Women and workload in Uganda and Senegal: who are the time-poor, by how much and why?

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1 Introduction

The intricate landscape of gender inequality brings to the fore time poverty as a critical, yet often underestimated factor (Abdourahman, 2010; Antonopoulos, 2009; Bardasi and Wodon, 2006, 2010; Charmes, 2006; Gammage, 2010; Giurge and Whillans, 2020; Harvey and Mukhopadhyay, 2007; Kalenkoski *et al.*, 2011; Ramson *et al.*, 2016; Warren, 2003; Williams *et al.*, 2016). Time poverty, a concept formally established by Vickery (1977), refers to the condition where an individual is unable to fulfill desired tasks due to time constraints, a predicament particularly prominent among women in developing nations (Antonopoulos and Hirway, 2010; Bardasi and Wodon, 2010; Blakden and Wodon, 2006; Komatsu *et al.*, 2015). This paper aims to explore the complex interplay between gender, time poverty and their determinants in Uganda and Senegal, two sub-Saharan African countries.

UN Women's 2012 report marked a turning point in our understanding of this issue, highlighting that women in sub-Saharan Africa collectively spend around 40 billion hours a year collecting water, equivalent to a year's work for the entire working population in France (UN Women, 2012, 2014). This time allocation contrasts sharply with that of men, a marked trend observed in Guinea, Sierra Leone and Malawi, countries whose socio-cultural context is similar to that of Uganda and Senegal. In Guinea, women spend 5.7 hours a week fetching water, compared with 2.3 hours for men. In Sierra Leone, women spend 7.3 hours a week fetching water, compared with 4.5 hours for men. The imbalance reaches a height in Malawi, where women invest 9.1 hours each week, more than eight times the 1.1 hours devoted by men (UN Women, 2012).

Beyond water collection, this inequitable distribution of domestic tasks points to a wider systemic problem that affects all aspects of women's lives in Africa, whether social, economic, or cultural. The problem extends to all forms of unpaid domestic work, including cooking, cleaning, caring and firewood collection (Antonopoulos, 2009; Blakden and Wodon, 2006; FAO, 2011). Women's role in these tasks often stems from entrenched traditional norms that confine them to the domestic sphere, limiting their potential for meaningful participation in the economic, social, and political spheres. This gendered use of time, explored in depth in the World Bank's World Development Report 2012 (World Bank, 2012) and in the 2016 report of the UN Secretary-General's High-Level Panel on Women's Economic Empowerment (UN Women, 2018), highlights the urgent need to recognize, reduce and redistribute unpaid work.

Moreover, the repercussions of this inequitable distribution of unpaid work are profound and multi-faceted. They significantly impact their health, education, empowerment, employment opportunities and overall quality of life. Research indicates that excessive workloads can be detrimental to overall well-being (World Bank, 2012; Gonzales et al., 2015; UN Women, 2015; Williams et al., 2016; Giurge and Whillans, 2020), particularly among women in developing countries who shoulder the bulk of unpaid work (Sayer, 2005; Antonopoulos, 2009; Bardasi and Wodon, 2010). Women in these settings often bear the disproportionate burden of unpaid care work, such as childcare, care of the elderly and household chores, exposing them to extreme levels of time poverty. Time poverty also prevents girls from going to school. In many developing countries, girls, especially those from poor families, spend huge hours a day collecting water and firewood, and cooking. They therefore have less time to go to school or do their school homework when they attend, further exacerbating gender inequalities (Giurge and Whillans, 2020).

Other studies clearly demonstrate the correlation between time poverty and the eventual problems of food insecurity and nutrition, emphasizing that time poverty can fuel cycles of poverty and inequality (Peterman et al., 2014; Blackden and Wodon, 2006). In Africa, the issues of time poverty and food insecurity are considerably exacerbated by socio-economic, gender and environmental factors. The complexity and interaction of these factors lead to a reinforcing cycle that traps individuals and families in a state of persistent food insecurity and time poverty (Blackden and Wodon, 2006; Kadiyala et al., 2014).

Various mechanisms can play a part in this process. For example, many people in Africa and other developing countries rely on low-paid, informal employment as their main source of income, which often imposes severe time constraints due to long working hours, unpredictable schedules, and physical demands. The other widespread practice, subsistence farming, is time- and labor-intensive, contributing to time poverty. Under these conditions, individuals have little time for food purchasing, preparation, and consumption, exacerbating food insecurity (Johnston et al., 2018; Aberman *et al.*, 2014). Furthermore, time poverty could exacerbate food insecurity by promoting poor diet quality and contributing to chronic health problems such as obesity and diabetes (Jabs and Devine, 2006; Engler-Stringer, 2010; Monsivais et al., 2014). Lack of time often pushes families in developing countries to turn more to convenient but nutritionally poor processed foods, increasing the risk of malnutrition and related health problems. This shift in diet is increasingly apparent in urban areas of Africa and other developing countries, pointing to a clear link between time poverty and food insecurity (Popkin, 2004; Monteiro *et al.*, 2004).

Time poverty also have implications for health outcomes. There is evidence that the experience of time poverty is directly related to poorer mental health. In a landmark study, Gershuny (2005) found that time stress, related to time poverty, significantly affects self-reported health. His research has shown that this impact is also a gender related issue. Women often experience higher levels of stress due to their lack of time. Time poverty can also prevent people from carrying out activities and behaviors that are essential for good health. People need time to access health services, exercise, play, care for themselves and perform all the activities instrumental to good health. Those who lack time may therefore adopt a lifestyle or healthcare-seeking behavior that is detrimental to their immediate or future health condition. Time poverty may also impede parents' investment in children's health and cognitive development. Because of time constraints, parents may have little or no involvement in activities that foster their children's health as they grow up. Time poverty is therefore likely to generate health inequalities (Strazdins *et al*., 2011).

