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Ragui Assaad and Sara Ragab

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Ragui Assaad¹ and Sara Ragab²

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Send correspondence to:

Ragui Assaad
University of Minnesota
assaad@umn.edu

¹ University of Minnesota, Humphrey School of Public Affairs.

² University of Minnesota, Hubert H. Humphrey School of Public Affairs.

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Abstract

In Egypt, women perform six hours of unpaid care work for every hour men do. What supports can help reduce this unequal burden of unpaid care work? This paper investigates how ownership of household appliances and access to local infrastructural services can help reduce women's unpaid care work. The 2023 wave of the Egypt Labor Market Panel Survey (ELMPS 2023) includes a new time-use module that measures direct and indirect unpaid care work among other activities, such as employment, subsistence work, and leisure activities. It also has a full roster of the durable household goods that households have access to, such as cooking stoves and washing machines, as well as information on access to infrastructural services, such as piped water in the home, connection to a public sewer network and waste collection. We find that access to a cooker/stove is consistently associated with reduced time spent on indirect care work across all sub-tasks and employment statuses for married women. In contrast, the effects of other appliances are mixed or inconclusive, with some counterintuitive results likely driven by low ownership rates. Access to infrastructural services shows similarly varied results: community-level access to garbage collection is linked to reduced time on cleaning and other tasks, while the effects of sewage access are sensitive to model specification, keeping in mind that we are unable to accurately detect the effects of some services such as water and electricity connections due to their virtual universality in Egypt.

Keywords: Unpaid care work, Time-use, Household appliances, Infrastructural services, ELMPS 2023, Egypt

JEL Classifications: J1, J2, O1, D1

ملخص

تقوم النساء في مصر- بالعمل لمدة ست ساعات في أعمال الرعاية غير مدفوعة الأجر مقابل كل ساعة يقوم بها الرجال. ما هي أشكال الدعم التي يمكن أن تساعد في تقليل هذا العبء غير المتكافئ لأعمال الرعاية غير مدفوعة الأجر؟ تبحث هذه الورقة في كيفية مساهمة ملكية الأجهزة المنزلية والوصول إلى الخدمات الأساسية المحلية في الحد من أعمال الرعاية غير مدفوعة الأجر التي تقوم بها النساء. تتضمن موجة عام 2023 من المسح التتبعي لسوق العمل في مصر، وحدة جديدة لاستخدام الوقت تقاس بواسطتها أعمال الرعاية غير مدفوعة الأجر المباشرة وغير المباشرة من بين أنشطة أخرى، مثل التشغيل والعمل المعيشي-والأنشطة الترفيهية. وتحتوي أيضًا على قائمة كاملة بالسلع المنزلية المعمرة التي يمكن للأسر الوصول إليها، مثل مواقد الطهي والغسالات، بالإضافة إلى معلومات حول الوصول إلى الخدمات الأساسية، مثل المياه المنقولة عبر الأنابيب في المنزل، والاتصال بشبكة الصرف الصحي العامة وجمع النفايات. لقد وجدنا أن الوصول إلى الموقد يرتبط باستمرار بانخفاض الوقت المستغرق في أعمال الرعاية غير المباشرة في جميع المهام الفرعية والحالات الوظيفية للنساء المتزوجات. وعلى النقيض من ذلك، فإن تأثيرات الأجهزة الأخرى مختلطة أو غير حاسمة، ومن المرجح أن تكون بعض النتائج غير البديهية مدفوعة بمعدلات الملكية المنخفضة. ويظهر الوصول إلى الخدمات الأساسية نتائج متباينة على نحو مماثل: إذ يرتبط الوصول إلى جمع القمامة على مستوى المجتمع بانخفاض الوقت المستغرق في التنظيف والمهام الأخرى، في حين أن تأثيرات الوصول إلى مياه الصرف الصحي حساسة لمواصفات النموذج، مع الأخذ في الاعتبار أننا غير قادرين على الكشف بدقة عن تأثيرات بعض الخدمات مثل توصيلات المياه والكهرباء بسبب عالميتها الافتراضية في مصر.

1. Introduction

One of the key reasons hindering progress on the wage gap is that women continue to have greater responsibility than men for unpaid care work. By recognizing its value, reducing its burden, and redistributing responsibilities, addressing unpaid care work is critical to achieving gender equality and fostering sustainable economic development (Elson, 2017). The 3 Rs framework for time use, first established by Elson (2017), stands for “Recognizing, Reducing, and Redistributing” time spent on unpaid care work. More recently, it evolved into the 5Rs framework, which now encompasses: “Rewarding and Representation”. The former focus on the fair compensation of care work and ensuring decent working conditions, while the latter seeks to bring the voices of unpaid care workers to the forefront of the decision-making process (UN Women, 2022).

This paper tackles the recognition as well as the reduction aspects of the 3Rs framework, with a specific focus on the latter. Within unpaid care work, we distinguish between indirect care work, which is time spent on various household chores, such as cooking, cleaning, and shopping, and direct care work, which is time spent directly caring for other household members, such as children, the elderly or disabled household members. Access to home appliances and infrastructural services can potentially result in time saving in indirect care work, which is the component of unpaid care work we focus on in this paper. Hence, our analysis focuses on whether access to home appliances and infrastructure reduces the time married women in Egypt spend on unpaid care, in general. More specifically, we examine potential time-savings on sub-components of indirect care work, such as cooking, cleaning, and other indirect work, which includes shopping and travel.

With regard to ownership of home appliances, we focus on the following: refrigerators, stoves, washing machines, water heaters, freezers, dishwashers, microwave ovens, mixers/grinders/kitchen machines, and vacuum cleaners. Among infrastructural services, we focus on access to piped water, electricity, sewage networks, and garbage collection. It should be noted, however, that access to piped water and electricity has become fairly universal in Egypt, limiting the degree of variation in the sample that would allow us to identify an effect. There is a fairly well-developed literature on time savings resulting from access to water and sanitation services, but this literature produces a large range of estimates of the time savings effects of access in different settings (Chandrasekaran et al., 2022). The vast majority of studies examine the effect of water supply improvements. They indicate an average of nearly 76 minutes of time saving per household per day but vary widely from 0.3 min to 211 minutes (Chandrasekaran et al., 2022). Estimates from sanitation interventions is less common and generally indicate a lower range, but also lower averages of somewhere between five and ten minutes per household per day (Chandrasekaran et al., 2022).

There are a number of other benefits resulting from household access to infrastructural services besides time savings in unpaid care work. The literature has documented benefits of improved water

access on a variety of other household outcomes, such as quantity of water consumed (Chen et al., 2019), achievement among primary school children (Hamlet et al., 2021), improvements in the health of children, reduced child work and school attendance (Assaad et al., 2010), improved water quality and reduction in water-borne diseases (Fewtrell et al., 2005).

The literature on the effect of appliance ownership on time savings in unpaid care work is less well developed and has reached contradictory results as to whether the ownership of household appliances reduces women's time in household work. Using the 1997 Australian Time Use Survey, Bittman et al. (2004) find that domestic technology does not reduce women's time in unpaid care work, and even, paradoxically results in some increase in domestic labor. However, their conclusion is questioned by Gershuny (2004) who argues that their results suffer from unmeasured heterogeneity. More recent works by Tewari & Wang (2021) found that a Chinese appliance rebate program led to increased durable goods ownership, reduced housework, and resulted in higher female labor force participation (FLFP), with time reallocation driven mainly by women.

Other attempts to study the impact of time-saving domestic appliances on women's and children's employment have shown that such employment decreases when the ownership of appliances increases (Kerr, 2019, Bhargava & Kerr, 2022). Kerr (2019) found that household appliance ownership reduced housework, increased school enrollment, and lowered child labor, especially among females. Again, this work suffers from the potential endogeneity of appliance ownership and the difficulty in finding suitable instruments to account for it. To address this endogeneity issue while studying the effect of household appliances on female labor force participation, Coen-Pirani et al. (2010a) employed an instrumental variable approach, where they used the state-level ownership rate of an appliance among single women as an instrument for a married woman's ownership of that appliance. By doing so, they assumed that the observed variation in single women's ownership of home appliances is influenced by the unobserved costs in appliances rather than changes in women's labor force participation rates.

Munro (2025a) tests the instrument used by Coen-Pirani et al. (2010a) using the 1991-2010 Brazil microdata, where he obtains similar results to Coen. However, as a robustness check, Munro replaced the washing machine appliance with televisions which yielded similar results, implying that the positive impact on FLFP could be attributed to some other contextual factor and that the instrument of single women's ownership of an appliance might not be a strong one. He conducts another robustness check using single women who work in the domestic services sector as an instrument and finds a negative relationship on FLFP, hence refuting Pirani's earlier findings.

