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Breaking Barriers or Reinforcing Gaps? Gender Wage Disparities Across Skill Levels in a Developing Economy

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Abstract: Many factors are behind the persistent gender wage gap in a developing economy, such as occupational segregation, social norms, and gender attitudes. To narrow 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 the case of a developing economy, Pakistan. This research has utilised 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-skilled occupations; however, in high and very-high-skilled occupations, women are in advantageous positions. In addition, the empirical estimation elaborates on the presence of glass ceiling effects in low, average, and very high-skilled occupations in Pakistan. To tackle 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-skilled occupations for women in developing economies.

Keywords: 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 (GWG) in the developing world is a significant concern due to its influence on social equity, gender equality, and economic development. Therefore, addressing the GWG is crucial to achieving sustainable economic growth, alleviating poverty, and attaining greater social justice (Gharehgozli and Atal, 2020). Besides, eliminating the GWG can have a substantial positive influence on economic prosperity. Females 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, a sizeable proportion of female workers are engaged in low-paid occupations and industries, such as retail, hospitality, and agriculture. These sectors typically hit the hardest during economic contraction, leading to more job losses. In developing economies, the majority of the employed women work as part-time workers or hold temporary positions; these jobs are often the first to be cut, impacting women's wages and employment statuses (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 GWG. The presence of strong social safety nets can lower the GWG. 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 take part in labour market activities 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 increased the GWG in developing economies. 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 GWG in low and middle-income 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 (FLFP) rate in the South Asian region, and most of the women are either working in vulnerable employment or the informal sector; the GWG is more pervasive in these sectors as compared to the formal sector. There are many determinants of the GWG, including occupation segregation, differences in education attainments among males and females, gender discrimination, and employment in specific types of occupations which are not well-paid (Akram, 2022). Women have limited access to 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 (Labour Force Survey of Pakistan, 2020-2021).

On the contrary, men dominate the well-paid jobs in Pakistan. Furthermore, in a traditional society, deep-rooted patriarchal norms play a substantial part in the GWG. Due to various 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 face stereotypes and gender biases that hinder their career advancement and wage rise (Cheema et al., 2022).

The present research's theoretical foundation is based on a broader perspective of feminist economics, which challenges the assumption of mainstream economics models grounded in gender norms, discrimination in the labour market, and undervaluation of unpaid and care work. Gender equality is the central theme at the heart of feminist economics. On the same lines, Ferber and Nelson (2009) postulated that it is essential to integrate gender-specific perspectives in mainstream economic analysis. In his pioneer work, Sen's (2000) capabilities approach elaborates that equal access to opportunities and resources enhances women's agency and increases FLFP. In a comparatively recent work, Moran (2017) asserted that to decrease gender inequalities in the labour market, it is mandatory to integrate the feminist perspective into mainstream economic analysis. Moreover, Goldin (2021) has provided compelling historical evidence on the evolution of FLFP and wage inequalities in developed economies. Our study's theoretical foundation is grounded in these eminent economists' pioneering contributions. Our study offers a comprehensive approach towards the GWG within a theoretically rich discourse. The study has heightened the need for inclusive labour policies and structural reforms to reduce GWGs.

Generally, skill is the ability to perform various job duties. Besides, *the skill level* is "a function of the complexity and range of tasks and duties to be performed in an occupation." Skill level is typically assessed by considering the nature of work performed in a specific occupation relative to the defined tasks and responsibilities associated with each ISCO-08 skill level, as well as the formal education level specified by the International Standard Classification of Education (ISCED-97) (UNESCO, 1997) required for proficient execution of these tasks and duties, along with the requisite informal on-the-job training and/or prior experience in a related occupation necessary for competent task performance. 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 occupations (we have discussed this 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. The present study intends to give detailed insights into the GWG in the case of a developing economy, and we will analyse four skill levels and examine which occupational group has the highest GWG.

Our study addresses specific research questions based on the previously mentioned scenario. Does the GWG differ across occupational groups based on skill level? Does working in a high-skilled occupation reduce or exacerbate the GWG? Does the GWG change along the distribution in different occupations?

