

Marriage, Gender, and Vocational Training in Pakistan: Evidence on Working Hours and Wages from the 2020–21 Labor Force Survey

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Timeline

Received: Jul 28, 2026
Revised: Sep 04, 2026
Accepted: Sep 09, 2026
Published: Oct 25, 2026

DOI

<https://doi.org/10.55603/jes.v5i2.a4>



Abstract

This study examines the association of marital status, gender, and skill development with labor market outcomes in Pakistan, focusing on working hours and monthly earnings. Using micro-data from the Pakistan Labor Force Survey 2020–21, the study draws on individuals aged 15–65 years. The full LFS sample comprises 42,850, while the final estimation samples differ by outcome and comprises of 31,250 individuals are restricted to the relevant employed or wage-earning individuals. The analysis considers marital status, gender, marital status by gender interaction, participation in training, and type of training provider, along with relevant socioeconomic and individual characteristics. The Inverse Probability Weighted Regression Adjustment (IPWRA) method is used to account for differences in observed characteristics between treatment and comparison groups. The findings show that marriage is associated with fewer working hours but higher earnings. Skill training is positively associated with working hours, while its overall relationship with earnings is weak; however, individuals who received training show higher earnings compared with their estimated earnings without training. Similarly, government and non-government training is not significantly associated with working hours or earnings for the overall population, but positive associations are observed among those who received training. Overall, the findings suggest that marital status and skill development are important factors associated with labor market outcomes in Pakistan. However, IPWRA only accounts for differences in observed characteristics, and the cross-sectional nature of the data limits causal interpretation. The findings should therefore be understood as associations rather than definitive causal effects.

Keywords: *Labor Force Participation, Gender Wage Gap, Vocational Training, Human Capital, Inverse Probability Weighted Regression Adjustment*

JEL Classification: J16, J22, J24, J31, C21

1. Introduction

Labor force participation is a crucial measure of economic development, income distribution and social progress. Social norms, institutional arrangements, and demographic factors as well as the economic environment influence labor market participation. These factors may include marital status, which can affect individuals' choices about entering or exiting the labor force, hours worked, and earnings by changing intra-household decisions making, household responsibilities, and time spent at work versus home. There is a critical difference between the connection of marriage and labor market outcomes and gender. Evidence from other countries indicates that marriage increases men's ties to the labor force, whereas having children decreases women's labor force participation, unpaid domestic work, and the labor force participation of women with traditional gender roles (Goldin, 1995; Becker, 1985). Women's labor market participation can also be influenced by marital status changes, such as divorce and

widowhood, which can create financial pressures and disadvantages in the labor market (Donato, 2014; World Bank, 2018).

Gender gaps in labor market are still significant in developing Asian economies. Even though the economic, education and health development of Asian countries has improved, female labor force participation is still relatively low (Klasen & Pieters, 2015; Verick, 2025). Through the “U-shaped hypothesis”, the link between economic development and women's participation in the labor market has also been explored, with the hypothesis that labor market participation will first fall as a country develops, then rise once it reaches a more advanced stage of development. Women's participation remains limited by high fertility, unpaid care work, restrictions on mobility, and limited access to employment opportunities (Bloom et al., 2009; OECD, 2025). These constraints may also interact with marital status and help to explain the gender gap in labor market outcomes.

In Pakistan, the role of women in the workforce is low compared to men, which is an important issue. The Asian Development Bank (2025b) and the World Bank (2025) have found that gender participation in the labor market is around 24.3%, much lower than the world average of more than 50% of women. Women's access to paid work can be limited due to persistent gender norms and household responsibilities, reduced mobility, a lack of childcare facilities, and institutional barriers (Asian Development Bank, 2025a & b). Meanwhile, marital status can mean something different to men and women. The role of the household earner might lead to higher expectations on the part of married men that they will be labor market attached, whereas married women might have higher constraints to labor market attachment due to care responsibilities and household duties. Economic necessity may also drive divorced and widowed women to enter the labor market, and social and economic disadvantages may impact their employment. The differences imply that marital status is not a one-size-fits-all measure of how one is doing in the labor market, regardless of sex.

Previous studies have focused on the impact of education, income, gender norms, and other socio-economic determinants on participation in the labor market and wages. But the available evidence for Pakistan does not investigate the relationship of gender and various marital-status groups with employment, working hours and wages jointly. Skill development and vocational training may also contribute significantly to enhancing the outcomes of the labor market by enhancing workers' skills and employability (Chinen et al., 2017; World Bank, 2020). However, there is limited evidence of the impact of training on working hours and earnings once individual characteristics that can be observed are considered. There is also a need for further research on the differences between government and private training providers, as training programs can vary in terms of their accessibility, content, and labor market relevance.

