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Gender, Work, and Time Use in the Context of a Low-Income Agrarian Economy: The Case of Sudan

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ABSTRACT

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Sudan is a primarily agrarian economy. Formal employment or even wage employment comprises a relatively small proportion of the productive activities in which individuals engage. In this paper we examine the broad spectrum of involvement in economic work activities by gender, including wage employment, self-employment and unpaid family labor, both in activities for the purpose of pay or profit (employment) as well as in subsistence activities. Along with gender, we assess the variation in work patterns by urban/rural location, education, and marital status. Given the agrarian nature of Sudan's economy, we delve in more detail into the gender division of labor in agriculture, including participation in crop production, animal rearing, and other agricultural activities, distinguishing between primary roles and support roles in these activities. We end the paper by looking at the interplay between work and other time uses such as paid and unpaid care work and the gender division of labor in time use.

JEL Classification:

J21, J22, J43

Keywords:

employment, work, gender, division of labor, time use, Sudan

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1 Introduction

The organization of labor and the gender division of labor varies systematically as societies develop and labor becomes increasingly marketized and specialized, as suggested by Boserup (1970) and more recently documented in Bandiera et al. (2022). Sudan is at a stage in its structural transformation where the transition from the family sphere to the market and state spheres is still in its early stages (Etang Ndip and Lange 2019; Ebaidalla and Nour 2021). The labor market is primarily agrarian. Around a third of GDP came from agriculture over 2009-2014/15, with no appreciable change over the period (Ebaidalla and Nour 2021). At the same time, a rising share of overall employment, increasing from 36% to 54%, was in agriculture, with an even higher share for women (71% in 2014/15) (Ebaidalla and Nour 2021). Political turmoil, starting in 2018, and subsequent negative economic growth have worsened labor market conditions (Assaad, Krafft, and Wahby 2023; Krafft, Nour, and Ebaidalla 2022).

In Sudan, gender role attitudes emphasize a male breadwinner/female caregiver model (Etang et al. 2022; Krafft and Moylan 2023). By standard measures, men's employment rates are much higher than women's (Krafft et al. 2023). Women in Sudan, like those of other countries in the Arab states, spend a high and disproportionate amount of time on unpaid care work (International Labour Organization 2018). Women's participation in economic activities and the forms of work they engage in are thus still strongly tied to their familial roles, either directly in the form of subsistence work or indirectly as participants in the household's market-related activities, such as crop and livestock production. Thus women's labor is neither highly marketized, with much of it unpaid or for subsistence purposes, nor is their labor highly specialized (Bandiera et al. 2022). This paper explores gender, involvement in a variety of economic activities, and time use in the agrarian context of Sudan. The paper draws on the new 2022 Sudan Labor Market Panel Survey (SLMPS 2022).

Women's labor force participation through the course of a society's development has been theorized to follow a U-shaped relationship (Alesina, Giuliano, and Nunn 2013; Goldin 1995; Boserup 1970). When production is closely tied to household activities the separation between women's reproductive and productive activities is fluid, then women have relatively high rates of participation in both subsistence work and market work related to agriculture and animal husbandry, often as unpaid household workers (Goldin 1995). As economies develop men's privileged access to education and new technologies tends to displace women from the labor force during the early stage of development (Boserup 1970). But with further development, women gain access to education and technologies and start to participate at higher rates in individual employment activities outside the home, leading to the U-shaped curve for female labor force participation. When economies grow and incomes initially rise, women's labor force participation rates fall (Goldin 1995). Even when women's relative wage rises, married women may be barred from manufacturing employment by social custom or by employer preference. But as female education improves and the value of women's time in the market rises further, women re-enter the paid labor force. This occurs as a move along the increasing portion of the U-shaped curve.

Sudan is currently classified as a low-income country by the World Bank with a GDP per capita (PPP) of \$4,217 in 2022 (World Bank 2024). Illiteracy is high in Sudan, (49 percent overall for adults; 39 percent for men and 58 percent for women (Krafft et al. 2023). A fraction (14 percent) of Sudanese have completed some school but less than a secondary level, and a further 13 percent secondary, but only around 10 percent have completed higher education (Krafft et al. 2023). Sudan also has high fertility which will shape women's time use and labor market participation. The total fertility rate (TFR, births per woman) was 4.9 in 2022 (Krafft et al. 2023).

With limited structural transformation, low levels of education, and relatively high reproductive burdens, one would expect that Sudan would still be at the early phases of the transformations that Boserup (1970) and Bandiera et al. (2022) discuss. Specifically, labor would be at early phases of marketization, especially for women, suggesting a large role for unpaid work in the household's market-related activities and in subsistence work. There would be few opportunities for women to work outside of agriculture and animal husbandry, limiting women's opportunities in urban areas. Educated women would be able to participate in marketized employment, but the low levels of development in the Sudanese private sector limit opportunities there and confines wage work primarily to the government and the public sector.

Our results show women's involvement in economic activity in Sudan is strongly shaped by women's stage in the life course, their education level, and the location of residence (rural vs. urban) in which they live. Specifically, married women, who have primary responsibility for household reproduction, are more likely to engage in home-based subsistence and market work than unmarried women. Educated women are more likely to engage in individual forms of market work, such as wage employment outside the home, although location of residence will also matter in the nature of their involvement in work. Women in rural areas, where the separation between household care work and economic activity is least well defined, are more likely to engage in subsistence and home-based market work than their urban counterparts. Facing barriers to engage in either wage work or nonfarm self-employment, less educated urban women face the largest barriers to engage in work, especially if they are unmarried. While all educated women are able to engage more in wage employment, rural educated women have few private sector opportunities and are usually confined to public sector wage work. Similarly educated urban women tend to leave private sector wage work at marriage, potentially seeing it as incompatible with their household responsibilities.

The rest of the paper proceeds as follows. In section 2 we discuss data and methods; we lay out the various concepts and definitions of work that we utilize throughout the paper. In section 3, we place Sudan in an international comparative perspective and use Bandiera et al. (2022) to see how the rates and structure of employment by gender compare to international predictions based on Sudan's GDP per capita. We also examine in that section how different ways of measuring employment and work affect the estimates, especially for women whose economic activities are closely tied to their domestic roles. We then examine the effects of location of residence, educational attainment, and stage in the life course on the patterns of work by gender. We delve in more detail into the gender division of labor in both crop production and animal husbandry,

two areas in which a large fraction of Sudanese workers are engaged. In section 4, we explore the interplay between employment and other time uses, with a particular focus on unpaid indirect and direct care work. Section 5 concludes.

2 Data and methods

This research uses the first wave of the Sudan Labor Market Panel Survey (SLMPS 2022). The survey was carried out by the Economic Research Forum (ERF) in collaboration with Sudan's Central Bureau of Statistics. Publicly accessible microdata are available through ERF's Open Access Microdata Initiative (OAMDI 2023). The survey is nationally representative after the application of sample weights, which are used throughout. The SLMPS 2022 sampled 25,442 individuals in 4,878 households (Krafft, Assaad, and Cheung 2023). Our analyses focus on working-age individuals, aged 15-64.

2.1 Measuring work

The information on work and employment used in this paper is derived in part from the individual questionnaire of the SLMPS 2022, which enquires about an individual's employment status in a short (one week) and a long (three months) reference period. The information is also derived from the household questionnaire which includes information about individual involvement in household economic activities, such as animal husbandry, crop production, other agricultural activities, and non-agricultural household enterprises. The household perspective allows us to complement the information provided by the individual questionnaire modules on employment by detecting employment and other forms of work among individuals who do not consider or report their contribution to household activities as work.⁴ Survey enumerators were instructed to arrange up to three visits to the household to attempt to interview the individual him or herself for the individual module. Attempts to meet the most knowledgeable person about each household activity were made while administering the household questionnaire.

The employment modules in the individual questionnaire first ask a direct question about being involved in employment in the relevant reference period. If an affirmative answer is obtained, the interview proceeds to ask about the details of such employment. If a negative answer is given, a series of 15 keyword questions is asked to detect any kind of work that is carried out for purposes of pay or profit in line with the recommendations on the measurement of "employment" of the 19th International Conference of Labor Statisticians (ILO 2013). An affirmative answer to any of the 15 keyword questions in either reference period is considered evidence of employment and sends the individual to the detailed employment characteristics module.

The household questionnaire contains detailed modules on household farm and non-farm enterprises. The farm module is divided into sub-sections on livestock rearing, crop production,

⁴ See Assaad and Krafft (2024) for more details about using the household activities and projects to better measure individual employment and work activities.

and the production and sale of other agriculture products (such as dairy, eggs, honey, oil, fish, etc.). The non-farm activities cover all household enterprises outside of agriculture, forestry and fishing including small shops, restaurants, cafes, the processing of agricultural products, small manufacturing and repair workshops, professional services, or transportation services.

