

DOES UNPAID CARE WORK CONSTRAIN FEMALE LABOR FORCE PARTICIPATION IN PAKISTAN?

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ABSTRACT

This paper examines the relationship between unpaid caregiving work and women's labour force participation in Pakistan using data from the 2024-25 Labour Force Survey. Baseline models show a negative relationship, but adjusting for endogeneity with a two-stage residual-inclusion model reveals a positive relationship. Women, especially in urban areas, benefit from flexible, home-based work, allowing them to balance caregiving and employment. However, structural challenges in rural areas hinder participation. The study suggests that conventional models may overstate the impact of unpaid care on work and advocates for gender-responsive policies that integrate caregiving support with labour market opportunities.

Keywords: Unpaid Care Work, Labour Force Participation, Flexible Employment, Pakistan

1. Introduction

One of the most persistent gender disparities in development settings remains low female labour force participation (FLFP). The educational achievement of women in many low- and middle-income countries has increased significantly; however, women are not entering the labour market more frequently, which means that an increase in human capital does not necessarily lead to economic inclusion (Klasen, 2019; Assaad et al., 2018). This separation is apparent in South Asia, where educational levels have risen, and fertility has been delayed, but women have been less successfully integrated into the workforce, which has become weaker and more unequal (Klasen & Pieters, 2015). The accumulating research has made it clear that gender norms and the unequal distribution of unpaid household and care duties are the key factors in explaining this phenomenon (Jayachandran, 2021; Ferrant et al., 2014).

Although there is now a much better understanding of the importance of unpaid work, much of the existing empirical evidence still uses indirect demographic proxies (e.g., marital status or young children) to measure household constraints on female labour supply (Killingsworth & Heckman, 1986). These proxies, although informative, do not measure the intensity of time demands or separate the burden of care from other correlated variables, such as social norms, individual preferences, or bargaining arrangements within the household. The time-use data across countries indicate that women do most of the work at home and care, with greater imbalances in unpaid care also linked to wider disparities in employment and earnings (Ferrant et al., 2014; Rubiano-Matulevich & Viollaz, 2019). Much of this evidence, however, is descriptive, and it remains unknown whether unpaid care is a binding time constraint or whether the observed correlations reflect unobserved heterogeneity and

simultaneity in time use and labour-market activity.

This difference has implications for welfare evaluation and policy formulation. Losing unpaid work may reduce women's overall workloads and misrepresent indicators of economic involvement and susceptibility (Apps, 2003). At the aggregate level, a constant low FLFP indicates lost productivity and an inefficient distribution of talent (Cuberes & Teignier, 2016). At the household level, economic dependence and the restricted agency of women, stemming from limited access to paid employment, can influence the allocation of resources within the household and long-term well-being (Elson, 1995; Kabeer, 2016) if unpaid care is a binding type of constraint, education- or labour-demand-based policies can yield limited returns without additional interventions that reduce time costs, such as childcare and eldercare support.

Pakistan is a good case study where these issues can be analysed because the participation in the labour force by women in the country is still relatively low, and unpaid labour is highly gendered. Previous research on Pakistan has primarily used household composition or fertility as proxies for caregiving constraints (Naqvi & Shahnaz, 2002; Ejaz, 2007), thereby limiting a direct evaluation of the relationship between time spent on unpaid work and labour-market outcomes. The present study uses new nationally representative microdata, which includes direct measures of domestic and care activities without pay and detailed labour-market information, from the Labour Force Survey (LFS) 2024-25. Incorporating time-use measures into a typical labour force survey enables a more direct analysis of the relationship between care participation and national-level participation.

Empirically, both unpaid care and labour-force participation are jointly estimated, and this is a concern of reverse causality and omitted-variable bias. To deal with this concomitance, the analysis employs a two-stage residual inclusion (2SRI) methodology that is suitable for nonlinear participation models (Terza et al., 2008), in which the unpaid hours of care are instrumented by the age structure of the household as a proxy of exogenous needs of caregiving (Ettner, 1996; Heitmueller, 2007; Van Houtven et al., 2013; Crespo & Mira,

2014). The heterogeneity between urban and rural labour markets is also examined, as the same care burden can elicit different labour-supply responses across different employment prospects and institutional settings.

