to primary school. Considering distance to nearest water source, there appear to be few gender differences, although 12.6% of men, compared with 16.1% of women, in the lowest quintile, have to travel for more than 30 minutes to the nearest water source.

Considering further infrastructure variables, we can see from Table 3, that significantly smaller proportions of the monetary based poorest FHH's (9.6%) live in dwellings that do not have electricity, compared with MHH's (11.9%). On average, only 1.8% of rural households have electricity and 2.2% have piped water onto the premises. Perhaps of most interest from a gender perspective is that, of the poorest households, significantly higher proportions of FHH's (48.9%), compared with MHH's (43.3%), use wood as the main source to heat their dwelling. This might further explain why greater proportions of FHH's, with higher dependency ratios, are time poor, than compared with MHH's.

**Table 2. Time Taken To Reach Public Goods, Disaggregated By Lowest/Highest Quintile and Urban/Rural (By Column)**

	All	Male All	Urban	Rural	Lowest Wealth Quintile	Highest Wealth Quintile	Time Poor	Females All	Urban	Rural	Lowest Wealth Quintile	Highest Wealth Quintile	Time Poor
<b>How long does it take to reach nearest supply of drinking water</b>													
0.14 mins	74.3%	74.1%	85.5%	63.8%	67.3%	83.1%	73.2%	74.5%	83.8%	63.2%	65.6%	84.4%	74.5%
15-29 mins	15.8%	16.3%	9.2%	22.7%	20.1%	10.0%	15.4%	15.4%	10.8%	20.5%	18.3%	9.0%	16.3%
30-44 mins	6.0%	5.7%	3.2%	7.8%	6.6%	4.6%	6.1%	6.3%	3.1%	9.8%	9.7%	4.1%	5.2%
45-59 mins	1.6%	1.6%	0.9%	2.1%	1.9%	1.0%	2.5%	1.7%	1.2%	3.2%	3.2%	0.7%	1.5%
60+ mins	2.3%	2.4%	1.2%	3.5%	4.1%	1.3%	2.9%	2.1%	1.1%	3.3%	3.2%	1.8%	2.4%
<b>How long does it take to reach nearest point for public transport</b>													
0.14 mins	49.2%	48.7%	64.2%	34.8%	37.7%	61.5%	45.0%	49.5%	61.6%	36.2%	37.6%	58.3%	54.9%
15-29 mins	20.9%	21.0%	24.8%	17.6%	22.2%	23.1%	21.4%	20.8%	25.9%	15.2%	19.6%	21.7%	19.3%
30-44 mins	9.9%	9.5%	7.7%	11.1%	13.2%	5.4%	10.7%	10.1%	8.3%	12.2%	15.3%	7.3%	9.5%
45-59 mins	4.2%	4.0%	1.7%	6.1%	4.4%	2.6%	4.3%	4.4%	2.1%	7.0%	6.3%	2.2%	4.0%
60+ mins	15.8%	16.8%	1.7%	30.4%	22.5%	7.5%	18.6%	15.2%	2.2%	29.5%	21.1%	10.5%	12.3%
<b>How long in minutes does it take from here to reach nearest primary school?</b>													
0.14 mins	31.6%	31.5%	43.0%	21.1%	22.1%	44.6%	28.9%	31.6%	40.4%	21.9%	22.7%	41.5%	33.7%
15-29 mins	27.7%	27.8%	30.6%	25.2%	26.7%	26.2%	24.6%	27.7%	31.8%	23.2%	24.7%	27.2%	27.9%
30-44 mins	19.1%	18.9%	17.2%	20.5%	24.2%	14.0%	21.8%	19.2%	18.0%	20.4%	23.0%	15.8%	19.6%
45-59 mins	8.6%	8.5%	4.9%	11.7%	10.7%	5.2%	9.6%	8.7%	4.7%	13.0%	12.7%	5.4%	7.67%
60+ mins	13.1%	13.4%	4.4%	21.5%	16.3%	10.1%	15.0%	12.9%	5.0%	21.6%	16.8%	10.0%	11.0%
<b>How long does it take to reach nearest health centre</b>													
0.14 mins	16.4%	16.5%	26.7%	6.8%	7.3%	24.8%	13.9%	16.3%	24.0%	8.3%	10.0%	24.5%	20.9%
15-29 mins	21.1%	21.1%	32.7%	10.6%	16.8%	29.7%	23.6%	21.1%	31.6%	9.6%	17.0%	24.7%	22.4%
30-44 mins	16.7%	17.4%	20.4%	11.3%	16.5%	16.5%	16.1%	15.6%	23.2%	11.1%	16.6%	17.6%	17.8%
45-59 mins	8.1%	8.2%	8.3%	7.7%	9.0%	7.3%	9.6%	8.0%	9.2%	7.0%	7.7%	8.6%	7.4%
60+ mins	37.7%	36.8%	12.0%	63.6%	50.4%	21.7%	36.8%	39.0%	12.1%	64.0%	48.7%	24.6%	31.6%