The primary person taking care of either a crop, a type of livestock, a nonfarm activity or other agricultural activity is considered to *run/manage* the activity and is classified as a paid self-employed worker in our analyses. The questionnaire also enquires about a second and potentially third member of the household that may be involved in each activity. These individuals are considered as *support* workers and classified as unpaid contributing family workers. If an individual is playing both roles across different activities, their role as running/managing an activity takes precedence.

The determination of whether a worker is involved in market work (for purposes of pay or profit) versus solely subsistence work is based on whether the household has sold any of the products of the activity in the past twelve months. This applies to both livestock rearing and crop production. Nonfarm activities and other agricultural products, such as dairy, eggs, oil, or fish, are only captured if undertaken for the purposes of market exchange.

To determine an individual's work status, we combine information from the individual employment module for the long reference period (3 months) with that obtained about the individual's involvement in household activities from the household questionnaire, which has a 12 months' reference period. We referred to the variables created in this way as the *added* definition of employment, which is our most comprehensive measure of employment. When subsistence work is added to that definition, we refer to this as (economic) "work."⁵

Accordingly, we consider various measures of employment and work in this paper. The 7-day or "current" definition of employment is the narrowest and corresponds to the definition of employment currently used in the Sudan Labor Force Survey (last fielded in 2011 (Ministry of Human Resources Development and Labour 2011)). It is subsumed in all the other definitions. The 3-months or "usual" definition of employment adds to those employed in the reference week those who were employed in the three months reference period, again as ascertained by the individual questionnaire. The added definition of employment is our most comprehensive definition of employment and adds to the 3-month definition those who were reported to be engaged in household agricultural or non-agricultural projects that sold goods or services in the market in the past 12 months, as ascertained by the household questionnaire.

Finally, we expand this concept of employment to the broader concept of (economic) work by adding subsistence work, namely engagement in livestock rearing or crop production activities

⁵ Besides employment, work for purposes of pay or profit, economic work includes the production of goods that fall within the boundaries of the system of national accounts for purposes of household consumption. It does not include the production of services for household consumption, which we refer to as unpaid direct and indirect care work and only include in the time use section.

that are not sold in the market during the 12-month reference period. It is, thus, the most comprehensive definition of work we present, keeping in mind that domestic work (direct and indirect care work) is only brought into our analysis in the time use section. All the work concepts we use in the paper are summarized in Table 1 below.

Table 1. Summary of work definitions and sub-classifications within work

Classification	Definition
Any work	Any market work (employment) as detected by the individual questionnaire employment module or the household questionnaire activity module, or any subsistence work (as indicated in the household questionnaire)
Any market work (employment)	Any work for the purposes of pay or profit as detected by the individual questionnaire employment module or the household questionnaire activity module
Any paid work	Market work that is paid a wage or self-employed. Excludes unpaid contributing household labor supporting household projects
Any wage work	Work for others that is paid a monetary or in-kind wage as ascertained by the employment modules in the individual questionnaires
Any public wage work	Wage work in the government or public enterprise sectors
Any private wage work	Wage work in the private sector, including private enterprise, casual wage work, cooperatives and nonprofit entities
Any market nonwage work	Any market work that is not paid a wage. Includes work as an employer, self-employed individuals, and unpaid contributing household workers
Any subsistence work	Any work rearing livestock or producing crops in a household activity that has not sold any of its products in the past 12 months
Any nonwage work	Any nonwage work in either a market or subsistence activity
Any paid self-employed work	Running/managing a household activity involved in rearing livestock, producing crops, producing other

	agricultural products or operating a nonfarm enterprise for purposes of market exchange
Any unpaid work	Engaged in a supporting role in a household farm or non-farm activity, including subsistence work
Any unpaid market work	Engaged in a supporting role in a household farm or non-farm activity only for purposes of market exchange

Source: Authors' construction

Notes: Indentations denote nested sub-categories

2.2 *Additional classifications*

To investigate the gender division of labor in detail, we further classify household-based work activities into the type of household project (livestock rearing, crop production, production and sale of other agricultural products, and non-farm enterprise). Within livestock, we distinguish between small (poultry and rabbits), medium (goats and sheep) and large (cows, camels, donkeys, etc.) livestock. Within crops, we distinguish between field crops, on the one hand, and fruits and vegetables, on the other. We also distinguish between individual roles as running/managing or supporting an activity.

Besides gender, we examine participation in various kinds of work along a variety of covariates that describe the different locations in which people live, their various stages in the life course, and their education and skill level. With regard to location of residence, we distinguish between urban and rural areas (abbreviated as U and R), as defined administratively in Sudan. For life course variables, we distinguish between never married and ever married individuals (abbreviated as N and M). For education, we account for the relatively low levels of attainment in Sudan but only distinguishing between those with less than primary education and those with primary or above (abbreviated as L and H). Combined, these characteristics generate an eight-group classification, which we use for our figures.

2.3 *Time-use data*

The time-use analysis uses the SLMPS module that enquires about the individual's use of time in the 24 hours starting at midnight the day before the interview. The individual is asked about their primary activities using the 1-digit international classification of time use activities in time slots that are in multiples of 15 minutes. They are also asked about whether they undertook a secondary activity while doing the primary activity. We aggregate the time-use activities into six categories: (i) employment, which includes employment in primary or secondary jobs, involvement in a non-agricultural household enterprises, involvement in crop production, livestock rearing or fishing, (ii) job search, (iii) collecting firewood/fuel/water, (iv) indirect care work only, which includes cooking, cleaning, and maintenance, (v) direct care work only, which includes child care and caring for the elderly or other dependent adults, (vi) indirect care work

with direct care work, which combines question from the primary and secondary activities to capture time spent on both of these activities simultaneously.

Because time uses are quite different on weekdays and weekends, we follow the recommendations of the UN statistical division to appropriately weight the data for whether it was collected during a weekday or a weekend to get the correct distribution of weekend days (UN Department of Economic and Social Affairs 2005).

2.4 Methods

We present descriptive results on rates of engagement in work. We present rates of engagement in work as measured by the individual employment modules in the individual questionnaires as well as measures that are supplemented by the questions on engagement in household activities from the household questionnaire – the “added” measure. We compare these rates to predicted rates of engagement based on GDP per capita, as ascertained by Bandiera et al. (2022), who examine how average patterns of employment vary with GDP per capita from a sample of 155 countries. We also examine how the measures of participation in various sorts of work vary by reference period (seven days versus three months) and by including the household perspective in the “added” approach. This is followed by an analysis of how participation in different types of work varies along individual and contextual characteristics. We test whether the differences observed in the graphs between men and women and among men and women are statistically significant using regression models with the relevant interaction terms. While we report on these tests in the main text, we only show the results of the results in an appendix.

3 Gender differences in participation in various measures of work in Sudan

3.1 Sudan in a global perspective

We present in Table 2 rates of participation in any work, paid and unpaid work for men and women in Sudan according to the individual as well as “added” measures and provide a comparison of the predicted average rates obtained from Bandiera et al. (2022) for an average country with Sudan’s per capita income in PPP terms.

As shown in the first column of Table 2, Sudan’s overall participation rate in any kind of (economic) work is quite low at 43 percent according to the individual measures and increasing to 48 percent according to the “added” measure. These rates are well below the predicted rate of 60 percent based on international averages for Sudan’s income level. As expected, the large gap with international predictions is for women, where at 28 percent according to the “added” measure of work, Sudan is at just over half the predicted rate of 52 percent internationally. Male participation rates are also lower than predicted, but by a much smaller margin. Disaggregating the results by paid and unpaid work, we can see that the gap with international predictions is much larger for women’s paid work. Sudan is at one third of the international prediction for women’s paid work even when using the more inclusive added measure. In contrast, at 15

percent, rates of women’s participation in unpaid work are slightly higher than the 12 percent predicted international average for this per capita income level.

Table 2. Comparison of Sudan’s rates of participation in work by sex using SLMPS data to predicted rates based on Sudan’s log per capita GDP, ages 15-49 (percentage)

Gender/type of work: <u>Data source</u>	Any work			Paid			Unpaid		
	Overall	Women	Men	Overall	Women	Men	Overall	Women	Men
SLMPS – Individual	43	22	65	31	9	56	11	13	9
SLMPS – Added	48	28	69	36	13	62	11	15	8
Predicted	60	52	76	48	40	62	12	12	14

Source: Authors’ calculations from SLMPS 2022 data and Bandiera et al. (2022)

Notes: The predicted values from Bandiera et al. (2022) are taken from Figure 3: percentage employment vs. log of per capita GDP. The predicted values for Sudan are calculated at the log per capita GDP PPP of 8.3 (GDP per capita, PPP is US\$4,217 in 2022 (World Bank 2024)). The reference period for SLMPS individual data is three months. For this comparison, we used the same age range used in Bandiera et al. (2022), which is 15-49. Since the age range used in this table is different from that of subsequent tables, the results shown here may deviate from those in subsequent tables and figures.