2. Data and definitions

For the first time, the 2023 wave of the ELMPS included a full time-use module for individuals ten and older based on a 24-hour calendar of activities. The time-use module starts by enquiring about when the individual woke up in the day preceding the interview and then asks about each activity the individual has engaged in sequentially in intervals of at least 15 minutes. Activities are classified according to the 2016 International Classification of Time-Use Statistics (ICATUS) developed by the United Nations Statistics Division (United Nations Department of Economic and Social Affairs, 2021). The ELMPS classifies time-use activities at the 2-digit level of detail of ICATUS for the most part, with the exception of a few activities that are classified at the 1-digit level, such as “employment and related activities”, for which a detailed description exists elsewhere in the questionnaire, and “unpaid volunteer, trainee, and other unpaid work” and “socializing and communication, community participation and religious practice.” Once an activity has been listed, the module enquires about the amount of time spent in it in multiples of 15 minutes and whether a secondary activity was taking place at the same time. The enumerator then enquires about the next activity until the individual’s bedtime is reached.

We follow the recommendations of the 21st International Conference of Labour Statisticians (ICLS-21) to define unpaid care work as the provision of services for own final use. Unpaid care work is typically disaggregated into indirect care work and direct care work. *Indirect care work* include activities such as preparing and/or serving meals (which we call “cooking” for short), cleaning, decorating and maintaining one’s own dwelling or premises, durables and other goods (which we call “cleaning” for short), household accounting and management, purchasing and/or transporting goods, gardening, household waste disposal and recycling, and caring for domestic animals or pets (which we aggregate together in a residual category called “other indirect care work”). *Direct care work* includes activities such as childcare and instruction, transporting and caring for elderly, dependent or other household members (ILO, 2023). We define economic work as including employment (work for pay or profit) as well as production of goods that fall within the System of National Accounts (SNA) production boundary, which generally includes the production and processing of primary goods for own final use (ILO, 2013). Since care work is often carried out while doing other things, we count time spent in care work, whether it is a primary or secondary activity, but we do not double count the two different types of care work when they are carried out simultaneously.

This highlights one of the challenges when it comes to surveys that seek to measure time use which usually either adopt a time diaries style or stylized questions. The ELMPS adopts the former as it offers a more comprehensive and accurate account of daily activities, yet it risks confusion over simultaneous tasks making them more susceptible to recall bias, especially among respondents with lower literacy levels. Despite this limitation, many researchers regard the diary method as the gold

standard for time-use data collection. (Rubiano-Matulevich & Viollaz, 2019) Since the focus of this paper is time savings due to access to appliances and infrastructural services, the main emphasis of our analysis is on indirect care work, which is most likely to be affected by such access. To obtain additional insights into the nature of time saving, we disaggregate the minutes in indirect care work into minutes preparing and/or serving meals (cooking), hours cleaning, decorating and maintaining one's own dwelling or premises, durables and other goods (cleaning) and a residual category of other indirect care work.

As part of the household questionnaire, the ELMPS collects information about household ownership of 41 household durable goods and about household access to basic infrastructure, such as piped water, sewerage, and cooking gas. We selected from among the list of 41 durable goods a set of household appliances including: fridge, cooker/stove, water heater, automatic washing machine, freezer, dishwasher, microwave oven, mixer/grinder/kitchen machine, and vacuum cleaner. For each of these appliances, we created a binary variable of whether or not the household owns the appliance. As shown in Table 1, ownership of home appliances varies a great deal depending on the appliance. Ownership of a fridge is close to universal in both urban and rural areas. Ownership of a cooker/stove or mixer/grinder/kitchen machine, while very widespread, is a little less universal. Ownership of a water heater and automatic washing machines is less common, especially in rural areas. Other appliances like separate freezers, microwave ovens, and vacuum cleaners are much less widespread, and with the exception of freezers, much less common in rural areas.

With regards to access to infrastructural services, we considered a household to have access if it was connected to the public network or had an equivalent source of access. For access to piped water, the household was deemed to have access if it had a tap inside the dwelling connected to the public water network. For access to electricity, the household has access if it is hooked to the public electricity network. Access to energy for cooking and water heating was determined by whether the household had access to the natural gas network, bottled gas, or used electricity for cooking or water heating. Access to sewage networks was determined by whether the household has access to either a private or public sewage network. Finally, access to garbage collection was determined by whether the household's waste was collected by either public or private waste collector. As shown in Table 1, access to piped water, electricity, and a convenient energy source for cooking is almost universal. There is more variation across urban and rural areas, in access to a convenient fuel source for water heating, sewage networks, and regular garbage collection.

Table 1. Proportion of households with access to infrastructural services and ownership of durable goods, (percentage)

From ELMPS 2023	Location		Total
	Urban	Rural	
Infrastructural services			
Piped water	99.5	97.7	98.5
Electricity	99.7	99.5	99.6
Cooking gas	99.7	99.7	99.7
Natural gas	52.1	3.3	25.0
Public or private sewage system	93.3	54.6	71.8
Public or private garbage collection	53.7	55.2	54.5
Public sewage network	90.3	30.2	56.9
Home appliances			
Fridge	98.5	97.4	97.9
Cooker/Stove	97.2	92.4	94.5
Water Heater	83.7	56.1	68.4
Automatic Washing Machine	47.8	20.9	32.9
Freezer	29.1	28.1	28.5
Dishwasher	3.0	0.7	1.7
Microwave	18.4	8.4	12.9
Mixer/Grinder/Kitchen Machine	93.3	91.2	92.1
Vacuum Cleaner	31.4	15.2	22.4

Source: Authors calculations based on data from ELMPS 2023.

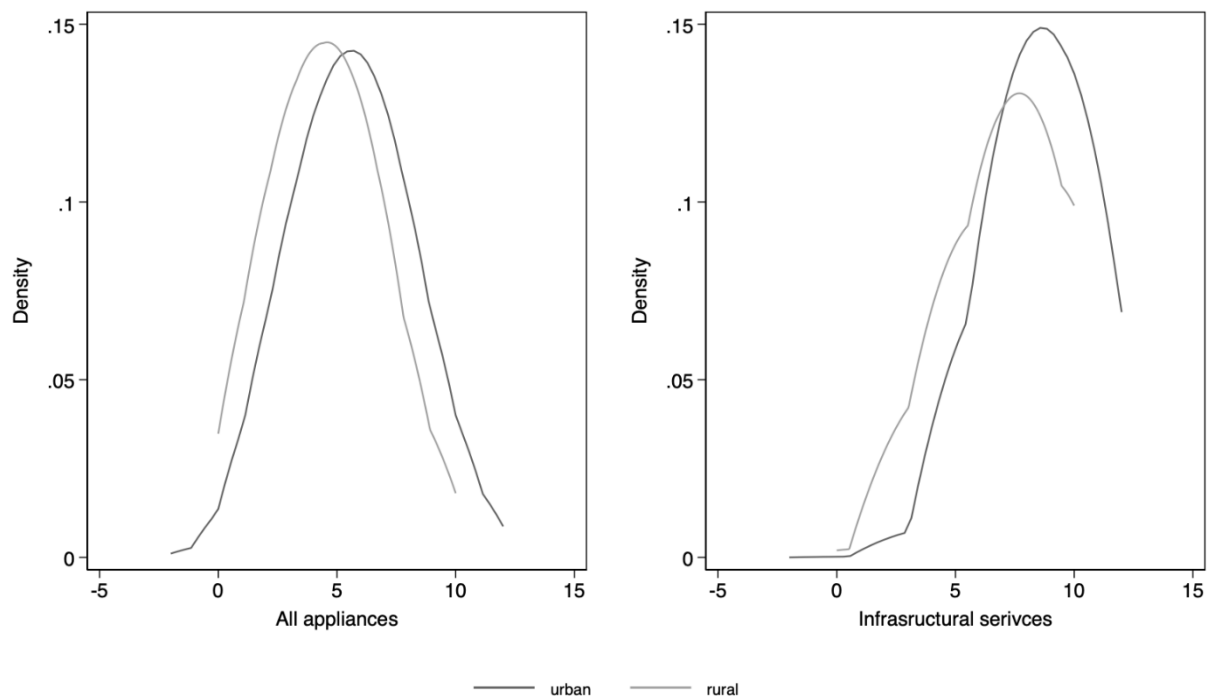
We used the variables on access to individual appliances and services to create household-level indices summarizing access to (i) all appliances and (ii) infrastructural services. One way to construct these indices is to assume equal weights for all items in the index by simply adding across the binary access variables. We then standardize the indices to the same 0-10 scale by using the following formula:

$$std_{index} = 10 * \frac{index - \min(index)}{\max(index) - \min(index)} \quad (1)$$

The interpretation of this index is that a one-unit change represents a 10-percentage point increase in ownership of the possible list of appliances.

The distribution of various indices in urban and rural areas is shown in Figure 1. Overall appliance ownership is centered at 5 in urban areas and a little lower in rural areas. Access to infrastructural services is also quite prevalent across households, but as expected, lower for rural areas than for urban areas.

Figure 1. Distribution of indices of household ownership of all appliances and access to infrastructural services by urban/rural location



Note: Kernel density estimates using epanechnikov kernel functions with bandwidth 2.

