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**Can occupational skills explain the gender wage gap in a developing economy? An unconditional quintile regression approach**

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**Abstract:** There are many factors behind the persistent gender wage gap in a developing economy, such as gender discrimination, occupational segregation, social norms, and attitudes. To close the gender wage gap, it is mandatory to create gender-inclusive work environments, increase minimum wages and implement labour market regulations. The present study investigates the gender wage gap for four occupational groups based on skill levels as per ISCO-8 guidelines in case of a developing economy Pakistan. The study has utilized the latest available Labour Force Survey (2020-21) data and applied the Oaxaca–Blinder decompositions and unconditional quantile regressions. The empirical outcome described that women earn lower wages in low and average-skill occupations; however, in high and very-high skilled occupations, women are in advantageous positions. In addition, the empirical estimation elaborates the presence of glass ceiling effects in low, average and very high skill levels of occupations in case of a developing economy, Pakistan. To address the issue of the gender wage gap, governments, employers, and society must undertake a collective effort to achieve equal pay for equal work and provide adequate career opportunities in high skill occupations for women in developing economies.

**Key words:** Gender wage gap, skill levels, occupations, glass ceiling

**JEL classifications:** J08, J24, J31

## 1. Introduction

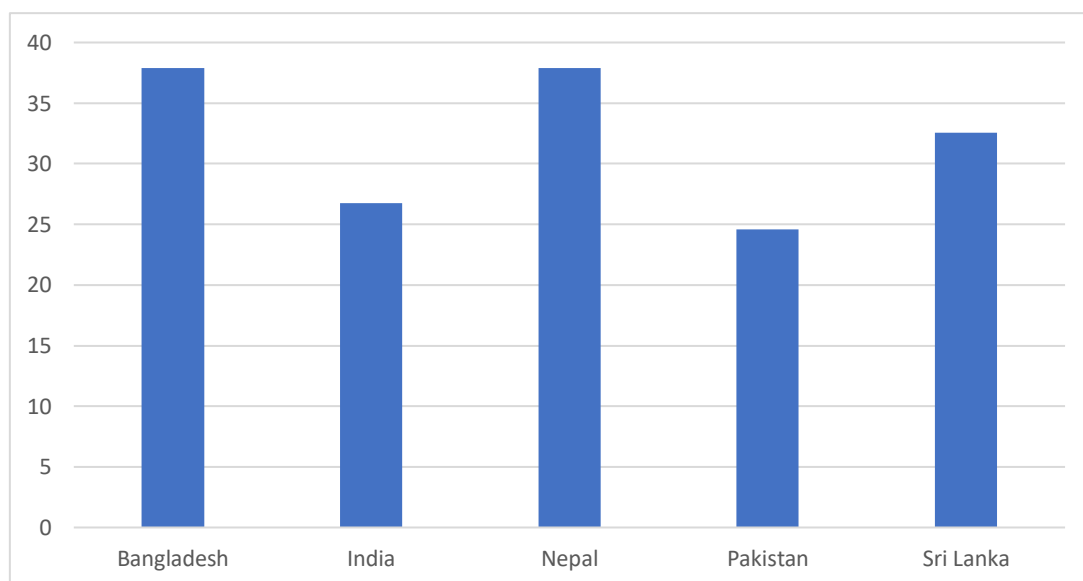
Globally, women earn 20 per cent less than men, and there are wide variations across economies (ILO Global Wage Report, 2019). The gender wage gap in the developing world is a significant concern due to its influence on social equity, human capital development, gender equality, policy governance and economic development. Therefore, addressing gender wage gap is crucial to promoting inclusive and sustainable economic growth, alleviating poverty, and attaining greater social justice (Gharehgozli and Atal, 2020). Besides eliminating the gender wage gap can have a substantial positive impact on economic prosperity. Women constitute a significant proportion of the labour force, and guaranteeing equitable remuneration enhances their productivity, agency and empowerment. Thus, closing the wage gap would enable more households to escape poverty, as women's earnings play a substantial role in the overall well-being of households (Iwasaki and Satogami, 2023).

In developing countries, many women are overrepresented in low-paying occupations and industries, such as retail, hospitality, and agriculture. These sectors typically hit the hardest during any economic contraction, leading to more job losses than men. In developing economies, most women work as part-time workers or hold temporary positions and are mostly in economic distress; these positions are often the first to be cut, impacting women's wages and employment (Bennedsen et al., 2023). In addition, in developing economies, the informal sector has a dominant share in employment where the wages are significantly lower, thus exacerbating the gender wage gap. The presence of strong social safety nets can lower the gender wage gap. However, weak social support systems in developing economies can exacerbate female workers' financial positions. Besides, effective policy measures such as childcare support, paid maternity leave, and equal pay legislation can be used as practical policy tools to encourage women workers to participate actively in the labour market and compete with their male counterparts (Wihardja and Pradana, 2024). Nonetheless, developing economies need more resources to implement these measures. Various shocks, such as the global financial crisis and COVID-19, also widened the gender wage gap in developing

economies, particularly in those sectors where a sizeable share of women is employed. The economic impact of the recent pandemic revealed the vulnerability of women's employment with significant job losses in women-dominated sectors (Lim and Zabek, 2024).

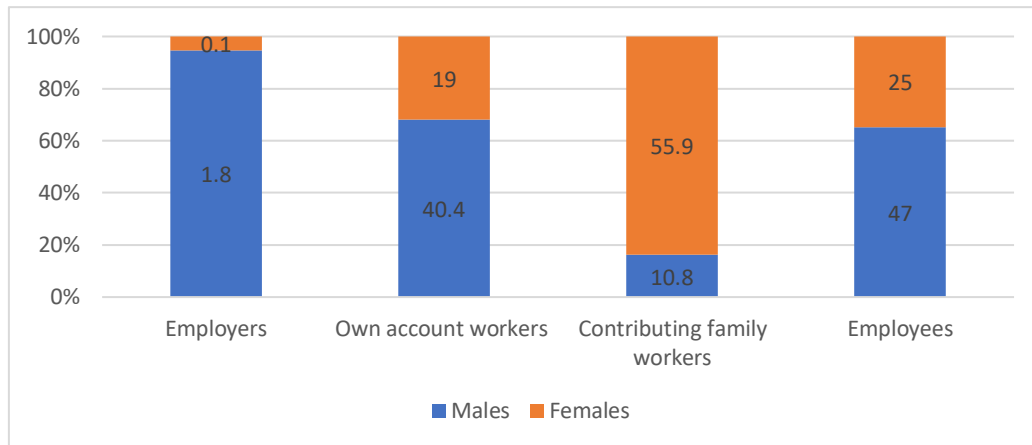
The gender wage gap in developing economies in general and Pakistan is a multifaceted issue determined by many economic, social and cultural factors (Yasmin et al., 2021). Women in Pakistan earn less than their male counterparts, and this gap varies across various sectors, particularly in the informal sector. Pakistan has the lowest female labour force participation rate in the South Asian region (Figure 1), and most of the women are either working in vulnerable employment or the informal sector, gender wage gap is more pervasive in these sectors as compared to the formal sector. There are many determinants of gender wage gap, including occupation segregation, difference in education attainments among males and females, gender discrimination, and employed in specific types of occupations, which are not well paid (Akram, 2022). Besides, motherhood also brings plenty of wages that can endure across a woman's working life. In addition, women have fewer preferences and opportunities in technical and vocational training. In addition, only 1 per cent of women work as employers, and this figure has stagnated for the last decade and more. A proportion (more than 70%) of women are engaged in vulnerable employment in Pakistan (Figure 2) (Labour Force Survey of Pakistan, 2020-2021).

**Figure 1: Female labour force participation rates in South Asian economies**



Source: World Development Indicators, the World Bank, 2021

**Figure 2: Distribution by Employment Status and Sex (%)**



Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

On the contrary, men dominate the well-paid and executive jobs in Pakistan. Furthermore, in a traditional society like Pakistan, deep-rooted patriarchal and cultural norms play a significant part in the gender wage gap. Due to these patriarchal values and cultural norms, women are not encouraged at the household level to pursue careers in well paid jobs (Andlib and Khan, 2018). Traditional roles mainly prioritise women's roles as caregivers and homemakers. Furthermore, women have to face various types of discrimination in hiring, promotion and increases in salaries. They have to face stereotypes and gender biasness that hinder their career advancement and rise in wages (Cheema et al., 2022).

Generally, skill is the ability to carry out the duties and tasks of a specified job. Besides, *skill level* is defined as “a function of the complexity and range of tasks and duties to be performed in an occupation”. In most cases, skill level is measured by taking into account the nature of the work performed in a given occupation about the characteristic tasks and duties defined for each ISCO-08 skill level or the level of formal education defined in terms of the International Standard Classification of Education (ISCED-97) (UNESCO, 1997) required for competent performance of the tasks and duties involved the amount of informal on-the-job training and/or previous experience in a related occupation necessary for competent performance of these tasks and duties. The International Labour Organization (ILO) and Pakistan Bureau of Statistics (PBS) have classified eight occupations into four skill levels namely, low skilled, average skilled, high skilled and very high skilled (we have discussed it in detail in the methodology section). Each skill level gives comprehensive information about the nature of jobs and associated tasks and the required levels of formal education. In this study, we want to probe which skill level has the highest gender gap. The present study intends to give detailed insights into gender wage gap in the case of a developing economy, and we will analyse four skill levels and examine which occupation group has the highest gender wage gap.