Source: Authors calculations

**Table 3: Infrastructure: Electricity/Water Source/Heating Disaggregated by Gender and Time Poverty**

	All	Urban	Rural	All Time Poor	Quintile 1	Quintile 5	All Males Time Poor	All MHH Time Poor	MHH Quintile 1	MHH Quintile 5	All Females Time Poor	All FHH Time Poor	FHH Quintile 1	FHH Quintile 5
<b>% of dwelling supplied with electricity?</b>	14.9%	26.9%	1.8%	12.5%	11.3%	17.9%	12.4%	12.5%	11.9%	17.9%	12.7%	12.5%	9.6%	18.1%
<b>What is the main source of water for your household?</b>														
Piped water on premises	27.2%	52.7%	2.2%	25.2%	20.4%	31.4%	24.4%	24.7%	20.6%	30.7%	26.8%	26.3%	19.8%	33.0%
Piped community water	41.5%	31.4%	51.3%	42.6%	45.3%	38.9%	41.4%	41.2%	43.6%	37.8%	45.2%	45.9%	48.8%	41.5%
Catchment's Tank	0.4%	0.4%	0.4%	1.0%	0.8%	0.8%	1.0%	1.0%	0.7%	0.8%	0.9%	1.0%	0.8%	0.8%
Public well	9.82%	5.6%	14.0%	9.4%	10.5%	8.8%	10.4%	10.6%	11.2%	9.6%	7.2%	6.6%	9.0%	7.0%
Private Well	0.4%	0.6%	0.3%	1.0%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	1.3%	1.4%	1.1%	1.1%
Covered spring	5.2%	1.4%	8.9%	5.0%	5.4%	4.5%	5.7%	5.5%	6.0%	5.2%	3.5%	3.8%	4.2%	3.1%
Uncovered spring	9.3%	2.2%	16.1%	9.5%	10.5%	8.6%	9.7%	9.8%	10.8%	9.1%	9.0%	8.7%	9.8%	7.5%
River	0.1%	0.0%	0.2%	0.3%	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%
Borehole	4.4%	2.8%	6.0%	4.9%	4.7%	4.4%	5.1%	5.0%	4.9%	4.7%	4.3%	4.4%	4.2%	3.7%
Other	1.7%	2.9%	0.5%	1.4%	1.5%	1.6%	1.3%	1.4%	1.3%	1.3%	1.6%	1.7%	2.0%	2.0%
<b>How do you usually heat this dwelling?</b>														
Electricity	4.7%	8.7%	0.2%	3.4%	2.6%	6.0%	3.5%	3.5%	2.8%	6.6%	3.1%	2.9%	2.2%	4.7%
Gas	5.2%	9.2%	1.9%	5.2%	4.1%	6.4%	5.8%	5.9%	4.6%	6.8%	3.7%	3.5%	2.8%	5.5%
Paraffin	36.5%	56.6%	14.8%	37.2%	32.5%	38.1%	36.0%	36.5%	32.6%	36.9%	39.7%	38.8%	32.3%	41.0%
Coal	5.8%	8.1%	4.2%	6.2%	6.0%	6.5%	6.5%	6.5%	6.4%	7.1%	5.6%	5.6%	4.0%	5.1%
Wood	39.4%	15.0%	63.5%	39.4%	44.8%	35.0%	39.4%	39.0%	43.4%	34.7%	39.5%	40.5%	48.9%	35.8%
Cow dung	7.7%	1.8%	14.4%	7.8%	9.1%	7.1%	8.0%	7.9%	9.1%	7.2%	7.4%	7.7%	8.7%	7.0%
Crop waste	0.5%	0.3%	0.7%	0.5%	0.6%	0.4%	0.4%	0.3%	0.6%	0.3%	0.7%	0.7%	0.7%	0.6%
Other	0.2%	0.2%	0.4%	0.4%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.5%	0.4%