For empirical analysis, the present research has taken the aid from the unconditional quantile regression method in an Oaxaca-Blinder type decomposition. Our objective is to evaluate the influence of different household and individual-level variables on the GWG at both the mean and entire wage distribution. We have taken Pakistan as a case study to examine this policy issue for various reasons. First and foremost, a vast majority of females (70 per cent) are working in vulnerable employment, and those women who are well-educated and in highly skilled jobs are still getting lower wages as compared to their male counterparts. Furthermore, the GWG phenomenon holds significant importance in Pakistan, as evidenced by research conducted by Yasmin et al. (2021) and Cheema et al. (2022). However, to our knowledge, this research is the first attempt to evaluate the GWG in Pakistan using advanced econometrics techniques and considering four skill levels.

Geographically, Pakistan has four provinces, namely, Khyber Pakhtunkhwa (KP), Punjab, Sind and Balochistan. It is evident from the prior literature (Andlib and Khan, 2018; Andlib and Khan, 2019) that labour market dynamics are different in these provinces as Punjab province is the most developed province among all provinces. In contrast, Balochistan and Khyber Pakhtunkhwa are relatively less developed regarding human development indicators. Therefore, inequality and duality in labour markets make Pakistan an interesting case study for the analysis. The empirical findings of the study will not only provide policy insights for the Pakistani economy but are equally applicable to other developing nations. In the present research, 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 and a detailed section on wages.

After a comprehensive introduction, Section 2 illustrates an overview of the prior literature on the GWG 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, elaborates on policy discussions grounded on our findings.

2. Literature review

In this section, we discuss the existing literature on GWGs in various economies; however, we will emphasise the relevant literature for developing economies.

Goldin (2014) explained the causes of persistent GWG in the USA. The study argued that differences in pay structure diminish over time due to the narrowing down of differences in human capital. In addition, to reduce wage inequality, there is a need to restructure the job and compensation, promote temporal flexibility and reduce overwork. Goldin et al. (2017) explained the GWG for college graduates in another compelling study. According to the

empirical findings, the GWG has increased to 34 log points for ages 26 to 39. Moreover, the GWG is more pronounced for married individuals and varies between employment sectors and occupations.

Piazzalunga and Di Tommaso (2019) have explored the issue of the GWG in the Italian economy. The study draws inferences from EU-SILC data from 2004 to 2012 and uses Oaxaca-Blinder decomposition. According to the empirical outcomes, the GWG increased between 2008 and 2010 along the entire quantile distribution in explained and unexplained components. However, it is observed that after 2010, the GWG increased among workers in the upper part of the wage distribution. Castagnetti and Giorgetti (2019) explained the GWG in Italy in the public and private sectors. The study utilised the fixed effect quantile regressions and inferred that the GWG decreased in both sectors. Nonetheless, the analysis depicts the presence of a glass ceiling in the public sector. Gharehgozli and Atal (2020) have described the GWG for the period 1986 to 2016 in the USA and concluded that the GWG has moderately declined over the last three decades. Sloane et al. (2021) explained that one of the significant reasons behind the GWG is that most women get educational degrees in those disciplines where there is a high possibility of getting lower wages than their male counterparts. Therefore, according to the study, selecting a significant subject in their undergraduate and occupational sorting are two pertinent factors behind the GWG in the USA. Schirle (2015) revealed that the GWG substantially decreased in almost all Canadian provinces during the selected time period (1997-2014).

Duraisamy and Duraisamy (2016) discussed the GWG in the Indian economy and highlighted that the GWG decreased in the selected period, i.e., 1983-2012. Furthermore, the study found evidence of sticky floors compared to glass ceilings for all labour market segments. In another interesting study, Deshpande et al. (2018) supported the previously mentioned findings and illustrated that the GWG is higher at the lower quantiles. It elaborates on the existence of sticky floors rather than glass ceilings in the Indian labour market. Poddar and Mukhopadhyay (2019) explored the GWG in the Indian economy. The study has taken aid from the Oaxaca-Blinder decomposition methodology and Heckman's two-step technique. According to the study's findings, women are discriminated against in different jobs at the time of recruitment, especially in those occupations and industries where most employers are men. In addition, the lack of relevant experience and low skills among women workers are two of the most prominent reasons for the low pay structure for women. Agrawal (2021) demonstrates that gender segregation in India is more pervasive in rural areas. The reasons behind the gender segregation in rural labour markets stem from educational attainment, while in urban markets, it is caused by an individual's vocational profile. The empirical outcomes of the wage decomposition analysis highlight that a significant portion of the GWG 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 GWG in Sri Lanka and concluded that it has declined since the 1990s liberal reforms. The unexplained part is still higher than the explained part. High-skilled women workers who are engaged in the public sector earn better than their male counterparts.