Based on previously mentioned scenario, our study will address few specific research questions. Does gender wage gap differ across different occupational groups based on skill levels? Does working in high skill occupation reduce or exacerbate the gender wage gap in case of developing economy, Pakistan? Does gender wage gap change along the distribution in different occupational groups based on skill levels?

For empirical analysis, the present research has taken the aid from the unconditional quantile regression method in an Oaxaca-Blinder type decomposition. In the ongoing research, we aim to evaluate the impact of various household and individual level factors on the gender wage gap at both the mean and entire wage distribution. We have taken Pakistan as a case study to examine this for various reasons. Primarily, Pakistan has the lowest female labour participation rate in the South Asian region (Figure 1), and females have to suffer from labour market disparities and discrimination on various career stages. In Pakistan, a vast majority of women is working in vulnerable employment, and those women who are well educated and in highly skilled jobs will have to suffer from different types of discrimination. Furthermore, the gender wage gap phenomenon holds significant importance in Pakistan, as evidenced by research conducted by Sabir and Aftab, (2007); Yasin et al., (2010); Yasmin et al., (2021) and Cheema et al., (2022). However, to our knowledge, this study is the first attempt to examine the gender wage gap in Pakistan using advanced econometrics techniques and considering four skill levels.

Pakistan is geographically divided into four provinces: Punjab, Sind, Khyber Pakhtunkhwa and Baluchistan. It is evident from the prior literature (Andlib and Khan, 2018) that labour market dynamics are different in these provinces as Punjab province is the most developed province among all provinces, whereas Balochistan and Khyber Pakhtunkhwa are relatively less developed in terms of provincial human development indicators. Therefore, inequality and duality in labour markets make Pakistan an interesting case study for the analysis at hand. The empirical outcomes of the study will not only provide policy insights for the Pakistani economy but are equally applicable to other developing nations. In the present study, we have used the latest available data from the Pakistan Labour Force Survey 2020-21. This nationally representative survey provides comprehensive information on the labour market dynamics. It has an additional advantage over other household surveys, i.e., the Pakistan Social and Living Standards Measurement (*PSLM*) survey, in that it has a detailed section on the employees' monthly wages. *PSLM* does not have this information.

The subsequent sections of the paper are organised in the following manner. Section 2 provides an overview of the prior literature on the gender wage gap and establishes our research interests. Section 3 presents an analysis of our employed data source and offers descriptive analysis. Section 4 provides a detailed description of our econometric approach. Section 5 illustrates the outcomes of the regression analysis. The final section, Section 6, has policy discussions based on our empirical outcomes.

## **2. Literature review**

In this section, we discuss the prior literature on gender wage gap for various economies, however our emphasis will be on the relevant literature for the developing economies.

Piazzalunga and Di Tommaso, (2019) have explored the issue of gender wage gap for the Italian economy. The study draws inferences from EU-SILC data for the time period 2004 to 2012 and uses Oaxaca-Blinder decomposition for the empirical analysis. According to the empirical outcomes, gender wage gap has increased between 2008 and 2010 along the entire quantile distribution in explained and unexplained components. However, it is observed that after 2010, gender wage gap increased among workers in the upper part of the wage distribution. Castagnetti and Giorgetti (2019) explained the presence of gender wage gap in Italy in the public and private sectors. The study utilised the fixed effect quantile regressions and inferred that gender wage gap decreased in both sectors. Nonetheless, the analysis found evidence of

the glass ceiling in the public sector. Gharehgozli and Atal (2020) have described the gender wage gap for the time period 1986 to 2016 for the USA and concluded that gender wage gap has moderately declined over the three decades. Sloane et al. (2021) explained that one of the significant reasons behind gender wage gap is that most women get educational degrees in those subjects/disciplines where there is a high possibility of getting lower wages than their male counterparts. Therefore, according to the study, selecting a major subject in their undergraduate and occupational sorting are two pertinent factors behind gender wage gap in the USA. Schirle (2015) used Canadian Labour Force Survey data (1997-2014) and revealed that all provinces have made progress towards a decline in the gender wage gap during the selected time periods. In addition, the unexplained component has been reduced in many regions.

Duraisamy and Duraisamy (2016) have discussed the presence of gender wage gap for the Indian economy and highlighted that gender wage gap has decreased in the selected time period, i.e., 1983-2012. In addition, the study found evidence of sticky floors than glass ceilings for all segments of the labour market. In another interesting study, Deshpande et al. (2018) supported the previously mentioned findings and illustrated that gender wage gap is higher at the lower quintiles. They also found evidence of sticky floors rather than glass ceilings in the Indian labour market. Poddar and Mukhopadhyay, (2019) explored gender wage gap for the Indian economy. The study has taken aid from the Blinder–Oaxaca decomposition methodology and Heckman two-step technique. According to the study's findings, women are discriminated in different jobs at the time of recruitment, especially in those occupations and industries where most employers are men. In addition, lack of relevant experience and low level of skills among women workers are two of the most prominent reasons for lower wages for women. Agrawal (2021) demonstrates that gender segregation in India is more pervasive in urban than rural areas. Most of the segregation seen in rural labour markets stems from educational attainment, while in urban markets, it is caused by an individual's vocational profile. The results of the wage decomposition analysis indicate that a significant portion of the gender wage gap may also be explained by education in rural areas. However, a significant portion of the pay disparity in rural and urban areas remains unexplained. Seneviratne (2020) has elucidated the gender wage gap for Sri Lanka and concluded that it has declined since the 1990 liberal reforms. However, the unexplained part is still higher than the explained part. High-skilled women who work in the public sector earn better than their male counterparts.

Ahmed and McGillivray (2015) analysed the gender wage gap for Bangladesh and highlighted that gender wage gap declined from 1999 to 2009, and this decrease is attributed to human capital endowment. Bjerger et al. (2021) assessed the impact of on-the-job training on the gender wage gap in Vietnam and concluded that on-the-job training is a pertinent factor in decreasing gender wage gap. However, the difference in gender wage gap is more pervasive between trained and untrained workers irrespective of their gender. However, not much difference in wages is observed between trained males and females. Cheng et al. (2020) explained the existence of the gender wage gap between rural and urban migrants in the case of China. The empirical outcomes elaborate that rural migrant workers are paid less than urban migrant workers. Overall, the gender wage gap is higher in public sector enterprises and among highly educated workers in Guangdong province. Yamamoto et al. (2019) highlighted that educated rural women workers face higher gender wage gaps than educated urban women workers in Nepal. Rahman and Al-Hasan (2021) explained the gender wage gap in the case of Bangladesh

and concluded that male workers work significantly more than female workers. The study also supported the presence of a glass ceiling and sectoral segmentation in the Bangladesh labour market. Siddiquee and Hossain (2018) also elucidated that gender wage gap is increased in Bangladesh in 2010. Besides, the gender wage gap is more persuasive at the lower end of the distribution than at the higher end. Rahman and Al-Hasan, (2019) used the Labour Force Survey data for 2016 and examined the gender wage gap in Bangladesh. The mean wage decomposition reveals that women are earning 12 per cent less than men. The reason behind this gender wage gap is that a sizeable proportion of employed workers are engaged in informal employment. Nonetheless, females who are working in formal sectors are earning higher wages than males at first few deciles and then at the higher deciles they face the wage plenty.

We have found a few interesting studies for the Pakistani economy in the prior literature. For instance, Aslam, (2009) has applied the OLS, two stage least square methods and households fixed effect methods and estimated gender wage gap by using the Pakistan Integrated Household Survey (2002) data. The study revealed that the education-earning profile is convex for women compared to men. In addition, as per the study's outcomes, the labour market outcomes are higher for men even though returns to education are higher for women. Yasmin et al. (2020) have concluded that schooling, region of residence and type of occupation are the most pertinent factors behind the gender wage gap in Pakistan. In addition, based on the empirical outcomes, the study concluded that gender wage gap is increased in the year 2018. Cheema et al. (2022) have used data from the Social and Living Standard Measurement Survey and highlighted that labour market discrimination is prevailing in the Pakistani labour market, thus exaggerating the gender wage gap. Malik and Akram (2024) have explored the factors behind the gender wage gap in the case of Pakistan. The study applied the ordered logit model and illustrated that there are many household and individual factors behind the gender wage gap, including marital status, education level, gender, age, and type of employment.

By having a glance on prior literature, we could not find any study for Pakistan, which examined gender wage gap for different occupation based on skill levels. Therefore, the present study will contribute in the existing literature on various grounds, it will assess the gender wage gap for workers who are working in low, average, high and very skill occupations and provide an in-depth analysis in case of a developing economy. It will also elaborate the presence of glass ceiling in various occupations. In addition, the study also highlights which household characteristics are more pervasive in explaining the gender wage gap in a developing economy.

### **3. Data and variables construction**

To examine the gender wage gap, we used data from Labour Force Survey (LFS) of Pakistan for the year 2020-2021. The survey is conducted by the government authority named, Pakistan Bureau of Statistics (PBS). It is a nationally representative survey and conducted at the provincial and district levels and offers the largest sample size and vast coverage on labour market indicators as compared to any other household survey in Pakistan and even as compared to any other round of LFS conducted in the previous years. The survey has the information on employment statuses, industry, occupations, wages, unemployment and underemployment. The LFS survey also collects information on individual characteristics from a large nationally representative population. It includes age, education, household size, migration, number of children, region, and province of residence. Furthermore, the LFS survey provides comprehensive detail information regarding competencies, duties, and job responsibilities per



International Labour Organisation (ILO) guidelines. Overall, the LFS examines the attributes of various occupations using a comprehensive and detailed questionnaire.