This paper aims to complement these pioneering studies by offering an in-depth analysis of time poverty in Uganda and Senegal. Despite distinct cultural contexts and stages of development, both countries exhibit gender disparities in time use that reflect broader regional trends. A 2018 study by Oxfam reveals that more Ugandan men than women devote a large proportion of their time to paid work during a typical 24-hour day (24% for men versus 13.8% for women), while only 3% of these men devote part of their time to unpaid care activities during the same 24-hour day, compared with 18.2% of their female counterparts (Guloba *et al.*, 2018). In Senegal, despite forward-looking gender policies, traditional gender roles persist, with women spending an average of 4 hours and 9 minutes a day on domestic work and unpaid care, compared with 30 minutes for men (UN Women WCARO, 2023).

We use data from the latest time-use surveys collected in 2017-2018 in Uganda and in 2021 in Senegal. Our approach to time poverty is one that characterizes the state of individuals who do not have enough time available after working (in paid or unpaid work) and after devoting time to necessary activities (Bardasi and Wodon, 2006; Burchardt, 2008). After setting time poverty rates by gender, a further core objective of this study is the multivariate analysis of the situation of women in time poverty. This analysis aims to uncover and understand the determinants that contribute to, or mitigate, women's time poverty in Uganda and Senegal. The intersection of time poverty and family structure is at the center of this analysis. Family structure, which encompasses variations in living conditions and household composition, significantly shapes the distribution of unpaid work and, consequently, time poverty. The study poses several hypotheses in this regard. Through focusing on these two countries, this study hopes to contribute to the academic understanding of women's time poverty and its determinants in sub-Saharan Africa. In addition, the analysis aims to inform policymaking, with the aim of challenging societal norms and reducing gender inequalities, thus enabling women to participate fully in all facets of life. We believe that this is an essential step towards achieving inclusive and sustainable development.

2 Related literature

2.1 Time use and activities

Time-use analysis, as discussed by Ås (1978), Gershuny (2011), Burchardt (2008), Bardasi and Wodon (2010), and Harvey and Mukhopadhyay (2007), involves categorizing activities to understand how individuals allocate their time. In the context of developing countries, individuals face unique challenges and priorities that influence their patterns of time use across the various categories of activities. Ås (1978) characterizes activities as necessary, contractual, committed, and free time. Necessary time encompasses activities that individuals must engage in to sustain their well-being and the functioning of their households. In Africa, individuals may allocate a significant portion of their time to activities classified as necessary time. These activities include personal care, household chores, subsistence agriculture, and collecting water and fuel. Due to limited access to modern amenities and resources, individuals in this region often spend considerable time on activities essential for their basic needs and daily survival. Categorizing activities as necessary time helps capture the time devoted to meeting fundamental requirements in resource-constrained environments. Ås (1978) defines contracted time as activities that individuals engage in as part of formal agreements or obligations, often involving financial compensation. In the African context, contracted time encompasses both formal and informal work arrangements. Formal employment in sectors such as manufacturing, services or government is just a subset of contracted time. A significant proportion of the contracted time takes place in the informal sector, where individuals engage in activities such as street vending, small-scale farming, or home-based work. In Africa, contracted time often reflects the need to generate income and support livelihoods in the absence of widespread formal employment opportunities. Committed time refers to activities that individuals engage in as part of their personal commitments and obligations beyond paid work. Committed time in Africa includes activities related to family and community responsibilities, which hold immense importance. This can involve caring for children, elderly family members, or other dependents. Additionally, individuals often participate in community-oriented activities, such as volunteering, religious or cultural ceremonies, and informal support networks. Committed time is influenced by the social fabric and communal values prevalent in developing countries, where strong interpersonal relationships and community engagement play vital roles. Free time is the residue left after other blocks of time have been subtracted over the course of a day or week. The concept of free time is also put forward by Gershuny (2011) and Burchardt (2008) in time-use analysis. It refers to the unstructured, discretionary time available to individuals for leisure, personal and self-determined activities. This includes activities such as socializing, participating in recreational activities, pursuing hobbies, engaging in cultural events, and accessing entertainment. In Africa, free time is influenced by cultural norms, local traditions, and available resources. Analysis of free time is useful for understanding the opportunities individuals have to express themselves and engage in activities based on personal preferences and social interactions in the specific cultural and economic contexts of developing countries. While Ås' classification of time activities provides a useful framework, the literature also points out some limitations associated with his approach, including the subjective nature of activity classification and the potential for overlap between the activity categories.

Burchardt (2008) follows Ås' approach of differentiating activities according to their nature and purpose, albeit with differences in terminology and emphasis. Burchardt's categorization of activities comprises four categories: paid work, unpaid work, personal care, and free time. Paid work refers to activities performed in return for monetary compensation. Unpaid work includes tasks such as housework, caregiving, and volunteer work. Personal care includes activities related to personal care, such as feeding, grooming and health-related tasks. Free time is the residual time remaining after the allocation of time to paid work, unpaid work, and personal care. While Burchardt's framework provides a comprehensive breakdown of activities, explicitly emphasizing “personal care” as a separate category, Gershuny (2011) proposes a more simplified representation of the major spheres of individuals' time allocation. Gershuny (2011) builds on the “triangle of daily activities”, emphasizing the allocation of time among paid work, unpaid work, and free time. Gershuny's framework does not explicitly mention personal care as a separate category. In this framework, paid work refers to activities performed in exchange for monetary compensation, including employment, commuting, and work-related tasks. Unpaid work includes household chores, caregiving, and other non-market activities performed for the well-being of the individual and their family. Free time encompasses leisure activities, personal pursuits, socialization, and civic activities.