Source: Authors calculations

We have already highlighted how individual level data indicates that females spend significantly higher proportions of time on domestic duties (including collecting firewood), than males, and we can see here that the poorest FHH's are the ones that this is impacting most on. Such factors are likely to have major 'knock on' effects on issues such as whether female heads have the time to develop social relationships etc. – issues and activities that are increasingly recognised as important in enabling households to move out of poverty (Lawson and Hulme 2007).

This lack of time that FHH's have to build social networks is also supported with evidence in Table 4, which shows the Living Conditions Index (LCI) survey results. This survey asked individuals to 'rate' certain environmental and infrastructure conditions. If we focus on the 'Time, Leisure and Travel' section, we can see FHH's (MHH's) rate their opportunities to contacts friends and families at only 5.6 (6.2), out of 10. FHH's also rate their access to potentially economically mobilising resources, lower than that of MHH's. For example, FHH's rate their access to means for production (tools, fertiliser, etc) at 2.8, compared with 3.2 for MHH's. Furthermore, for most 'Livestock' and 'Farm Conditions' questions, FHH's rate their access lower than their male headed counterparts. For example, FHH's rate their access to grazing at only 5.4 compared with MHHs at 5.9. This is also the case, when we compare all time poor male and females, with the latter ranking access at only 5.8 compared with time poor males who rate access to grazing at 6.1.

Such evidence would seem to further strongly support the hypothesis that grazing and livestock keeping are predominantly a male dominated activity, and that females are limited in entering this type of activity. Although the LCI survey results are subjective, the evidence does seem to clearly support that FHH's, in particular, are limited in their economic opportunities. We now extend all of the analysis by adopting regression analysis.

**Table 4: Living Environment/ Conditions and Infrastructure Disaggregated by Gender**

	All	Urban	Rural	Time Poor Males	Time Poor Females	Male Headed Households	Female Headed Households
<b>How do you rate.....</b>							
<b>Health, Education, Public</b>							
- the public health services	5.4	5.1	5.8	5.5	5.5	5.5	5.4
- the school system	6.0	6.0	6.1	6.1	6.1	6.0	6.0
- energy situation for lighting and cooking?	4.7	5.1	4.4	4.9	4.5	4.8	4.6
- government support for better housing (land, credits, etc.)	3.8	3.9	3.6	3.8	3.8	3.7	3.8
<b>Time, Leisure and Travel</b>							
- the distribution of work/duties within your household	6.4	6.6	6.2	6.5	6.5	6.4	6.4
- your available time for leisure activities such as sports, radio, TV, newspapers, books, movies	4.7	5.4	4.0	4.7	4.8	4.7	4.6
- your access to leisure activities	4.2	4.7	3.8	4.3	4.2	4.2	4.3
- your contacts with relatives and friends	6.0	6.1	5.9	6.1	5.9	6.2	5.6
- your possibilities to go to other places	4.8	4.9	4.6	4.9	4.7	4.8	4.7
<b>Social Security</b>							
- public safety net (pensions, social transfers, free services)	3.8	3.8	3.9	3.8	3.8	3.8	3.8
- support from other organisations ( NGO's, church, etc)	4.3	4.4	4.2	4.3	4.3	4.3	4.3
- support from other sources (relatives, employers etc)	5.1	5.3	4.9	5.2	5.1	5.1	5.1
<b>Economic Opportunities</b>							
- your possibilities to get job	3.2	3.5	3.0	3.2	3.1	3.3	3.2
- your access to market to sell products	3.9	4.1	3.8	4.0	4.0	3.9	3.9
- your access to means for production (tools, fertiliser, etc)	3.1	2.7	3.5	3.3	3.0	3.2	2.8
- your access to cultivable land (including water)	3.6	3.6	3.6	3.7	3.6	3.6	3.5
- your possibilities to get commercial credits	2.8	3.0	2.6	2.8	2.8	2.8	2.8
<b>Livestock Keeping Conditions</b>							
- access to grazing	5.7	4.2	6.1	6.1	5.8	5.9	5.4
- extension services (Dairy, Wool, Mohair, Poultry, etc.)	4.3	4.1	4.3	4.4	4.3	4.3	4.2
- fees for extension services	3.8	3.6	3.9	4.0	3.6	3.9	3.7
<b>Farming Conditions</b>							
- compensation for lost harvests	3.1	3.2	3.1	3.2	3.2	3.1	3.1
- government services for farming	4.3	4.1	4.4	4.5	4.4	4.3	4.3