The first and foremost part of the present analysis is to identify the skill levels. ILO has given a comprehensive guideline in this regard. Following the ILO guidelines, PBS has published an extensive document that provides information on skill levels. As per these guidelines, nine occupations are divided into four groups concerning skills: skill level 1, skill level 2, skill level 3, and skill level 4. Occupation included in skill level 1 (low skills) involves simple and routine physical or manual tasks. These tasks mostly require knowledge of handheld tools, such as vacuum cleaners, electrical equipment, and shovels. Similarly, most of the functions included in this group required physical strength, such as cleaning, digging, picking fruit and vegetables, lifting and carrying materials by hand, and operating non-motorised vehicles. Basic education and short on-the-job training are required for some jobs in this category.

Occupations included in skill level 2 (average skills) involved the performance of various tasks such as operating electric equipment and operating machinery, repairing electrical and mechanical equipment, driving vehicles and ordering and storage information. The nature of the occupations shows that workers need the ability to read information, to read the instructions manual, and to perform simple calculations. However, few occupations in this category need relatively higher literacy levels and numeracy skills. Good interpersonal skills may serve as another advantage to performing better in these occupations. In addition, in most jobs, completing the first stage of secondary education is required (International Standard Classification of Education (ISCED), level 2). However, some jobs require the completion of the second stage of secondary education (ISCED level 3), which may need on-the-job training.

Occupations included in skill level 3 (high skills) mainly required to perform complex and technical tasks, and it also involved procedural knowledge in a specialised field. These occupations required higher education and interpersonal skills (ISCED-97 Level 5b). Besides, these occupations also need a high level of professional training. Skill 4 (very high skills) is the most competent category among all occupations, it mostly involves various tasks that require creativity and complex problem-solving techniques based on extensive theoretical and factual knowledge in a specialised discipline. This occupation required a higher level of education (ISCED-97 Level 5a or higher). These occupations include sales and marketing managers, civil engineers, secondary school teachers, medical practitioners, musicians, operating theatre nurses, and computer system analysts.

We have done the analysis for 15 to 60 years old workers, because above 60 is the retirement age in Pakistan. Moreover, we have dropped those individuals from LFS data set who are not working in any occupation or those who are not earning from any occupation. The total sample size for the individuals who are working and earning monthly wage is 66,140 out of which 58,257 are males and 7,883 are females. A detailed description of the variables under consideration is provided in Table 1.

**Table 1. The detailed description of the variables used in the empirical analysis**

Variable	Description
<b>Dependent variable</b>	
Log wages	Log of monthly wages
<b>Explanatory variables</b>	
Age	Age in completed years (15 to 60 years)
Urban	If the individual is residing in urban areas, rural is the reference category.
Punjab	If the individual is residing in Punjab province.
Sind	If the individual is residing in Sind province.
KP	If the individual is residing in KP province, Balochistan is the reference category.
Never married	If the individual is never married, ever married is the reference category.
Migrants	If the individual is migrated from rural to urban areas, native is the reference category.
Technical and vocational (T&V) training	If the individual is obtained T&V trainings, no training is the reference category.
Low education	If the individual has less than secondary level of education.
High education	If the individual has secondary and above level of education, no education is the reference category.
Average skills	If the individual is working as a clerical support worker or service and sales worker or skilled agricultural worker or craft and related trades worker or plant and machine operator, or assembler.
High skills	If the individual is working in technicians or associate professionals occupations.
Very high skills	If the individual is working in manager and professionals occupations, Elementary occupations (low skill level) is the reference category.
Formal	If the individual is working in formal sector.
Informal	If the individual is working in informal sector, agriculture sector is the reference category.
Household size	Household size.
Under 5	Number of under 5 children at home.

Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

### 3.1. Descriptive statistics

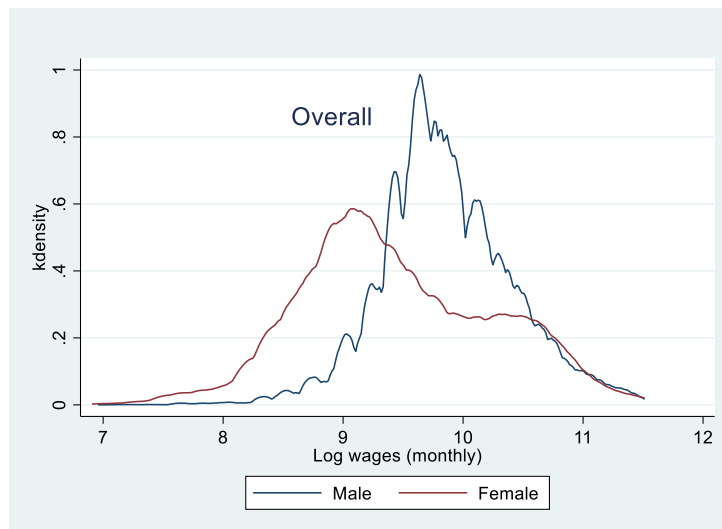
Pakistan has the lowest female labour force participation in the South Asian region, and the same fact is reflected in Table 2, where we have observed that a sizeable proportion of the employed workforce is comprised of males for the selected time period. However, it is indicated in Table 2 that a significant proportion of women are engaged in low skilled occupations or very high-skill occupations. Besides, mean wage is higher for men as compared to women workers in all skills. However, the difference is highest in the case of average skills, and is the lowest in the case of high-skill occupations. The mean wages for both genders are plotted in Figure 5.

**Table 2. Sample composition and mean wage by gender for the year 2020-2021**

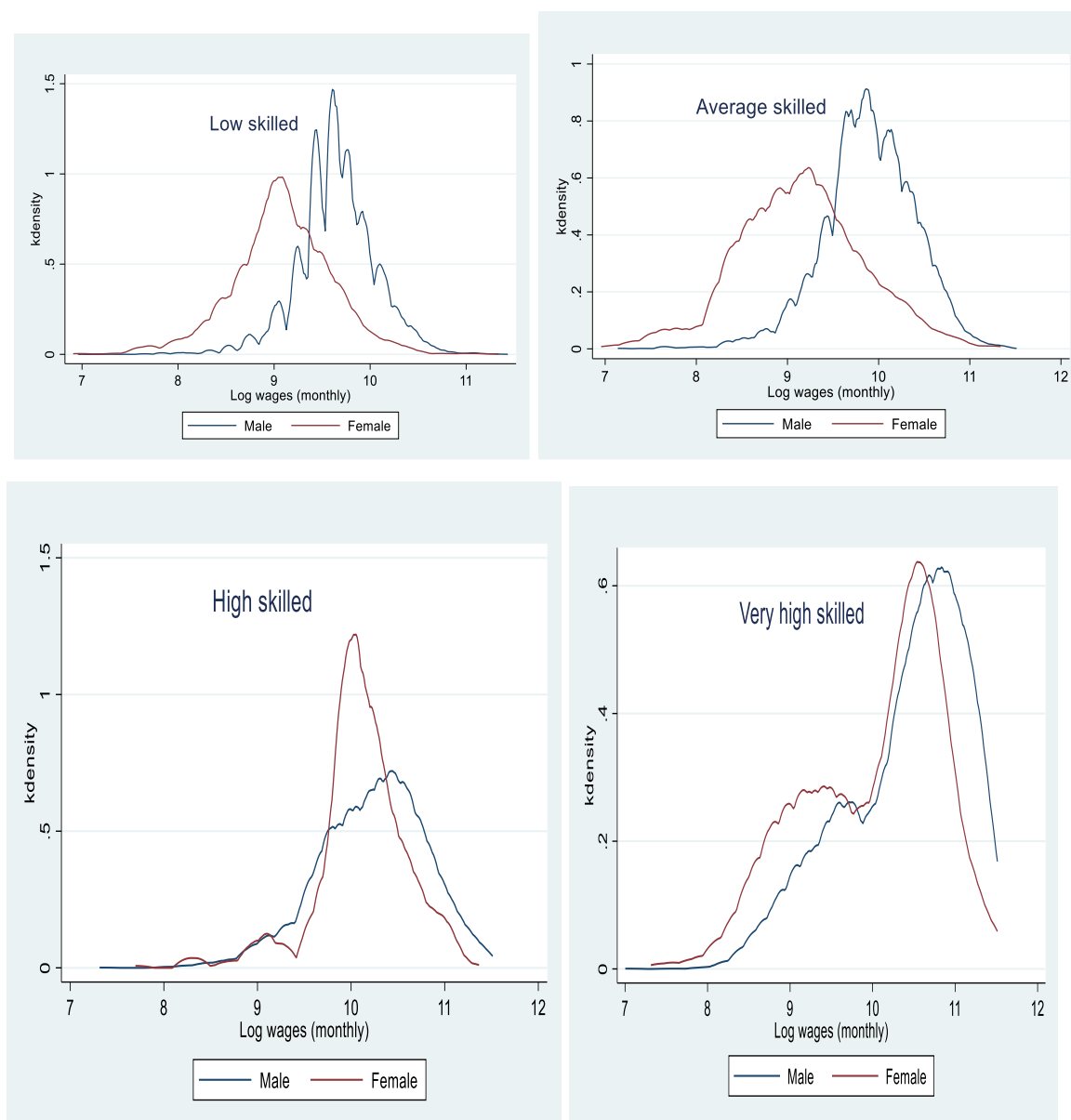
Gender	Sample composition		Log annual earnings	
	N	%	Mean	SD
Overall				
Male	58,257	88.08	9.85	0.55
Female	7,883	11.92	9.44	0.80
Total	66,140	100	9.80	0.60
Low skills				
Male	23,202	88.63	9.64	0.40
Female	2,977	11.37	9.08	0.51
Total	26,179	100	9.58	0.45
Average skills				
Male	26,535	92.93	9.89	0.51
Female	2,018	7.07	9.14	0.69
Total	28,553	100	9.83	0.55
High skills				
Male	3,251	86.26	10.23	0.57
Female	518	13.74	10.10	0.48
Total	3,769	100	10.21	0.56
Very high skills				
Male	5,269	68.97	10.39	0.74
Female	2,370	31.03	10.00	0.83
Total	7,639	100	10.27	0.79

Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

In Figure 3, we present the kernel estimates of the wage density for men and women workers for the year 2020-2021, whereas in Figure 4, we present the gender wage for four skill levels. The figures reveal that the wage distribution for males is shifted to the right of that of female workers.