Interestingly, the common principle underlying these different categorizations lies primarily in the degree of choice and constraint involved in the use of time. The activities of necessary, contractual, and committed time are analogous to those of paid work, unpaid work, or personal care. They are often described as compulsory and productive, as well as more constraining than free time. Burchardt (2011) therefore finds it more appropriate to combine the three activity categories of paid work, unpaid work, and personal care into a single category. Thus, time devoted to paid and unpaid work, as well as personal care, is called "committed time"; free time is the residual. Free time is the time that remains after completing all committed activities. The question is, how much time is dedicated to these commitments per day? But, who knows? Individuals are different, as are their environments and conditions. They can be influenced by a whole range of factors, including socio-economic conditions, cultural norms, gender roles and access to resources and opportunities, particularly in developing countries. Some people may devote more time than is strictly necessary to committed activities or achieve more in these areas than is strictly necessary. Thus, social constraints and norms can restrict people's ability to control their time and engage in the activities of their choice. The differentiating element of free time is therefore the degree of discretion individuals dispose of to engage in activities they freely choose (Burchardt, 2011). In other words, the focus then must be on the discretionary time available to individuals to engage in leisure and other activities to enhance their well-being once they have fulfilled all their commitments. The common definition of discretionary time is the time remaining after considering all time spent on paid work, personal care, domestic activities and caring (Fisher and Layte, 2004; Burchardt, 2011). But Goodin et al (2005) suggest a more restrictive approach and define discretionary time as the amount of time potentially available to individuals if they devoted only the amount of time strictly necessary to achieve a decent standard of living.

A similar approach, grouping time use into two blocks of activities, is taken by Williams *et al.* (2016), adopting slightly different terminology. They classify activities into two categories: necessary time and discretionary time. They define necessary activity time as the time an individual devotes to activities required to satisfy the basic necessities of life in a given society, including those required by law or social norms and those performed by that individual in person or by paid labor. Note that this “necessary time” category corresponds exactly to what Burchardt (2011) refers to as "committed time", which comprises paid work, unpaid work, and personal care activities. On the other hand, Williams *et al.* (2016) defines “discretionary time” as time spent on activities that people generally choose to do, underscoring the level of freedom of choice associated with this time category, as opposed to necessary time.

This simplification, regrouping blocks of time into committed and discretionary time, is well suited to the analysis of time poverty and is widely adopted in this research field (Bardasi and Wodon, 2006; Burchardt, 2008; Harvey and Mukhopadhyay, 2007; Kalenkoski et al., 2011; Williams *et al.*, 2016). Not only does it underscore the role of work, care, and voluntary activities in people's time allocation patterns, but it also emphasizes the importance of people being able to make choices about their leisure time and other personal spare activities (discretionary time). This focus on discretionary activities underlines the importance of individuals' free time and the pursuit of personal interests and leisure activities. It also reflects the multi-dimensional nature of people's use of time, and the need to consider activities beyond obligations and commitments.

In the literature, the issue of time poverty is approached from both angles: committed time or discretionary time. Once activities are classified into committed/necessary time and discretionary time, a threshold-based assessment for either block of time is the most readily used means of addressing that issue. In this way, it is possible to identify people with a deficit of discretionary time or an excess of time allocated to committed/necessary activities. In this article, we analyze time poverty in Uganda and Senegal using a similar approach. We are primarily interested in committed time, i.e., time devoted to paid work, unpaid work, and the satisfaction of basic personal needs. In the methodology section, we indicate how we define the threshold we apply.

2.2 Time poverty: definition and dimensions

Time poverty is a concept that emerged in the field of sociology and economics in the 1970s (Vickery, 1977) to describe the lack of time individuals have to engage in activities they enjoy due to various factors such as work, caring responsibilities and other obligations. There is no single, universally accepted definition of time poverty, but there are a range of varying approaches to defining it. The most common definitions include:

2.2.1 Lack of Discretionary Time

One fundamental element of time poverty is the lack of discretionary time available to individuals. Discretionary time refers to the time that individuals have at their disposal after fulfilling essential obligations such as work, household chores, and caregiving responsibilities. Time poverty occurs when individuals have limited or no discretionary time due to the overwhelming demands of essential obligations and commitments. Various research studies underline the importance of discretionary time for activities that contribute to personal well-being, self-care, leisure, and pursuing individual interests. Individuals experiencing time poverty often struggle to allocate time for activities beyond their obligatory responsibilities, leading to a diminished quality of life.

Thus, Gershuny (2000) interprets the concept of time poverty as the scarcity of discretionary time. He defines discretionary time as the time individuals have available for activities they value and enjoy, beyond the time spent on necessary and obligatory tasks. Gershuny discusses time poverty in the context of modern societies where individuals experience a perceived lack of time for discretionary activities. He points out that despite advances in technology and increased productivity, people feel more time-poor because of their heavy workloads, multiple responsibilities, and time-consuming commitments, leaving limited discretionary time. Folbre (2001) addresses the gendered dimensions of time poverty, particularly for women who often bear a disproportionate burden of unpaid caregiving and household work. She argues that women's time poverty is linked to the limited discretionary time they have due to the demands of unpaid work. In their study on time-use patterns in Australia, Bittman *et al.* (2004) emphasize the idea of time poverty as the scarcity of discretionary time. They define time poverty as the condition where individuals have insufficient time for relaxation, leisure, and pursuing personal interests due to overwhelming commitments to paid work, unpaid work, and other obligations. Burchardt (2008) considers time poverty as the insufficient availability of discretionary time, especially among individuals with lower incomes. He argues that time poverty is not only about the lack of income but also about the lack of time that can be freely chosen and used for personal well-being, leisure, and self-development. Bardasi and Wodon (2010) explore time poverty in Guinea, considering the lack of discretionary time as a key component. They emphasize that individuals' time poverty is not only about fulfilling essential obligations but also about the limited time available for activities they value, such as spending time with family, pursuing education, or engaging in community activities. Chant (2010) focuses on time poverty and gender in urban areas of developing countries and touches upon the concept of limited discretionary time. She discusses how women's time poverty is exacerbated by the lack of time available for leisure and self-care due to the burden of unpaid domestic work. Roelen and Gassmann (2013) study time poverty and social exclusion in rural Ethiopia, emphasizing that time poverty extends beyond the lack of material resources and includes a scarcity of discretionary time. They highlight that individuals experiencing time poverty have limited opportunities for leisure and personal development. As well, in their research on time poverty among women in rural Pakistan, Mujahid et al. (2017) find that women experience significant time poverty, limiting their discretionary time for personal pursuits due to the heavy workload of household chores and caregiving responsibilities.