Ahmed and McGillivray (2015) analysed the GWG in Bangladesh and highlighted that the GWG declined from the year 1999 to 2009, which is attributed to human capital endowment. Bjerge et al. (2021) assessed the influence of on-the-job training on the GWG in Vietnam and concluded that on-the-job training is a pertinent factor in decreasing the GWG. The difference

in the GWG is more pervasive between trained and untrained workers, irrespective of gender. Cheng et al. (2020) explained the existence of the GWG between rural and urban migrants in the case of China. The empirical outcomes elaborate that urban migrant workers are paid more than rural migrant workers. Overall, the GWG 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 GWGs than educated urban women workers in Nepal. Rahman and Al-Hasan (2022) explained the GWG in the case of Bangladesh and concluded that male workers earn significantly more than female workers. The study also supported a glass ceiling and sectoral segmentation in Bangladesh. Siddiquee and Hossain (2018) elucidated that the GWG increased in Bangladesh in 2010. Besides, the GWG 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 the year 2016 and examined the GWG in Bangladesh. The mean wage decomposition reveals that females earn 12 per cent less than men. The reason behind this GWG is that a sizeable proportion of employed workers are engaged in informal employment. Nonetheless, females working in formal sectors earn higher wages than males at the first few deciles.

We have found a few interesting studies on the Pakistani economy in the prior literature. For instance, Aslam (2009) 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 GWG in Pakistan. In addition, based on the empirical outcomes, the study concluded that the GWG increased in 2018. Cheema et al. (2022) have used data from the PSLM survey and highlighted that labour market discrimination is prevailing in the Pakistani labour market, thus exaggerating the GWG. Malik and Akram (2024) have explored the factors behind the GWG in the case of Pakistan. The study applied the ordered logit model and illustrated that many household and individual factors are behind the GWG, including marital status, education level, age, and type of employment.

Looking at prior literature, we could not find any study for Pakistan that examined the GWG for different occupations based on skill levels. Therefore, the current study will add value to the existing literature on various grounds; it will assess the GWG for employees working in low, average, high, and very high-skilled occupations and provide an in-depth analysis in the case of a developing economy. It will also elaborate on the existence of a glass ceiling in various occupations. In addition, the study also highlights which household characteristics are more pervasive in explaining the GWG in a developing economy.

3. Data and variables construction

To examine the GWG, we used data from the Labour Force Survey (LFS) of Pakistan for 2020-2021. The Pakistan Bureau of Statistics (PBS) conducted the survey. It is a nationally representative survey conducted at the provincial and district levels. It offers the largest sample size and vast coverage of labour market indicators compared to any other household survey in Pakistan and even to any other round of LFS conducted in recent years. The survey has 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, detailed 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 identifying 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. Skill level 1 (low-skilled) occupations involve routine, straightforward 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-skilled occupations) involved performing various tasks such as operating electric equipment and machinery, repairing electrical and mechanical equipment, driving vehicles and ordering and storing 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 be 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). Nonetheless, some jobs require the completion of the second stage of secondary education (ISCED level 3), which may need on-the-job training.