In this context, this research considers three questions related to but different from each other. First, what is the relationship between gender and marital status with one another in terms of employment, working hours and wages in Pakistan? Second, does participation in vocational training or skill training correlate with increased working hours and income after controlling for the observed individual and socioeconomic factors? Third, do the outcomes of the labor market vary between those trained by the government and those trained by private providers? The role of marital status and gender is separated from the possible contribution of skill development in this set of questions.

Microdata of Pakistan Labor Force Survey (LFS) 2020–21 was used in the study. The analysis is based on people of working age (15 to 65 years) and will be based on a sample of people for outcomes such as employment, working hours and earnings. The empirical analysis uses an Inverse Probability Weighted Regression Adjustment (IPWRA) method to balance the observed differences among treatment and comparison groups. Analysis adjusts for characteristics that are relevant to the outcome such as age, education, health limitations, and other socio-economic factors. The findings are taken as conditional associations since IPWRA can only deal with the selection of observed characteristics and cannot remove

unobservable bias from unobservable factors or reverse causality. Besides, the cross-sectional design of the LFS means that causal effects cannot be determined.

The study contributes to literature because it considers both marital status and gender together, at the same time, in relation to a series of labor market outcomes instead of just labor force participation. It also adds to the study by exploring the relationship between skill training and labor market outcomes, and the difference between government and private training for the skilled. The results can be used to offer evidence for policies that have a gender responsive approach to the labor market and for the design of skill development programs to enhance inclusive employment opportunities in Pakistan.

2. Literature Review

The marital status of the head of household can also be a factor in labor market outcomes as household responsibilities, social norms and roles may influence employment, hours worked and employment experience. This is especially significant in South Asian nations like Pakistan, where societal gender norms persist and influence women's economic engagement. Women's roles in the household and society can limit their access to the labor market, especially in the non-agricultural sector (World Bank, 2024; Nation, 2025). Moreover, there is also limited mobility, limited access to education and training, and lack of employment opportunities, which are further contributing to Pakistan's low rate of female labor force participation. The recent estimates state that female participation in the labor force is still significantly lower than male participation, representing around 22.9% of the total compared to approximately 80.4% for males (Trading Economics, 2024). Estimates derived from news outlets and data aggregators should however be used with caution and preferably substituted by official data on the labor market.

Theoretical and empirical labor economics has indicated that marriage has different impacts on men and women. Becker's framework of the household allocation of time suggests that people spend time on both paid and household production, and specialization of the household might affect labor supply (Becker, 1981). Marriage can then lead to a greater likelihood that men are more likely to be attached to employment when they see a higher need for financial help in the household, and women are less likely to be attached when they see an increase in domestic and care responsibilities. Similarly, Bianchi et al. (2012) highlight household responsibilities as an important factor determining women's employment decisions. Data from South Asia suggests that married women are more likely to be constrained in the labor market compared to single, divorced and widowed women, though it is not the only factor that determines labor market participation for women (Kabeer 2016). The results indicated that marital status needs to be analyzed separately for males and females and cannot be assumed to have the same impact in both groups.

Gender differences are also reflected in earnings and employment quality. These differences in wages and working conditions can be driven by traditional gender roles, unequal opportunities and institutions of the labor market. In most developing economies, women's employment continues to be largely concentrated in vulnerable and informal jobs, and weak employment protection and earnings are prevalent (Asian Development Bank, 2025b). Those differences indicate that there could be differences in working hours or wages between marital status and labor market outcomes as well. Hence, the relationship between gender and marital status is crucial as marriage can affect the labor market activity of men and women in different ways.

There is a related body of literature that looks at the impact of education and vocational training on employment and earnings. Vocational training can enhance the capabilities of workers and could even lead to higher employment levels, hours worked and income. However, training access does not have to be random (Kabeer, 2012). People in training may have different education, motivation, employment prospects, income, age or other attributes when compared to those who do not participate in training. As a result, comparing the pay of trained workers to the pay of untrained workers may yield misleading results

on the size of the payoff from training to labor market outcomes. While Chinen et al. (2017) conclude that women-focused trainings can enhance labor market outcomes, it is not clear that such trainings work under certain institutional and household circumstances.

A related strand of literature examines how education and vocational training influence employment and earnings. Vocational training can improve workers' skills and potentially increase their employability, working hours, and earnings. However, access to training is not necessarily random. Individuals who participate in training may differ from non-participants in education, motivation, employment prospects, income, age, or other characteristics. Consequently, simple comparisons between trained and untrained workers may produce biased estimates of the relationship between training and labor market outcomes. Chinen et al. (2017) find that women-oriented training programs can improve labor market outcomes, although the effectiveness of such programs may depend on institutional and household conditions.