#### **4. Econometric Results**

We divide our sample into both males and females, after likelihood ratio tests rejected pooling. As stated earlier, we focus purely on adults (aged 15 and above), as data was not found to be sufficiently robust for school aged children.

Tables 5 provide the results of our probit model for time poverty for 1)All adults 2)Males 3)Females 4)Male headed households 5)Female Headed Households. As noted earlier, although the latter of these is not necessarily an ideal category for analysing gender issues, they have commonly been used and we adopt them for two main reasons. Firstly, such an approach is useful when used as a complement to other gender based analysis, and secondly, out of perhaps all of the results from the descriptive section FHH related issues and characteristics are appearing to be statistically very revealing of specific characteristics.

In line with the descriptive data it would appear that women are less time poor than men, with column 1 showing that females are statistically less likely to be time poor, however the caveats regarding the distribution of the time variable, that have already been highlighted in the previous section, substantially reduce the meaningful nature of these results.

More importantly, in consideration of this paper, are the infrastructure variables. Perhaps the most striking result is that proximity to main water source, public transport and primary school all have the expected signs of influence on time poverty, with the closer the proximity to all of these being negatively associated with individuals being time poor. Such results are intuitively sensible given that, for example, the less far an individual has to travel to fetch water, use public transport, or take children to school should all be negatively associated with time poverty.

Specifically, we can see from column 3, that females who have access drinking water that is within 30 minutes are statistically less likely to be time poor, relative to the default of

having their water source more than one hour away. However, the importance of having public transport within one hour appears to be even greater. All of the aforementioned effects are significant at the 10% level, except for females who have public transport within 1 hour, with this being significant at the 5% level. If we consider the marginal effects, we can see that females are 9.6% (5.5%) less likely to be time poor if their nearest water supply (public transport) is within 30 (60) minutes, relative to women with a water supply (public transport) that is more than 1 hour away.