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

Variable	Description
Dependent variable	
Wages	Log of monthly wages.
Explanatory variables	
Age	Age in completed years (15 to 60 years).
Urban	If the individual resides in an urban area, the rural area is the reference category.
Punjab	If the individual resides in Punjab province.
Sind	If the individual resides in Sind province.
KP	If the individual resides in Khyber Pakhtunkhwa (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 has migrated from rural to urban areas, native is the reference category.
T&V training	If the individual has obtained technical and vocational training, no training is the reference category.
Below secondary level	If the individual has less than a secondary level of education.
Secondary or above-level	If the individual has a secondary and above level of education, no education is the reference category.
Average-skilled occupations	If the individual works as a clerical support worker, a service and sales worker, a skilled agricultural worker, a craft and related trades worker, a plant and machine operator, or an assembler.
High-skilled occupations	If the individual works as a technician or an associate professional.
Very high-skilled occupations	If the individual works as a manager or professional, Elementary occupations (low skill level) are the reference category.
Formal sector	If the individual works in the formal sector.
Informal sector	If the individual works in the informal sector, the agriculture sector is the reference category.
Household size	Household size.
Under five children	Number of children under 5 years of age at home.

Occupations included in skill level 3 (high-skilled) 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-skilled) is the most competent category among all occupations; it mainly involves tasks requiring creativity and complex problem-solving techniques based on extensive theoretical and factual knowledge in a specialised discipline. These occupations 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 analysed the GWG for 15-60-years old workers in the case of Pakistan. Moreover, we have dropped those individuals from the LFS data set who are not working or earning from any occupation. The total sample size for the individuals working and earning a monthly wage is 66,140, out of which 58,257 are males and 7,883 are females. A detailed explanation of the variables under consideration is revealed in Table 1.

3.1. Descriptive statistics

Pakistan has the lowest FLFP 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 in the selected period. However, it is indicated in Table 2 that a significant proportion of women are engaged in low-skilled occupations or very high-skilled occupations. Besides, the mean wage is higher for men than for women workers in all skills. The difference is highest in the case of average-skilled occupations and is the lowest in the case of high-skilled occupations. The mean wages for both genders are plotted in Figure 1.

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

Gender	Sample composition		Log monthly wages	
	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-skilled occupations				
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-skilled occupations				
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-skilled occupations				
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-skilled occupations				
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: Own calculations based on Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan.

Figure 1. Mean monthly wages for overall and various skill levels

Source: Own calculations based on Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan.

In Figure 2, we elaborate the kernel estimates of the wage density for both genders for the year 2020-2021, whereas in Figures 3 to 6, we present the wage distributions for four groups of occupations divided by skill sets. The figures reveal that male employees' wage distribution is higher than female employees.

Figure 2: *Wage distribution by gender – overall*
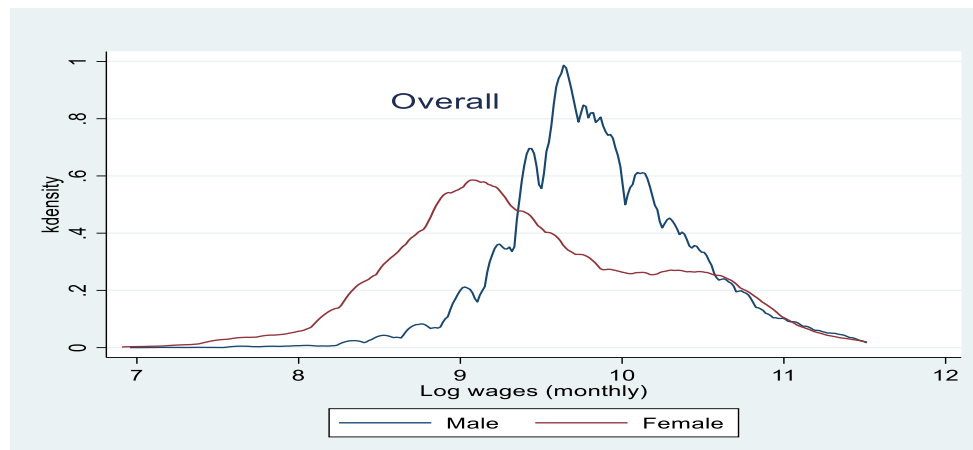
Source: Own calculations based on Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan.