The lower than predicted rates of participation in paid work among women in Sudan are in line with patterns in the Middle East and North Africa, where female participation tends to be lower than in other regions (Kabeer, Deshpande, and Assaad 2019; Verick 2018). These lower-than-expected rates of paid work are attributed strong norms about male breadwinners and female homemakers in many Muslim countries, traditions of female seclusion and limits of women’s mobility in the public domain, and patrilineal inheritance practices that severely limit women’s access to land and other assets (Kabeer, Deshpande, and Assaad 2019; Krafft and Moylan 2023). The fact that unpaid work is approximately in line with international predictions can be attributed to the fact that unpaid work usually takes place in the home without challenging any of these key constraints to women’s access to paid employment.

3.2 *What difference does measurement make?*

We next investigate how the change in reference period from the current 7-day period to the usual 3-months period changes the estimates of participation in work that are derived from the employment modules of the individual questionnaire. Participation in market work (or employment) varies modestly for both men and women when we go from a short to a long reference period, increasing by about a fifth for women and 8 percent for men. This suggests that there is only limited fluctuation over time in work participation, with most people working fairly continuously. The largest variation between the two reference periods is for female private sector wage workers, where the long reference period shows 35 percent more participation. Differences are more limited in all self-employment and unpaid work.

Table 3. Measurement of market work at the individual level across different reference periods, ages 15-64 by sex

Primary work status	Women		Men	
	7 days	3 months	7 days	3 months
Market work (employment)	12.0	14.3	58.1	62.9
Paid work	8.4	10.5	50.9	58.3
Wage work	5.1	6.7	31.3	36.7
Public wage work	2.4	3.1	6.7	7.5
Private wage work	2.6	3.5	23.7	27.7
Self-employed paid work	3.2	3.8	19.6	21.6
Self-employed paid work – crops	2.0	2.1	6.0	6.4
Any self-employed paid work – livestock	0.0	0.1	4.6	4.7
Any self-employed paid work – nonfarm	1.2	1.5	9.0	10.4
Unpaid market work	3.1	3.9	3.8	4.6
Unpaid market work – crops	2.6	3.0	2.3	2.8
Unpaid market work – livestock	0.3	0.4	0.7	0.8
Unpaid market work – nonfarm	0.2	0.4	0.8	1.1

Source: Authors' calculations from SLMPS 2022 data

Note: Analysis is restricted to individuals who are in market work because we are not able to get subsistence work figures from individual-level data.

Our next set of results involve a comparison of the individual measures, to those obtained from the household activities, and to those that combine the two. As shown in Table 4, adding the household perspective makes a substantial difference in the measurement of women's overall involvement in work activities, increasing the overall rate from 24.0 to 29.5 percent – a 23 percent relative increase— as compared to an 8 percent increase for men. We can also see that much of women's work is captured by the household perspective (22.5 out of 29.5 percent) showing that women's economic activities in Sudan are predominantly within household projects. The ratio is much lower for men (41 out of 73 percent) showing that men are more likely to engage in individual non-household-based employment, such as wage work.

Women's participation in market work, or employment, also increases substantially when a household perspective is used rather than simply asking the women directly, despite the use of a large number of keyword questions to detect employment in the individual questionnaire. As shown in Table 4, employment rates increase from 14 percent to 24 percent (a 71 percent relative increase). These compare to a rate of 16 percent in Egypt when an individual perspective is used and a rate of 20 percent when a household perspective is used (Assaad and Krafft 2024). This suggests that the use of a household activities approach is much more critical to detecting women's employment in Sudan than in Egypt. This importance is a consequence of Sudan's more agrarian economy, in which women do not consider their involvement in household agricultural production activities as employment.

Table 4. Comparison of work rates by various definitions, reference periods, and perspectives (individual/household), ages 15-64 by sex

	Women			Men		
	Individual – 3 months	Household – 1 year	Added – a combination of the two	Individual – 3 months	Household – 1 year	Added – a combination of the two
Any work	24.0	22.9	29.5	67.2	41.0	72.7
Any market work (employment)	14.3	16.6	24.4	62.9	34.7	70.5
Any paid work	10.5	7.3	14.7	58.3	29.5	66.0
Any wage work	6.7	N.A.	6.7	36.7	N.A.	36.7
Any public wage work	3.1	N.A.	3.1	7.5	N.A.	7.5
Any private wage work	3.5	N.A.	3.5	27.7	N.A.	27.7
Any paid self- employed work	3.8	7.3	8.6	21.6	29.5	34.2
Any paid self- employed work – crops	2.1	4.5	5.2	6.4	16.8	18.6
Any paid self- employed work – livestock	0.1	2.8	2.8	4.7	7.3	9.4
Any paid self- employed work – nonfarm	1.5	1.7	2.2	10.4	12.1	15.1
Any unpaid market work	3.9	9.8	11.8	4.6	5.9	9.0
Any unpaid market work – crops	3.0	8.8	10.3	2.8	3.5	5.2
Any unpaid market work – livestock	0.4	1.1	1.4	0.8	1.4	2.2
Any unpaid market work – nonfarm	0.4	0.1	0.5	1.1	0.7	1.6
Any subsistence work	N.A.	14.5	14.5	N.A.	19.8	19.8
Any subsistence work – crop	N.A.	4.5	4.5	N.A.	3.1	3.1
Any subsistence work – livestock	N.A.	2.3	2.3	N.A.	2.1	2.1
Only subsistence work	N.A.	N.A.	5.0	N.A.	N.A.	2.1

Source: Authors' calculations from SLMPS 2022 data

Note: Work includes individuals who are either in market or subsistence work. All categories refer to market work except for the any work and subsistence work categories. Wage employment is only from individual data and subsistence employment is only from household activity data. For individual data, the reference period is three months, for household data the

reference period is one year. Values in the “added” column are a union of individual and household-level data. Accordingly, “any work” in the individual (3 months) column comes from a union of employed with market definition from the individual questionnaire and “any subsistence” from the household questionnaire.

According to the “added” measure of work shown in Table 4, a little less than a quarter of working women in Sudan engage in wage work, almost equally divided between public and private wage work. About 30 percent are engaged in self-employment, 40 percent in unpaid market work, and just under 50 percent in subsistence work.⁶ Most of the workers involved in subsistence work are also involved in market work, with only 5 percent of all women and 17 percent of working women involved in only subsistence work. The distribution of working men across these roles is quite different, with 50 percent of working men engaged in wage employment, 47 percent involved in self-employment, and a much smaller fraction involved in unpaid or subsistence work, which they often do simultaneously with their paid roles.

3.3 Patterns of work by location of residence, education, and marital status

We now examine how the various forms of work described above vary by location of residence, educational level, and across the life course for both men and women. We distinguish between eight categories of men and women based on location (U=urban, R=rural), educational attainment (L= less than primary, H=primary and above), and marital status (N=never married and M=ever married). The distribution of men and women across these eight categories is shown in Figure A9 in the appendix. As can be seen in the figure, the vast majority of Sudanese adult women have less than primary education (71 percent), live in rural areas (67 percent), and are ever married (75 percent).

As shown in Figure 1, the highest rates of participation in all kinds of work, except wage work, are among ever married, rural, less educated women (MRL). Their rates of participation in all forms of non-wage work are well above average and reflect their high rates of involvement in household economic activities related to agriculture. The second highest rates of involvement in work is among their never married counterparts (NRL), reflecting the increased involvement in these same activities as they go through the life course. Together, these two groups make up about 60 percent of women aged 15 to 64 in Sudan. Rural less educated men tend to also have higher rates of involvement in nonwage work than their urban counterparts, but the contrast between rural and urban areas is not as stark for men as it is for women.

Higher educated women irrespective of marital status or location have relatively high rates of involvement in market work, but mostly as wage workers. The ever married among them are almost exclusively public sector wage workers if they work as are the rural never married ones,