**Table 5: Time Poverty Regressions Marginal Effects**

	All(1)	Males (2)	Females (3)	MHH (4)	FHH(5)
<b>Constant</b>	-0.219 (-3.108)***	-0.433 (-3.908)***	-0.225 (-2.488)**	-0.315 (-3.663)***	-0.468 (-4.121)***
<b>Female</b>	-0.059 (-3125)***				
<b>Age Range</b>					
15-24	0.144 (5.287)***	0.238 (5.802)***	0.065 (1.797)*	0.137 (3.974)***	0.116 (2.513)**
25-34	0.150 (5.704)***	0.179 (4.526)***	0.117 (3.296)***	0.127 (3.857)***	0.154 (3.334)***
35-44	0.180 (6.668)***	0.155 (3.706)***	0.174 (4.798)***	0.165 (4.774)***	0.176 (3.858)***
45-54	0.170 (6.126)***	0.107 (2.45)**	0.195 (5.306)***	0.156 (4.357)***	0.146 (3.201)***
55-64	0.117 (4.196)***	0.056 (1.266)	0.155 (4.257)***	0.091 (2.534)**	0.134 (2.892)***
<b>Marital Status</b>					
Single	0.037 (1.383)	0.003 (0.069)	0.057 (1.702)*	-0.841 (2.133)**	0.025 (0.668)
Married	-0.028 (-1.197)	0.019 (0.483)	-0.045 (-1.583)	0.009 (0.266)	-0.417 (-1.098)
Widowed	-0.058 (-2.224)**	-0.041 (-0.755)	-0.081 (-2.651)***	-0.737 (-1.615)	-0.694 (-2.027)**
<b>Education</b>					
None, can read	0.017 (0.879)	0.023 (0.857)	0.031 (0.992)	-0.016 (-0.715)	0.048 (1.358)
Primary	0.023 (1.114)	0.015 (0.532)	0.053 (1.661)*	-0.040 (-1.669)*	0.102 (2.738)***
Secondary	0.047 (1.844)*	-0.005 (-0.139)	0.112 (2.86)***	0.001 (0.042)	0.098 (2.027)**
Vocational	0.026 (0.571)	-0.126 (-1.972)**	0.151 (2.327)**	-0.068 (-1.259)	0.144 (1.846)*
Teaching	0.147 (3.87)***	0.019 (0.316)	0.237 (4.598)***	0.076 (1.676)*	0.245 (3.653)***
University	0.078 (1.532)	0.038 (0.526)	0.135 (1.815)*	0.032 (0.557)	0.137 (1.32)
<b>Household</b>					
Size	-0.033 (-3.304)***	-0.034 (-2.286)**	-0.039 (-2.916)***	-0.021 (-1.867)*	-0.085 (-4.062)***
Number of children	0.033 (3.159)***	0.046 (2.869)***	0.032 (2.254)**	0.024 (1.987)**	0.073 (3.334)***
Number of adults	0.023 (2.168)**	0.020 (1.275)	0.030 (2.1)**	0.007 (0.543)	0.083 (3.868)***
<b>Urban Region</b>					
Leribe	0.071 (3.151)***	0.067 (1.937)*	0.074 (2.475)**	0.068 (2.522)**	0.058 (1.408)
Butha Buthe	0.029 (1.174)	0.052 (1.386)	0.015 (0.454)	0.030 (1.02)	0.014 (0.301)
Thaba Tseka	0.176 (6.475)***	0.176 (4.282)***	0.175 (4.782)***	0.148 (4.561)***	0.219 (4.286)***
Maseru	0.041 (1.912)*	0.087 (2.591)***	0.011 (0.379)	0.054 (2.096)**	-0.013 (-0.324)
Mafeteng	0.047 (2.007)**	0.091 (2.519)**	0.025 (0.802)	0.055 (1.985)**	0.008 (0.195)
Mohale's Hoek	0.058 (2.196)**	0.126 (3.071)***	0.013 (0.393)	0.035 (1.06)	0.075 (1.64)
Quthing	0.092 (3.327)***	0.116 (2.615)***	0.086 (2.407)**	0.065 (1.919)*	0.121 (2.475)**
Qacha's Nek	0.071 (2.407)**	0.117 (2.561)**	0.042 (1.094)	0.047 (1.285)	0.107 (2.058)**
Mokhotlong	0.088 (3.3)***	0.091 (2.247)**	0.092 (2.56)**	0.094 (2.928)***	0.070 (1.409)
<b>Infrastructure</b>					
Electricity	0.050 (2.783)***	0.093 (3.167)***	0.020 (0.886)	0.039 (1.797)*	0.076 (2.294)**
Water within 30 mins	-0.065 (-1.695)*	-0.032 (-0.545)	-0.096 (-1.881)*	-0.068 (-1.366)	-0.078 (-1.268)
Water 30-59 mins	-0.060 (-1.556)	-0.046 (-0.724)	-0.072 (-1.484)	-0.074 (-1.513)	-0.044 (-0.689)
Public transport 30mins	-0.021 (-1.094)	0.004 (0.135)	-0.040 (-1.602)	-0.016 (-0.692)	-0.021 (-0.601)
Public transport 30-59mins	-0.037 (-1.782)*	-0.016 (-0.462)	-0.055 (-2.085)**	-0.040 (-1.555)	-0.021 (-0.553)
Primary school 30 mins	-0.036 (-1.79)*	-0.064 (-2.043)**	-0.015 (-0.588)	-0.074 (-3.017)***	0.057 (1.658)*
Primary school 30-59 mins	-0.013 (-0.662)	-0.017 (-0.558)	-0.011 (-0.428)	-0.027 (-1.12)	0.025 (0.713)