This analysis has three contributions. To begin with, it is opportune to have nationally representative, evidence-based data on unpaid domestic and care time, thereby overcoming the demographic proxies used in Pakistani scholarship. Second, it removes potential endogeneity bias between unpaid care and participation, showing that traditional cross-sectional models can distort the value of the relationship between care and participation in some situations, including negative ones. Third, the research documents substantial urban-rural disparities, underscoring that unpaid care can constitute a participation constraint in some contexts and coexist with labour-market attachment in others, underscoring the need for spatially differentiated policies that combine care support and employment strategies.

2. Conceptual Framework and Related Literature

The theories of time use are based on models that consider labor supply, given the distribution of scarce time between paid work, unpaid household production, caregiving, and leisure within time and money constraints (Becker, 1965; Gronau, 1977). In this context, the opportunity cost of market work increases as demand for care rises, due to time lost from paid work. The increased caretaking demands should reduce labour force participation among households without lower-cost substitutes in the care market, especially among households whose primary role is domestic work.

Collective household models further develop this framework by noting that time allocation is an intra-household process of providing intra-household bargaining, directed by relative wage differentiation, resource access, and social norms, rather than simply by individual productivity (Chiappori, 1992; Kabeer, 1999). In many developing countries, social institutions place the primary responsibilities for routine household and care work on women, regardless of their earning capacity. Therefore, shifts in household structure, such as the inclusion of young children or dependent aged adults, are

more likely to increase women's unpaid workloads than to trigger substitution into paid care services when formal care markets are limited or cultural limitations exist.

However, it may not necessarily be a negative correlation between unpaid care and labor force participation. Women can respond to the need to provide care by choosing more flexible, home-based, self-employed work that can be rearranged alongside households, in high-informality labor markets, and with little workplace safety. Unpaid care can be concomitant with labor market attachment in such environments and creates a two-fold burden rather than an abstraction from employment. This process suggests that unpaid care can not only determine whether women are engaged in the labor market, but also the nature and quality of work they can obtain, with implications for the stability of earnings, employment conditions, and long-term economic stability.

Econometrically, unpaid care is endogenous to labor force participation. Greater caregiving demands can reduce labor force participation, and engagement in paid jobs mechanically restricts time devoted to unpaid tasks. Besides, both time use and labor market participation may be affected by unobserved factors, including preferences for market labor, health conditions, social values, and bargaining power, which interact to make both dependent on the other (Elson, 1995; Kabeer, 2016). When these simultaneous variables are omitted, estimates of the impact of unpaid care can be biased, and therefore conclusions may be drawn about the relative significance of education, fertility, or household structure.

Empirical evidence shows that women do most of the unpaid care and household labor, and that greater unpaid workloads correlate with reduced female labor force participation (Ferrant et al., 2014; Rubiano-Matulevich & Viollaz, 2019). Empirical research that expressly deals with endogeneity through instrumental-variable or control-function designs tends to result in the finding that caregiving roles lower employment and labor supply, specifically in the case of eldercare or intensive childcare task demands (Ettner, 1996; Heitmueller, 2007; Van Houtven et al., 2013; Crespo & Mira, 2014). Although much of this evidence is based on

high-income environments, comparatively little is understood about how unpaid care relates to labor supply in developing-country labor markets characterized by high informality and limited access to care services.

In addition to providing labor, unpaid care also influences indicators of well-being and social inclusion more broadly. Failure to acknowledge unpaid work may underestimate overall workloads, perpetuate gender disparities in productive endeavors, and distort the vulnerability and time poverty measures (Apps, 2003). In terms of social indicators, labour market participation, unpaid labour, and women's decent employment are mutually determined outcomes that reflect both household-level and structural labour market characteristics. The interaction between unpaid care and the labour market is thus a key concept for explaining gender differences in income security, economic autonomy, and general welfare.