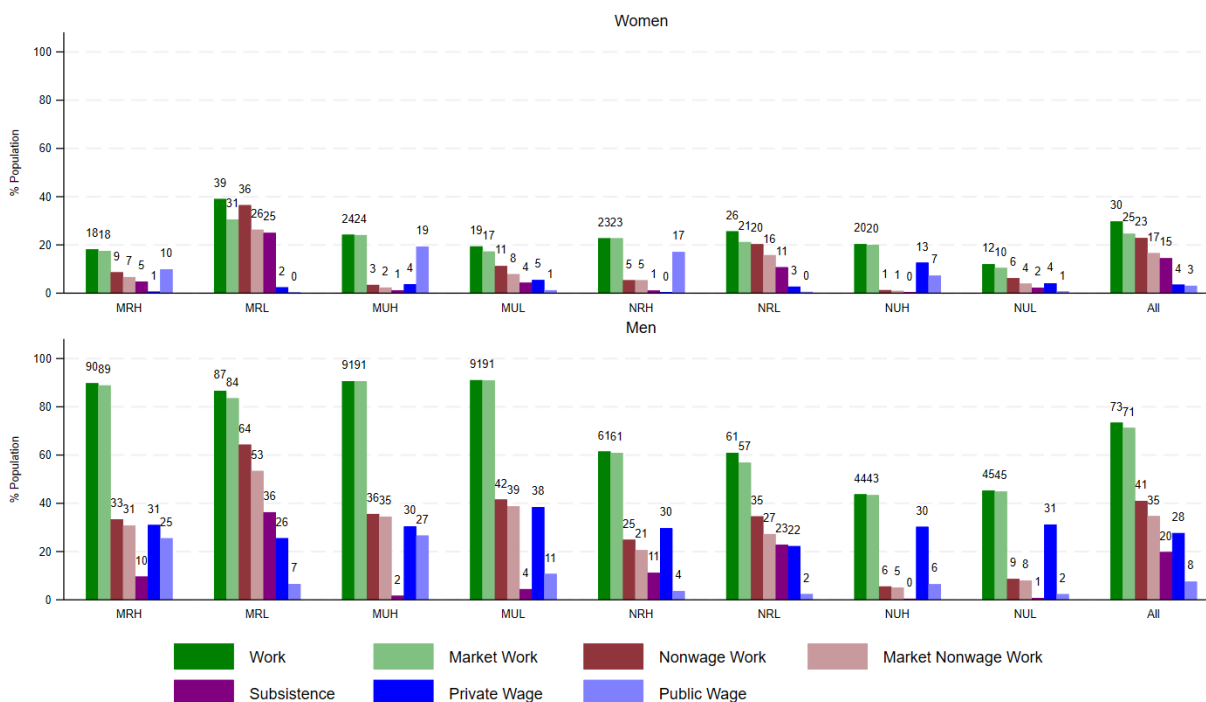
⁶ These percentages do not add up to 100 percent due to the possibility of engaging in multiple livelihood activities simultaneously. If we construct a mutually exclusive classification, wage work takes precedence over non-wage work, paid self-employment takes precedence over unpaid market work, and market work takes precedence over subsistence work.

while urban never married women are split among private and public wage work. These differences underscore the lack of private sector opportunities for educated women in rural areas and the fact that women working for wages in the private sector in the MENA region tend to leave that kind of work at marriage (Assaad, Krafft, and Selwaness 2022). Rural educated women tend to be more involved in nonwage work than their urban counterparts, an indication of some involvement in household activities related to crops and livestock.

Differences in involvement in both work and market work between men and women are statistically significant in favor of men for all the subgroups we examine (see Table A5 in the Appendix). Differences in work across education levels for women are not significant, but the kinds of work educated and uneducated women perform are very different, with educated women specializing in wage work and uneducated women in non-wage work. Differences across urban and rural areas for women are highly significant in favor of rural women, who, as expected, tend to specialize in crop and livestock work, whereas urban women specialize in non-farm work. Differences in work between ever married and never married women are also statistically significant in favor of the former.

Less educated urban women have lower levels of involvement in work than either their rural counterparts or their more educated urban counterparts. This pattern is because they have fewer opportunities for nonwage work in household activities (which are typically related to agriculture), and they do not have the requisite skill to engage in the forms of wage work that are socially acceptable for women in Sudan.

Figure 1. Involvement in various work activities (percentages), all individuals aged 15-64 by sex, location of residence, marital status, and educational attainment



Source: Authors' calculations from SLMPs 2022 data

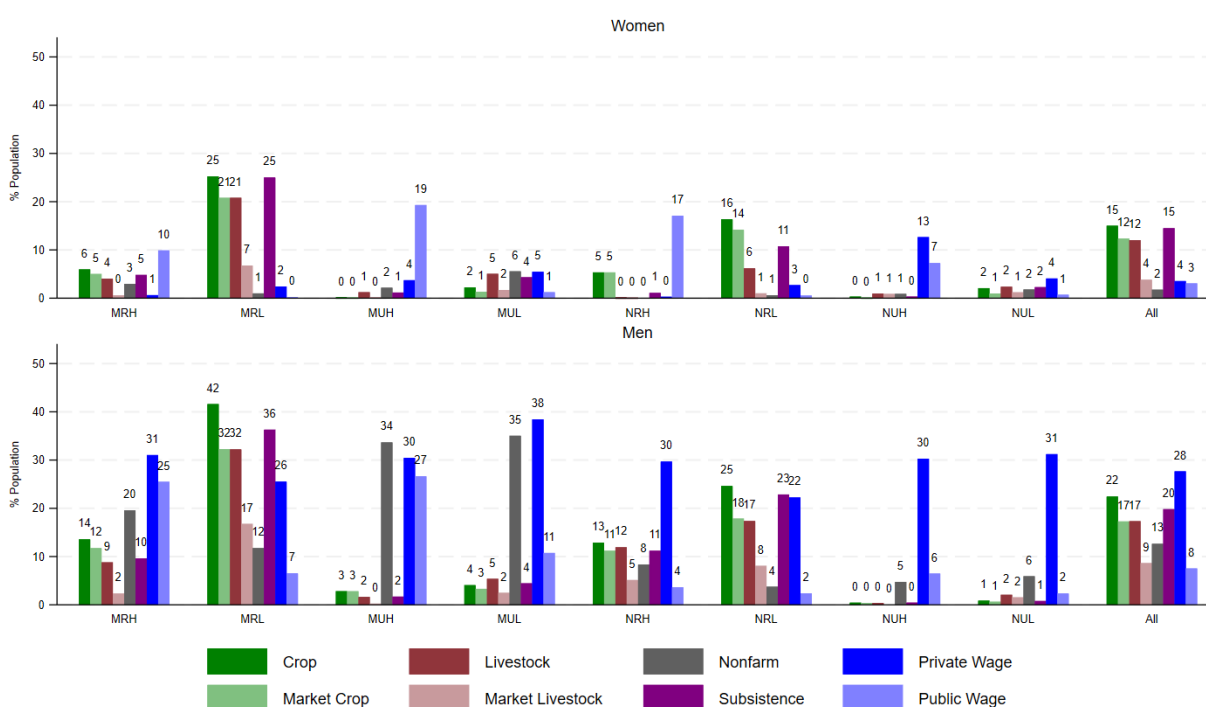
Note: Any involvement in each work activity is captured irrespective of whether it is the primary work status of the individual. M stands for ever married and N for never married. R stands for rural and U for urban. H stands for primary education or above and L for less than primary education. For example, NRL means never married, rural individuals with less than primary education.

Going into more detail in the kinds of work performed by men and women in Sudan, in Figure 2 we examine involvement in crop production, livestock rearing, nonfarm self-employment, subsistence work, and public and private wage employment. Like their male counterparts, rural, ever-married less-educated women have the highest levels of involvement in crop and livestock work, with almost equal involvement in both. However, their crop work appears to be mostly for the market, whereas their involvement in livestock rearing is primarily for subsistence purposes. This is the group with the smallest gender differences in patterns of work, followed by their never married counterparts, which have lower levels but similar patterns of activity.

As we saw before, women with higher levels of education are mostly involved in wage work irrespective of location or marital status, but the ones in rural areas have some involvement in crop and livestock work, albeit at much lower levels than their less educated counterparts. These differences in involvement in nonwage work across education levels are all statistically significant (Table A5 in appendix).

More educated, ever-married urban men are much more likely to be involved in non-farm self-employment and private sector wage work than their female counterparts, suggesting that these two forms of livelihoods appear to be virtually closed to educated, ever-married women in Sudanese urban areas. Also, while private sector wage work is a major livelihood option of less educated urban men, it appears to be a relatively scarce option for their female counterparts. Nonfarm self-employment emerges as a major option for urban men after marriage, irrespective of education. Again, it appears to be limited option for urban less educated ever-married women and almost non-existent option for their more educated counterparts.

Figure 2. Participation in any market and subsistence work by type of work, all individuals aged 15-64, by sex, location of residence, marital status, and educational attainment



Source: Authors' calculations from SLMPS 2022 data

Note: Any involvement in each work activity is captured irrespective of whether it is the primary work status of the individual. Any crop/livestock includes both market and subsistence crop/livestock work. All other categories except for subsistence only involve market work. M stands for ever married and N for never married. R stands for rural and U for urban. H stands for primary education or above and L for less than primary education. For example, NRL means never married, rural individuals with less than primary education.

Regression results in Table A5 in the appendix corroborate the fact that married women engage more in all the sorts of nonwage work identified here than their unmarried counterparts. Rural women engage more in market work in general, as well in crop and livestock production, but urban women are more likely to engage in nonfarm self-employment. More educated women are

less likely to engage in all sorts of nonwage work than their less educated counterparts, but their higher engagement in wage work results in higher overall engagement in market work. There are no significant differences by education among women in engagement in work overall.

Rather than focus on any involvement in categories of work that can be done simultaneously, we now define a number of mutually exclusive categories that describe an individual's work status. We also distinguish whether the status was obtained through the individual portion of the questionnaire (IND) or through the perspective of household activities (HH). We maintain our focus on the eight sub-groups we discussed above among men and women and focus exclusively on those who are involved in some kind of work activity.