Health centre 30 mins	0.014 (0.792)	0.030 (1.095)	0.006 (0.29)	0.026 (1.227)	-0.019 (-0.638)
Health centre 30-59 mins	0.009 (0.534)	0.020 (0.757)	0.000 (0.006)	0.012 (0.59)	-0.007 (-0.24)
<b>Income Quintiles</b>					
Two	0.017 (0.989)	0.006 (0.217)	0.025 (1.094)	0.002 (0.096)	0.057 (1.856)*
Three	0.016 (0.884)	0.012 (0.445)	0.019 (0.825)	0.031 (1.435)	-0.011 (-0.353)
Four	0.048 (2.592)***	0.077 (2.654)***	0.029 (1.219)	0.040 (1.768)*	0.074 (2.217)**
Five	0.057 (2.846)***	0.098 (3.13)***	0.032 (1.236)	0.064 (2.664)***	0.046 (1.26)

Authors Calculations

Defaults: Age::>=65 years; Region: Berea; Education: None and can't read; Infrastructure:>60mins for all variables; Income Quintile: Lowest Quintile

Once again, intuition and prior evidence would support such findings. Such variables are perhaps of greater importance for women, than for men, given control over major assets – i.e. if there is a motorbike or a car in the household it is likely that men will control the usage. Women's dependence on close public transport is clearly very important, and accentuated because of their large number of domestic/home duties.

Of the other infrastructure variables, the results have the expected signs of influence – i.e. if individuals are within one hour of a primary school then they are less likely to be time poor. However, this result requires further investigation as it appears that the effects are slightly stronger for MHH's than for FHH's. For almost all groups of individuals, electricity is positively associated with being time poor. This is very likely to be correlated with income i.e. the higher an individual's income the more likely they are to have electricity, and are more commonly found to be time poor. Perhaps unexpectedly we do not find any strong evidence that living within one hour of a health centre to have any association with an individual's time poverty status.

A number of non-infrastructure variables were also included in the models. Considering the household variables, at first glance an increase in household size is negatively associated with time poverty (i.e. individuals living in households with more people are less time poor). Once again, this would seem intuitively sensible, but only if the increase in household size is not associated with disproportionately larger workloads. The demographic distribution of a household is therefore very important. For example, if households are experiencing a large increase in the number of young infants then time pressures for adult heads are likely to increase, compared with a situation if able bodies

working aged adults were entering the household. From the data this would appear to be particularly important for FHH's, and divorced FHH's, who appear to be particularly time poor. For example, we can see that for each child added to a FHH the probability of being time poor increases by almost 22%. Although, an increase in adults also has a large impact on the time poverty of females and FHH's, this is very likely to be a result of the high HIV/AIDS levels for adults – with increased evidence coming from Lesotho that more adults are being cared for by FHH's. The relatively high number of hours spent on domestic and care duties by females in such households would seem to further support this country specific evidence, and that the broader evidence such as that by Akintole, 2005.