All these analyses show that time poverty, defined as the lack of discretionary time, is a crucial aspect of individuals' well-being and quality of life. The scarcity of time for leisure, relaxation, and self-development can lead to increased stress, reduced life satisfaction, and social exclusion. Moreover, time poverty is often intertwined with gender inequalities, with women disproportionately affected by limited discretionary time due to unpaid domestic and caregiving responsibilities. Understanding the concept of time poverty in terms of discretionary time provides insights into the complex challenges individuals face in balancing their various obligations and the need for policies and interventions to support a better time-use balance.

2.2.2 Subjective Perception of Time Poverty

The subjective approach emphasizes individuals' perceptions and experiences of time scarcity. According to Folbre (2006), time poverty is a subjective experience where individuals feel a lack of time to fulfill caregiving responsibilities and engage in activities they value. Hwang and Burton (2016) expand on this concept, defining subjective time poverty as a condition where individuals perceive a sense of time pressure and a lack of freedom to allocate time according to their preferences. This approach emphasizes the uniqueness of each individual's experience with time. It acknowledges that different people may feel time-poor even when objectively they have similar amounts of time available. Factors such as personal values, aspirations, and priorities play a crucial role in shaping how individuals perceive and experience time scarcity (Gershuny, 2011; Hwang & Burton, 2016).

Subjective time poverty is associated with a sense of time pressure. Individuals may feel overwhelmed and stressed due to the perception that there is not enough time to fulfill their obligations and engage in activities they value (Folbre, 2006; Southerton et al., 2012; Rose, 2017). This feeling of time pressure can be influenced by various factors, including work demands, caregiving responsibilities, and societal expectations.

Subjective time poverty also considers individuals' perceived control over their time. It recognizes that having limited autonomy to decide how to allocate time can contribute to a sense of time poverty. For example, individuals who feel compelled to engage in activities they do not value or have limited flexibility in their schedules may experience a lack of control over their time (Southerton, 2003; Warde and Southerton, 2012; Moen and Yu, 2019).

Another dimension of subjective time poverty is the inability to engage in activities that individuals consider important or meaningful. This can encompass various aspects of life, such as spending quality time with family, pursuing hobbies, or participating in community activities. The lack of opportunities to engage in these activities can contribute to a subjective sense of time poverty (Sayer, 2005).

Beyond these, it is worth noting that subjective time poverty is influenced by cultural norms, social expectations, and gender roles. These factors shape individual experiences of time poverty differently from one society or community to another. For example, cultural norms may dictate specific roles and responsibilities for men and women, resulting in different experiences of time poverty depending on gender (Sullivan et al., 2012; Lachance-Grzela & Bouchard, 2010). The subjective experience of time poverty may also be shaped by intersecting identities and social categories. Race, ethnicity, class, and age can shape the perception of time constraints and exacerbate time poverty in specific groups within a society. Certain groups may face unique challenges in managing their time, further complicating the understanding of time poverty from a subjective perspective (Hook and Wolfe, 2012; Fisher and Gershuny, 2014; O'Brien and Jones, 2016).

In the context of developing countries, several studies have explored the subjective perception of time poverty. Thus, Nalwadda et al. (2018) explores the subjective experience of time poverty specifically among women living in urban Uganda, looking at how they perceive and navigate their time constraints, considering the intersection of gender, work, and household responsibilities. The study found that women in urban Uganda experience a subjective sense of time scarcity. They expressed feelings of having limited time to fulfill multiple roles and responsibilities, including household chores, caregiving, income-generating activities, and personal pursuits. Women's narratives highlighted the constant juggling of time and the pressure to meet competing demands. Women reported feeling time-poor due to the expectations placed upon them to fulfill traditional gender roles, such as caregiving, cooking, and cleaning. These gender norms constrained women's time and limited their opportunities for other activities. The findings also revealed that women emphasized the importance of having control over their time and the desire for greater autonomy in decision-making related to time use.

Sivamurthy and Rao (2018) provide valuable insights into the subjective time poverty in rural India. The findings of their study suggest that subjective time poverty is a serious problem that has a significant impact on women's well-being. Women in particular report feeling rushed and overwhelmed, and they have difficulty juggling their multiple roles as mothers, wives, farmers, and caregivers. They also feel that they have little control over their time, and that they are constantly having to make trade-offs between different activities. Besides, women who experience subjective time poverty are more likely to report feeling stressed, anxious, and depressed. They are also more likely to have difficulty meeting their commitments and to have lower levels of life satisfaction.