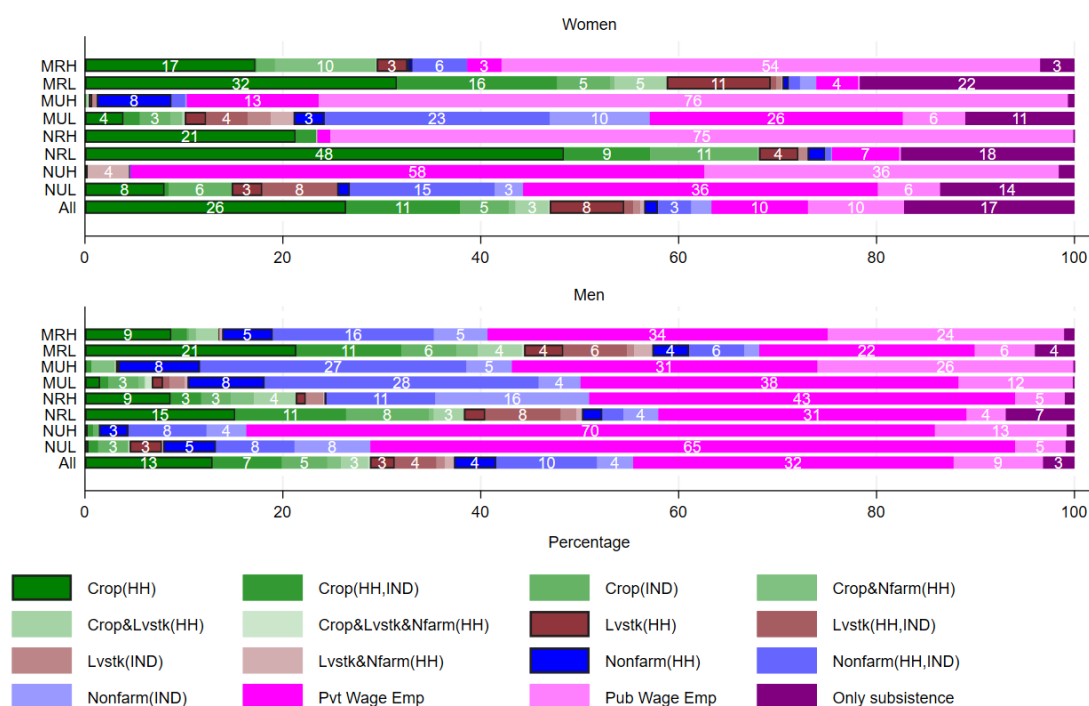
As shown in **Error! Reference source not found.**, just under half of working women are engaged in some sort of crop related market work, some of which is mixed with livestock rearing. About 10 percent are exclusively engaged in livestock work for the market, 4 percent in nonfarm nonwage work, 20 percent in wage work, and 17 percent in only subsistence work. In comparison, working men tend to be much more engaged in wage work (41 percent) and much less engaged in subsistence work.

As expected, the highest involvement in crop work is among rural, less educated women, irrespective of marital status. Although, as we have seen earlier, ever married women rural women are more likely to be engaged in work than their never married counterparts, conditional on working, the distribution of activities is similar across the two groups.

As we have noted earlier, among women, wage work, the most marketized form of work, is almost exclusively the purview of educated women, with ever married women and never married rural women almost entirely working in the public sector. Only never married, urban educated women have substantial involvement in private sector wage work. Male wage work on the other hand cuts across educational groups and is predominantly in the private sector.

Nonfarm nonwage employment is not common among women, contributing less than 5 percent of working women's activities, as compared to 18 percent for working men. These differences by gender are statistically significant for all sub-groups except for never married, lower education rural individuals (See Table A5 in the appendix). The group of working women who is most likely to engage in non-farm non-wage work are urban, ever-married women with lower education (37 percent), followed by their never married counterparts (19 percent). Otherwise, nonfarm nonwage employment does not appear to be a viable option for either rural women or for educated urban women. In contrast, nonfarm nonwage employment is a common option among men across settings and educational attainments, but somewhat less so for lower educated men in rural areas and never married higher educated men in urban areas who mostly engage in private sector wage work.

Figure 3. Percentage of participation in subsistence and market work by type of market work, working individuals 15-64 by sex, urban/rural status, marital status, and educational attainment



Source: Authors' calculations from SLMPS 2022 data

Notes: Analysis is restricted to individuals who are either in market or subsistence work.

Categories followed by HH and which have a black outline in the figure are obtained from household activity data rather than individual responses. Categories followed by IND are exclusively from individual data. Wage employment is only from individual data and subsistence employment is only from household activity data. Labels for categories 2 percent or below are suppressed. M stands for ever married and N for never married. R stands for rural and U for urban. H stands for primary education or above and L for less than primary education. For example, NRL means never married, rural individuals with less than primary education.

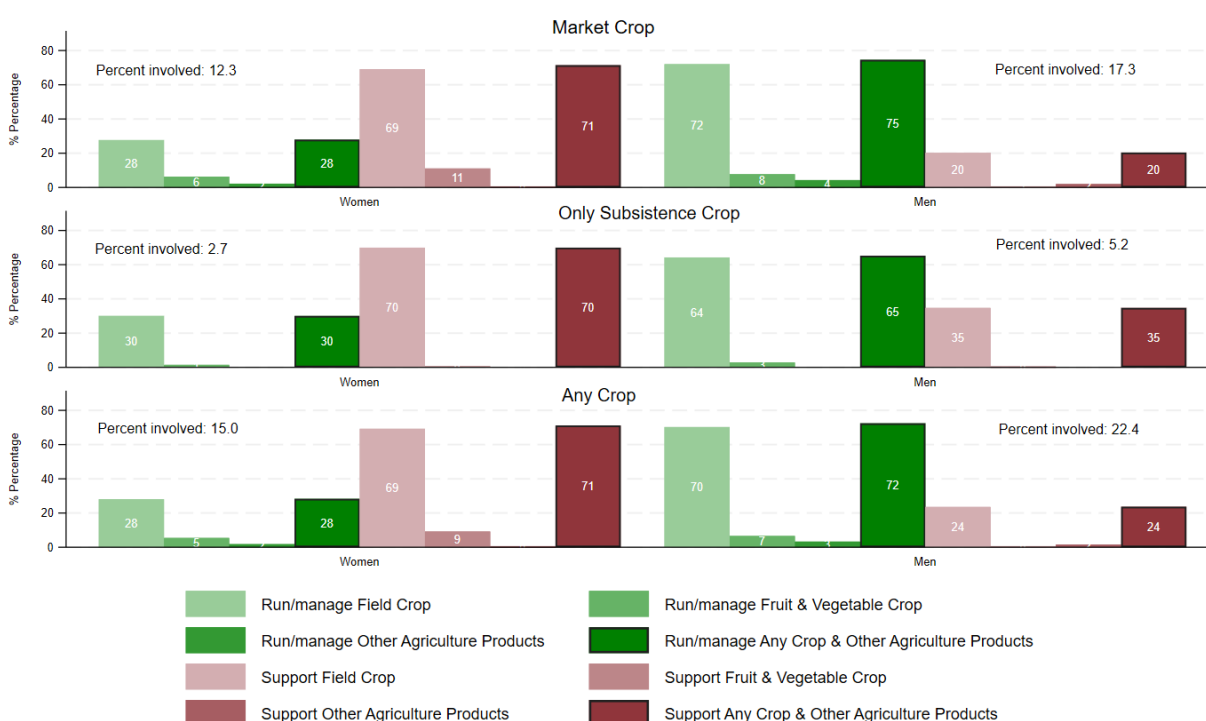
3.4 A focus on crop production

As noted above, about 15 percent of women and 22 percent of men in Sudan are involved in crop production, mostly but not exclusively for market purposes (see Figure 2). Among working individuals, the shares are 50 percent for women and 30 percent for men (comparison of Figure 1 and Figure 2). Given this substantial involvement, it is worth focusing a little more deeply on this crop work and the gender division of labor within it.

Besides the distinction between market and subsistence work we have made above, we also distinguish between run/managing the activity versus support roles and between field crops, fruit and vegetable crops, and other agricultural products (dairy, eggs, oil, fish, etc.). As shown in

Figure 4, the main division of labor between women and men is that women are mostly engaged in support roles (71 percent of involved women) whereas men are predominantly the ones running/managing the activity (72 percent of involved men). This is the case irrespective of whether the activity is for market or subsistence purposes. The bulk of involvement among both men and women is in field crops rather than fruits and vegetables crops and other agricultural products. However, women appear to be disproportionately engaged in fruit and vegetable production relative to field crop production compared to men, both in run/manage and support roles.

Figure 4. Involvement in market crop production, only subsistence crop production, and any crop production using household-level data (percentages), individuals involved in crops, aged 15-64 by sex



Source: Authors' calculations from SLMPS 2022 data

Note: The figure examines involvement by type of crop and role among those who engage in crop production for the market, only for subsistence, and overall. The bars indicate the percentage of those involved in market/subsistence/an crop production who are involved in various subactivities/roles. The percentage of the overall population involved in market/subsistence/any crop production is also mentioned in text on the figure.