**Figure 3: Wage distribution by gender – overall**

**Figure 4. Wage distribution by gender – skill levels**



Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

**Figure 5. Mean wages, overall and for various skill levels**



Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

**Table 3. Kolmogorov–Smirnov test**

	<b>Combined</b>	<b>Male</b>	<b>Female</b>
<b>Overall</b>			
KS2	0.369 (0.000)		
KS1		0.006 (0.521)	-0.369 (0.000)
<b>Low skills occupations</b>			
KS2	0.539 (0.000)		
KS1		0.005 (0.999)	-0.539 (0.000)
<b>Average skills occupations</b>			
KS2	0.537 (0.000)		
KS1		0.001 (0.999)	-0.537 (0.000)
<b>High skills occupations</b>			
KS2	0.189 (0.000)		
KS1		0.065 (0.023)	-0.189 (0.000)
<b>Very high skills occupations</b>			
KS2	0.209 (0.000)		
KS1		0.000 (1.00)	-0.209 (0.000)

Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

In addition, to complement Figures 3 and 4, the non-parametric Kolmogorov-Smirnov (K-S) test was employed to evaluate the distributions' uniformity accurately. The notion of applying this test is derived by measuring the most significant discrepancy in the empirical distribution functions for different skill levels.

More precisely, we utilise the one-sided (KS1) and two-sided Kolmogorov-Smirnov tests (KS2). The KS2 enables us to assess whether the two distributions are uniform, whereas the KS1 establishes if one distribution is superior. The findings from Table 3 demonstrate that the wage distributions for both genders are not the same for overall and various skill levels. Regarding the outcomes of the KS1, Table 3 indicates that the monthly wage distribution of male employees significantly and stochastically dominates the distribution reported by female employees for various skill levels.

We have presented the descriptive statistics for the explanatory variables in Table 4.

**Table 4. Descriptive statistics of the explanatory variables included in the analysis**

Variables	Overall		Low skilled occupations		Average skilled occupations		High skilled occupations		Very high skilled occupations	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	32.941	11.149	31.927	11.283	32.840	11.088	35.392	10.664	35.585	10.523
Urban	0.314	0.464	0.200	0.400	0.372	0.483	0.450	0.498	0.422	0.494
Rural	0.686	0.464	0.800	0.400	0.628	0.483	0.550	0.498	0.578	0.494
Punjab	0.441	0.497	0.437	0.496	0.446	0.497	0.424	0.494	0.445	0.497
Sind	0.269	0.443	0.286	0.452	0.263	0.440	0.282	0.450	0.224	0.417
KP	0.176	0.381	0.172	0.378	0.170	0.375	0.171	0.376	0.215	0.411
Balochistan	0.114	0.318	0.105	0.306	0.121	0.326	0.124	0.329	0.116	0.320
Never married	0.274	0.446	0.283	0.450	0.283	0.450	0.224	0.417	0.234	0.423
Ever married	0.726	0.446	0.717	0.450	0.717	0.450	0.776	0.417	0.766	0.423
Migrants	0.083	0.275	0.074	0.262	0.081	0.273	0.089	0.285	0.113	0.316
Natives	0.917	0.275	0.926	0.262	0.919	0.273	0.911	0.285	0.887	0.316
No Technical and vocational (T&V) training	0.828	0.377	0.957	0.204	0.699	0.459	0.788	0.409	0.890	0.312
T&V trainings	0.172	0.377	0.043	0.204	0.301	0.459	0.212	0.409	0.110	0.312
No education	0.335	0.472	0.539	0.499	0.274	0.446	0.042	0.201	0.010	0.097
Low education	0.462	0.499	0.427	0.495	0.583	0.493	0.415	0.493	0.151	0.358
High education	0.203	0.402	0.035	0.183	0.143	0.350	0.543	0.498	0.840	0.367
Low skills	0.396	0.489	-	-	-	-	-	-	-	-
Average skills	0.432	0.495	-	-	-	-	-	-	-	-
High skills	0.057	0.232	-	-	-	-	-	-	-	-
Very high skills	0.115	0.320	-	-	-	-	-	-	-	-
Agriculture	0.099	0.299	0.234	0.423	0.013	0.113	0.016	0.124	0.001	0.026
Formal	0.355	0.479	0.187	0.390	0.346	0.476	0.743	0.437	0.773	0.419
Informal	0.546	0.498	0.580	0.494	0.641	0.480	0.241	0.428	0.226	0.418
Household size	6.650	3.340	6.580	3.214	6.702	3.357	6.648	3.421	6.694	3.638
Under 5	0.884	1.163	0.909	1.135	0.878	1.159	0.825	1.143	0.851	1.272
N	66,140		26,179		28,553		3,769		7,639	

Source: Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan

#### 4. Methods

The decomposition technique suggested by Oaxaca (1973) and Blinder (1973) is widely recognised for examining discriminatory attitudes in the labour market. It enables the study of the difference in the average earnings of two groups (such as natives and migrants or males and females) into a segment that is influenced by explanatory factors or endowments (referred to as the "explained effect") and one elucidated by the differences in the group coefficients (referred to as the "unexplained effect"). Nevertheless, the technique depends on the assumption of linearity (Firpo et al., 2018) and exclusively permits an average estimate. This study utilises Unconditional quantum regressions (UQRs) of recent influence Functions (RIFs) to achieve a comprehensive decomposition beyond the mean, similar to the Oaxaca-Blinder method (Firpo et al., 2018).

Compared to the conventional quantile regression approach devised by Koenker and Bassett (1978), this approach can figure out the impacts on the distribution of an outcome variable that is not influenced by the variables included in the model (Fortin et al., 2011). Therefore, we can directly compare income disparities between males and females at various quantiles on the distribution without enforcing a path dependence in the wage gap estimation (Gaeta et al., 2018).

Furthermore, by employing the approach suggested by Firpo et al. (2009), the study incorporates pertinent covariates into the model without modifying the explication of the estimated coefficients on the distributional statistic, i.e., the average or a quantile.

The previously mentioned UQR approach is taken into account in the calculation of the RIF, which is explained as follows:

$$rif(x; u, G) = u(G) + if(x, u, G) = u(G) + \lim_{t \downarrow 0} \frac{u((1-t)G + t\Delta_x) - u(G)}{t}$$

In the above expression,  $G$  is the distribution function for the dependent or outcome variable, which is represented by  $x$  here, that is, the logarithm of monthly wages, whereas  $u(G)$  denotes a distributional statistic. In addition to this,  $if(x, u, G)$  is called the influential function (Hampel, 1974). Firpo et al. (2009) demonstrated that first, we would calculate the values of  $f(x, u, \text{and } G)$  for all observations. The influence of additional or marginal change in the distribution of our variable (gender) of interest on distributional statistic  $u(G)$  can be evaluated through the ordinary least square method. The main advantage of using the UQR technique is that it considers the economic and demographic characteristics of individuals, which are different for male and female employees, and this difference can bring a potential bias in marginal effects. In this study, we have regressed RIFs on our variable of interest and other included variables, (age, education, marital status, migrated or native, household size, children, highly skilled occupations, region and provinces). We have included occupational skill levels to control skill heterogeneity, and the same notion was put forward by Leonida et al. (2020). In the prior literature, the resultant influence on wage distribution statistics is identified as "counterfactual effect" or "unconditional partial effect" or "policy effect" (Rothe, 2010; Gallo and Pagliacci, 2020). In the last stage, similar to the conventional Oaxaca-Blinder decomposition, the gender wage gap is divided into an endowment component and a coefficients component. We apply the same approach for various skill levels.

## 5. Results and discussions

In Table 5 we have estimated the average gender wage gap for the year 2021 and also for various occupational groups, based on skill levels. The gender wage gap is decomposed between the explained and unexplained components. The gender wage gap is significant and negative (in favour of women) for the year 2021. The explained component represents -21 percent of the total gender wage gap, while most of the gender wage gap is reflected by the unexplained component which indicates some type of discrimination in the Pakistani labour market.

**Table 5. Estimates and decomposition of average gender wage gap**

Overall/skill levels	Difference	Explained	%	Unexplained	%
Overall	0.404***	-0.088***	-21.782	0.492***	121.782
Low skilled	0.576***	0.058***	10.069	0.518***	89.931
Average skilled	0.716***	0.083***	11.592	0.633***	88.408
High skilled	0.144***	-0.051***	-35.417	0.194***	134.722
Very high skilled	0.452***	0.057***	12.611	0.395***	87.389

Source: Labour Force Survey 2020-21, Pakistan Bureau of Statistics, the Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

We have divided occupations with respect to skill levels. We have observed that the gender wage gap is the highest for the workers who are engaged in high skilled occupations but interestingly it is in favour of women workers. But on the other hand, the empirical analysis reveals the incidence of the highest discrimination in these occupations.