Figure 3. *Wage distribution by gender – low-skilled occupations*
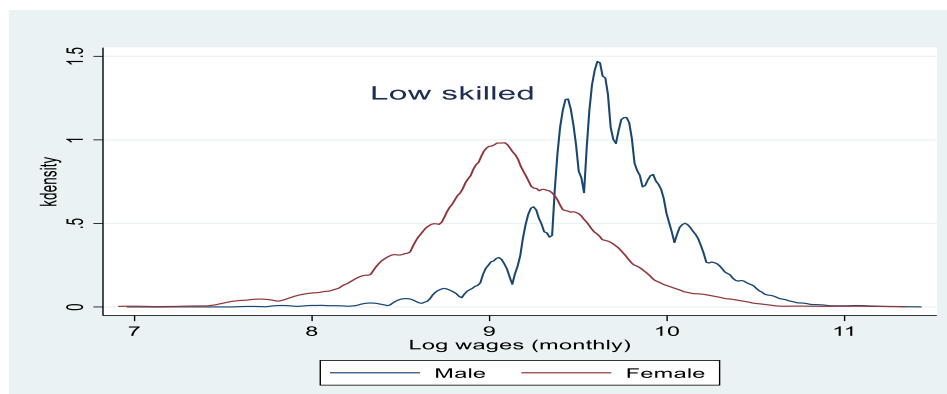
Source: Own calculations based on Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan.

Figure 4. *Wage distribution by gender–average-skilled occupations*
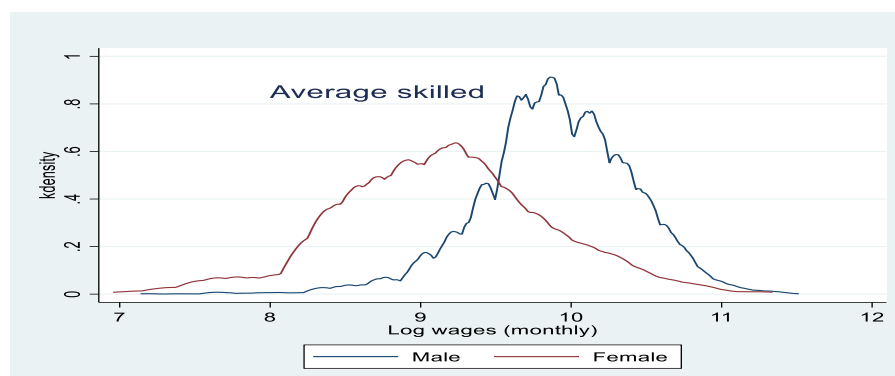
Figure 5. *Wage distribution by gender – high-skilled occupations*
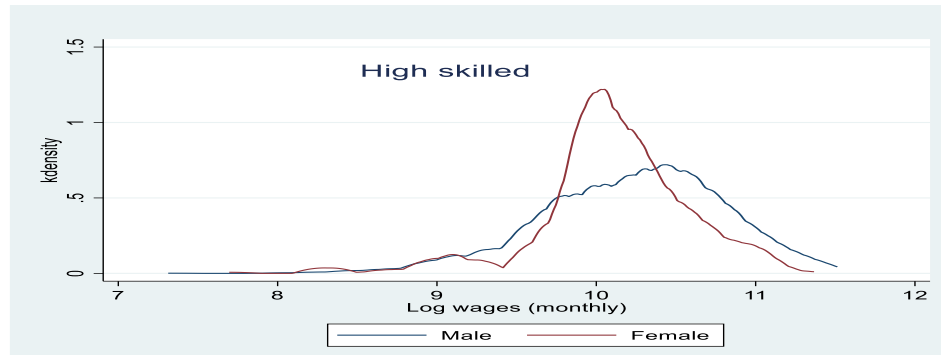
Figure 6. *Wage distribution by gender – very high-skilled occupations*
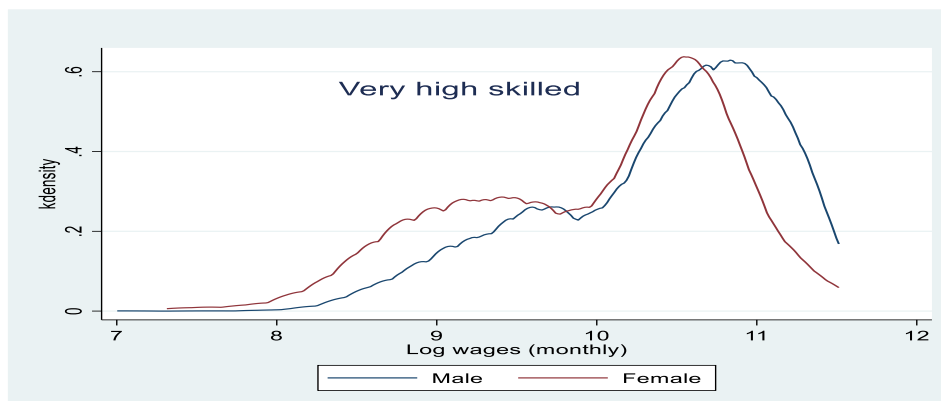
Table 3. Kolmogorov–Smirnov test