3.5 A focus on livestock rearing

Given that livestock rearing is also an important activity for both women and men in Sudan we focus on it in more detail. Almost 12 percent of Sudanese women and 17 percent of men are

involved in livestock rearing (Figure 1). The shares among working individuals are 40 percent for women and 23 percent for men (Figure 2).

Unlike the case of crops where the main gender division of labor was between run/manage and support roles, the main division of labor in the case of livestock rearing is by size of livestock. While there is a slightly higher proportion in support roles among women involved in livestock than among men (24 vs. 15 percent), the majority of both women and men are in primary run/manage roles (Figure 5). More than half of men involved in livestock (60 percent), run/manage large livestock (cows, buffaloes, camels, etc.) as compared to 36 percent of women. The difference is smaller in the case of medium livestock (goats, sheep, etc.), but still in favor of men (55 vs 38 percent). Women are however almost exclusively responsible for small livestock (poultry, rabbits, etc.) with 50 percent of livestock involved women caring for such livestock as compared to 7 percent of men.

Women are also disproportionately represented in subsistence livestock rearing activities compared to men. While two-thirds of women involved in livestock are engaged in it exclusively on a subsistence basis, the equivalent ratio is 50 percent for men. The division of roles within market and subsistence livestock are relatively similar, although for market purposes women tend to specialize more in medium livestock than in small livestock.

Figure 5. Measurement of market livestock, only subsistence livestock, and any livestock work at the household level (percentages), individuals engaged in livestock work aged 15-64 by sex



Source: Authors' calculations from SLMPS 2022 data

Note: This figure examines the distribution by size of livestock and the role among those who engage in livestock work for the market, only for subsistence, and overall. The percentage of the population involved in market versus subsistence livestock production is mentioned in text in the figure.

4 The interplay between employment and time use

In this part of the analysis we report on results from the time-use module of the SLMPS 2022. As a reminder, the module applies to all time uses lasting at least 15 minutes in the 24-hour period starting at midnight in the day before the interview. In the following we focus on six categories of time uses: (i) employment, which includes all kinds of work whether wage or nonwage,⁷ (ii) job search, (iii) collecting firewood/fuel/water, (iv) only indirect care work, which includes household chores such as cooking, cleaning, and provisioning, (v) a combination of indirect and direct care work, (vi) only direct care work, which includes taking care of children, the disabled or the elderly.

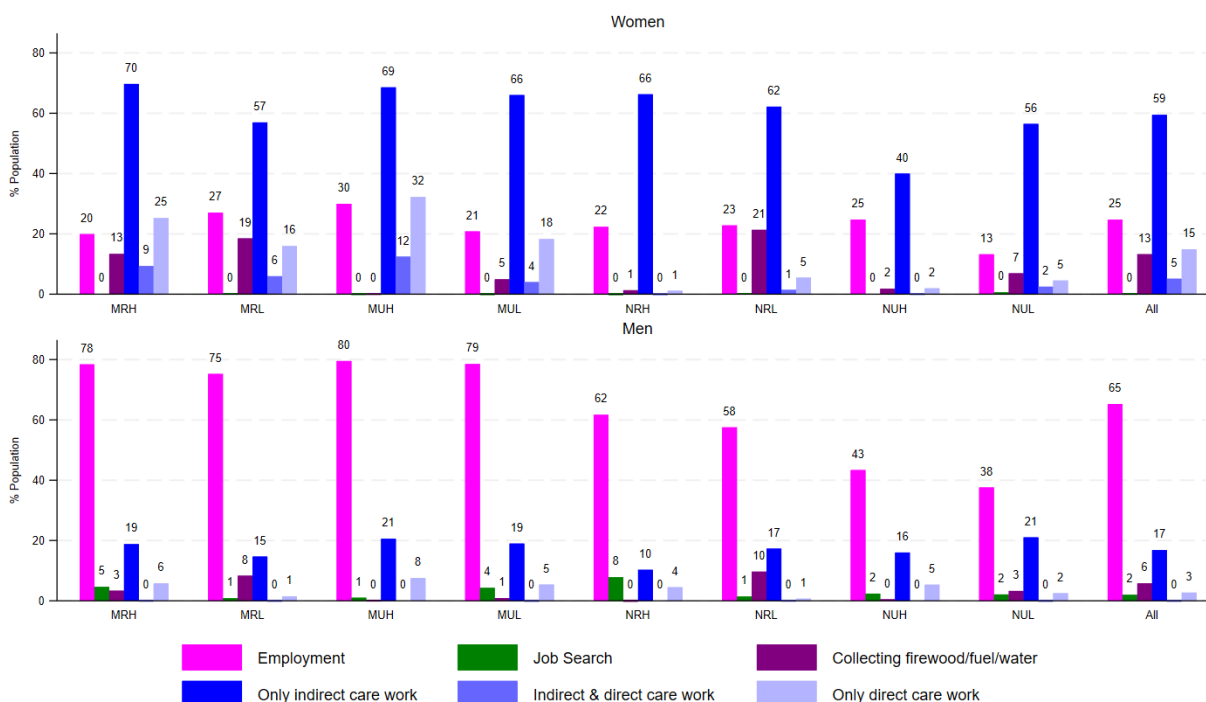
In Figure 6, we examine the incidence of these activities, that is whether they occur at all or not at the individual level for men and women without concern for how much time is spent on them. As shown in Figure 6, there is a clear gender division of labor where men's primary activity in the past 24 hours is employment (66 percent), and women's primary activity is care work (79 percent adding up all three categories of care work). Despite this clear division of labor, about a quarter of women have engaged in some form of work in the past 24 hours and 20 percent of men have engaged in care work. Women are also much more likely than men to engage in the collection of firewood, fuel, or water (13 percent vs. 6 percent).

There are limited differences in the incidence of time uses among sub-groups of women and men. Ever married women are more likely to engage in care work than never married ones, especially direct care work. Educated women and urban women engage in more indirect care work than their less educated rural counterparts. Collecting firewood, fuel or water is mainly the purview of rural less educated women, although educated rural women engage in it as well.

There are some differences in time use among different groups of men as well, the most important of which is the incidence of employment by marital status. Because ever married men are typically the breadwinners of their households, they have a higher incidence of involvement in employment as compared to never married men. Among never married men, urban men have lower incidences of employment than rural ones, an indication of the later onset of employment for men in urban areas. The incidence of the other time uses we identify does not vary much across groups of men.

⁷ We do not distinguish between employment (market work) and subsistence work in this section since it is difficult to make such a determination in the time use section, although gathering firewood/fuel/water – a sort of subsistence work not previously measured – is separately identified.

Figure 6. Percentage engaging in different time-use activities, all individuals aged 15-64 by sex, location of residence, marital status, and educational attainment

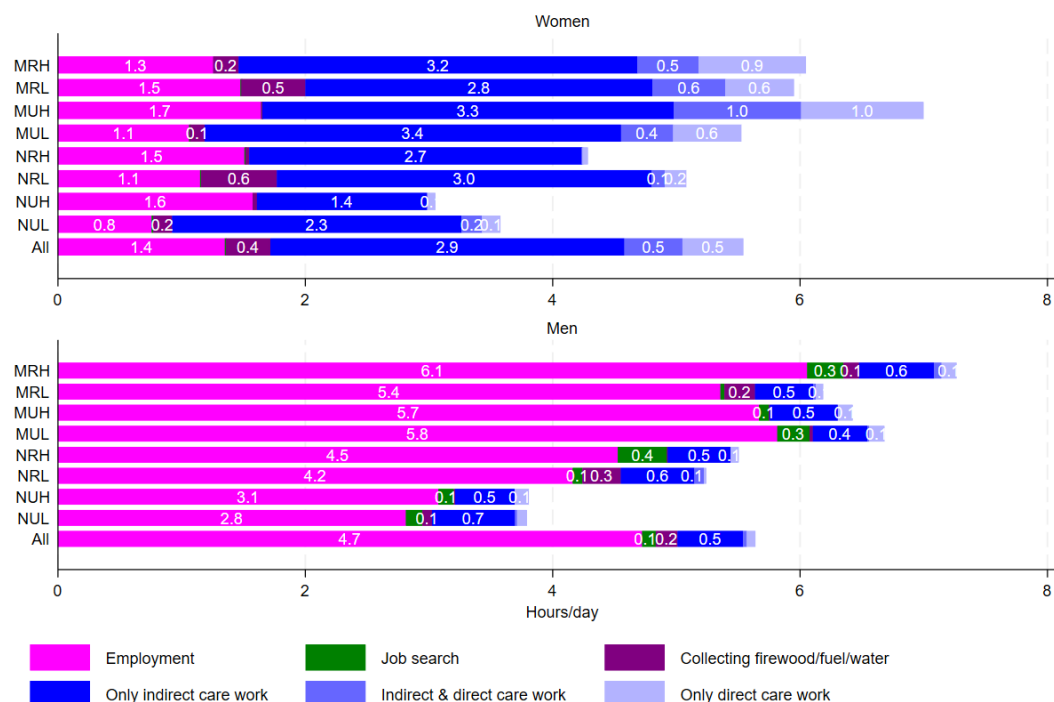


Source: Authors' calculations from SLMPS 2022 data

Notes: Time use data in employment includes employment in primary and secondary or tertiary jobs. Unpaid domestic chores such as cooking, cleaning, and maintenance are considered as indirect care work. Childcare and caring for elders and other dependents is considered direct care work. Activities are only counted if the minimum activity engagement is 15 minutes. M stands for ever married and N for never married. R stands for rural and U for urban. H stands for primary education or above and L for less than primary education. For example, NRL means never married, rural individuals with less than primary education.