Table 6 presents the average gender wage gap decomposing into explained and unexplained components for the year 2021. We have inferred from the empirical outcomes that estimated gender wage gap is significantly negative at mean and 0.80 and 0.90 quantiles. The negative explained component describes that the gender wage gap is in favour of women in Pakistan. However, it is not significant at all quintiles, and most of the gender wage gap is related to unexplained components, i.e., some discrimination in the case of a selected developing economy. In developing economies, discrimination is prevalent in almost all sectors of the labour markets. In most cases, women are not given equal preferences in the hiring process; men are always preferred for highly-paid jobs. It is commonly perceived in traditional societies that women cannot perform well at executive positions. Besides, the discrimination is reflected through different channels, for instance, wage disparities, i.e., women are paid less for the same positions and jobs. In addition, women are not given equal preferences to get promotions in various occupations compared to their male counterparts. This situation is commonly referred to as the glass ceiling effects in the labour economics literature. Besides, women are disproportionately represented in specific jobs and occupations, for example, teaching or nursing (occupation segregation). Since women face discrimination in hiring processes, which in turn limit them to avail opportunities to apply and avail highly paid jobs. Furthermore, our empirical results also provide the evidence of glass ceiling effects, i.e., the gender wage gap at 0.90 quintile is greater than the gender wage gap at median quintile (0.50) .

On the same lines, to examine the gender wage gap for various groups of occupations, we have divided our overall sample by skill levels and estimated the gender wage gap for these groups



of occupations. As mentioned previously, we have divided ISCO's nine occupations (ISCO) into four skill levels, i.e., low skills, average skills, high skills and very high skills occupations.

First, we discuss the gender wage gap for workers who work in low-skilled occupations (Table 7). We have observed an interesting pattern here: at mean, the gender wage gap is positive and in favour of men; however, on all quintiles, the gender wage gap is negative and in favour of women, but it is only significant at higher quintiles. In addition, a large part of the gender wage gap is coming from the unexplained part, which means that discrimination is prevalent in low-skilled occupations. The gender wage gap is higher at the higher quintiles, which reflects the glass ceiling; women are excluded from top positions.

Table 8 depicts the gender wage gap estimations for average skilled workers. The results differ from those of a previously mentioned category, i.e., low-skilled workers. We have observed from the empirical estimations that the explained component is positive and highly significant not only on the mean but also on all quintiles; it means men are earning more than women workers in average skilled occupations, in a developing economy, Pakistan. However, most of the gender gap is attributed to the unexplained part, which again reveals the discrimination.

In Table 9 we have estimated the gender wage gap for high skilled workers as well. The analysis depicts that the gender wage gap favours women till 0.70 quintiles, but at 0.80 and 0.90 quintiles, gender wage gap is positive and shows that men are earning more than women workers. However, the results show the presence of discrimination here as well. After that, we have estimated gender wage gap for very high skilled occupations and observed from Table 10 that at mean gender wage gap's estimates illustrate that male are earning more than female employees. Nonetheless, the quintile regression provides evidence of the opposite scenario where females are earning better than their male counterparts. We inferred from our empirical analysis that women are earning better and higher wages in high and very high skilled occupations as compared to lower and average skilled occupations.

Our empirical estimates for various occupations based on skill levels, also provide evidences for sticky floor (gender wage gap at 0.10 quintile is higher than gender wage gap at median 0.50 quintile) and glass ceiling (gender wage gap at 0.90 quintile is higher than gender wage gap at median 0.50 quintile). According to empirical estimation, individuals who are working in low, average and very high skill occupations are facing the glass ceiling effects. The findings of the study are in line with the prior literature, for instance, Biagetti and Scicchitano (2011), Scicchitano, (2012), Christofides et al., (2013) and Said et al., (2022) and Bonacini et al., (2024).

**Table 6. Full estimates of the gender wage gap at the mean and along the distribution (total sample of employees for the year 2020-2021)**

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
<b>Overall</b>										
Male	9.888***	7.745***	8.005***	8.107***	8.258***	8.350***	8.389***	8.427***	8.445***	8.532***
Female	9.485***	7.037***	7.231***	7.385***	7.474***	7.527***	7.605***	7.624***	7.642***	7.654***
Difference	0.404***	0.708***	0.774***	0.722***	0.784***	0.823***	0.783	0.804***	0.803***	0.878***
Explained	-0.088***	0.011	-0.041	-0.024	-0.033	-0.003	-0.003	-0.003	-0.026**	-0.020**
Unexplained	0.492***	0.697***	0.814***	0.745***	0.817***	0.826***	0.787***	0.807***	0.829***	0.899***
<b>Explained</b>										
Age	0.002*	0.001	0.002	0.003	0.002	0.001	0.001	0.001	0.002	0.001
Urban	0.002***	0.003*	0.004*	0.005	0.004	0.002	0.002	0.002	0.000	0.000
Punjab	0.019***	0.016***	0.001	0.017	0.023	0.003	0.003	0.003	-0.001	-0.002
Sind	-0.011***	-0.007**	-0.007	-0.015	-0.017*	-0.008**	-0.008**	-0.008**	-0.008	-0.005
KP	-0.005***	0.000	0.003	0.000	-0.001	-0.002	-0.002	-0.002	0.001	0.000
Never married	-0.004***	-0.005**	-0.012***	0.026***	0.026***	0.010***	0.010***	0.010***	0.018***	0.010***
Migrants	-0.004***	-0.005***	-0.007*	-0.012*	-0.008	-0.003	-0.003	-0.003	-0.006	-0.003
Technical and vocational training	-0.002***	0.001	0.003	0.004	0.005*	0.002	0.002	0.002	0.007**	0.003**
Low education	0.023***	0.017	0.028	0.025	0.021	0.007	0.007	0.007	0.005	0.002
High education	-0.063***	-0.013	-0.018	-0.024	-0.037*	-0.021**	-0.021**	-0.021**	-	-
Average skills	0.019***	-0.034**	-0.043**	-0.054**	-0.027	-0.019**	-0.019**	-0.019**	0.039***	0.023***
High skills	0.000***	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Very high skills	-0.066***	0.043**	0.032	0.063**	0.045	0.048***	0.048***	0.048***	0.089***	0.051***
Formal	-0.010***	-0.002	-0.003***	0.015***	-0.011**	-0.006**	-0.006**	0.006***	0.010***	0.005***
Informal	0.011***	-0.005	-0.027	0.007	-0.003	0.004	0.004	0.004	0.000	-0.002
Household size	0.000***	0.000	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001
Under 5	0.000	0.001	0.003	0.001	0.001	0.000	0.000	0.000	0.001	0.001
<b>Unexplained</b>										
Age	-0.039	-0.648	-0.387	-0.354	-0.232	-0.375**	-0.112	-0.112	0.050	-0.112
Urban	-0.018***	0.185	0.151	0.083	0.050	0.029	0.019	0.019	-0.001	-0.004
Punjab	0.111***	0.070	0.119	0.133	0.085	0.170***	0.115***	0.115***	0.135**	0.153***
Sind	0.013*	-0.026	-0.025	-0.014	-0.019	0.001	-0.006	-0.006	-0.006	0.007
KP	0.012**	0.001	0.006	0.020	0.015	0.013*	0.013*	0.013*	0.017*	0.016**
Never married	-0.004	-0.013	-0.069	0.172***	0.168***	0.068***	0.055***	0.055***	0.104***	0.049***
Migrants	0.005	-0.029	-0.001	0.019	0.010	-0.001	0.003	0.003	0.009	0.007
Technical and vocational trainings	0.017***	0.088	0.026	0.024	-0.007	0.020	0.008	0.008	-0.037	-0.021
Low education	-0.011*	-0.189	-0.050	-0.077	-0.049	-0.060	-0.033	-0.033	-0.035	-0.030
High education	-0.055***	-0.327	-0.117	-0.140	-0.124	-0.161*	-0.097**	-0.097**	-0.042	-0.074*
Average skills	-0.005	0.010	-0.084	-0.015	0.000	0.009	0.031	0.031	0.011	-0.015
High skills	-0.007**	0.012	-0.011	-0.008	0.004	0.006	0.006	0.006	0.002	-0.002
Very high skills	0.048***	0.047	-0.086	-0.049	0.042	0.038	0.030	0.030	-0.029	-0.005
Formal	-0.022	0.144	0.169***	0.341***	0.242	0.168***	0.104***	0.104***	0.164***	0.139***
Informal	0.127***	0.135	0.122	0.210**	0.147***	0.171***	0.073***	0.073**	0.059	0.118***
Household size	0.028	0.462*	0.378*	0.161	0.025***	0.108	0.057	0.057	0.047	0.055
Under 5	-0.017***	-0.107	-0.091	-0.076	-0.045	-0.050	-0.032*	-0.032**	-0.030	-0.029**
Constant	0.309***	0.881**	0.767***	0.659***	0.841***	0.808***	0.663***	0.683***	0.618***	0.745***

Source: Labour Force Survey, 2020-2021, Pakistan Bureau of Statistics, Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

**Table 7. Full estimates of the gender wage gap at the mean and along the distribution (employees in low skilled occupations – elementary occupations)**