Gender inequalities in access to skill development remain an important concern. Women may have fewer opportunities to obtain vocational skills, which can contribute to wage penalties and restricted career progression (World Bank, 2018). Limited access to childcare and supportive labor market institutions can further restrict women's ability to participate in employment and training (World Bank, 2025; Asian Development Bank, 2025a). These constraints are particularly relevant in Pakistan, where informal employment represents an important part of the labor market and women face institutional barriers, discriminatory practices, and limited access to better-quality employment (Asian Development Bank, 2025).

One important methodological problem in this literature is that of non-random sampling of people who are categorized as married and those who are trained. Those who have married, those who are not married, and those who have been trained, can systematically differ with respect to observable characteristics which can also affect employment, working hours, and wages. Propensity-score-based methods can decrease the difference in observed characteristics between the treatment and comparison groups, and doubly robust methods like Inverse Probability Weighted Regression Adjustment (IPWRA) incorporate both treatment-probability weighting and outcome regression. These approaches require certain assumptions, however: conditional independence of treatment and outcome given the observed covariates, adequate overlap in the treatment groups and correct specification of at least one of the models for the treatment or outcome. They can't rule out bias that is caused by unobserved attributes or causality in the opposite direction. Thus, estimates derived from cross-sectional data should be interpreted as adjusted associations, and not as causal effects.

Literature is rich with findings regarding gender differences in labor force participation, domestic labor and the importance of education and training. Nevertheless, there are still some lacunas in the Pakistani scenario. Most of the previous literature focuses on sex differences or the role of women in the labor force and does not pay special attention to marital status as a dimension of analysis separately. Relational patterns between marital status categories and working hours and wages are comparatively little studied and the relationship between working hours and wages by marital status is not evaluated for gender differences. Furthermore, the relationship between gender and marital status has been less well explored in accounting for gender gaps in labor market outcomes.

Another weakness is what role vocational training plays among the different marital categories. While the current literature has acknowledged the opportunity for skill development, there is a lack of research available that looks at whether training is related to improved working hours and earnings beyond the observable difference in the characteristics of participants and non-participants. There is also limited evidence of the differences in outcomes between government and private training providers. These gaps stimulate an integrated analysis of three related questions: the relationship between gender and marital status and employment and working hours and wages; the relationship between vocational

training and outcomes in the labor market after controlling observed characteristics; and the difference in outcomes between government and private training providers.

As such, the findings of the study are a contribution to the body of literature by coming together these dimensions with the help of micro-level evidence from Pakistan. It does not consider marriage, gender and training as separate problems, but instead explores how these are related to a variety of labor market outcomes, whilst acknowledging the distinction between observed relationships and causal effects. The analysis can offer more specific information about variations in labor market outcomes for marital and gender subgroups and about the benefits that might accrue from skill development to enhance labor market outcomes.

3. Methodology

3.1 Theoretical Background

This section provides a theoretical model and econometric approach to studying the impact of marital status, training, gender and training provider type on wage rates and working hours. It is organized into four sections which begin with a theoretical piece based on the human capital theory, which focuses on the value of education and training for improving productivity in the labor market. The chapter covers the impact of marital status and gender on labor participation and economic activity as well as the differences in the types of training (government vs private) in outcomes. To overcome the problem of selection bias, it uses a treatment effect model, which compares individuals who are trained and non-participants in different marital statuses and finds that labor supply and wage determination depends on different socio-demographic factors.

$$lworkhrs_i = f(MSgend_i, training_i, traingorg_i, X_i) \quad (1)$$

where $MSgend_i$, $training_i$, and $traingorg_i$ denotes:

marital status–gender interaction, training status, and type of training organization, respectively. The vector X_i includes relevant control variables such as age, education, marital status, gender, injury status, and logged wage. Expanding the functional form yields:

$$lworkhrs_i = \beta_0 + \beta_1 MSgend_i + \beta_2 training_i + \beta_3 traingorg_i + \beta_4 age_i + \beta_5 edu_i + \beta_6 MS_i + \beta_7 gend_i + \beta_8 injury_i + \beta_9 lwage_i + \varepsilon_i \quad (2)$$

Similarly, wage determination measured as the wage is influenced by demographic attributes, marital structure, training, and labor supply. The wage function is expressed as:

$$lwage_i = g(MSgend_i, training_i, traingorg_i, X_i) \quad (3)$$

which, in linear form, becomes:

$$lwage_i = \gamma_0 + \gamma_1 MSgend_i + \gamma_2 training_i + \gamma_3 traingorg_i + \gamma_4 age_i + \gamma_5 edu_i + \gamma_6 MS_i + \gamma_7 gend_i + \gamma_8 injury_i + \gamma_9 lworkhrs_i + \eta_i \quad (4)$$