Source: Authors' calculations using data from ELMPS 2023.

3. Methods

After descriptively examining the allocation of time to economic work, indirect and direct unpaid care work by sex and marital status, we then examine the relationship between owning different appliances and time spent in indirect care work and three of its subcomponent parts, namely: cooking, cleaning, and other indirect care work (such as shopping, travel, etc.). Our dependent variables are minutes spent on all kinds of indirect care work and in its subcomponents. We also examine how time spent on unpaid care work varies with women's economic status (whether women are non-employed, working from home/field, or working outside).

Our research is susceptible to an endogeneity issue manifested in the relationship between household appliance ownership and time spent on unpaid care work, arising from both unobserved heterogeneity and reverse causality. The unobserved heterogeneity stems from the possibility that households owning more appliances may differ from others in ways not fully captured in the data,

which, in turn, may influence how household members allocate their time. The reverse causality issue arises from the likelihood that households in which women spend more time on unpaid care work may be more inclined to acquire appliances, making causality run in both directions. Additionally, wealth can act as a confounder as it is strongly correlated with appliance ownership and can also influence time use through factors such as access to domestic help, housing quality, and employment opportunities.

One way to address the endogeneity issue is to use an instrumental variable (IV) approach and include a variable that affects appliance ownership without directly impacting time spent on indirect care work. However, we failed to find a suitable IV that fulfills those criteria. As shown in the literature, while Coen-Pirani et al. (2010) uses the average value of single women's ownership of appliances on the state level as an instrument, yet this instrument is not applicable within the context of our study because it is not a common for Egyptian women to live on their own. Additionally, appliance ownership in the ELMPS data is on the household level and not the individual one, also hindering the application of this instrument. While Munro (2025a) utilized the proportion of single women working in the domestic services sector as an IV, however this sector is quite stigmatized in the Egyptian context. Hence, this instrument is also not applicable due to the small, non-representative sample.

We are cognizant of the potential endogeneity of owning home appliances due to unobserved heterogeneity and in the absence of suitable instrumental variables, we strive to include a large number of individual, household, and community-level characteristics as controls. Individual and household controls include the individual's education (6 levels), age and age squared, age at first marriage, dummy variables indicating whether a spouse is present, whether a mother-in-law is present, whether the spouse is more educated or less educated, and whether the individual is neither the head nor spouse of the household head. They also include the spousal age difference (calculated as positive if the spouse is older), household composition (number of children less than 5, 6-11, and number of male and female members 12-14, 15-17, 18-24, 25-59, 60-74, and 75 plus), household per capita income decile.³ Community level controls, which are calculated at the village or neighborhood level, include whether the community is rural, the percent of households in the community with access to running water, electricity, cooking gas, sewage connections, garbage collection, and access with a twenty minute walk to a primary school, preparatory school, secondary school, and government health center. We also include an average wealth index for the community to control for the overall socio-economic status of the community.

³ The household per capita income variable was computed by adding all household income sources earned by the household as reported in ELMPS 2023 and dividing by the household size. See El-Sayed et al. (2024) for more details on calculating household income per capita using ELMPS data.

We then repeat the analysis for the relationship of indirect care work with access to infrastructural services. While there is no good way to instrument for appliance ownership other than including a large number of controls, the literature suggests that the endogeneity of access to services can be partly addressed by aggregating the access variables to the community level and including a sufficient number of community-level controls (Koolwal & Van De Walle, 2010a). This approach addresses household level unobserved heterogeneity related to decision to connect to or make use of particular services. Given the limited household mobility in low-income settings, it is possible to treat community-level placement of infrastructure as conditionally exogenous with the inclusion of a sufficient number of geographic controls (Koolwal & Van De Walle 2010). These controls could include variables that indicate access to other services, such as schools and clinics, as well as average income at the community level. Since the primary source of concern about endogeneity at the community level stems from household residential choices, the limited mobility of households allays these concerns. Nonetheless, placement of infrastructure can be influenced by unobserved community-level factors that can also affect household outcomes, limiting the causal claims that can be made using this analysis.

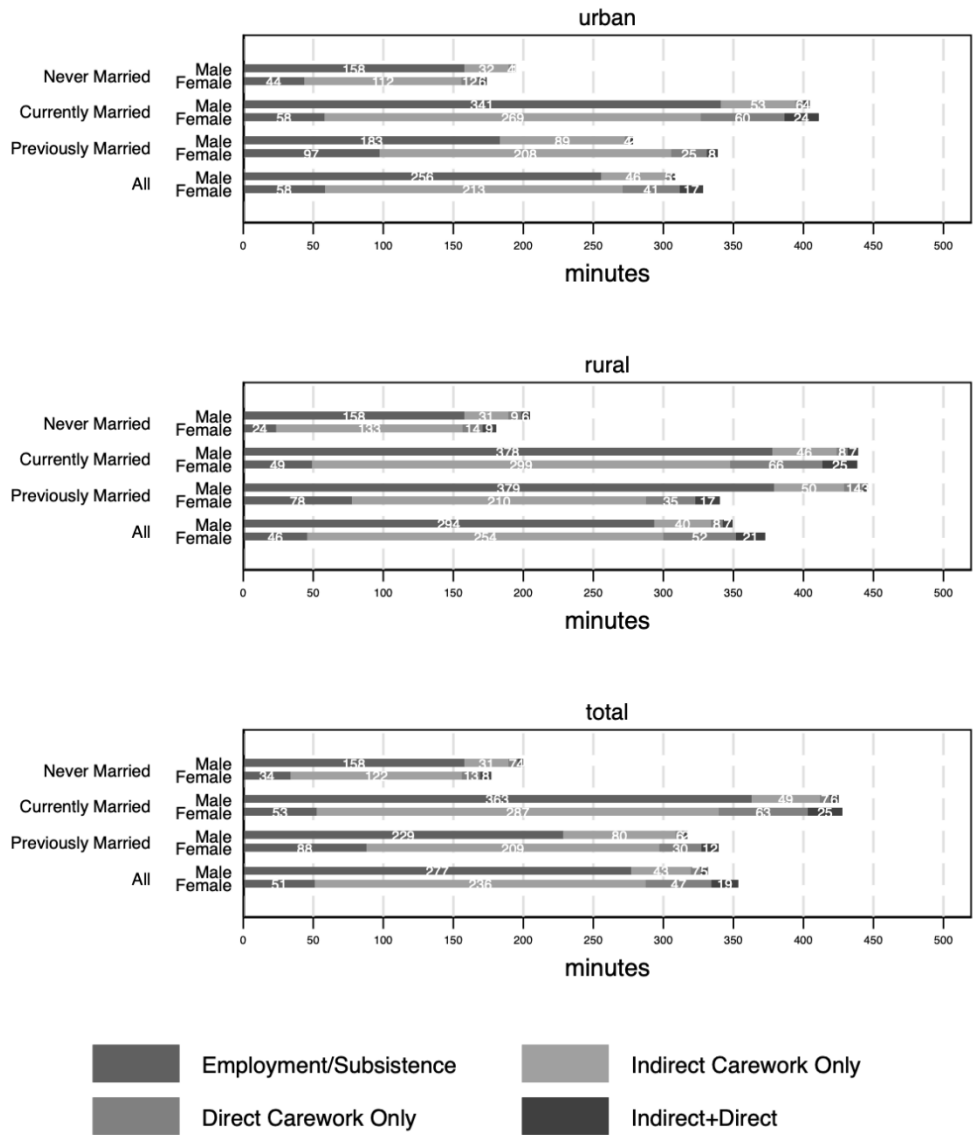
4. The distribution of care work

We begin the analysis by examining the distribution of care work by gender, marital status, and urban/rural location. As shown in Figure 2 women aged 15-64 spend around 280 minutes per day of unpaid care work per day compared to 50 minutes per day for their male counterparts; over five times the amount spent by men. Conversely, men undertake about five times more economic work than women. Most unpaid care work is in the form of indirect care work (236 minutes out of 283 minutes or 83 percent), 19 minutes of which are carried out alongside direct care work.

Beyond the gender gap, the next most striking contrast emerges by marital status. Currently married women undertake approximately 375 minutes of unpaid care work per day, compared to 143 minutes among never-married women. Previously married women fall in between, at 251 minutes per day. Marital status also matters for men, with previously married men undertaking the most care work at 88 minutes per day, compared to currently married men at 62 minutes and never married men at 42 minutes. Thus, currently married women undertake 6 times more unpaid care work than currently married men. They also undertake over five times more unpaid indirect care work (287 minutes versus 49 minutes).

There is also some contrast in the time spent in unpaid care work between urban and rural areas, with women in rural areas spending more time in unpaid care work. Women in rural areas spend 327 minutes per day on average in unpaid care work compared to 271 minutes for women in urban areas, a difference of about 20 percent. There are no stark differences between urban and rural men.