Lwasa et al. (2018) investigate the issue of time poverty among the urban poor in Kampala City, Uganda, with a specific focus on the relationship between time poverty and housing conditions. While the paper does not explicitly discuss subjective time poverty, it provides insights into the factors and dynamics that contribute to a subjective experience of time constraints and pressures. The authors argue that the combination of long work hours, time spent on household chores, and lengthy commutes leaves little time for individuals and families to engage in leisure activities, personal development, or social interactions. They highlight how these time constraints contribute to a subjective sense of time poverty among the urban poor. Individuals and families may perceive that they lack control over their time, face constant time pressures, and experience a diminished quality of life due to the limited time available for activities beyond work and basic survival needs.

These studies in developing countries shed light on how individuals within specific contexts subjectively experience time poverty. They provide insights into the intersectionality of gender, work, and social norms in shaping individuals' perceptions and experiences of time scarcity. Overall, the subjective perception of time poverty acknowledges that individuals' own evaluations and experiences of time constraints are vital in understanding the impact on their well-being and quality of life. It emphasizes the need for interventions and policies that consider the subjective aspects of time poverty, including gender dynamics, cultural norms, and the specific context of developing countries.

2.2.3 Low quality of Time

The issue of time quality is an essential aspect of the analysis of subjective time poverty. While time poverty typically refers to a lack of sufficient time to fulfill obligations or engage in desired activities, time quality focuses on the subjective experience and satisfaction derived from the way individuals spend their time. The idea is that individuals may feel rushed, stressed, or overwhelmed due to time constraints, which can negatively impact their well-being and satisfaction with life.

Time quality recognizes that individuals' experiences of time go beyond the mere quantity of available time. It acknowledges that individuals may feel time-poor even if they have enough time on their hands if they perceive their time as low in quality. Assessing subjective time poverty involves understanding the emotional, psychological, and social aspects of how individuals perceive and evaluate the quality of their time.

Time quality considers the extent to which individuals feel satisfied and fulfilled in their daily activities. It focuses on whether individuals can engage in activities that are personally meaningful, enjoyable, and aligned with their values and goals. Subjective time poverty can be exacerbated when individuals feel that they have limited opportunities for high-quality time experiences, leading to reduced satisfaction and fulfillment. There is a growing body of research that suggests that subjective time poverty is associated with low quality of time. Reisch (2001) proposes a qualitative perspective on time, both for work and for other spheres of life, viewing time as a form of wealth complementary to material wealth. Reisch believes that time and wealth are inextricably linked. Reisch sees time wealth as sufficient, unconstrained time for any activity, allowing for a relaxed pace of life, a certain autonomy in temporal decisions and satisfactory synchronization with temporal constraints and the rhythms of others. She asserts that time is not just a quantity, but also a quality. In other words, not all time is equal. Certain times are more valuable than others, depending on how they are used. Thus, the quality of time depends on 1) the availability of large amounts of time, 2) autonomy in time allocation and 3) the alignment of time with the temporal rhythms of others.

Analyzing time quality involves examining the types of activities and experiences individuals value and find rewarding. It recognizes that individuals may prioritize certain activities (e.g., leisure, hobbies, personal relationships) that contribute to their overall well-being and quality of life. Understanding the composition of individuals' time and the extent to which it aligns with their preferred activities provides insights into the relationship between time quality and subjective time poverty.

Time quality is closely linked to achieving a satisfactory work-life balance. Individuals who perceive their time as low in quality may struggle to balance work-related responsibilities with personal life, leisure, and self-care activities. Examining the trade-offs and tensions between work and other life domains can shed light on how time quality and time poverty intersect.

The analysis of time quality recognizes that cultural norms, social expectations, and structural factors influence individuals' perceptions of time and the quality of their time experiences. Cultural values and societal norms shape individuals' preferences for certain activities and influence their perception of what constitutes high-quality time. Additionally, contextual factors such as socioeconomic status, gender roles, and technological advancements can influence individuals' access to time and the quality of their time experiences.

By incorporating the concept of time quality into the analysis of subjective time poverty, researchers can gain a more comprehensive understanding of the multidimensional nature of time poverty and its impact on individuals' well-being and overall quality of life.

(to be completed)

2.2.4 Multidimensional Approach

Some researchers advocate for a multidimensional approach to time poverty:

The concept of time poverty can be further understood through an intersectional lens, considering how multiple dimensions such as socio-economic status, race, ethnicity, and location intersect to shape individuals' experiences of time poverty. This perspective acknowledges that time poverty can vary across different contexts and population groups.

(to be completed)

3 Methodology

3.1 Measuring time poverty

3.1.1 Subjective or objective approaches

There are several approaches to measuring time poverty. They fall into two broad categories: subjective and objective.

- The subjective approach defines time poverty based on people's perception of their time resources. This perspective acknowledges that individuals' experiences and interpretations of time scarcity may vary based on their personal circumstances, cultural context, and aspirations. Subjective assessments of time poverty consider individuals' feelings of time pressure, stress, and the extent to which they perceive their time as insufficient for their desired activities (Gershuny, 2000; Bittman et al., 2004). This approach most often uses surveys to collect data on people's perceptions of time pressure and stress. Data from these surveys can then be used to calculate the level of subjective time poverty experienced by different groups of people. One of the best-known subjective methods of measuring time poverty is that of **time pressure**. This defines time poverty as the situation in which people feel that they do not have enough time to do the things that they need to do. Another subjective approach to measuring time poverty is the **temporal stress measure**. This defines time poverty as the situation in which people feel they are constantly rushed and under pressure.