We examine in Figure 7 the time spent (hours per day) in the time uses identified above by gender and other characteristics. The gender division of labor between economic work and care work is very apparent in this figure as well. While women spend 1.4 hours per day on average on employment, this rises to 4.7 hours per day for men. Women also spend 3.9 hours per day on average in care work plus an additional 0.4 hours in collecting firewood/fuel/water. This compares to about 0.8 hours in such work for men; a ratio of more than four to one.

Figure 7. Time-use in work and care activities (hours per day), all individuals 15-64 by sex, location of residence, marital status, and educational attainment



Source: Authors' calculations from SLMPS 2022 data.

Notes: Time use data in employment includes employment in primary and secondary or tertiary jobs. Unpaid domestic chores such as cooking, cleaning, and maintenance are considered indirect care work. Childcare and caring for elders and other dependents are considered direct care work. Labels for categories of 0 percent are suppressed. M stands for ever married and N for never married. R stands for rural and U for urban. H stands for primary education or above and L for less than primary education. For example, NRL means never married, rural individuals with less than primary education.

Overall work burdens, combining economic and care work, are substantially higher for ever married women and men as compared to their never married counterparts (Figure 7). The contrast is particularly sharp in urban areas, where work burdens for never married individuals are relatively low irrespective of educational attainment. As we have seen before, lesser educated urban women have the fewest opportunities to engage in economic work and thus have the lowest hours of employment. While the never married among them have more care work responsibilities than their more educated counterparts, that is not the case for the ever married.

It thus somewhat surprising that the highest workloads among women are among urban, ever-married women with higher levels of education given their somewhat lower involvement in economic work compared to their less educated rural counterparts. The difference appears to

come from their greater involvement in care work; potentially involving more time assisting their children in schoolwork.

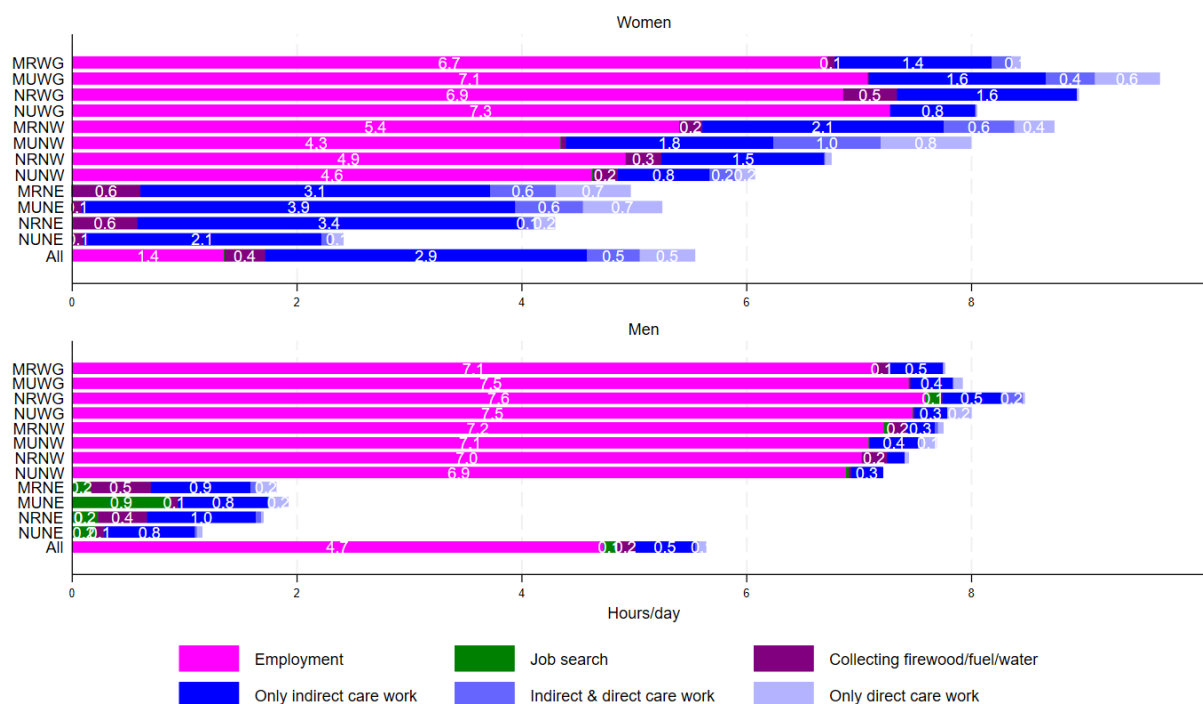
In an attempt to detect the double burden for working women more effectively, we separate in our classification between individuals working for wages (WG), non-wage working individuals (NW) and non-working individuals (NE), keeping the distinctions by marital status and location of residence. The distribution of individuals across these groups is shown in Figure A10 in the appendix. Wage workers are no more than 5 percent of all women, as compared to 32 percent of men. Nonwage workers make up 19 percent of women and 34 percent of men. Finally, nonworking individuals make up 76 percent of women and 35 percent of men.

As shown in Figure 8, there is clearly evidence of a double burden for married women working for wages, whether urban or rural. At seven hours of economic work per day, they have only slightly fewer work hours than their male counterparts, but they have more than double the men's care work time. As a result, their total workdays are about an hour longer than those of their male counterparts.

There is some evidence, however, that either through an inability to shift the burden of care work onto others or through selection, wage working women have lower burdens of care work than either non-working women or women doing nonwage work. This result is counter to what was found for Egypt and Jordan, where the burden of care work was invariant among employed and non-employed women (Assaad, Krafft, and Selwaness 2022). Ever married women in nonwage employment are able to spend about two hours less on economic work than ever married female wage workers, but spend about twice as much on various kinds of care work. Non-working ever married women spend even more time on care work, but their total work time is considerably less than either their wage or nonwage working counterparts. Unmarried nonworking women have the lowest total work burdens, especially in those living in urban areas.

As shown in Figure 8, there are few differences among different subgroups of working men in terms of either the time spent on economic work or care work. Male nonwage workers work slightly fewer hours than wage workers and may also spend a little less time in care work. Nonworking men spend more time in care work than their working counterparts, but also more time in fetching firewood/fuel/water and in job search. However, their total work hours are considerably fewer than either those of working men or those of non-working women. Urban, never married, nonworking men have the lowest overall work hours.

Figure 8. Time-use (hours per day), all individuals aged 15-64 by sex, location of residence, marital status, and employment status



Source: Authors' calculations from SLMPS 2022 data

Notes: Time use data in employment includes employment in primary and secondary or tertiary jobs. Unpaid domestic chores such as cooking, cleaning, and maintenance are considered indirect care work. Childcare and caring for elders and other dependents is considered direct care work. Labels for categories with zero percent are suppressed. M stands for ever married and N for never married. R stands for rural and U for urban. WG stands for wage employment, NW for nonwage market employment and NE for nonemployment. For example, NRWG means never married, rural individuals employed in wage market.

5 Conclusion

We examined in this paper the gender patterns of involvement in work, broadly defined to include all kinds of market work as well as subsistence work. We started with international comparisons that showed that Sudan has lower rates of paid employment for women relative to those predicted for its stage of economic development. This is attributable to Sudan being culturally similar to countries in the Middle East and North Africa where a strong male breadwinner/female homemaker norm prevails, where constraints on women's mobility in the public domain are tied to concerns about family honor, and where patrilineal inheritance rules limit women's access to land and property (Kabeer, Deshpande, and Assaad 2019; Krafft and Moylan 2023). We do show, however, that how one measures women's work matters a lot to the estimates. While simply lengthening the reference period from one week to three months raises overall female participation in market work by just two percentage points from 12 to 14 percent,

incorporating information from modules on household productive activities and who is involved in them can nearly double the measured female employment rate from 14 percent to 24 percent. This is because women's economic activities are so intimately tied to their other household chores that they do not consider them employment when asked individually even when great care is used to formulate the questions. When subsistence work is added, the estimate of female participation in work climbs to 29.5 percent, still well short of the 52 percent predicted from international data for a country at Sudan's per capita income level.