Since individuals self-select into training and marital categories, treatment assignment must be modelled as a separate behavioral equation. Training participation or marital status category selection is expressed through:

$$T_i = h(Z_i) \quad (5)$$

where T_i denotes treatment and Z_i is the vector of observable characteristics that influence selection, including age, education, marital status, gender, injury, working hours, and wage. The corresponding logistic probability is given by:

$$Pr(T_i = 1) = \frac{e^{\alpha_0 + \alpha_1 age_i + \alpha_2 edu_i + \alpha_3 MS_i + \alpha_4 gend_i + \alpha_5 injury_i + \alpha_6 lworkhrs_i + \alpha_7 lwage_i}}{1 + e^{\alpha_0 + \alpha_1 age_i + \alpha_2 edu_i + \alpha_3 MS_i + \alpha_4 gend_i + \alpha_5 injury_i + \alpha_6 lworkhrs_i + \alpha_7 lwage_i}} \quad (6)$$

The combination of these equations demonstrates the impact of marital status, gender, participation in training and type of provider on working hours and wage outcomes in the human capital model but considering the importance of personal factors in the choice of treatment category.

3.2 Econometric Model

The Inverse Probability Weighted Regression Adjustment (IPWRA) estimator is desirable because it is a methodologically preferred estimator for the non-random variables like marital status, gender roles, and training participation that are influenced by socio-economic and demographic factors. The traditional models (OLS for example) do not address the problem of endogeneity or selection bias in the self-selected categories. IPWRA is doubly robust, it is simultaneously propensity score weighted and regression adjusted and hence can yield consistent estimates of treatment effects when one of the models is mis specified. In addition, IPWRA produces potential outcome means (POMs) and estimates like the Average Treatment Effect (ATE) and Average Treatment Effect on the Treated (ATET), which are important to understand and compare the outcomes of the labor market for different treatments.

This is particularly important in the case of Pakistan, where there are many factors affecting the labor market behavior which are socio-demographic in nature. The framework involves estimating treatment assignments using logistic regression and estimating treatment effects on outcomes using regression, without compromising on selection bias. IPWRA is considered methodologically sound and appropriate for the research of the interplay of training, marital status and gender in a non-experimental labor market setting.

3.3 Treatment Model

The treatment model identifies the probability of receiving training or belonging to a specific marital status category (e.g., $Msgend = 1$ for married females or married respondents). A logit model is estimated as follows:

$$T_i = \alpha_0 + \alpha_1 Z_i + u_i \quad (7)$$

Where:

- T_i = treatment variable (training, training provider, or marital status indicator)
- Z_i = vector of socio-demographic characteristics (age, education, gender, marital status, injury status, wage level, and working hours)
- u_i = error term

This model predicts the likelihood of training or marital status category, which is then used to generate the inverse probability weights.

3.4 Outcome Model

The outcome model estimates the impact of the treatment variable on labor market outcomes log of working hours ($lworkhrs$) and log of wage rate ($lwage$) while controlling for observable characteristics.

Two equations are estimated:

For working hours:

$$lworkhrs_i = \beta_0 + \beta_1 T_i + \beta_2 X_i + \varepsilon_i \quad (8)$$

For wage rate:

$$lwage_i = \gamma_0 + \gamma_1 T_i + \gamma_2 X_i + \eta_i \quad (9)$$

Where:

- X_i = age, education, gender, marital status, injury, and the relevant labor variable (wage or working hours).
- Treatment variable T_i includes
 - Marital status gender dummy (MSgend)
 - Training dummy (training)
 - Training provider dummy (traingorg)

3.5 Measures of Treatment Effects

The analysis computes three treatment effects:

1. Average Treatment Effect (ATE):

Difference in expected outcomes between treated and untreated individuals in the whole population.

2. Average Treatment Effect on the Treated (ATET):

Impact of treatment among those who actually received the treatment.

3. Potential Outcome Means (POM):

Counterfactual mean outcomes under each treatment state (treated vs. untreated). These measures allow comparison of working hours and wages across marital categories, training status, and provider type while addressing selection bias.

3.6 Data Source and Variable Description

In this study, the micro-level data from the Labor Force Survey (LFS) of Pakistan have been used which provides an all-embracing view of the employment situation like wage, hours of work and training information. This data can be used to analyze other factors, including gender/participation in vocational education, marital status and can be used to inform labor market behavior. An outcome indicator could be logged hours, logged wage income, and then logging the percentage of the outcomes in a standardized format for everyone to compare variance. The research builds upon the concepts of human capital theory and examines the interactions between marital status and gender dimensions by creating a combined variable called MSgend in analysis of the labor supply since the two dimensions are interlinked.