- The objective approach defines time poverty based on objective measures of time use, focusing on the amount of time allocated to specific activities. These measures include the number of hours spent on paid work, household chores, caregiving, leisure, and personal activities. Time-use surveys and diaries are commonly used methods to capture these data, allowing for quantitative analysis and comparison across individuals or groups (Folbre, 2006). One of the most well-known objective approaches to measuring time poverty is the **time availability approach**. This approach defines time poverty as the situation in which people do not have enough time to meet their basic needs. The basic needs that are considered in the time availability approach include sleep, eating, personal care, and leisure. Another objective approach to measuring time poverty is the **time deficit approach**. This approach defines time poverty as the situation in which people have less time available than they would like. The time deficit approach is based on the idea that people have different preferences for how they spend their time. Some people may prefer to spend more time working, while others may prefer to spend more time on leisure activities.

Both objective and subjective approaches to measuring time poverty have their own strengths and weaknesses. The subjective approach is more sensitive to individual differences in time preferences. But one issue with this approach is that it can be difficult to measure accurately. This is because people's perceptions of their time resources can be influenced by several factors, such as their personality, their culture, and their economic circumstances. Another issue is that it can be difficult to compare across different groups of people. This is because people's perceptions of what constitutes "enough" time can vary depending on their individual circumstances.

The objective approach, on the other hand, is more factual, but may not capture the full extent of time poverty. Indeed, it does not incorporate people's perception of their time resources. Another problem is that it can be difficult to apply in practice. This is because it requires data on a wide range of time-consuming activities, which are not necessarily available in all countries.

All things considered, the best approach to measuring time poverty depends on the specific research question posed. As a rule, the subjective approach tends to be more relevant to understanding how time poverty affects people's well-being. On the other hand, the objective approach is more suitable for understanding the causes of time poverty and developing policies to address them. In this analysis, we adopt the latter approach to measure and understand the determinants of women's time poverty in Uganda and Senegal.

3.1.2 Poverty thresholds

There are several ways of measuring time poverty. The most common method is to use thresholds, which define time poverty as having an amount of time less than a certain amount. Thresholds or "poverty lines" are thus intended to categorize people who do not have sufficient time resources. They are set either by a normative or an empirical approach. As such, time poverty thresholds represent predefined levels or criteria for identifying who is short of time. More specifically, they are used to determine whether a person's time resources are inadequate or insufficient to meet basic needs or achieve well-being. Defining appropriate thresholds is accordingly crucial to identifying and quantifying the extent of time poverty within a population. Where should these thresholds be set? The choice will depend on the specific objective of the analysis. For example, if the objective is to identify people at risk of time poverty, a lower threshold may be used. If the objective is to identify people in a situation of severe time poverty, a higher threshold may be used.

As there is still no single, accepted definition of time poverty, there is also no standard method for measuring it. Two main approaches are often considered in the literature when it comes to determining thresholds for identifying who is time poor: the absolute approach and the relative approach.

Absolute thresholds involve setting specific numeric values as benchmarks for time allocations. These values are often based on expert recommendations, policy goals, or social norms. For example, an absolute threshold might specify a minimum of 40 hours of paid work per week or a minimum of 8 hours of sleep per day. Individuals falling below these absolute thresholds would be considered time-poor in those specific activities. Absolute thresholds provide clear benchmarks that are easy to interpret and communicate. However, some limitations of this measure include:

- Lack of flexibility: Absolute thresholds may not capture the contextual nuances or variations in time allocations across different populations or settings.
- Insensitivity to distributional differences: Absolute thresholds do not account for variations in the distribution of time allocations, potentially overlooking disparities within populations.
- Limited adaptability: These thresholds may not reflect changes in societal or individual circumstances over time.

Relative thresholds, on the other hand, involve comparing individuals' time allocations to the distribution of time allocations within a specific population. Percentile thresholds are commonly used as a form of relative thresholds. For instance, setting the threshold at the 25th percentile of time allocations for a particular activity means that individuals falling below the time allocation level at the 25th percentile would be classified as experiencing time poverty. Relative thresholds account for variations within a specific population or group and allow for comparisons across subgroups or regions.

Historically, Vickery (1977) was the first to lay the foundations for establishing an absolute time poverty line, which represents the minimum amount of time required to meet basic needs and engage in essential activities. Vickery argued that, just as people who fall below a certain income threshold are considered income poor, those who do not have enough time to meet basic needs and engage in important activities can be considered time poor. She discussed the possibility of establishing a time poverty line based on empirical evidence and conceptual reasoning, drawing parallels with the income poverty line.

Vickery calculated different thresholds based on the number of adults and the number of children in the household to account for differences in household time resources and needs. These thresholds are based on the amount of time that she estimated was necessary for individuals to meet their basic needs, such as sleeping, eating, and personal care. She also included some time for discretionary activities, such as socializing, leisure, and personal development. For example, for a household consisting of one adult and two or three children, she proposed an absolute time poverty line factoring in the minimum levels needed to maintain basic standards of mental health, personal care, and sleep (81 hours a week) and home maintenance (61 hours a week).

Various research and scientific contributions have subsequently built on Vickery's concept of absolute time poverty, using more recent data and context-specific analyses (Douthitt, 2000; Harvey and Mukhopadhyay, 2007; Goudin *et al.*, 2005, Gammage, 2010; Arora, 2014). This approach of an absolute time poverty threshold is much appreciated for its greater flexibility. It allows the time poverty line to be set to reflect the specific circumstances of different study contexts. Nevertheless, it is much criticized for being too subjective. After all, the minimum levels required for people to maintain their basic standards of mental health, self-care, sleep, and home maintenance are matters of judgment.