Women's work is strongly tied to household activities in agriculture and animal husbandry. Nearly half of working women are engaged in crop production and 40 percent are engaged in livestock rearing, with many engaged in both activities simultaneously. Much of the work is either unpaid market work or subsistence work. However, these overall patterns vary a great deal by location of residence, stage in the life course, and educational attainment. The pattern fits most closely the group that makes up nearly 50 percent of Sudanese adult women, namely rural, less educated, ever married women who have the highest rates of involvement in crop and livestock production. It also fits well their never married counterparts, whose rates are lower, reflecting the lower responsibilities they have for household reproduction at their stage in the lifecycle. The pattern does not fit very well educated women in general, and urban educated women in particular. Their participation in work is for the most part made up of wage work. Urban, never married educated women work for wages in both the private and public sectors, but urban ever married educated women, and rural educated women, regardless of marital status, work almost exclusively in the public sector. Rural, educated women do also engage in household agricultural activities but at much lower rates than their less educated counterparts.

In the absence of readily accessible agricultural and animal husbandry activities on family farms, lower educated women in urban areas have few opportunities to participate in economic activity. While some are able to participate in nonfarm nonwage work and in private wage work, these activities are often socially frowned upon since they involve significant exposure to the public domain (Krafft and Moylan 2023). Nonfarm nonwage work and private (usually casual) wage work are the most common form of livelihood for men in urban areas.

Given the importance of crop production and animal husbandry as forms of livelihood in Sudan, we delve more deeply into the gender division of labor within these domains. In crop production, we find that the most important division of labor between men and women is men's specialization in running/managing crop production and women's specialization in support roles. Women are disproportionately represented in fruit and vegetable production relative to field crop production, but are surprisingly not over-represented in subsistence work. This result may be in part because women have appreciably fewer rights to parcels of land, and this is even more so true once they are married (Krafft and Moylan 2023).

In animal husbandry, the main gender division of labor is not along run/manage versus support roles, but rather along animal size. Men tend to specialize in caring for large and to a lesser extent medium livestock, but small livestock are almost entirely the purview of women. Women are also disproportionately represented in subsistence as opposed to market livestock production,

with almost two thirds of women in subsistence production as compared to half of men. This pattern is also reflective of other research showing women do own (often jointly) livestock, more so than land (Krafft and Moylan 2023).

Finally, we examine the interplay between participation in economic work and unpaid care work. As expected there is a clear gender division of labor with men mostly engaged in economic work and women mostly engaged in care work, with almost equal total work burdens across ever married men and ever married women. Never married men and women generally have lower total work burdens, especially those residing in urban areas. When we also disaggregate by work status, we find that the small group of women who work for wage suffer from a clear double burden, with total work burdens that exceed those of their male counterparts. While they are generally not able to reduce their hours in wage work very much compared to men, they seem to be able to somewhat reduce their care work responsibilities relative to women in nonwage work and nonemployed women. This could partly be a selection issue, where women who are able to work for wages are those who have lower care work responsibilities, but it could also be that they are able to use the extended family structures prevalent in Sudan to shift care work to other members of the household, something that we have not observed in studies of Egypt and Jordan (Assaad, Krafft, and Selwaness 2022).

Women in nonwage work, a much larger group of women, occupy an intermediate position where they have shorter work hours on average than wage working women, but a level of care responsibilities that is intermediate between wage working women and nonworking women. Marital status also matters with never married women having much lower care work burden. Surprisingly, the highest total work burden is for ever married, urban, more educated women working for wages. While these women have similar hours of economic work as their less educated and rural counterparts, and similar indirect care hours, they have longer direct care hours, probably related to time they spend in helping their children study.

With Sudan's stalled structural transformation and slowing improvements in educational attainments (Etang Ndip and Lange 2019; Ebaidalla and Nour 2021; Krafft et al. 2023), we expect that the patterns we observed in this data to be fairly persistent. A substantial change in the gender division of labor would involve increased marketization of women's work through more paid self-employment and wage work, and more specialization in work as women acquire greater levels of education and the economy begins to generate increasingly sophisticated firms that are increasingly specialized. Both of these prospects seem somewhat remote for Sudan at the present time.

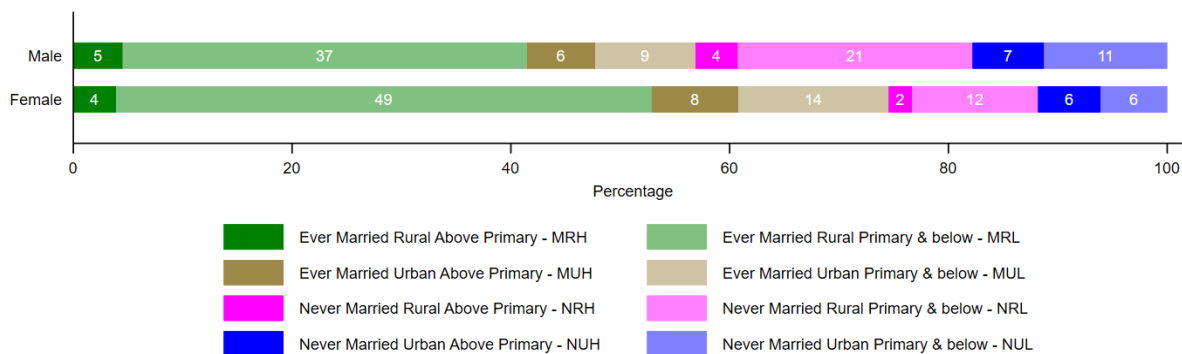
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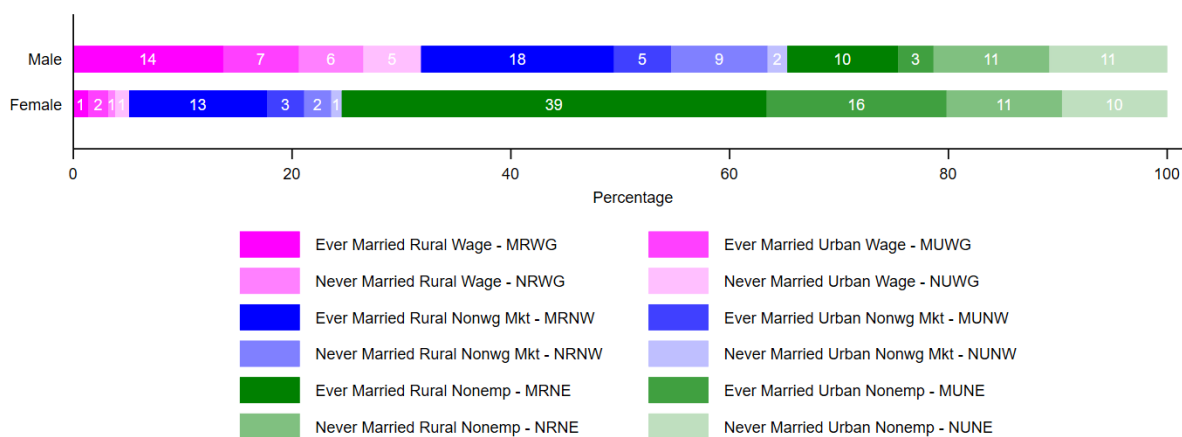
Appendix:

Figure A9. Distribution of individuals aged 15-64 by sex, location of residence, marital status, and educational attainment (percentage)



Source: Authors' calculations from SLMPS 2022 data

Figure A10. Distributions of individuals aged 15-64 by sex, location of residence, marital status, and individual employment status (3-month reference period) (percentage)



Source: Authors' calculations from SLMPS 2022 data

Table A5. Probit regression with dependent variables of subsistence and market work, by type of market work, all individuals aged 15-64 by sex, location of residence, marital status, and educational attainment

Type of group Outcome variable									Differences in	Differences in	Differences in
	NUL – women vs. men	NUH – men and women	NRL – women vs. men	NRH – men and women	MUL – women vs. men	MUH – men and women	MRL – women vs. men	MRH – men and women	in education level among women	rural/urban level among women	marital status among women
Crop	n.s.	n.s.	---	-	---	-	---	---	---	+++	++
Livestock	n.s.	n.s.	---	---	n.s.	n.s.	---	---	---	+++	+++
Nonfarm	---	---	n.s.	---	---	---	---	---	--	---	+++
Subsistence	n.s.	n.s.	---	---	-	n.s.	---	---	---	+++	+++
Market Work	---	---	---	---	---	---	---	---	+++	+++	+++
Work	---	---	---	---	---	---	---	---	n.s.	+++	+++
Base Group	men	men	men	men	men	men	men	men	less than primary educated women	urban women	never married women

Source: Authors' calculations from SLMPS 2022 data

Notes: Any involvement in each work activity is captured irrespective of whether it is the primary work status of the individual. The dependent variable is in the first column and the types of group are in the first top row. The reference group is mentioned in the last row of the table. Statistical significance and the direction of the effect is indicated by – and + signs. Three symbols indicates statistical significance at the 1 percent level, two indicate significance at the 5% level and one indicates significance at the 10 percent level. A negative symbol indicates a level lower than the reference group and a positive sign indicates a level higher than the reference group.

N stands for never married. R stands for rural and U for urban. H stands for primary education or above and L for less than primary education. For example, NRL means never married, rural individuals with less than primary education.