The literature combined implies two conflicting, although not mutually exclusive, mechanisms. Unpaid care can be a binding time constraint, limiting women's ability to be at home caring for children during periods of high care demand when market alternatives are not readily available. Alternatively, in environments where flexible and casual employment is common, women can remain attached to the workforce by making concessions about the types of work they take, even with significant unpaid labor. To distinguish between these processes, empirical strategies are needed that account for endogeneity and permit heterogeneity across labor market settings. The empirical method employed in this paper aims to test these conflicting hypotheses using nationally representative data that directly measure unpaid domestic and care time.

3. Method and Data

3.1 Method

Unpaid household and care labour is said to be endogenous to female labour-force participation, since the amount of time women spend in market and non-market activities is collectively determined by household care demand, socioeconomic factors, and existing social norms, all of which may directly affect participation. Women who engage in wage

labour also have less time for unpaid activities; on the other hand, high caregiving expectations can limit labour-market participation. Lack of consideration of this simultaneity can therefore bias estimates of the role of unpaid care on participation. In line with previous studies

(Terza et al., 2008; Ettner, 1996; Heitmueller, 2007), a two-stage residual inclusion (2SRI) method is employed to address potential endogeneity in unpaid care work in a nonlinear participation model.

The baseline participation equation is specified as:

$$LFP_i^* = \gamma_i U_i + \delta_i X_i + v_i, \quad LFP_i = \begin{cases} 1 & \text{if } LFP_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

where LFP_i^* is a dichotomous variable that indicates labour-force participation, U_i is the total number of hours per week spent performing unpaid domestic and care work, X_i is a vector of control variables, and v_i is an error term.

The first stage of the 2SRI approaches models unpaid care hours as:

$$U_i = \alpha_i X_i + \beta_i Z_i + \varepsilon_i \quad (2)$$

where U_i and X_i defined above. Z_i refers to instrumental variables used for the 2SRI model identification.

The instrumental variables include the number of children under age five and the number of elderly household members aged 65 and above.

α_i and β_i are parameters to be estimated, and ε_i as an error term.

In the second stage, the residual from the first stage is included in the probit participation equation:

$$LFP_i^* = \gamma_i U_i + \delta_i X_i + \eta_i \text{Residual}_i + \omega_i, \quad LFP_i = \begin{cases} 1 & \text{if } LFP_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (3)$$

where Residual_i the residual term predicted after estimating equation (2) and is included in equation (3) to account for unobserved heterogeneity that could bias the outcome variable (Terza et al., 2008). γ_i , δ_i , and η_i are parameters to be estimated, and ω_i as an error term.

Because the dependent variable is dichotomous, equations (1) and (3) are estimated using probit models, and average marginal effects are reported for ease of interpretation.

3.2. Data

The research paper examines a nationally representative microdata set of the 2024-25 Labour Force Survey (LFS) of the Pakistan Bureau of Statistics. The survey uses a stratified multistage cluster sampling design and covers cities and rural areas across all provinces of Pakistan. The analytic sample is limited to women aged 15 to 64 who possess all information on labor force participation, unpaid domestic and care services, and household confinements. Urban and rural subsamples are also estimated separately, in addition to the

entire sample. The final analysis sample contains 70,877 women, and the definitions of variables and their descriptive statistics for this sample are presented in Table 1.

The number of children under five and elderly individuals aged 65 and above is used as a proxy for unpaid care hours. As shown in the Pearson correlation tests (Appendix Table A1), both variables are significantly and positively correlated with unpaid care time, thereby confirming their suitability as proxies for caregiving needs. The instruments also show other small yet significant correlations with labor force participation, but they are tiny. In line with the caregiving literature, the identifying assumption is that household age structure influences caregiving responsibilities, conditional on observed controls.