It also has a binary indicator to be trained for attendance, to differentiate whether the student is attending formal training or not, which is required for analyzing human capital formation. Furthermore, the effect of training providers (government versus non-government) on the outcomes of labor is studied. Control variables are included as in the case of omitted variable bias; variables which are known to impact causal relationships being examined. The multiple approach will be useful for empirical examination of the impact of marriage, gender and training on the dynamics of Pakistan's labor market, which will illuminate the success rate of labor market skill-building activities and their impact on different segments of the population. This model, therefore, incorporates as much as possible the best

practices and the research needs in relation to labor market outcomes associated with marriage and training.

3.7 Results

The section presents findings of the empirical study on the effects of marital status, gender, training participation, and training provider type on labor market outcomes in Pakistan, based on IPWRA estimator. Working hours and wage earnings (both logged) are key dependent variables examined relative to socio-demographic variables. These results also show that there are wide differences in the nature of the labor market depending on marriage and gender status, with married women reporting lower working hours because of domestic responsibilities, and married men reporting high attachment to the labor market, thus reiterating the role of the breadwinners. Econometric techniques such as the Average Treatment Effect (ATE), Average Treatment Effect on the Treated (ATET) and the Potential Outcome Means (POM) help to understand the structure of gendered differences in labor market performance regardless of differences in education, age and health. The research further indicates that formal education training is significantly associated with positive labor market outcomes, thereby supporting the human capital theory that links skill acquisition to labor market outcomes and productivity.

Additionally, the difference between public and private training providers highlights important differences, as government training will tend to be more for labor force participation among lower-income or marginalized groups, while private training will tend to be more market-oriented in terms of skill return. The need for 'one package' training approaches that combine accessibility and market-oriented training is emphasized. The variables included in the model are consistent with the relationships that are expected; age has an impact on working hours and wages, education has a positive effect, and gender shows continuing inequalities in favor of men, while marital status and health restrictions affect the supply of labor. The results collectively show that, the Pakistani labor market is influenced by a combination of demographic factors, skills formation and institutional provision.

Marriage and gender practices persist and have an impact on labor opportunities and productivity; training to meet market needs can provide routes to better economic engagement. The differences observed between training providers suggest that both access to and quality of training could have a significant effect on labor market outcomes, highlighting the importance of skill development and marital status in explaining differences in wage and working-hour outcomes in Pakistan.

3.7.1 Descriptive Analysis

To explore the impacts of marital status, gender, and training on labor market outcomes in Pakistan, this study conducts a detailed descriptive analysis of Labor Force Survey (LFS) data. It introduces major variables like demographic variables, human capital endowment and labor supply variables. The descriptive statistics are used for several analytical purposes such as identifying the characteristics of the data distribution, identifying possible bias and/or heterogeneity, and setting baseline patterns and trends for estimating causal effects by using Inverse Probability Weighted Regression Adjustment (IPWRA) models. The evaluation of means, standard deviations and ranges can be used to evaluate the representativeness of samples, and the extent of socioeconomic and gender differences in the labor market. This analysis reveals that considerable structural inequalities exist in Pakistan based on gender norms, marital status, and education and training, which has a significant impact on economic participation. The results of the analysis reveal several low points, such as low female labor force participation, low involvement in vocational training and significant wage differentials by demographic group that need to be considered in subsequent treatment effect analyses.

The survey carried out by Pakistan Bureau Statistics (PBS) is called Labor Force Survey (LFS) 2020-21, which is a national survey to gather data on employment, wage, working hours and training and socio-demographic indicators. To capture the dynamics of early labor market entry and working-age dynamics, people aged between 11 and 65 years were sampled in this study. This age bracket had about 96,500 people who comprised the total sample. Of them approximately 52,800 were males (54.7%) and

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approximately 43,700 were women (45.3%). The survey was done in all provinces and territories, above forty per cent of the total population stratified by random sampling (July 2020 - June 2021). After cleaning and retaining the full information of all the variables included in this study, the acquired sample for analysis was 42,850 individuals (see Table 1).

Table 1: Descriptive Analysis

Variable	Description	Obs.	Mean	Std. Dev.	Min	Max
lworkhrs	Log of weekly working hours	42,850	3.75	0.45	0.69	4.61
Lwage	Log of monthly wage (PKR)	42,850	8.12	0.78	5.01	12.21
Age	Age in years	42,850	34.2	12.5	15	65
Edu	Education level (0 = No formal, 4 = higher)	42,850	1.88	1.32	0	4
Gender	Gender (1 = Male, 0 = Female)	42,850	0.68	0.47	0	1
MS	Marital status (1 = Married, 0 = Other)	42,850	0.62	0.49	0	1
MSgend	Marital status-gender interaction (1 = Married Female)	42,850	0.21	0.41	0	1
Injury	Injury or health limitation (1 = Yes, 0 = No)	42,850	0.04	0.19	0	1
Training	Received training (1 = Yes, 0 = No)	42,850	0.15	0.36	0	1
Traingorg	Training provider (1 = Private, 0 = Govt)	6,428	0.32	0.47	0	1

An in-depth study of 42,850 working-age population in Pakistan shows that the average age of the labor force is 34.2 years, with a slight majority of the population being young. Gender imbalance is observable with 68% male and 32% female, highlighting sociocultural factors that prevent women from getting jobs. Around 62% of the respondents are married, while 21% are married women who are more constrained in their labor supply because of the role played in the households. The average level of education is 1.88, which is lower than secondary school, and there are significant regional and gender gaps. Average weekly working hours are 42.5 hours, with a skewed distribution of wages, with a log mean wage of 8.12, which corresponds to the monthly wage of approximately PKR 3,350.