Figure 2. Time spent in economic work and care work by marital status, urban/rural and sex (minutes per day), Ages 15-64



Source: Authors' calculation based on data from ELMPS 2023.

Following that we examine the distribution of time spent by married women across three different employment categories: non-employed, working from home or field, and those working outside. The time spent dependent variable is categorized as follows; time spent on employment, time spent on indirect care work alone, time spent on direct care work alone, and time spent on both indirect and direct care work. The employment categories referenced above refer to the following: the non-employed category describes individuals who are currently not working regardless of their interest

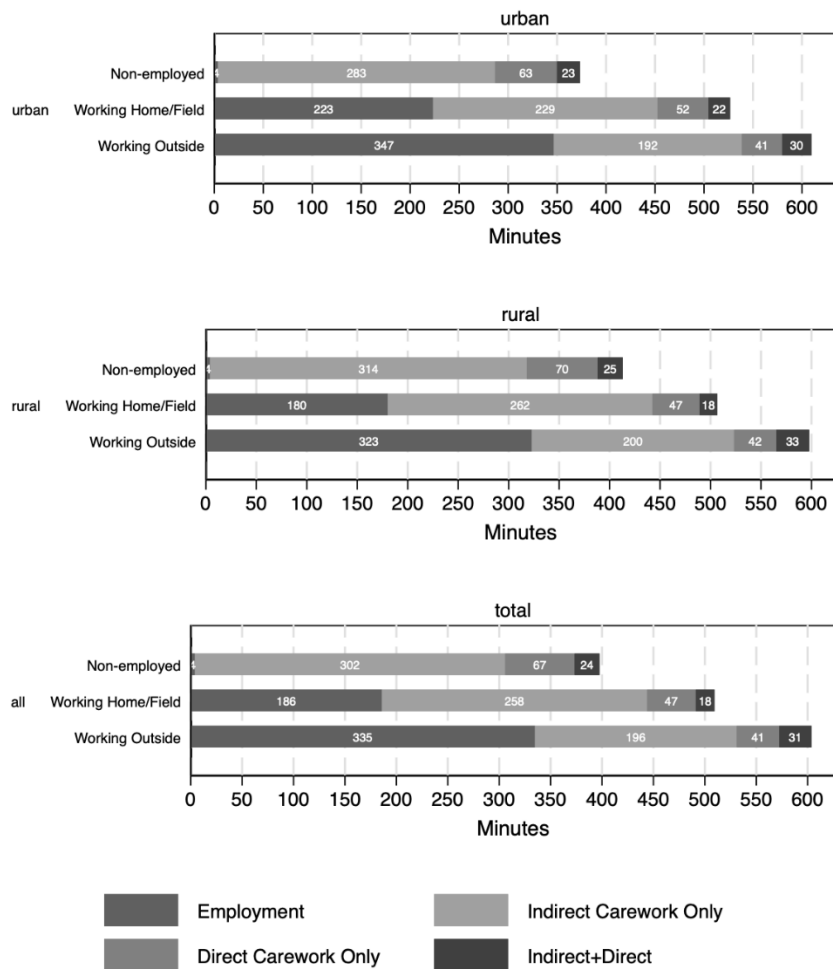
in finding a job. The second category describes individuals who are employed according to the market definition and who are either wage employed, self-employed/employer, and those who work outside their home. And the final category is the same as the latter with the exception that individuals work from home or a field that they own or is owned by their family.

As shown in Figure 3 below, married women aged 15-64 who are non-employed spend most of their time on indirect care work, while employed women spend less time on indirect care work in comparison, yet they still dedicate a significant amount of time to it, especially women working from home/field. Notably, non-employed women spend around 1.5 times more time on indirect care work compared to women working outside, while women working outside spend around 1.8 times more time on employment compared to women working from home/field.

The amount of time spent on direct care work does not vary considerably across women who work in home/field versus those who work outside, 47 and 41 minutes, respectively, but is a slightly higher for non-employed women.

Differences between time spent on unpaid care work between urban and rural women are not significant, with women in rural areas spending slightly more time on unpaid care work overall, whereas employed women in urban areas spend more time on employment compared to their rural counterparts. Overall, the pattern of time allocation across the 3 employment categories is quite similar across urban and rural women, where we can see that non-employed women allocate more time towards indirect work compared to employed women, while women working outside tend to allocate the least amount of time to indirect care work and the most amount of time to employment. For both urban and rural areas, non-employed women spend approximately 1.2 times as much time on unpaid care work as women working from home or in the field, and between 1.5 and 1.6 times as much as women working outside the home.

Figure 3. Time spent on economic and care work by married women (ages 15–64) in urban and rural areas. (in minutes per day)

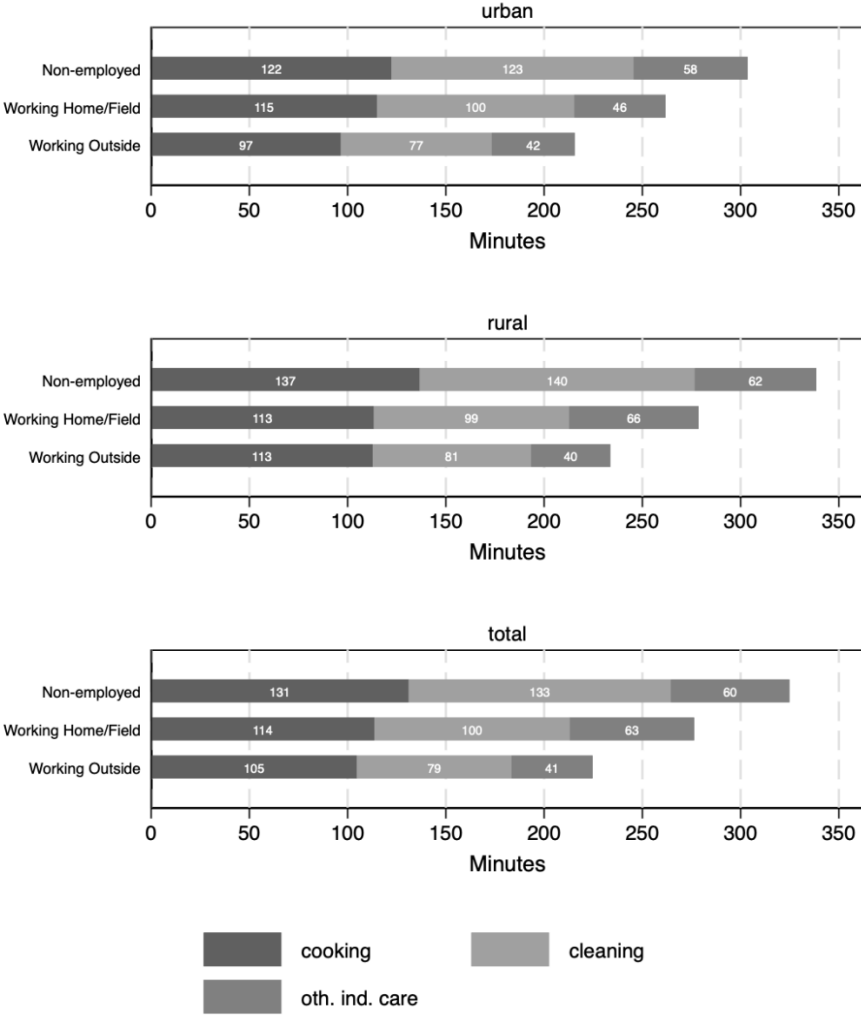


Source: Authors' calculation based on data from ELMPS 2023.

In Figure 4, we examine the breakdown of unpaid indirect care work into its three sub-components: cooking, cleaning, and other indirect care work activities, across urban versus rural areas. The figure conveys consistent results on how women across different employment categories distribute their time across the different components of indirect care work. Time is more or less allocated equally between cooking and cleaning followed by other indirect care category, which includes shopping and travel. Both non-employed women and those working from home or in the field allocate roughly 40 percent of their indirect care time to cooking, compared to about 47 percent among women working outside the home. Cleaning accounts for a similar share among women working from home or outside (35–36 percent) but represents a larger proportion (around 41 percent for non-employed women).

The distribution of unpaid care work does not vary considerably between urban and rural women. For example, while rural women devote more time to indirect care work relative to urban women, the allocation of time across its various subcomponents does not vary significantly by employment category in either setting.

Figure 4. Time spent in minutes on indirect care work by married women (ages 15–64) in urban and rural areas (minutes per day)



Source: Authors' calculation based on data from ELMPS 2023.

5. Ownership of home appliances and married women's unpaid indirect care work

We now examine the relationship between time spent on indirect care work (and its sub-components) by currently married women and household ownership of various home appliances.

As shown in Table 2, the time savings associated with owning a cooker or stove are consistent across all three subcomponents of indirect care work, and these associations persist in models both with and without controls. The association is particularly pronounced for time spent on cleaning. Owning a water heater is associated with reductions in time spent on cooking and cleaning, although these associations diminish once controls are added. The time savings associated with owning a freezer are similar for cooking and cleaning, with a small positive association with time spent on other indirect care activities. As expected, owning a vacuum cleaner is associated with reduced time spent on cleaning, as well as on other indirect care activities. While owning an automatic washing machine is not associated with a reduction in overall indirect care time in the model with controls, it is associated with some reductions in time spent on other indirect care activities.