Table 1. Variable definitions and descriptive statistics

Variables	Definitions	Mean (SD)
LFP	1 if female is employed or unemployed but actively seeking work; 0 if out of the labour force	0.30 (0.46)
Unpaid Hours	Total weekly hours spent on unpaid domestic and care work	21.30 (13.83)
Children < 5	Number of children under age 5 in the household	1.02 (1.26)
Elderly 65+	Number of elderly household members aged 65 and above	0.22 (0.50)
Age	Age of female respondent in years	33.24 (11.83)
Education level	Years of completed schooling	4.48 (5.25)
Household size	Total number of household members	7.05 (3.50)
Married	1 if currently married; 0 otherwise	0.75 (0.43)
Widow	1 if widow; 0 otherwise	0.03 (0.18)
Divorced	1 if divorced; 0 otherwise	0.003 (0.05)
Sindh	1 if the household resides in Sindh province; 0 otherwise	0.23 (0.42)
KPK	1 if household resides in Khyber Pakhtunkhwa; 0 otherwise	0.21 (0.41)
Balochistan	1 if household resides in Balochistan; 0 otherwise	0.11 (0.32)

Note: SD refers to standard deviation.

4. Results

Table 2 presents estimate of the baseline and two-stage residual inclusion (2SRI) for the relationship between unpaid domestic and care labour and women's labour-force participation. Since coefficients from probit models cannot be interpreted directly, we provide average marginal effects to facilitate a more straightforward interpretation. Column (A) shows the baseline probit estimates, Column (B) is the first stage regression of unpaid care hours, and Column (C) is the second stage 2SRI probit estimates. The significance level of the residual value of Column (C) reveals the existence of the unobserved factors that have a combined effect on unpaid care time and labour-force participation and, therefore, proves that endogeneity is indeed a significant issue in this case. Once endogeneity is controlled for, unpaid care hours are positively and statistically significantly associated with labour-force participation. Namely, every extra hour of the week spent on unpaid household care chores is associated with an increase of about 1.9 percentage points in the likelihood of being in the labour force.

To compare, Column (A) reports the estimates of the uncorrected endogeneity baseline probit model. These findings suggest that an additional hour of unpaid care work is associated with a decrease in the likelihood of labour-force participation of approximately 0.17 percent. When added to the estimates in Columns (A) and (C), the antagonistic relation between unpaid care and participation implied by the standard time-allocation models would be exaggerated, and possibly inaccurately described, when simultaneity between the time use and labour-market participation is omitted. These results align with the conceptual framework, which recognizes that, even though unpaid care work limits time, women with greater caregiving duties might also exhibit more necessity-driven labour provision and increased participation in informal or home-based work that can be combined with household tasks. When some of the unobserved preferences, intra-household bargaining, and differing access to employment are accounted for by the 2SRI approach, unpaid care work no longer emerges as a participation-decreasing constraint but rather co-exists with labour-market attachment in limited institutional and economic settings.

Table 2. Baseline and 2SRI Estimates of Female Labor Force Participation

Variables	Baseline	First Stage	Second Stage
	FLFP (0/1)	Unpaid Hours	FLFP (0/1)
Unpaid Hours	−0.0017* (0.0002)		0.0191* (0.0063)
Residual ($\hat{u}$)			−0.0209* (0.0063)
Children < 5		0.4247* (0.1014)	
Elderly 65+		0.0957 (0.1930)	
Age	0.0274* (0.0017)	1.1260* (0.0526)	0.0043 (0.0072)
Age ²	−0.0004* (0.0000)	−0.0157* (0.0007)	−0.0001 (0.0001)
Education level	0.0067* (0.0005)	0.2910* (0.0194)	0.0006 (0.0019)
Household size	−0.0013* (0.0007)	−0.0870 (0.0362)	−0.0015* (0.0007)
Married	−0.0605* (0.0087)	6.5140* (0.3280)	−0.2064* (0.0452)
Widow	0.0173 (0.0160)	4.9318* (0.5741)	−0.0982 (0.0388)
Divorced	−0.0281 (0.0453)	7.6010* (1.8165)	−0.1950* (0.0675)
Sindh	−0.0852* (0.0058)	−7.2146* (0.2122)	0.0661 (0.0464)
KPK	0.0065 (0.0067)	−3.7805* (0.2404)	0.0875* (0.0256)
Balochistan	−0.0831* (0.0107)	−0.3788 (0.3509)	−0.0732* (0.0111)
Constant		0.3816 (0.8567)	
Observations	23,745	23,745	23,745

Note: ***p < 0.01, **p < 0.05, *p < 0.1, strong standard errors are displayed in brackets, and the reference province is Punjab, and marital status is never married.