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
<b>Overall</b>										
Male	9.664***	7.874***	8.038***	8.122***	8.171***	8.355***	8.406***	8.443***	8.533***	8.532***
Female	9.089***	7.067***	7.366***	7.604***	7.619***	7.634***	7.649***	7.664***	7.631***	7.662***
Difference	0.576***	0.807***	0.672***	0.518***	0.553***	0.721***	0.757***	0.779***	0.902***	0.871***
Explained	0.058***	-0.016	-0.268	-0.023	-0.023	-0.023	-0.023	-0.023	-0.053**	-0.056**
Unexplained	0.518***	0.823***	0.940***	0.541***	0.576***	0.744***	0.780***	0.802***	0.955***	0.926***
<b>Explained</b>										
Age	-0.003	-0.041	-0.087*	-0.007*	-0.007*	-0.007*	-0.007*	-0.007*	-0.014**	-0.011*
Urban	-0.002	-0.004	-0.006	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001
Punjab	0.119***	0.056	0.184*	0.015*	0.015*	0.015*	0.015*	0.015*	0.033*	0.035**
Sind	-0.023**	-0.007	-0.022	-0.001	-0.001	-0.001	-0.001	-0.001	-0.005	-0.005
KP	-0.048**	0.027	0.016	-0.009	-0.009	-0.009	-0.009	-0.009	-0.013	-0.015
Never married	-0.004	0.061	0.090	0.010	0.010	0.010	0.010	0.010	0.013	0.011
Migrants	-0.004	-0.020	-0.001	-0.002	-0.002	-0.002	-0.002	-0.002	-0.001	0.004
Technical and vocational training	0.000	-0.003	-0.012*	0.000	0.000	0.000	0.000	0.000	-0.001	-0.002
Low education	0.019**	0.050	-0.196	-0.014	-0.014	-0.014	-0.014	-0.014	-0.003	-0.019
High education	-0.007	0.003	0.000	0.001	0.001	0.001	0.001	0.001	0.003	0.002
Formal	0.033***	-0.026	-0.016*	0.001*	0.001	0.001	0.001	0.001	-0.005*	-0.002
Informal	-	0.024***	-0.102	-0.219	-0.017	-0.017*	-0.017*	-0.017*	-	-
Household size	-0.001	-0.015	-0.036	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.003
Under 5	0.001	0.007	0.036	0.004***	0.004**	0.004**	0.004**	0.004**	0.003	0.003
<b>Unexplained</b>										
Age	0.089**	-0.600	-1.236*	-0.170	-0.292	-0.118	-0.118	-0.013	-0.179**	-0.110
Urban	-0.007	-0.085	-0.092	-0.001	-0.031	-0.013	-0.013	0.001	-0.022	-0.013
Punjab	0.233***	0.156	0.498*	0.083	0.037	0.091	0.091	0.086	0.097**	0.115**
Sind	0.097*	0.045	0.150	0.006	0.030	0.036	0.036	0.024	0.040	0.039
KP	0.054	-0.032	0.009	0.036	0.072	0.050**	0.050**	0.046	0.029	0.039**
Never married	-0.010	-0.168*	-0.244	0.136***	0.235***	0.097***	0.097***	0.099***	0.058***	0.070***
Migrants	0.001	-0.006	0.009	0.013**	0.010	0.002	0.002	-0.001	0.000	0.004
Technical and vocational training	0.001	-0.004	-0.028	-0.005	-0.011	-0.004	-0.004	-0.018	-0.010	-0.012
Low education	0.011	-0.014	0.411	0.105**	0.164**	0.077**	0.077**	0.085*	0.023	0.070
High education	0.015*	-0.016	-0.014	-0.010	-0.010	-0.003	-0.003	0.000	-0.003	0.000
Formal	-0.005	0.067	0.037	0.058**	0.100**	0.056***	0.056***	0.067**	0.035***	0.029***
Informal	0.136***	0.309***	0.586	0.111	0.118	0.137**	0.137**	0.159**	0.208***	0.223***
Household size	0.000	0.335	0.839	0.002	-0.222	-0.013	-0.013	0.005	0.054	0.033
Under 5	-0.010	-0.029	-0.219*	-0.038	-0.048	-0.039	-0.039	-0.048	-0.029	-0.036

Constant	-0.087	0.864	0.234	0.488**	0.892**	0.580***	0.617***	0.509**	0.769***	0.618***
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Source: Labour Force Survey, 2020-2021, Pakistan Bureau of Statistics, Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

**Table 8. Full estimates of the gender wage gap at the mean and along the distribution (employees in average skilled occupations – clerical support workers, service and sales workers, skilled agricultural workers, craft and related trades workers, plant and machine operators, and assemblers)**

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
<b>Overall</b>										
Male	9.887***	7.679***	7.799***	8.035***	8.175***	8.305***	8.358***	8.389***	8.419***	8.450***
Female	9.171***	7.010***	7.063***	7.146***	7.187***	7.228***	7.269***	7.315***	7.434***	7.451***
Difference	0.716***	0.669***	0.735***	0.889***	0.988***	1.077***	1.089***	1.074***	0.985***	0.999***
Explained	0.083***	0.062***	0.208***	0.149***	0.227***	0.062***	0.044***	0.044***	0.044***	0.044***
Unexplained	0.633***	0.607***	0.528***	0.740***	0.760***	1.015***	1.045***	1.030***	0.941***	0.954***
<b>Explained</b>										
Age	0.009***	0.007**	0.026***	0.018***	0.027***	0.007***	0.006***	0.006***	0.006***	0.006***
Urban	0.001**	0.008*	0.016	0.013	0.019	0.007***	0.006**	0.006**	0.006**	0.006**
Punjab	0.014***	0.009**	0.019	0.011	0.027**	0.007**	0.005**	0.005**	0.005**	0.005**
Sind	-0.004**	-0.002	-0.011	-0.005	-0.010*	-0.004*	-0.004*	-0.004*	-0.004*	-0.004*
KP	-0.006***	0.001	-0.002	-0.001	-0.009	-0.005	-0.009***	0.009***	0.009***	0.009***
Never married	-0.006***	-0.006**	0.037***	0.023***	0.050***	0.015***	0.014***	0.014***	0.014***	0.014***
Migrants	-0.002***	-0.003**	0.020***	-0.004	-0.006	-0.001	0.000	0.000	0.000	0.000
Technical and vocational trainings	-0.014***	0.011	0.053	0.043	0.080	0.027	0.018	0.018	0.018	0.018
Low education	0.017***	0.010	0.018	0.004	-0.010	-0.004	-0.004	-0.004	-0.004	-0.004
High education	0.020***	0.005	0.026**	0.010	0.009	0.004	0.004	0.004	0.004	0.004
Formal	0.083***	-0.012*	0.195	0.090	0.118	0.019	0.013	0.013	0.013	0.013
Informal	-0.029***	0.034***	-0.078	-0.010	0.029	0.020	0.023	0.023	0.023	0.023
Household size	0.001	0.000	0.002	0.001	0.002	0.000	0.000	0.000	0.000	0.000
Under 5	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
<b>Unexplained</b>										
Age	0.100	0.248***	0.959***	0.238	0.597*	-0.146	-0.172	-1.132*	-0.160	-0.160
Urban	-0.015	0.039*	0.074	0.228*	0.256*	0.197*	0.194*	0.208	0.073	0.073
Punjab	-0.047**	-0.070***	-0.152	-0.046	-0.171*	-0.017	-0.002	0.260***	0.053	0.053
Sind	-0.020**	-0.019*	-0.124**	-0.069**	-0.122**	-0.054**	0.056***	-0.046	-0.032**	-0.032**
KP	-0.006	0.001	-0.002	-0.015	-0.024**	-0.019**	-0.025**	-0.038	-0.019***	-0.019***
Never married	-0.050***	-0.031**	0.206***	-0.057	0.209***	-0.017	-0.010	0.035	-0.047	-0.047
Migrants	0.022***	0.008**	0.052***	-0.008	0.000	-0.013	-0.016	-0.013	0.001	0.001
Technical and	0.127***	-0.024	-0.123	0.041	-0.043	0.078	0.099	0.315*	0.055	0.055

vocational trainings										
Low education	-0.025	0.023	0.042	-0.164	-0.196	-0.182	-0.183	-0.421**	-0.136**	-0.136**
High education	-0.027***	0.007	0.041**	-0.022	-0.023	-0.031	-0.031	-0.092**	-0.024*	-0.024*
Formal	-0.039***	-0.010	0.158	0.021	0.043	-0.037	-0.042	-0.022	0.009	0.009
Informal	-0.007	-0.132***	0.299	-0.162	-0.311	-0.277	-0.289*	-0.262	-0.091	-0.091
Household size	0.064	-0.010	-0.082	0.195	0.167	0.250	0.246	0.280	0.073	0.073
Under 5	-0.013	0.022	0.091*	-0.022	-0.014	-0.069	-0.066	-0.099	-0.022	-0.022
Constant	0.569***	0.554***	-0.500	0.582	0.810	1.352***	1.398***	2.056***	1.210***	1.223***

Source: Labour Force Survey, 2020-2021, Pakistan Bureau of Statistics, Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

**Table 9. Table 8. Full estimates of the gender wage gap at the mean and along the distribution (employees in high skilled occupations – technicians and associate professionals)**