In summarizing the results of the other explanatory variables on time spent in indirect care work shown in Appendix Table 1, we focus exclusively on statistically significant results and only on results relating to the aggregated indirect care work variable. A woman's own education has a non-monotonic effect on time spent in indirect care work, with time spent increasing with education up to the secondary level and falling back at the higher education level to where women with university education are spending the least time indirect care work. The negative effect for university-educated women is primarily due to less time spent cleaning, suggesting that they may be more able to purchase cleaning services. Age has the expected concave relationship, with the maximum time reached at 38 years of age. Age at first marriage has a small negative effect, suggesting that women who marry younger have a higher indirect work burden. Women who have the same number of education as their spouses spend more time in indirect care work than either those with more or less education than their spouses. Having children 6-11, boys 12-14, and young men 18-24 increases time spent in indirect care work. Conversely, having adult women in the household of any age (18-24, 25-59, 60-74, and 75+) significantly reduces time spent in indirect care work since they presumably share the work burden with the index woman. As with education, the relationship between time spent in indirect care work and household per capita income is non-monotonic, increasing for the first five income deciles and then dropping, so that women in the richest income decile do the least indirect care work, again mostly due to less time spent on cleaning.

As we saw in the descriptive results, women in rural communities spend significantly more time in indirect care work even after correcting for individual, household and community characteristics. Some of that work may involve increased involvement in subsistence tasks that are captured in the data as indirect care work. There is a negative relationship between the average community wealth

index and time spent in indirect care work, suggesting that women living in more affluent communities can spend less time on indirect care work. Other community controls have varying effects on time spent in indirect care work, with some positive and other negative effects.

Table 2. Coefficient estimates from OLS regressions of time spent in indirect care work (in hours) on access to infrastructural services at the household and community levels, currently married women, 15-64.

Variables	(1) indirect care hrs.	(2) indirect care hrs.	(3) cooking hrs	(4) cooking hrs	(5) cleaning hrs	(6) cleaning hrs	(7) oth. indirect care hrs	(8) oth. indirect care hrs
fridge	24.57* (13.70)	17.14 (13.39)	10.30 (7.976)	7.188 (7.859)	10.12 (8.408)	5.720 (8.292)	4.873 (7.811)	3.890 (7.800)
cooker/stove	-41.69*** (7.170)	-37.77*** (7.074)	-8.250** (4.174)	-7.039* (4.153)	-26.80*** (4.400)	-22.67*** (4.382)	-7.170* (4.088)	-8.289** (4.122)
water heater	-5.836 (3.664)	2.340 (3.769)	-5.481** (2.133)	-0.216 (2.213)	-6.123*** (2.249)	-0.999 (2.335)	4.781** (2.089)	3.605 (2.196)
automatic washing machine	-12.74*** (3.744)	-3.131 (3.780)	-2.822 (2.180)	1.451 (2.219)	-0.689 (2.298)	4.533* (2.341)	-6.941*** (2.135)	-5.835*** (2.202)
freezer	-7.914** (3.628)	-4.029 (3.703)	-7.712*** (2.112)	-6.381*** (2.174)	-7.830*** (2.227)	-5.401** (2.294)	4.402** (2.069)	5.603*** (2.158)
dishwasher	-3.306 (12.58)	22.18* (12.56)	-2.273 (7.326)	9.503 (7.373)	0.144 (7.723)	15.94** (7.779)	-2.702 (7.175)	-0.839 (7.318)
microwave	6.953 (4.860)	15.02*** (4.869)	-2.061 (2.829)	1.473 (2.858)	12.44*** (2.983)	17.81*** (3.016)	-9.524*** (2.771)	-8.943*** (2.837)
mixer, grinder or kitchen machine	10.88 (6.958)	3.575 (6.831)	6.313 (4.051)	2.505 (4.010)	5.200 (4.270)	2.051 (4.231)	-0.628 (3.967)	-1.148 (3.980)
vacuum cleaner	-20.14*** (4.019)	-10.41** (4.122)	-0.438 (2.340)	4.098* (2.420)	-12.39*** (2.467)	-7.067*** (2.553)	-5.037** (2.292)	-3.717 (2.402)
Constant	320.2*** (14.87)	243.1*** (66.77)	126.6*** (8.659)	-15.47 (39.20)	145.0*** (9.128)	102.1** (41.36)	61.31*** (8.480)	130.1*** (38.90)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	12,979	12,979	12,979	12,979	12,979	12,979	12,979	12,979
R-squared	0.011	0.066	0.004	0.043	0.010	0.047	0.004	0.017

In Table 3, we show coefficients and standard errors from ordinary least squares (OLS) regressions of the minutes spent on indirect care work on dummy variables indicating ownership of various appliances across each of the 3 employment categories defined earlier. Hence, we define 4 different models for each of those categories: (Model 1) examines non-employed women, (Model 2) examines women working from home/field, and (Model 3) examines women working outside. All three models include a full set of controls, and (Model 4) examines the effects on the full sub-sample of married women aged 15 to 64.

According to Table 3, only some appliances have a statistically significant effect on time in minutes spent on indirect care work. All 4 models include full set of controls since it makes them less susceptible to omitted variable bias due to unobserved heterogeneity. As shown in Table 3, it is no surprise that we cannot detect any time-savings effects of fridges across all 4 columns, since the

ownership of fridges is almost universal in Egypt (see Table 1), leading to limited variation in the sample.

The time savings associated with owning a stove are substantial across all employment categories, particularly for non-employed women. Specifically, stove ownership is associated with reductions in time spent on indirect care work by approximately 37.5 minutes for non-employed women, 44.4 minutes for those working from home or in the field, and 41.2 minutes for women working outside the home. While the magnitude of these effects is similar, the statistical significance varies, likely due to differences in sample size. The non-employed group includes 10,839 women, compared to only 815 and 1,320 in the home/field and outside work categories, respectively. This discrepancy helps explain why the effect is significant at the 1% level for non-employed women, but only at the 10% level for the other two groups.

Owning an automatic washing machine has a significant effect on reducing the amount of time spent on indirect care work for women who work outside, by around 26 minutes. We can observe a couple of counterintuitive results, where the ownership of dishwashers and microwaves are associated with an increase in the time spent on indirect care work for non-employed women. This might be due to the low ownership rates of dishwashers and microwaves; 1.7% and 12.9 % respectively, (see Table 1), which may limit the ability to reliably estimate their actual effects. Owning a vacuum cleaner seems to be associated with a reduction in time spent on indirect care work for women who are non-employed but surprisingly seems to have a positive association with time spent on indirect care work for women working at home/field.

Table 3. Coefficients estimates from an Ordinary Least Squares Regression on the association between household ownership of various home appliances and minutes spent in indirect care work, married women 15-64 by employment category

	Model 1 (Non-employed)	Model 2 (Working from home/field)	Model 3 (Working outside)	Model 4 (Total)
Fridge	13.26 (14.34)	46.47 (47.34)	14.13 (48.06)	17.14 (13.39)
Cooker/Stove	-37.54*** (7.59)	-44.37* (25.87)	-41.16* (23.50)	-37.77*** (7.07)
Water Heater	-0.24 (4.04)	-25.55* (14.71)	19.55 (13.01)	2.34 (3.77)
Automatic Washing Machine	-1.22 (4.07)	17.11 (19.60)	-25.90** (10.64)	-3.13 (3.78)
Freezer	-4.12 (4.04)	-19.54 (15.93)	-14.06 (10.19)	-4.03 (3.70)
Dishwasher	26.69* (14.09)	84.08 (109.07)	-18.07 (27.40)	22.18* (12.56)
Microwave	14.15*** (5.27)	40.09 (31.72)	5.43 (12.59)	15.02*** (4.87)
Mixer, Grinder or Kitchen Machine	2.86 (7.34)	16.85 (23.16)	2.51 (23.98)	3.58 (6.83)
Vacuum Cleaner	-10.76** (4.46)	47.97** (22.85)	0.54 (11.08)	-10.41** (4.12)
Constant	148.66** (70.58)	375.09 (264.16)	704.31** (325.04)	243.10*** (66.77)
Controls Included	Yes	Yes	Yes	Yes
Observations	10,839	815	1,320	12,979

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Author's calculations based on data from ELMPS 2023.