Besides unpaid care work, female labour-force participation is highly related to marital status and geographical location. The married, widowed, and divorced women in Column (C) are less likely than the never-married women to enter the labour force, even after correcting for endogeneity, suggesting tenacious gender norms and role expectations within the household, as promoted by collective household models. In terms of geographical variation, compared to Punjab (the excluded province), women in Balochistan show much lower levels of participation, while women in Khyber Pakhtunkhwa show higher levels of participation in both controlled household work and unpaid care obligations. These trends emphasise the role of regional labour-market factors and other institutions of social relations outside time allocation in the household.

The estimates from the first stage, recorded in Column (B), show that household caregiving needs are closely related to unpaid care hours. The presence of children under 5 years old increases unpaid care, indicating that childcare has become a significant contributor to the enormous household workload. In comparison, the count of aging household members shows no statistically significant correlation, suggesting greater diversity in eldercare roles or that some

may be partially distributed across extended family groups. Marital status also correlates significantly with the number of unpaid care hours, indicating more household roles after marriage. Unpaid care time shows a concave relationship with age and a positive relationship with education, which may be due to variations in household composition or to differences in how domestic activities are reported. Overall, these findings justify the applicability of the instruments and suggest that differences in unpaid care time are tightly associated with differences in household care demands.

Table 3 presents estimates of the relationship between urban and rural samples, indicating that the relationship between unpaid care and labour-force participation varies across labour-market settings. To simplify the presentation, only the average marginal effects of unpaid hours of care are reported. Unpaid care hours are negatively and significantly associated with both areas in the baseline probit estimates, with the negative values larger in rural settings. In particular, an hour of unpaid care decreases the likelihood of participation by about 0.17 percentage points among urban women and by about 0.49 percentage points among rural women.

Table 3. Disaggregated Analysis by Region (Urban and Rural Samples)

Sample	N	Baseline Probit	2nd Stage
Urban	23,745	-0.0017 (0.0002)***	0.0191 (0.0063)***
Rural	47,132	-0.0049 (0.0002)***	-0.0051 (0.0049)

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ and robust standard errors are presented in parentheses.

Once endogeneity is corrected using the 2SLS method, the estimated relationship differs sharply by place of residence. Unpaid care hours are significantly and positively related to participation in urban areas: an additional hour increases the likelihood of being in the labour force by about 1.9 percentage points. The effect is statistically insignificant in the rural regions. These non-homogeneous patterns, along with results based on the full sample, indicate that models that do not account for endogeneity overestimate the role of unpaid care in reducing participation, especially in urban labour markets. The urban-rural gap in estimates aligns

with labour-market disparities. The urban environment usually provides more opportunities for informal service-sector and home jobs that can easily be combined with domestic duties, so that women with greater caring duties can still be connected to the labour market. Rural labour markets, on the other hand, are more limited and are mainly controlled by agriculture and family-based businesses, restricting the ability to engage in flexible wage work. In this scenario, the burden of caregiving is less likely to become an ongoing market interaction, and wider structural pressures will determine labour-supply choices.

Table 4. Results of the robustness check

Sample	N	AME of Unpaid Care Hours
Full sample	70,877	0.0276*** (0.0094)
Urban	23,745	0.0514*** (0.0099)
Rural	47,132	-0.0149 (0.0143)

Note: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$, the AME refers to average marginal effects and strong standard errors are displayed in brackets.

The IV-Probit model was complete, and urban and rural estimates of coefficients and exogeneity test statistics were presented in Appendix Table A2.

To test how the findings would respond to the method of estimation, an IV-probit specification is also estimated, with household age structure used to instrument unpaid care hours. This has been extensively used in the caregiving and labour-supply literature to address simultaneity between caregiving and labour-market participation (Ettner, 1996; Heitmueller, 2007; Van Houtven et al., 2013; Crespo & Mira, 2014).