Table 2: Demographic and Sociocultural Profile.

Survey Detail	Specification	Description / Values
Survey Name	Official Title	Labor Force Survey (LFS) 2020–21
Conducted By	Implementing Authority	Pakistan Bureau of Statistics (PBS)
Survey Period	Data Collection Timeline	July 2020 – June 2021
Age Range in This Study	Sample Restriction	11–65 years
Total Sample Size	Population Covered	Approximately 96,500 individuals (ages 11–65)
Gender Composition	Male Respondents	Approximately 52,800 individuals (54.7%)

Gender Composition	Female Respondents	Approximately 43,700 individuals (45.3%)
Analytical Sample	Final Estimation Sample	42,850 individuals with complete data on all variables
Key Variables Included	Labor Market Outcomes	Working hours, wage rate
	Demographic & Socioeconomic Controls	Age, education, gender, marital status
	Human Capital & Job Characteristics	Injury status, training participation, training provider type

Vocational training is only available to 15% of students, reflecting the general underdevelopment of Technical and Vocational Education and Training (TVET) that restricts productivity and wage mobility. A small proportion (4%) reported health problems affecting their work capacity. The figures highlight some important research questions about the impact of marriage and gender on economic activity as well as the lack of conditions to leverage skill development, more especially for women and marginalized groups, and the remaining inequalities in wages and working hours.

3.8 Discussion

The IPWRA estimator is used to examine how marital status, gender, training participation, and training provider type affect Pakistani labor market outcomes. Key findings show that married women work less hours due to household duties, while married men are more labor market attached. Human capital theory suggests that formal training improves employability and output. Private training yields greater wages, but government training boosts labor force participation, especially for underrepresented groups. Demographic considerations, skill acquisition, and institutional support shape labor market dynamics, underlining the need for integrated training frameworks that address access and quality in skill development to increase economic participation.

3.8.1 Marital Status and Log Working Hours

The negative Average Treatment Effect (ATE) of -0.029 on employment discussed in Table 3 suggests that married individuals experience fewer working hours than unmarried individuals (3.33 vs. 3.78 hours). When girls marry early, they are unable to use their time for employment because of domestic duties which limit their ability to progress in careers and contribute to the economy. The Average Treatment Effect on the Treated (ATET) was found to be positive (0.207), indicating that people who are not married would have worked more hours if they were married but not burdened by the early marriage effect. This analysis points to gendered inequalities that are systemic in who takes part in the labor market, and this can affect educational and career progression. The paper demands a policy change to solve these problems and highlights the need for considering marital time-lags in the labor market to encourage equal participation of the labor market.

Table 3: Impact Of Marital Status on Log Working Hours

	ATE	POmean	ATET	POmean
Coefficient	-0.029	3.79	0.207	3.33
Std. err	0.0086	0.0047	0.019	0.022
Z	-3.33	811.59	11.16	152
P> z 	0.001	<0.001	<0.001	<0.001

Table 4: Impact Of Marital Status on Log Wage Rate

	ATE	P0mean	ATET	P0mean
Coefficient	0.36	8.141	0.207	7.45
Std. err	0.085	0.0064	0.042	0.047
Z	4.33	1284.77	4.95	160.96
P> Z 	<0.001	<0.001	<0.001	<0.001

Married is the treated group in the treatment effect model in Table 4, which examines the effect of marital status on the log wage rate. The Average Treatment Effect (ATE) is 37% at statistically significant level of 1 per cent, indicating positive association between marriage and earnings, which implies a marriage premium. The potential mean wage for the untreated group (P0mean) is 8.141 with a high z-score (1284.77). The Average Treatment Effect on the Treated (ATET) is 0.207, which indicates that although married people earn more than unmarried people, their ATE is not as large as the ATET. It is suggested that this difference is due to the selection effect, that is, people who might earn more are more likely to marry.

3.8.2 Marital Status and Log Wage Rate

The counterfactual wage for married people (P0mean in ATET) is 7.45, which is considerably higher than the wage of the unmarried. Results show that there is a positive wage premium for marriage, which is affected by various factors such as intra-household specialization and employers' perception. But the results seem to be distorted when there are gender differences, as historical studies indicate higher premiums for males. Overall, the model highlights the importance of marital status in explaining wage determination, and impacts on economic outcomes could differ by gender and socioeconomic status.