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
<b>Overall</b>										
Male	10.261***	8.141***	8.328***	8.431***	8.521***	8.591***	8.609***	8.696***	8.419***	8.450***
Female	10.117***	8.320***	8.356***	8.392***	8.428***	8.464***	8.500***	8.536***	7.434***	7.451***
Difference	0.144***	0.178***	0.027***	0.039***	0.093***	0.127***	0.109***	0.159***	0.985***	0.999***
Explained	-0.051***	0.039	-0.146	-0.164	-0.221*	-0.221*	-0.236**	-0.215**	0.044***	0.044***
Unexplained	0.194***	0.217***	0.118***	0.203***	0.314***	0.348***	0.345***	0.375***	0.941***	0.954***
<b>Explained</b>										
Age	0.020***	0.006	-0.016	-0.009	-0.007	-0.007	0.002	-0.002	0.006***	0.006***
Urban	0.020***	0.031	-0.020	-0.028	-0.053	-0.053	-0.029	-0.027	0.006*	0.006*
Punjab	0.005	0.000	0.007	0.008	-0.010	-0.010	-0.010	-0.010	0.005**	0.005**
Sind	-0.011***	-0.001	-0.020	-0.017	0.011	0.011	-0.005	-0.004	-0.004*	-0.004*
KP	0.011***	0.061	0.042	0.039	-0.002	-0.002	0.016	0.009	-0.009***	-0.009***
Never married	-0.003	-0.005	-0.012	-0.013	-0.015	-0.015	-0.008	-0.009	0.014***	0.014***
Migrants	-0.004	-0.004	-0.015	-0.015	-0.001	-0.001	-0.004	-0.006	0.000	0.000
Technical and vocational trainings	-0.009***	-0.034	-0.008	-0.015	-0.023	-0.023	-0.032*	-0.017	0.018**	0.018**
Low education	-0.002	0.004	-0.024	-0.022	-0.008	-0.008	-0.003	0.000	-0.004	-0.004
High education	-0.005	0.003	-0.018	-0.017	-0.010	-0.010	-0.007	-0.004	0.004	0.004
Formal	-0.093***	0.011	0.006	0.007	0.035	0.035	0.048*	0.042**	0.013	0.013
Informal	0.022***	-0.028	-0.052*	-0.066**	0.125***	0.125***	0.192***	0.174***	0.023	0.023
Household size	-0.001	0.007	0.001	0.000	0.002	0.002	-0.002	-0.001	0.000	0.000
Under 5	-0.001	-0.012	-0.018	-0.015	-0.013	-0.013	-0.010	-0.011	0.000	0.000
<b>Unexplained</b>										
Age	0.284***	0.061	-0.481	-0.310	-0.275	-0.275	-0.043	-0.141	-0.160	-0.160
Urban	-0.006	0.057	-0.032	-0.047	-0.090	-0.090	-0.049	-0.044	0.073	0.073

Punjab	-0.012	0.001	-0.141	-0.148	0.208	0.208	0.221	0.211	0.053	0.053
Sind	-0.042***	-0.003	-0.051	-0.044	0.030	0.030	-0.013	-0.010	-0.032***	-0.032***
KP	-0.008	-0.179	-0.121	-0.112	0.018	0.018	-0.039	-0.018	-0.019***	-0.019***
Never married	0.000	-0.038	-0.074	-0.081	-0.091*	-0.091*	-0.054	-0.057	-0.047	-0.047
Migrants	0.001	0.008	0.031	0.031	0.001	0.001	0.007	0.012	0.001	0.001
Technical and vocational trainings	-0.056***	0.087*	0.026	0.044	0.062	0.062	0.082**	0.049	0.055	0.055
Low education	0.010	-0.093	0.601	0.547	0.199	0.199	0.068	0.011	-0.136**	-0.136**
High education	0.073	-0.154	0.898	0.852	0.496	0.496	0.330	0.207	-0.024*	-0.024*
Formal	-0.204*	-0.040	-0.013	-0.016	-0.177	-0.177	-0.256*	-0.220*	0.009	0.009
Informal	-0.013*	-0.018**	-0.036***	-0.046***	-0.089***	-0.089***	-0.136***	-0.124***	-0.091	-0.091
Household size	0.030	0.422*	0.157	0.079	0.184	0.184	0.006	0.042	0.073	0.073
Under 5	-0.001	-0.101	-0.148	-0.124	-0.107*	-0.107*	-0.089	-0.096*	-0.022	-0.022
Constant	0.138	-0.227	-0.500	-0.423	-0.056	-0.022	0.308	0.553	1.210***	1.223***

Source: Labour Force Survey, 2020-2021, Pakistan Bureau of Statistics, Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

**Table 10. Table 9. Table 8. Full estimates of the gender wage gap at the mean and along the distribution (employees in very high skilled occupations – managers and professionals)**

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
<b>Overall</b>										
Male	10.476***	8.165***	8.312***	8.383***	8.389***	8.523***	8.553***	8.584***	8.614***	8.644***
Female	10.024***	7.456***	7.567***	7.677***	7.756***	7.827***	7.902***	8.019***	8.054***	8.088***
Difference	0.452***	0.709***	0.745***	0.706***	0.634***	0.696***	0.651***	0.565***	0.560***	0.555***
Explained	0.057***	0.027	-0.041	-0.041	-0.065*	-0.056**	-0.056**	-0.056**	-0.056**	-0.056**
Unexplained	0.395***	0.682***	0.786***	0.747***	0.699***	0.752***	0.706***	0.620***	0.615***	0.611***
<b>Explained</b>										
Age	0.089***	0.002	-0.027	-0.027	0.014	-0.004	-0.004	-0.004	-0.004	-0.004
Urban	0.015***	0.022***	0.008	0.008	0.012*	0.010**	0.010**	0.010**	0.010**	0.010**
Punjab	0.006	0.029	0.018	0.018	0.005	-0.036	-0.036	-0.036	-0.036	-0.036
Sind	0.000	-0.004	-0.035	-0.035	-0.065***	-0.007	-0.007	-0.007	-0.007	-0.007
KP	-0.001	0.002	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001
Never married	0.008**	-0.009	-0.003	-0.003	-0.002	0.006	0.006	0.006	0.006	0.006
Migrants	-0.002**	-0.003	-0.003*	-0.003*	-0.004*	-0.001	-0.001	-0.001	-0.001	-0.001
Technical and vocational training	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001
Low education	-0.006	-0.053*	-0.038**	-0.038**	-0.075***	-0.062***	-0.062***	-0.062***	-0.062***	-0.062***
High education	-0.033***	0.055***	0.056***	0.056***	0.067***	0.052***	0.052***	0.052***	0.052***	0.052***
Formal	0.003	-0.004	-0.004	-0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001

Informal	-0.021*	-0.010	-0.013	-0.013	-0.020*	-0.015*	-0.015*	-0.015*	-0.015*	-0.015*
Household size	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001
Under 5	0.001	0.000	-0.001	-0.001	0.002	-0.002	-0.002	-0.002	-0.002	-0.002
<b>Unexplained</b>										
Age	-0.383***	-0.053	-0.417	-0.571*	-0.314	-1.291***	-1.291***	-0.899***	-0.899***	-0.899***
Urban	0.047***	0.105*	-0.015	0.097	0.127	0.105	0.105	0.087	0.087	0.087
Punjab	0.245***	-0.058	0.021	-0.011	0.030	0.383***	0.383***	0.268***	0.268***	0.268***
Sind	0.037***	0.002	-0.018	-0.039	-0.058***	-0.014	-0.014	-0.010	-0.010	-0.010
KP	0.035***	0.062*	0.033	0.025	0.009	0.061**	0.061**	0.048**	0.048**	0.048**
Never married	0.016	0.002	-0.017	0.008	0.005	0.030	0.030	0.006	0.006	0.006
Migrants	0.004	0.010	0.002	-0.008	-0.004	-0.049**	-0.049**	-0.003	-0.003	-0.003
Technical and vocational training	0.002	0.001	-0.012	-0.017*	-0.016	-0.044***	-0.044***	-0.016	-0.016	-0.016
Low education	-0.057*	-0.034	0.048	0.105	0.077*	0.095***	0.095***	0.043***	0.043***	0.043***
High education	-0.836	-0.272	-0.285	-0.278	-0.381	-0.728	-0.728	-0.696	-0.696	-0.696
Formal	-0.089	0.124	0.121	0.121	0.040	0.026	0.026	0.026	0.026	0.026
Informal	-0.017	-0.017	-0.023	0.005	-0.042	-0.041	-0.041	-0.068	-0.068	-0.068
Household size	0.019	0.106	0.026	0.064	0.048	0.218	0.218	0.100	0.100	0.100
Under 5	-0.031**	-0.015	0.008	-0.019	0.010	-0.120**	-0.120**	0.084***	0.084***	0.084***
Constant	1.404***	0.718*	1.312***	1.264***	1.169***	2.121***	2.076***	1.819***	1.814***	1.809***

Source: Labour Force Survey, 2020-2021, Pakistan Bureau of Statistics, Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

In order to check the robustness of our empirical results, we have followed Acemoglu and Autor (2011) and Jaimovich and Siu (2020), and delineated occupations along two dimensions: cognitive vs manual and non-routine vs routine. These descriptions are based on the various tasks performed in the occupations. For instance, the distinction between cognitive and manual jobs can be characterised by the differences in the extent of mental vs physical activities. If an occupation entails many tasks requiring creativity, flexibility and problem-solving skills, then it will be included in the non-routine cognitive group of occupation. On the other hand, if a job involves a small set of specialisations, it is called a routine task. Based on this delineation, we have constructed our dependent variables based on skill set, i.e., cognitive non-routine (managers, professional and associate professionals), cognitive routine (clerks and sales workers), manual routine (craft and plant workers) and manual non-routine (service workers). Nonetheless, cognitive non-routine occupations are considered to be high-skilled occupations, and manual non-routine are low-skill occupations.