The qualitative averages of the marginal effects of Table 4 are consistent with the prominent two-stage residual inclusion (2SRI) estimates. The unpaid caregiving hours show a positive, statistically significant relationship with labor-force participation in the total sample and the urban sub-sample, but not in the rural sub-samples. The fact that the results are corroborated by those obtained with various

nonlinear estimation strategies suggests that the main results are not sensitive to the functional form imposed by the 2SRI specification. However, due to the nature of the data (a cross-sectional design) and the use of household composition as instruments, the results must be interpreted as endogeneity-adjusted associations rather than unambiguous causal impacts.

5. Concluding Remarks

The research examines the relationship between unpaid domestic and caring labour and women's labour market participation in Pakistan. It uses national information to document how individuals invest their time. The initial models identify a negative relationship, but when we control for endogeneity, the picture changes: on average, women who take on more unpaid care work are more likely to be employed. This is a growing relationship in urban areas, where women combine their caregiving with informal, home-based, or flexible jobs. In the rural setting, there is a lack of job opportunities, and

structural factors suggest that unpaid care has little impact on participation. Neglected endogeneity in models therefore overestimates the extent of the reduction in unpaid care in work participation. The policy suggestions are as follows: in cities, support affordable childcare and eldercare, and enhance flexible work arrangements. Policies in rural regions should foster more productive enterprises and improve market access. By linking time-use information on unpaid care to labor-market indicators, we are better equipped to understand gender barriers and to construct an inclusive, gender-sensitive economy.

6. Declarations

Conflict of interest: No conflict of Interest to declare.

Consent to Participate: All the authors made substantial contributions to all the segments of the articles, drafted the work, approved the final version, and agreed to be accountable and responsible for the article.

Consent to Publish: The authors are responsible and accountable for all the segments of the manuscript.

Data availability: Our manuscript contains data, which will be made available at reasonable request.

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8. Appendix

Table A1 Pearson Correlation Tests for Instrument Validity

Instrument	Outcome Variable	Correlation	p-value
Children < 5	Unpaid hours	0.0888	< 0.001
Elderly 65+	Unpaid hours	0.0262	< 0.001
Children < 5	FLFP	0.015	< 0.001
Elderly 65+	FLFP	0.0203	< 0.001

Table A2 IV-Probit Estimates of Female Labor Force Participation (Robustness Check)

Variables	Full Sample	Urban	Rural
Unpaid care hours	0.0276*** (0.0094)	0.0514*** (0.0099)	-0.0149 (0.0143)
Age	0.0568*** (0.0159)	0.0113 (0.0269)	0.1198*** (0.0136)
Age ²	-0.0008*** (0.0002)	-0.0001 (0.0004)	-0.0016*** (0.0002)
Education (years)	-0.0188*** (0.0021)	0.0015 (0.0068)	-0.0008 (0.0040)
Household size	-0.0033* (0.0018)	-0.0039 (0.0025)	0.0041 (0.0029)
Married	-0.3116*** (0.0534)	-0.5542*** (0.0375)	-0.0091 (0.0888)
Widow	-0.1654*** (0.0594)	-0.2639*** (0.0796)	0.0859 (0.0849)

Divorced	−0.1932* (0.1073)	−0.5237*** (0.1461)	0.1067 (0.1360)
Sindh	−0.3662*** (0.0798)	0.1783 (0.1177)	−0.5141*** (0.0401)
KPK	−0.3806*** (0.0564)	0.2350*** (0.0381)	−0.7142*** (0.0262)
Balochistan	−0.7277*** (0.0634)	−0.1962*** (0.0658)	−0.9976*** (0.0218)
Constant	−1.4141*** (0.1083)	−1.6318*** (0.3729)	−1.6534*** (0.0658)
corr(e_Unpaid, e_LFP)	−0.507*** (0.113)	−0.768*** (0.121)	0.005 (0.183)
Wald test exogeneity (p-value)	0.0002	0.0006	0.978
Observations	70,877	23,745	47,132