Note: Coefficients estimates (and standard errors in parentheses) from regressions of the dependent variable (columns) on dummy variables representing ownership of home appliances with controls where (Model 1) includes non-employed women, (Model 2) women working from home/field, (Model 3) women working outside, (Model 4) all married women aged 15 to 64. Individual and household controls include individual's education (6 levels), age and age squared, age at first marriage, dummy variables indicating spouse present, mother in law present, spouse more educated, spouse less educated and whether individual is neither the head nor spouse of the household head, the spousal age difference, and household composition (number of children less than 5, 6-11, and number of male and female members (12-14, 15-17, 18-24, 25-59, 60-74, and 75 plus), household per capita income decile. Community level controls, which are calculated at the village or neighborhood level, include whether the community is rural, the percent of households in the community with access to running water, electricity, cooking gas, sewage connections, garbage collection, and access to a primary school, preparatory school, secondary school, government health center within a twenty-minute walk. We also include an average wealth index for the community to control for the overall socio-economic status of the community. Statistical significance at the 0.1% (***), 1% (**) and 5% (*) levels are shown.

6. Access to infrastructural services and married women's indirect care work

We turn next to the association between access to infrastructural services, such as piped water, electricity, sanitary systems, and garbage collection and married women's time spent on indirect care work. We start with all time spent on indirect care work as our main dependent variable and

estimate models with and without controls, first with access to services defined at the household level and second with access defined at the community level.⁴

As shown in Table 4, when access to services is defined at the household, but no controls are used (Model 1), only access to a sewage system appears to have a time-saving effect on women's indirect care work.⁵ This effect disappears when a full set of controls is added (Model 2), however it now seems that access to piped water increases time spent on indirect care work. When access is defined at the community level, both access to a sewage system and to garbage collection appear to have time-saving effects (Model 3), but when controls are included, access to garbage collection remains negative and significant (Model 4). Access to electricity is also shown to significantly be associated with a reduction on time spent on indirect care work, however as noted earlier in (Table 1) above, access to electricity is almost universal 96.1% , implying that households that do not have access to electricity are drastically different from those who do and are an anomaly, which can explain the results we have.

Table 4. Coefficient estimates from an Ordinary Least Squares regression of time spent in minutes on indirect care work on household and community access to infrastructural services for married women 15-64

Variables	(1) HH. access/no controls	(2) HH. Access w/controls	(3) Community Access, no controls	(4) Community access, w/controls
piped water	8.755 (11.94)	19.46* (11.70)	2.639 (32.29)	31.38 (32.04)
electricity	-3.700 (22.24)	-16.59 (21.81)	-55.37 (50.77)	-113.6** (50.36)
sewage system	-21.40*** (3.347)	-3.546 (3.876)	-31.35*** (4.129)	-4.169 (5.178)
garbage disposal	-1.916 (3.111)	-2.459 (3.156)	-11.77** (4.652)	-20.73*** 31.38
Controls included?	No	Yes	No	Yes
Observations	12,979	12,979	12,979	12,979
R-squared	0.004	0.060	0.007	0.062

Finally, we repeat our preferred estimates, which aggregate access to services to the community level, but break down time in indirect care work into its three sub-components: cooking, cleaning, and other indirect care tasks. As shown in Table 5, the results indicate that although increased community access to a sewage system has a significant effect on time spent in all kinds of indirect care work, it reduces time spent cooking in the models with and without controls, but it is also associated with more time in other indirect work tasks. Increased community access to garbage collection saves times cleaning and in other indirect work tasks. Time spent in other indirect care

⁴ Community-level access is defined as the proportion of households in the village or neighborhood in the sample that have access to the service and thus varies from 0 to 1.

⁵ A full set of results in shown in Appendix Table 2

work is also negatively associated with increased community access to water and electricity networks, but this kind of access is virtually universal in Egypt as shown in Table 1. Hence, households that do not have access to water and electricity networks are atypical and would be quite different from the majority of households which do have access to these services. Accordingly results associated with electricity and water services are not representative or do not provide reliable results.

Table 5. Coefficient estimates from an Ordinary Least Squares regression of community access to infrastructural services on time spent (in minutes) on indirect care work and its sub-components for married women 15-64

Variables (community access to)	(1) indirect care mins	(2) indirect care mins	(3) cooking mins	(4) cooking mins	(5) cleaning mins	(6) cleaning mins	(7) oth. indirect care mins	(8) oth. indirect care mins
Water	-3.183 (31.44)	31.39 (32.04)	51.85*** (18.31)	70.39*** (18.78)	17.55 (19.27)	24.09 (19.87)	-75.90*** (17.80)	-65.83*** (18.65)
Electricity	-63.70 (50.26)	-115.3** (50.30)	59.74** (29.27)	18.39 (29.49)	-18.35 (30.80)	-31.92 (31.19)	-66.81** (28.46)	-69.55** (29.29)
Sewage	-30.18*** (3.96)	-4.16 (5.18)	-17.95*** (2.31)	-7.71** (3.04)	-14.66*** (2.43)	-1.70 (3.21)	5.98*** (2.24)	13.72*** (3.01)
Garbage	-14.10*** (4.47)	-20.76*** (4.95)	-0.161 (2.61)	-2.58 (2.90)	-7.65*** (2.74)	-11.16*** (3.07)	-12.56*** (2.53)	-13.26*** (2.88)
Controls included?	No	Yes	No	Yes	No	Yes	No	Yes
Observations	12,979	12,979	12,979	12,979	12,979	12,979	12,979	12,979
R-squared	0.007	0.062	0.006	0.042	0.004	0.041	0.004	0.015

Source: Author's calculations based on data from ELMPS 2023.

Note: Coefficients estimates (and standard errors in parentheses) from regressions of access to infrastructural services and its effect on time spent on indirect care work and its subcomponents (Models 1, 3, 5, and 7) are without controls while (Models 2, 4, 6, and 8) include a full set of individual, household and community-level controls. Individual and household controls include individual's education (6 levels), age and age squared, age at first marriage, dummy variables indicating spouse present, mother in law present, spouse more educated, spouse less educated and whether individual is neither the head nor spouse of the household head, the spousal age difference, and household composition (number of children less than 5, 6-11, and number of male and female members 12-14, 15-17, 18-24, 25-59, 60-74, and 75 plus), household per capita income decile. Community level controls, which are calculated at the village or neighborhood level, include whether the community is rural, proportion of households with walking access within 20 minutes to a primary school, preparatory school, secondary school, government health center. We also include an average wealth index for the community to control for the overall socio-economic status of the community. Statistical significance at the 0.1% (***), 1% (**) and 5% (*) levels are shown.

7. Conclusions

In this paper we utilized the ELMPS 2023 wave time use module to examine the relationship between the unpaid indirect care work of married women ages 15 to 64 in Egypt and their access to home appliances and infrastructural services. We address the first two pillars of the 5Rs framework of unpaid care work; “Recognize, Reduce, Redistribute, Reward, Represent”; with a particular focus on the reduction of indirect care work and its sub-components. In light of the reduction pillar, our hypothesis is that home appliances and access to infrastructural services would result in a reduction in time spent on indirect care work since they are likely to contribute to time savings in various household chores, such as cooking, and cleaning. By recognizing the value of unpaid care through

time-use data and identifying pathways to reduce this burden, our broader goal is to help shift cultural norms, free up women's time for labor market participation, and contribute to narrowing the gender wage gap. These expectations are borne out with regards to ownership of appliances such as a cooker/stove and vacuum cleaner, and access to services, such as garbage collection.

We encounter a limitation manifested in endogeneity concerns linked to unobserved heterogeneity at the household level, reverse causality, as well as wealth as a confounder. We sought to apply a suitable IV approach to try and conquer these concerns. However, given the context of our study, we were unable to come up with a suitable IV or adopt the IVs proposed in the literature such as: the average rate of ownership of appliances by single women on a state level as proposed by Coen-Pirani et al. (2010) or Munro's (2025) IV of single women working in the domestic service sector. The former is inapplicable given that Egyptian women rarely live on their own and that appliance ownership is on the household level not the individual level in our data. While the stigmatized nature around working in the domestic services sector in Egypt prevents us from applying Munro's IV. Hence, given these limitations, we followed Koolwal & Van De Walle's (2010) footsteps and resorted to controlling for a large set of individual, household and community-level controls. By aggregating on the community level, we can control for household level unobserved heterogeneity given the assumption of low mobility in low-income settings.

Results show that ownership of a cooker/stove consistently shows a strong, significant association with reduced time spent on indirect care work; an effect that holds across all three sub-components and employment status. In contrast, results for other appliances are largely inconclusive. For example, the association between freezer ownership and reduced time spent cooking and cleaning disappears once controls are added; in fact, it is positively associated with time spent on other indirect care tasks. Vacuum cleaner ownership reduces time spent on cleaning and on other indirect tasks, but only for non-employed women. A few counterintuitive findings emerge where dishwasher and microwave ownership are linked to increased time spent on indirect care work among non-employed women, likely due to their low ownership rates. Water heater ownership appears to reduce time spent on cooking and cleaning, but this association weakens after adding controls. Similarly, while owning an automatic washing machine has no significant association with overall indirect care time, it does reduce time spent on "other" indirect care tasks.