Of the individual level characteristics, unsurprisingly, individuals aged less than 65 years are statistically more likely to be time poor. This is particularly the case for 35-44 year olds who are on average 17 percent more likely to be time poor than 65 year olds. Also in line with the descriptive data, individuals with higher levels of education appear to be associated with an increased probability of being time poor. For example, individuals with secondary school education are on average 25% more likely to be time poor than those who cannot read or write. Such a result is especially strong for females, potentially further supporting the hypothesis that as women become more educated and take on additional work/jobs, although time spent cooking and domestic duties is reduced this is not reduced sufficiently to offset the increase in time spent working, thus increasing time poverty for such cohorts.

Dummy variables for the districts confirm some of the trends highlighted in the descriptive data, with fairly large variations in time poverty across districts. For example comparing findings relative to the district of Berea, we find that living in Maseru, the capital, is associated with an increase in time poverty of more than 6%.

## 5. Conclusions

This paper has used a large scale nationally representative survey to investigate both socio-economic determinants of time poverty and the impact of infrastructure, using nationally representative data from Lesotho. As well as addressing the substantive question of whether there are gender differences associated with the impact of infrastructure the paper has also revealed a different methodological approach to considering non income poverty.

Overall, we find that the time poverty analysis can be revealing but when adopting such an approach, as with simple monetary based poverty measures, the results are sensitive to the cut off points used for time poverty. In particular, in this case, higher proportions of men appear to be time poor because there is a disproportionately large numbers of men are towards the upper tail of the distribution – i.e. time use for men is slightly skewed when compared with that of women. As such, when we lower the time poverty line, although men appear slightly more time poor than women, the difference is marginal. The main point is that sensitivity analysis is required in the context of such calculations. In the case of Lesotho, yes, it does appear that men are slightly more time poor than women – a finding that is logical given the very large bias of farm work/livestock work towards men, but the differences are not that great. In line with prior expectations it would appear that both wealthy, and more educated, men and women are more time poor.

However, because of the unique data associated with Lesotho we have been able to provide further findings, particularly from an infrastructure perspective, that are of greater interest than simple proportions of people that are time poor. The unique LCI survey has enabled us to judge individuals attitudes of infrastructure, and how this relates to time poverty issues. Such data is fairly unanimous in that females and FHH's rate virtually all economic empowering infrastructure issues less than their male counterparts. For example access to production services is ranked at 2.8 (3.2), out of 10, by FHH (MHH)'s. However, perhaps the main policy relevant finding of this research was the powerful effect higher dependency ratios have on FHH's and the impact of living near water and public transport for females. The former of these is increasingly being found in

SSA countries generally, but particularly in countries such as Lesotho where HIV/AIDS incidence is very high, and FHH's are increasingly likely to become the carer of both orphans and sick adults.

Our data also provide some evidence regarding the effects of education and wealth. In line with prior evidence, such as that of Bardasi and Wodon (2006) for Guinea, wealthier individuals are more likely to be time poor, as are the more educated. Although the wealth variables are significant for all categories of individuals, educational variables were commonly found to be significant for females only. This is interesting in that it would appear that our evidence supports the hypothesis that as females, and FHH's, become more educated they appear to take on greater number of hours of formal work, but domestic duties are not proportionately reduced – a finding that supports prior SSA based evidence.

Overall therefore, many of the findings for Lesotho appear to be in line with much of the anecdotal, and other, evidence from many SSA countries. However, in the case of Lesotho, we have also been able to provide rare insight into a number of further issues. It would appear that time poverty is both a male and female issue, particularly for more educated and more wealthy females, and that infrastructure matters – especially for females who have to travel a long way for public transport and water, and these tend to be the poorest individuals. Usage rights over assets, and possibilities for women to enter into productive economic work also appears to be more limited than for men, and could also be directly linked to at least some women, and particularly FHH's, being time poor.

There are policy consequences of such findings (i.e. targeting of sub groups etc.) but it is also fairly clear that the importance of infrastructure services is not just connected to reducing monetary based poverty i.e. through health improvements, or by improving water and sanitation, which decreases incidence of illness, and associated lack of productivity (Masika and Baden 1997). Clearly infrastructure provision such as better transportation and water services can be very effective, and particularly important, in the context of reducing time poverty.

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