The alternative specification used in a series of studies is the relative time poverty threshold (Bittman, 2002; Burchardt, 2008; Bardasi and Wodon, 2006; Kalenkosk et al., 2011). Bardasi and Wodon (2006) explore time poverty in Guinea using two alternative relative time poverty lines, a lower line of one and a half times the median of the distribution of time spent working (paid and unpaid) and an upper line of twice the median. They then calculated time poverty rates for the population as a whole and for various groups of individuals. Bittman (2002) examines the relationship between leisure time, social participation, and family well-being in Australia, using a relative approach to the poverty threshold. The poverty line for leisure time was set at 50% of the median amount of leisure time for all Australians. Burchardt (2008) computed time poverty thresholds for the UK by using the relative distribution of time use, including personal care, unpaid work, and paid work in his definition of committed time, and classifying the residual as discretionary time. Like Bittman (2002), Kalenkosk *et al*. (2011) use the measure of discretionary time to determine time poverty thresholds. They adopt different thresholds for different household types at 50%, 60% and 70% of the population's median discretionary time.

3.1.3 Our measurements of time poverty

The initial allocation of time to everyone is 24 hours a day, 7 days a week, allowing a comparative analysis of the time spent by each adult within a household. Individuals divide this time resource between paid work, unpaid work, personal care, community activities and leisure activities, providing them with a certain standard of living. In this proposed analysis, we build on the common practice in the literature on time poverty, sorting activities into two categories: necessary activities and discretionary activities. We define necessary activity time as the time individuals devote to activities essential to their well-being and the functioning of their household. These activities include paid work, unpaid work, and personal care. We define discretionary time as the time left over after the above-mentioned activities have been completed.

The time of interest in this analysis is necessary time, measured in hours per week. We compare the number of hours individuals devote per week to necessary activities, defining thresholds at which this time is considered excessive or low. We also carry out this analysis at the individual level, accounting for any gender differences. The rationale for such an approach is that one person in a household may be short of time, even if the other members of the household are not, due to social norms and intrahousehold rules of time and tasks allocation, and control over resources. This is particularly the case in developing countries, where studies most often show an unequal distribution of workload within households, very frequently to the detriment of girls and women.

Like Bardasi and Wodon (2006), Spinney and Millward (2010) and numerous studies on developing countries, we adopt the relative time poverty approach, defining these thresholds based on the observed distribution of our total time of interest in the contexts studied. This option seems the most suitable in the context of our analysis, as we cannot make any assumptions about the adequate time required for the various necessary activities. It should be recognized that the time to be devoted to these activities is influenced by social environments, which shape people's participation in paid work, household chores, personal care, etc.

We adopt the same methodology as Bardasi and Wodon (2006), setting two thresholds: a moderate threshold corresponding to 1.5 times the median weekly time spent on necessary activities by individuals, and a severe threshold equal to 2 times this median. In this way, we can identify people whose workload deviates from the median, and in particular those who devote an excessive amount of time to these tasks. The interest in these thresholds is mainly due to the fact that the negative effects of excessive workloads on mental and physical health are tangible and detrimental to the general well-being of the people concerned. From a policy perspective, it may be important to correctly identify these people, particularly those who are severely affected, and to know whether time poverty affects women more than men, for example. And, if so, which category of women? This would enable us to better target them and design policies that are more beneficial to them. Indeed, in environments where access to collective amenities and modern resources is limited, as is the case in Africa, individuals, particularly women, often devote a considerable amount of time to these necessary activities. To ease their burden, policies that improve access to water, energy, sexual and reproductive health, as well as financial resources, are all options that have significant beneficial effects on time allocation and can help reduce time poverty.

We measure time poverty by means of the widely adopted Foster-Greer-Thorbecke (FGT) class of poverty indicators (Foster et al., 1984).

Thus, our time poverty measures are based on the normalized time poverty gaps of individuals. The time poverty gap is basically the distance of an individual's time on necessary activities t_i from the chosen time poverty threshold z. This is normalized by expressing it as a fraction of the threshold z. The normalized time gap g_i is defined as:

$$g_i = \begin{cases} \frac{z-t_i}{z}, \ if \ \ z < t_i \\ \quad 0, \ if \ \ z \geq t_i \end{cases} \qquad (1)$$

More specifically, the FGT index measures time poverty as follows:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{q} (g_i)^\alpha \qquad (2)$$

where α is a non-negative time poverty aversion parameter and with q as the subset of the poor (i.e., those for who $g_i < 0$), and N the total population.

We will consider three different values of the time poverty aversion parameter $(\alpha = 1, 2, 3)$, corresponding the three poverty measurements commonly used in the literature.

When $\alpha = 0$, P_0 corresponds to the headcount index or poverty incidence H which measures the proportion of time poor population in total population. H is given by:

$$H = \frac{q}{N} \qquad (3)$$

For $\alpha = 1$, P_1 refers to the poverty gap index in per person terms. P_1 corresponds to the product of H and I, with I as the proportionate shortfall of the average time of the poor from the time poverty line z. This measure represents the fraction of the time poverty threshold z, which would have to be given per person of the whole population to cut out time poverty.

When $\alpha = 2$, P_2 corresponds to the severity of time poverty. It is given by the mean of the squared proportionate time shortfall of individuals below the poverty threshold z. P_2 is a poverty measure, which reflects how poor the poor are. It is therefore sensitive to the time distribution among the poor; the worse this distribution is, the more severe poverty is.

The FGT measures have the propriety that they are additively separable. Thus, if we divide the total population into K mutually exclusive groups, the aggregate measure is the population-weighted average of the measures for all subgroups of the population.

$$P = \sum_k f_k P_k; \qquad k = 1, \dots, K \qquad (4)$$

where:

$$f_k = \frac{N_k}{N} \qquad (5)$$

By analogy with (2), we define the time poverty level in subgroup k by:

$$P_{\alpha,k} = \frac{1}{N_k} \sum_{i=1}^{q_k} (g_i)^\alpha \qquad (6)$$

Using this property of additive separability of FGT measures, we can thus illustrate the difference in temporal poverty between different sub-groups, notably men and women.