With regards to access to infrastructural services, results convey that increased community access to garbage collection is associated with negative effects on cleaning and other indirect care work tasks but not cooking, results also even once controls are added. Community access to a sewage system has a significant effect on time spent on indirect care work only when controls are excluded. However, it reduces time spent on cooking in the models with and without controls, but it is also associated with more time in other indirect work tasks. Given that access to water and electricity is common in Egypt, the results associated with these services may be unreliable.

Overall, there is no clear evidence that appliance ownership or access to infrastructural services consistently reduces the time women spend on indirect care work. Results vary considerably across different appliances and services, making it difficult to identify a clear pattern. With respect to the ownership of appliances, the best we could do was to control for a large set of these individual, household, and community level controls. In the case of access to infrastructural services, we were able to go further and aggregate access to services to the community level, this purging household level sources of unobserved heterogeneity. However, there could still be unobserved heterogeneity at the level of the community as well as possible endogeneity from households relocating to communities based on their service amenities. Our estimates cannot therefore be interpreted as causal, but simply suggestive of the possible direction and magnitude of effects.

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Appendix Table 1. Coefficient estimates from OLS regressions of time spent in indirect care work (in hours) and its sub-components as a function of ownership of home appliances. Currently married women, 15-64

Variables	(1) indirect care hrs.	(2) indirect care hrs.	(3) cooking hrs	(4) cooking hrs	(5) cleaning hrs	(6) cleaning hrs	(7) oth. indirect care hrs	(8) oth. indirect care hrs
fridge	24.57* (13.70)	17.14 (13.39)	10.30 (7.976)	7.188 (7.859)	10.12 (8.408)	5.720 (8.292)	4.873 (7.811)	3.890 (7.800)
cooker/stove	-41.69*** (7.170)	-37.77*** (7.074)	-8.250** (4.174)	-7.039* (4.153)	-26.80*** (4.400)	-22.67*** (4.382)	-7.170* (4.088)	-8.289** (4.122)
water heater	-5.836 (3.664)	2.340 (3.769)	-5.481** (2.133)	-0.216 (2.213)	-6.123*** (2.249)	-0.999 (2.335)	4.781** (2.089)	3.605 (2.196)
automatic washing machine	-12.74*** (3.744)	-3.131 (3.780)	-2.822 (2.180)	1.451 (2.219)	-0.689 (2.298)	4.533* (2.341)	-6.941*** (2.135)	-5.835*** (2.202)
freezer	-7.914** (3.628)	-4.029 (3.703)	-7.712*** (2.112)	-6.381*** (2.174)	-7.830*** (2.227)	-5.401** (2.294)	4.402** (2.069)	5.603*** (2.158)
dishwasher	-3.306 (12.58)	22.18* (12.56)	-2.273 (7.326)	9.503 (7.373)	0.144 (7.723)	15.94** (7.779)	-2.702 (7.175)	-0.839 (7.318)
microwave	6.953 (4.860)	15.02*** (4.869)	-2.061 (2.829)	1.473 (2.858)	12.44*** (2.983)	17.81*** (3.016)	-9.524*** (2.771)	-8.943*** (2.837)
mixer, grinder or kitchen machine	10.88 (6.958)	3.575 (6.831)	6.313 (4.051)	2.505 (4.010)	5.200 (4.270)	2.051 (4.231)	-0.628 (3.967)	-1.148 (3.980)
vacuum cleaner	-20.14*** (4.019)	-10.41** (4.122)	-0.438 (2.340)	4.098* (2.420)	-12.39*** (2.467)	-7.067*** (2.553)	-5.037** (2.292)	-3.717 (2.402)
edu==Reads & Writes		1.177 (8.282)		0.911 (4.862)		6.494 (5.130)		-0.979 (4.826)
edu==Less than Intermediate		18.17*** (5.177)		6.800** (3.039)		2.661 (3.207)		7.160** (3.017)
edu==Intermediate		20.30*** (4.469)		8.910*** (2.624)		5.145* (2.768)		3.563 (2.604)
edu==Above Intermediate		-1.068 (9.755)		9.970* (5.727)		-8.145 (6.042)		-7.281 (5.684)
edu==University & Above		-10.85* (5.775)		-2.385 (3.390)		-10.14*** (3.577)		-0.955 (3.365)
Age		10.11*** (1.286)		4.668*** (0.755)		2.072*** (0.796)		3.332*** (0.749)
age squared divided by 100		-13.08*** (1.596)		-6.058*** (0.937)		-2.923*** (0.988)		-4.196*** (0.930)
Age at first marriage		-1.013*** (0.387)		-0.160 (0.227)		-0.219 (0.240)		-0.452** (0.226)
Spouse present		-18.98* (10.86)		-19.35*** (6.373)		2.282 (6.725)		0.179 (6.326)

Appendix Table 1. Continued

Variables	(1) indirect care hrs.	(2) indirect care hrs.	(3) cooking hrs	(4) cooking hrs	(5) cleaning hrs	(6) cleaning hrs	(7) oth. indirect care hrs	(8) oth. indirect care hrs
mother in law present		1.645 (5.488)		1.142 (3.222)		-0.843 (3.400)		1.695 (3.198)
spouse more educated		-7.824** (3.777)		-1.237 (2.217)		-2.887 (2.339)		-1.912 (2.201)
spouse less educated		-9.541** (4.261)		-4.502* (2.502)		-5.038* (2.639)		1.369 (2.483)
spouse education missing		-47.43** (23.38)		-25.28* (13.72)		-40.69*** (14.48)		18.07 (13.62)
spouse age difference, +ve spouse older		-0.642 (0.410)		-0.884*** (0.241)		-0.363 (0.254)		0.338 (0.239)
spouse age missing		-22.45 (25.24)		-17.26 (14.81)		17.83 (15.63)		-23.73 (14.70)
individual neither HH head or spouse of head		8.879 (8.468)		-8.436* (4.971)		11.00** (5.245)		3.367 (4.934)
nch0_5		-0.336 (2.250)		1.361 (1.321)		-0.882 (1.394)		-1.297 (1.311)
nch6_11		4.264** (1.977)		1.110 (1.161)		2.469** (1.225)		-0.119 (1.152)
nfm12_14		-4.039 (3.918)		-2.051 (2.300)		-2.401 (2.427)		-2.010 (2.283)
nml12_14		12.04*** (3.899)		7.312*** (2.289)		4.796** (2.415)		0.929 (2.272)
nfm15_17		-2.124 (4.143)		0.0656 (2.432)		0.955 (2.566)		2.373 (2.414)
nml15_17		0.236 (4.086)		-1.862 (2.399)		3.908 (2.531)		-2.053 (2.381)
nfm18_24		-20.25*** (3.096)		-9.008*** (1.818)		-13.62*** (1.918)		0.546 (1.804)
nml18_24		7.686** (3.082)		8.288*** (1.810)		7.554*** (1.909)		-4.176** (1.796)
nfm25_59		-20.85*** (4.179)		-13.97*** (2.453)		-10.27*** (2.588)		1.779 (2.435)
nml25_59		5.284 (3.630)		3.554* (2.131)		4.947** (2.249)		-1.706 (2.115)
nfm60_74		-25.07*** (6.686)		-10.18*** (3.925)		-14.47*** (4.141)		-2.724 (3.896)
nml60_74		5.289 (6.828)		11.23*** (4.008)		0.692 (4.229)		-4.779 (3.978)

Appendix Table 1. Continued

Variables	(1) indirect care hrs.	(2) indirect care hrs.	(3) cooking hrs	(4) cooking hrs	(5) cleaning hrs	(6) cleaning hrs	(7) oth. indirect care hrs	(8) oth. indirect care hrs
nfm75p		-25.75** (11.38)		-2.964 (6.683)		-13.21* (7.051)		-14.11** (6.633)
nml75p		4.922 (13.28)		-4.488 (7.796)		9.856 (8.226)		-1.876 (7.738)
income_percd== 2.0000		5.955 (6.433)		10.41*** (3.777)		1.307 (3.985)		-1.574 (3.749)
income_percd== 3.0000		17.59*** (6.154)		10.39*** (3.613)		7.596** (3.812)		2.416 (3.586)
income_percd== 4.0000		13.12** (6.180)		11.76*** (3.628)		3.553 (3.828)		2.099 (3.601)
income_percd== 5.0000		21.80*** (6.235)		11.83*** (3.661)		8.289** (3.862)		3.445 (3.633)
income_percd== 6.0000		11.42* (6.163)		6.065* (3.618)		-0.770 (3.817)		6.700* (3.591)
income_percd== 7.0000		0.756 (6.342)		3.993 (3.723)		-1.129 (3.928)		0.941 (3.695)
income_percd== 8.0000		-9.594 (6.518)		-3.602 (3.827)		-14.33*** (4.038)		7.795** (3.798)
income_percd== 9.0000		4.804 (6.810)		8.033** (3.998)		-9.284** (4.218)		3.985 (3.968)
income_percd== 10.0000		-15.57** (7.436)		-2.176 (4.365)		-23.65*** (4.606)		8.026* (4.333)
rural		15.83*** (4.105)		4.755** (2.410)		7.579*** (2.543)		5.202** (2.392)
water_vs		30.14 (32.12)		67.81*** (18.86)		23.33 (19.89)		-64.62*** (18.71)
electricity_vs		-93.91* (50.41)		22.88 (29.60)		-20.40 (31.23)		-64.03** (29.37)
sewage_vs		-2.958 (5.199)		-6.959** (3.052)		-0.248 (3.220)		12.86*** (3.029)
garbage_vs		-20.32*** (5.008)		-2.115 (2.940)		-10.51*** (3.102)		-13.79*** (2.918)
prmsc_acc_vs		-27.46** (13.98)		-6.893 (8.207)		-1.440 (8.659)		-10.76 (8.145)
prpsc_acc_vs		42.03*** (11.67)		23.95*** (6.851)		19.63*** (7.228)		-0.344 (6.799)
secsc_acc_vs		-23.68*** (5.514)		-16.13*** (3.237)		-14.66*** (3.415)		-1.793 (3.213)
gvhlctr_acc_vs		22.04*** (8.368)		-6.094 (4.913)		13.44*** (5.183)		13.48*** (4.876)