Table 5: Impact of Training on Log Working Hours

	ATE	P0mean	ATET	P0mean
Coefficient	0.034	3.806	0.019	3.728
Std. err	0.00214	0.00178	0.0033	0.0066
Z	15.46	2143.49	5.95	567.81
P> Z 	<0.001	<0.001	<0.001	<0.001

Table 6: Impact of Training on Log Wage Rate

	ATE	P0mean	ATET	P0mean
Coefficient	-0.0091	8.146	0.0466	8.1639
Std. err	0.0088	0.00303	0.0027	0.0098
Z	-1.04	2689.23	17.45	833.59
P> Z 	0.298	<0.001	<0.001	<0.001

As shown in Table 5 the mean ATE is positive and statistically significant, suggesting that training has a positive effect on working hours for the participants. The average working hours between untrained and trained groups are 3.81 and 3.73 respectively, which makes the correlation between training and working hours positive. Training helps people develop their skills and knowledge and increases their

commitment to work, which helps them become more employable. The ATET value of 0.0193 also indicates that trained people would likely be employed less without any such programs. The training is especially useful for women who are constrained, such as those who are young and married, to return to the labor market, as these skill development programs play a critical role in increasing women's participation in the workforce.

3.8.3 Government and Private Trainings and Log Working Hours

The relationship between training and wages, an important aspect of employment quality, is presented in Table 7. The estimated Average Treatment Effect (ATE) is -0.0090 ($p = 0.298$), which is not significantly different between trained and untrained. The Average Treatment Effect on the Treated (ATET), however, is 0.0465 with a significant result ($p = 0.000$) meaning that it is concluded that trainees earn more than they would without training. This training is especially valuable for individuals involved with skill-building programs, as it affects wages for the quality, length and content of programs. All these can promote economic self-reliance for the individual, particularly women, which can benefit employability and access to better jobs. In this sense, a major factor influencing wages is the development of skills, especially among young people who are at risk of being affected by early marriage.

Table 7: Government and Private Training Impact on Log Working Hours

	ATE	POmean	ATET	POmean
Coefficient	0.0557	3.747	0.0528	3.611
Std. err	0.044	0.00496	0.0241	0.778
Z	1.29	755.66	2.19	46.44
P> Z 	0.197	<0.001	0.028	<0.001

Table 8: Government and Private Training Impact on Log Wage Rate

	ATE	POmean	ATET	POmean
Coefficient	-0.089	8.209	0.154	7.922
Std. err	0.062	0.0096	0.055	0.099
Z	-1.46	856.88	2.79	79.77
P> Z 	0.145	<0.001	0.005	<0.001

The findings of the government and/or private training programs analysis indicate a relatively small effect on the working hours of those with a health impact from early age marriage. The Average Treatment Effect (ATE) is 0.0558, suggesting that there is no significant difference between the working hours of trained and untrained groups ($p = 0.197$). The positive coefficient suggests, however, that training programs can improve labor involvement. The Potential outcome mean for the untrained group is 3.75 hours, and the trained group has a slightly lower mean of 3.61 hours, which means that there is a slight increase in working hours. The Average Treatment Effect on the Treated (ATET) is 0.0528 and statistically significant ($p = 0.028$) which is a positive effect of the training on the participants. Results suggest that skill development programs can help people, especially women who marry early, stay in the labor market: Government-led skill development programs provide access to a greater number of people

and skill development programs led by the private sector prioritize market-relevant skills and have a smaller impact on employment of women who marry early.

Table 8 looks at the impact of government and non-government training on wages. The Average Treatment Effect (ATE) is: -0.0890, which is not a large difference between the trained and untrained group as the result does not pass the significance threshold of $p = 0.145$. Despite this, the Average Treatment Effect on the Treated (ATET) is positive and significant (0.005): Training led to an increase in wages of around 0.15 log points compared to the wages that they would have realized if they had not received the training. The ATET is significant, indicating that training is a good tool to improve wage gains for the trained group, although there is not a significant difference in the average potential wage between the trained group and the untrained group (7.92 compared to 8.20). Training programs (both governmental and nongovernmental) do seem to have a positive effect on earning potential and job readiness, particularly for people from early marriages, which can be considered an empowering tool for women through the acquisition of skills and their contribution to economic autonomy and improved decision making in the household. So, long-term employment disadvantages can be reduced with structured training interventions even at the early age marriage context.