The empirical estimations Table 11 indicates that average gender wage gap is significant and positive in cognitive non-routine, manual routine and manual non-routine occupations. It shows that men are earning more than women in these group of occupations. In addition, unexplained part is significant for cognitive non-routine, manual routine and manual non-routine occupations. However, in case of cognitive routine occupations, gender wage gap is

negative which shows that women are earning better than men. The unexplained part is not significant here.

**Table 11. Estimates and decomposition of average (at mean) gender wage gap**

	<b>Cognitive non-routine</b>	<b>Cognitive routine</b>	<b>Manual routine</b>	<b>Manual non-routine</b>
Male	10.392***	9.898***	9.862***	9.955***
Female	10.040***	10.155***	9.057***	9.524***
Difference	0.352***	-0.257***	0.804***	0.431***
Explained	0.053***	-0.208***	0.051***	0.139***
%	15.057	80.934	6.343	32.251
Unexplained	0.299***	-0.050*	0.753***	0.293***
%	84.943	19.455	93.657	67.981
N	11,408	5,582	17,091	5,578

Source: Labour Force Survey, 2020-2021, Pakistan Bureau of Statistics, Government of Pakistan. \*\*\*, \*\* & \* illustrate the significance at 1%, 5% and 10 %.

## **6. Conclusions and Policy Implications**

The study examined the gender wage gap in Pakistan, a developing economy. We estimated the overall gender wage gap for the year 2020-2021 and also for four different group of occupations based on skill levels. The empirical estimations highlighted that the gender wage gap favours women in high skilled occupations, but men earn more than women workers in low and average-skilled occupations. The study extends a few valuable policy insights for developing economies to decrease wage discrimination in developing economies.

Addressing the gender wage gap in low and average-skilled jobs is essential to advancing socioeconomic equality and enhancing the well-being of women, particularly in developing economies where most of the employed women are working in low and average skilled occupations. In the same regard, increasing minimum wage levels is crucial to adequately compensate workers, especially women who are frequently overrepresented in low-paid occupations. This contributes to reducing the wage disparity, as many women are engaged in sectors that pay the minimum wage or slightly over it. Furthermore, it is imperative to enforce industry-specific minimum wage regulations, which can be especially advantageous in industries characterised by a significant number of female employees with limited skills, such as housekeeping, retail, and hospitality.

Reducing the gender wage gap in developing nations is a complex challenge requiring a comprehensive strategy that includes policy changes, education reforms and cultural shifts. The empirical results described that technical and vocational training are negatively associated with the gender wage gap. Therefore, advancing vocational training initiatives specifically designed for women, providing them with the necessary expertise to meet the job market requirements not only in low and average skilled occupations but also in STEM (Science, Technology, Engineering, and Mathematics) disciplines. It is necessary to offer customised training programs specifically designed for women employed in low—and average-skilled jobs, emphasising skills development that can improve their efficiency and create pathways to well-paid positions. Besides, employers must promote the implementation of on-the-job training programs to facilitate women's acquisition of new skills and enhance their prospects for career



advancement. It will help to encourage gender diversity in occupations that have historically been predominantly occupied by one gender, i.e., males. It is also necessary to promote the recruitment and hiring of women in traditionally male-dominated roles, which may provide greater remuneration. There is a need to advocate for flexible working hours, remote work alternatives, and job-sharing possibilities to help women manage their work and family obligations effectively. This adaptability can assist in retaining women in the job market and enable them to pursue professional advancement without compromising personal obligations.

To decrease the gender wage gap for low and average skilled occupation in particular and for all other occupations in general, the first and most important step is easy access to higher education in developing economies. Higher education (secondary level and above) strengthens men/women's opportunities to get training and credentials essential for promising careers. Besides, higher level of education provides access to professional and managerial positions that usually come with higher pay. In addition, education enables a woman to access traditionally male-dominated sectors such as science, technology, engineering, and mathematics (STEM), which offer better earnings. Hence, education mitigates occupational segregation and diminishes the wage disparity. Higher levels of education provide individuals with essential skills, like critical thinking, problem-solving, and technical abilities, which are highly sought after in the job market. These skills enhance their employability and capacity to compete for higher-paying professions. Also, education and professional development enable men and women to remain abreast of current industry trends and acquire new skills, enhancing their competitiveness and increasing their chances of being considered for promotions and wage raises.

Also, education expands job opportunities for women by introducing them to many subjects and professions, surpassing the conventional roles typically linked to gender stereotypes. Thus, this diversification helps mitigate occupational segregation, a phenomenon in which women are disproportionately concentrated in lower-paying occupations, and promotes more equitable representation across various industries. Education can combat gender stereotypes by offering role models and exposing individuals to a wide range of careers, thereby motivating girls and women to seek non-traditional and more lucrative professions. Education enables women to acquire information about market earnings and labour rights, enhancing their ability to negotiate improved salaries and benefits. Women with higher levels of education are more inclined to support equal pay, clearly understand their value in the labour market, and resist accepting lower salaries.

Education enhances knowledge of workplace rights, anti-discrimination legislation, and the principle of equal pay for equal labour, empowering women to confront unjust compensation practices. Besides, education empowers women by equipping them with the necessary tools to attain financial autonomy, reducing their dependence on low-wage employment and enabling them to make well-informed career decisions. Women with greater levels of education are more inclined to initiate their enterprises, resulting in increased revenue and the creation of job opportunities. This, in turn, contributes to economic expansion and the narrowing of the gender pay disparity.

At the national level, initiatives must be taken to challenge stereotypes and shift societal views that undervalue women's work and limit their involvement in specific occupations.

Furthermore, the local government must assist in community-based endeavours that enhance the agency of women and girls, fostering their engagement in education, professional prospects, and leadership positions.

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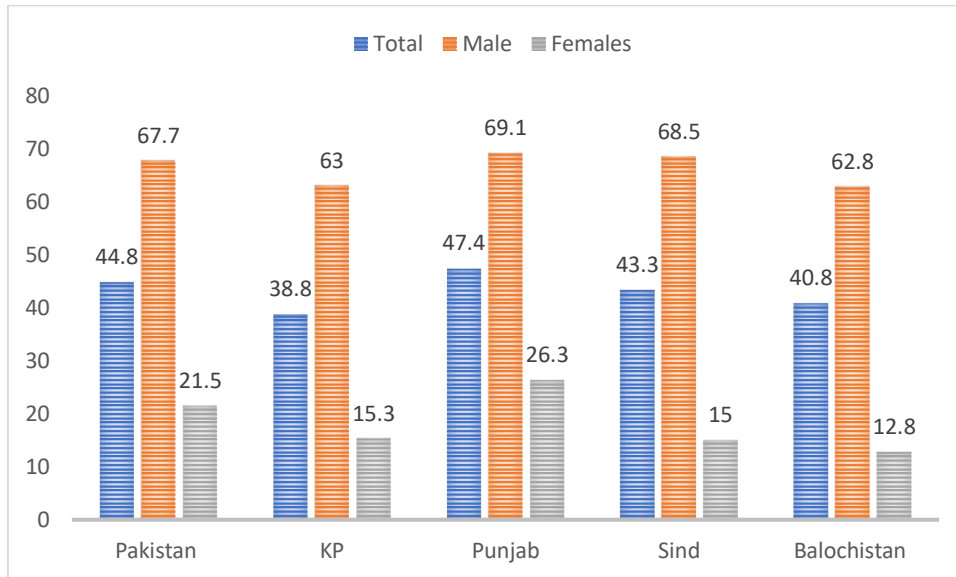
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## Appendix

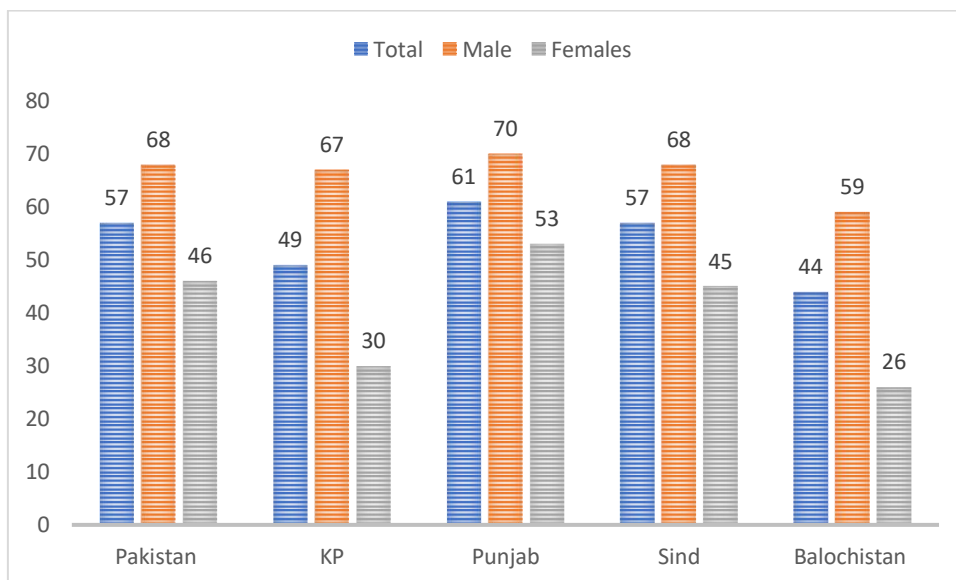
### Figures

**Figure A1: Province-wise labour force participation rates in Pakistan**



Source: Labour Force Survey, 2018-19

**Figure A2: Adult (15 years and older) literacy rates in Pakistan**



Source: PSLM survey, 2019-