Appendix Table 1. Continued

Variables	(1) indirect care hrs.	(2) indirect care hrs.	(3) cooking hrs	(4) cooking hrs	(5) cleaning hrs	(6) cleaning hrs	(7) oth. indirect care hrs	(8) oth. indirect care hrs
wealth_vs		-9.882*** (3.738)		-5.943*** (2.195)		-4.267* (2.315)		-2.907 (2.178)
Constant	320.2*** (14.87)	243.1*** (66.77)	126.6*** (8.659)	-15.47 (39.20)	145.0*** (9.128)	102.1** (41.36)	61.31*** (8.480)	130.1*** (38.90)
Observations	12,979	12,979	12,979	12,979	12,979	12,979	12,979	12,979
R-squared	0.011	0.066	0.004	0.043	0.010	0.047	0.004	0.017

*Note: Coefficients estimates (and standard errors in parentheses) from regressions of the dependent variable (columns) on dummy variables representing ownership of home appliances without controls (Model 1) (Model 3) (Model 5) (Model 7) and with individual, household and community-level controls (Model 2) (Model 4) (Model 6) (Model 8). Individual and household controls include individual's education (6 levels), age and age squared, age at first marriage, dummy variables indicating spouse present, mother in law present, spouse more educated, spouse less educated and whether individual is neither the head nor spouse of the household head, the spousal age difference, and household composition (number of children less than 5, 6-11, and number of male and female members 12-14, 15-17, 18-24, 25-59, 60-74, and 75 plus), household per capita income decile. Community level controls, which are calculated at the village or neighborhood level, include whether the community is rural, the percent of households in the community with access to running water, electricity, cooking gas, sewage connections, garbage collection, and access to a primary school, preparatory school, secondary school, government health center within a twenty-minute walk. Statistical significance at the 0.1% (***), 1% (**) and 5% (*) levels are shown.*

Appendix Table 2. Coefficient estimates from OLS regressions of time spent in indirect care work (in hours) on access to infrastructural services at the household and community levels. Currently married women, 15-64

Variables	(1) HH. access/no controls	(2) HH. Access w/controls	(3) Community Access, no controls	(4) Community access, w/controls
piped water	8.755 (11.94)	19.46* (11.70)	2.639 (32.29)	31.38 (32.04)
electricity	-3.700 (22.24)	-16.59 (21.81)	-55.37 (50.77)	-113.6** (50.36)
sewage system	-21.40*** (3.347)	-3.546 (3.876)	-31.35*** (4.129)	-4.169 (5.178)
garbage disposal	-1.916 (3.111)	-2.459 (3.156)	-11.77** (4.652)	-20.73*** (4.953)
edu==Reads & Writes		0.101 (8.292)		0.208 (8.287)
edu==Less than Intermediate		16.58*** (5.153)		16.10*** (5.147)
edu==Intermediate		17.42*** (4.387)		18.13*** (4.362)
edu==Above Intermediate		-6.134 (9.672)		-4.889 (9.655)
edu==University & Above		-14.16** (5.569)		-13.31** (5.537)
Age		9.835*** (1.283)		9.953*** (1.282)
age squared divided by 100		-12.74*** (1.594)		-12.88*** (1.593)
Age at first marriage		-0.914** (0.388)		-0.981** (0.388)
Spouse present		-16.78 (10.82)		-18.04* (10.83)
mother in law present		1.613 (5.493)		2.670 (5.490)
spouse more educated		-9.143** (3.781)		-8.657** (3.777)
spouse less educated		-10.25** (4.266)		-9.999** (4.262)

Appendix Table 2. Continued

Variables	(1) HH. access/no controls	(2) HH. Access w/controls	(3) Community Access, no controls	(4) Community access, w/controls
spouse education missing		-49.35** (23.42)		-47.90** (23.40)
spouse age difference, +ve spouse older		-0.571 (0.411)		-0.580 (0.410)
spouse age missing		-18.01 (25.27)		-20.77 (25.25)
individual neither HH head or spouse of head		10.20 (8.472)		8.833 (8.461)
nch0_5		-0.194 (2.245)		-0.711 (2.249)
nch6_11		4.711** (1.978)		4.493** (1.979)
nfm12_14		-3.627 (3.922)		-3.722 (3.921)
nml12_14		12.33*** (3.906)		12.10*** (3.902)
nfm15_17		-2.215 (4.151)		-2.203 (4.148)
nml15_17		0.194 (4.088)		0.322 (4.084)
nfm18_24		-20.85*** (3.097)		-21.20*** (3.094)
nml18_24		8.475*** (3.088)		7.845** (3.085)
nfm25_59		-20.22*** (4.174)		-20.74*** (4.181)
nml25_59		5.759 (3.639)		5.690 (3.635)
nfm60_74		-24.57*** (6.691)		-24.80*** (6.685)
nml60_74		5.016 (6.837)		4.764 (6.831)

Appendix Table 2. Continued

Variables	(1) HH. access/no controls	(2) HH. Access w/controls	(3) Community Access, no controls	(4) Community access, w/controls
nfm75p		-26.15** (11.41)		-26.25** (11.40)
nml75p		7.297 (13.31)		6.782 (13.29)
income_percd== 2.0000		6.108 (6.437)		6.993 (6.431)
income_percd== 3.0000		17.27*** (6.163)		17.93*** (6.158)
income_percd== 4.0000		13.18** (6.188)		13.93** (6.183)
income_percd== 5.0000		21.88*** (6.244)		22.27*** (6.238)
income_percd== 6.0000		11.21* (6.173)		11.26* (6.164)
income_percd== 7.0000		0.722 (6.354)		1.096 (6.348)
income_percd== 8.0000		-9.963 (6.524)		-9.382 (6.518)
income_percd== 9.0000		5.648 (6.812)		5.319 (6.804)
income_percd== 10.0000		-13.72* (7.413)		-14.22* (7.400)
rural		13.05*** (3.866)		15.85*** (4.061)
prmsc_acc_vs		-30.05** (13.92)		-29.69** (13.96)
prpsc_acc_vs		36.34*** (11.55)		42.76*** (11.66)
secsc_acc_vs		-24.70*** (5.502)		-24.13*** (5.503)
gvhlctr_acc_vs		23.10*** (8.346)		22.39*** (8.361)

Appendix Table 2. Continued

Variables	(1) HH. access/no controls	(2) HH. Access w/controls	(3) Community Access, no controls	(4) Community access, w/controls
wealth_vs		-15.37*** (3.257)		-10.95*** (3.415)
Constant	311.2*** (24.93)	159.7*** (36.91)	380.8*** (59.07)	249.3*** (65.25)
Observations	12,979	12,979	12,979	12,979
R-squared	0.004	0.060	0.007	0.062

Source: Author's calculations based on data from ELMPS 2023.

Note: Coefficients estimates (and standard errors in parentheses) from regressions of hours in indirect care work on indices of access to all appliances, basic appliances and supplementary appliances without and with individual, household and community-level controls (Model 2). Individual and household controls include individual's education (6 levels), age and age squared, age at first marriage, dummy variables indicating spouse present, mother in law present, spouse more educated, spouse less educated and whether individual is neither the head nor spouse of the household head, the spousal age difference, and household composition (number of children less than 5, 6-11, and number of male and female members 12-14, 15-17, 18-24, 25-59, 60-74, and 75 plus), household per capita income decile. Community level controls, which are calculated at the village or neighborhood level, include whether the community is rural, the percent of households in the community with access to running water, electricity, cooking gas, sewage connections, garbage collection, and access to a primary school, preparatory school, secondary school, government health center within a twenty-minute walk. We also include an average wealth index for the community to control for the overall socio-economic status of the community. Statistical significance at the 0.1% (***), 1% (**) and 5% (*) levels are shown.