4. Conclusion and Policy Implications

The paper explores the relationship of gender roles, marital status and skill enhancement with the labor market outcome in Pakistan. It highlights the importance of social norms and the unequal access of human capital to influence labor market participation. The study attempts to correct the issue of selection bias by using data from the Labor Force Survey (LFS) and applying the Inverse Probability Weighted Regression Adjustment (IPWRA) estimator. The interaction variable Marital Status and Gender are one key treatment variables as well as attendance at vocational training and the type of training providers. The figures indicate that married women have many fewer hours of domestic work due to domestic duties than the unmarried women and married men. But working hours and wages are more beneficial to private training than government training. The results of this research emphasize the significance of policies which can eradicate gender barriers and improve access to the quality of training, socio-cultural factors and human capital investment are important for determining the labor market experiences in Pakistan.

A study conducted on labor supply in Pakistan highlights that marriage status and gender have played a crucial role in the working hours and economic contribution. The expectations associated with social norms and cultural attitudes about how much married women should work outside their house as compared to unmarried females are responsible for lesser number of working hours of married women. It has put women under double jeopardy and kept their economic activities limited irrespective of their capacities. However, the married men have long working hours in line with the conventional role of male breadwinners due to their cultural values. In this scenario, a divide in the labor force still exists according to gender, and men receive societal support for their economic roles. Programs aimed at training emerged to become an essential element of success in the labor market.

Those who undertook self-selected training were found to be working for longer hours and earning more money due to increased employability because of skill development through such training. These can address the limitations faced by women because of their early marriages and expectations from society and give them greater opportunities for gainful employment. Further, while the private ETIs can provide greater returns in terms of employment hours and employment wages on market-based grounds, training by the government can be more effective for enhancing women employment.

The results of the article clearly show that demography, socio-cultural norms, and institutional opportunities affect the performance of the labor market in Pakistan. Gendered marriage roles have become one of the major obstacles for women who want to take an active role in the labor market, since they are unable to utilize their abilities and skills for the sake of the labor market due to their family roles

and responsibilities within the community. On the other hand, the culture of breadwinner jobs makes men engage in overwork and perform numerous tasks. Participation in the work force and wage income could be improved dramatically through training programs, particularly among married women who are engaged in their domestic roles. This result of the research shows that positive training conditions facilitate the development of skills that eventually improve productivity and independence from external sources of financial security.

In order to facilitate skill development, training should be inclusive, realistic, and responsive to the needs of disadvantaged groups. Thus, the government-private training institution becomes an example of a "balanced approach" for the purpose of effectiveness and maximum availability. Equal chances for developing skills are provided by the government training program that addresses the needs of the disadvantaged groups; meanwhile, private institutions address the needs of the labor market. This result indicates a need for such policies to eliminate gender barriers, provide more opportunities for training and incorporate skill development into economic and employment policies.

Labor market performance and gender equity need to be improved through policy reforms.

- Training to be more flexible and gender responsive to the needs of women to attend to household and work needs. Flexible training programs, such as part-time or online courses, and modular training can optimize learning without sacrificing family responsibilities.
- Enhancing public-private partnerships will make training courses more relevant and accessible, by updating the courses, curricula and involving employers.
- Gender sensitive employment policies such as affordable childcare and flexible work arrangements will have a positive impact on the socio-cultural barriers and expand women's participation in the labor market.
- Training activities must be aligned with overall employment and gender equity programs with a particular emphasis on quality assurance, outcome monitoring and funding follow-up.
- Policymakers should link training to employment and mentoring to improved skills, wages, labor market outcomes.

This study's cross-sectional design and use of the Inverse Probability Weighted Regression Adjustment (IPWRA) approach, which may miss unmeasured biases, should be addressed in future research. Use longitudinal data to study employment trends, gender outcomes, and successful training programs with social factors. Gender-specific data could help create training programs for men and women. Assessing commercial and government training providers' effectiveness would help determine quality and long-term benefits. Future studies should consider childcare availability and socio-cultural aspects to address labor market inequalities, especially for disadvantaged groups.

Acknowledgment

The authors express gratitude to the respected referees, reviewers, and editors for their valuable feedback. Moreover, all remaining errors are our own.

Data Availability Statement

The datasets used and/or analyzed during the current study are available from the following sources:

- Labor Force Survey 2020-21

These datasets were utilized under standard access provisions, and derived data supporting the findings are available from the website.

Funding source

For this work, the author or authors did not receive any specific funding.

Conflict of Interests Disclosure Statement

According to the authors, there are no conflicting interests.

Ethical Approval:

There have been no ethical violations in this study.

Author Contributions:

Saira Habib: Conceptualization, Methodology, Data Curation, Software, Writing – original draft preparation, Writing – reviewing and editing.

Noor-us-Saba: Conceptualization, Software, Writing – reviewing and editing.

Zainab Parveen: Conceptualization, formal analysis, writing - reviewing and editing.

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