3.2 Modelling time poverty

3.2.1 Determinants de time poverty

Once gender time poverty rates have been established, the core objective of this study becomes the multivariate analysis of women's time poverty status. This analysis aims to uncover and comprehend the determinants that contribute to, or alleviate, women's time poverty in Uganda and Senegal.

Central to this investigation is the intersection of time poverty and family structure. Family structure, encompassing variations in living arrangements and household composition, significantly shapes the distribution of unpaid work and therefore time poverty. Mostly notably, we are interested in how family structure affects caregiving in both settings.

The study posits several hypotheses in this regard. First, we hypothesize that women in larger households, especially those with younger or elderly family members, experience higher time poverty due to caregiving and domestic responsibilities. Second, single-parent households, particularly those headed by women, may face more pronounced time poverty due to the lack of shared domestic responsibilities. Third, households with higher economic status might exhibit lower time poverty among women, as they might have access to paid domestic help or time-saving appliances.

Additionally, we introduce a fourth hypothesis related to marital status: married women, particularly those in polygamous relationships, may experience elevated time poverty due to increased domestic obligations, while unmarried women or those in non-traditional relationships might exhibit different patterns of time use.

These hypotheses guide our multivariate analysis, aiming to shed light on the patterns and consequences of time allocation within diverse household contexts. Unraveling these complexities could help highlight the underlying structural issues that perpetuate time poverty and offer valuable insights for policy formulation. Ultimately, this study seeks to advance a more equitable distribution of time and responsibilities within households, integral to empowering women and promoting gender equality.

3.2.2 Random parameter analysis

The Probit model is the regression model commonly used in the literature to identify the main determinants of time poverty (Bardasi and Wodon, 2010; Kalenkosk et al., 2011). While this method has many strengths, it also has some limitations, such as the assumption of homogeneity of effects. The Probit model supposes that the effect of a given independent variable is constant for all levels of that variable and for all individuals. In other words, it assumes that there is a common relationship between the predictors and the latent variable for all individuals. Yet this may not be the case in gender analysis of time use, where the effects of certain variables may be different for men and women or vary according to the different levels of the variable.

Random parameter models, also known as mixed models or random coefficients models, offer some unique advantages that can address several of these limitations associated with the Probit model in the context of gender time use analysis. One of the main strengths of random parameter models is their ability to capture heterogeneity across individuals or groups. This can be especially valuable in the analysis of gender time use, particularly when there is reason to believe that the effects of certain variables may vary across individuals or groups. Random parameter models allow for individual-specific slopes and intercepts, providing a flexible framework for capturing heterogeneity in time use behavior. By capturing individual-level heterogeneity, random parameter models can provide a richer and potentially more accurate picture of time use patterns.

A simplified example of the use of a random parameter model in the analysis of men's and women's time use is as follows:

Suppose we are interested in the impact of income on time spent on unpaid care and hypothesize that this relationship may differ between men and women, or between women according to any characteristic. In a standard (fixed-effects) regression model, we could include an interaction term between income and a binary gender variable. However, this would assume that the effect of income on unpaid working time is the same for all women and men. A random parameter model allows us to relax this assumption. In such a model, the income coefficient would be a random variable with its own distribution. This means that the effect of income on unpaid working time can vary from one individual to another, enabling more complex, individual-specific relationships to be established.

This analysis focuses on the impact of family structure on time use. The effects of certain demographic variables (e.g., marital status) on the outcome (time poverty) are predicted to differ from one subgroup or individual to another. As an example, we expect the impact of marital status on women's time poverty to differ between married and unmarried women. The random parameter model offers an excellent opportunity to test this hypothesis. To do this, the model allows the effect of marital status to be a random variable with its own distribution, rather than a fixed parameter. This means that the effect of marital status on time poverty can vary from woman to woman, rather than being the same for all women. To illustrate, let's consider:

- T_i the time poverty status of a woman i
- m_i a binary variable indicating whether woman i is married ($m_i = 1$ if married, 0 otherwise)
- Other explanatory variables (such as age, education, number of children, etc.) are contained in the vector X_i

A random parameter model can be specified in this case as follows:

$$T_i = \beta_0 + \beta_1 m_i + \beta_2 X_i + \mu_i \qquad (7)$$

where:

- β_0 is the constant term,
- β_1 is the random coefficient for marital status (assumed to follow a normal distribution),
- β_2 is the vector of fixed coefficients for the other explanatory variables, and
- μ_i is the error term.

In this model, β_1 is allowed to vary across individuals, reflecting the idea that the impact of marital status on time poverty may differ between women.

To estimate the model, we use the simulated maximum likelihood (SML) method, which is frequently used for models with random parameters. Several software packages (including Stata, R, Python, etc.) have maximum likelihood estimation routines that can be adapted to SML estimates. I The Stata program offers a very useful command that can be used to estimate almost all linear and non-linear models using maximum likelihood. This command is -ml-. We code up our random parameter models building on this command.

4 Data and descriptive statistics

4.1 Ugandan TUS

4.2 Senegalese TUS

4.3 Stylized facts

5 Results

6 Conclusion

7 References

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Outline:
Preliminary title: Time poverty in Uganda – Are women over-burdened?
Introduction – Ousmane to draft a first version
Methodology: Ousmane draft – Hilda to review and add UBOS details of the survey
Descriptive statistics: Hilda and Simon to produce some first tables , Ousmane to review and add
Analysis: Ousmane to lead on the analysis – Simon will clean up and produce more regression tables

The lates