	Combined	Male	Female
Overall			
KS2	0.369 (0.000)	-	-
KS1	-	0.006 (0.521)	-0.369 (0.000)
Low-skilled occupations			
KS2	0.539 (0.000)	-	-

KS1	-	0.005 (0.999)	-0.539 (0.000)	
Average-skilled occupations				
KS2	0.537 (0.000)	-	-	
KS1	-	0.001 (0.999)	-0.537 (0.000)	
High-skilled occupations				
KS2	0.189 (0.000)	-	-	
KS1	-	0.065 (0.023)	-0.189 (0.000)	
Very high-skilled occupations				
KS2	0.209 (0.000)	-	-	
KS1	-	0.000 (1.00)	-0.209 (0.000)	

In addition, to complement Figures 2 to 6, the non-parametric Kolmogorov-Smirnov (K-S) test was employed to accurately evaluate the distributions' uniformity. The notion of applying this test is derived by measuring the most significant discrepancy in the empirical distribution functions for different skill levels.

We utilise the one-sided and two-sided Kolmogorov-Smirnov tests (KS1 and 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 in Table 4.

Table 4. Descriptive statistics

Variables	Overall	Low-skilled occupations	Average-skilled occupations	High-skilled occupations	Very-high skilled occupations
	Mean	**Mean**	**Mean**	**Mean**	**Mean**
Age	32.941	31.927	32.840	35.392	35.585
Urban	0.314	0.200	0.372	0.450	0.422
Rural	0.686	0.800	0.628	0.550	0.578
Punjab	0.441	0.437	0.446	0.424	0.445
Sind	0.269	0.286	0.263	0.282	0.224

KP	0.176	0.172	0.170	0.171	0.215
Balouchistan	0.114	0.105	0.121	0.124	0.116
Never married	0.274	0.283	0.283	0.224	0.234
Ever married	0.726	0.717	0.717	0.776	0.766
Migrants	0.083	0.074	0.081	0.089	0.113
Natives	0.917	0.926	0.919	0.911	0.887
No T&V training	0.828	0.957	0.699	0.788	0.890
T&V training	0.172	0.043	0.301	0.212	0.110
No education	0.335	0.539	0.274	0.042	0.010
Below secondary level	0.462	0.427	0.583	0.415	0.151
Secondary or above-level	0.203	0.035	0.143	0.543	0.840
Low-skilled occupations	0.396	-	-	-	-
Average-skilled occupations	0.432	-	-	-	-
High-skilled occupations	0.057	-	-	-	-
Very high-skilled occupations	0.115	-	-	-	-
Agriculture sector	0.099	0.234	0.013	0.016	0.001
Formal sector	0.355	0.187	0.346	0.743	0.773
Informal sector	0.546	0.580	0.641	0.241	0.226
Household size	6.650	6.580	6.702	6.648	6.694
Under five children	0.884	0.909	0.878	0.825	0.851
N	66,140	26,179	28,553	3,769	7,639

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 (males and females) into a segment that is influenced by explanatory factors or endowments (the "explained effect") and one elucidated by the differences in the group coefficients (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 quantile regressions (UQRs) of

recentered influence functions (RIFs) to achieve a comprehensive decomposition beyond the mean, similar to the Oaxaca-Blinder method (Firpo et al., 2018).

Compared to the traditional quantile regression approach devised by Koenker and Bassett (1978), this approach can determine 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 both genders 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:

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

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, $if(x, u, G)$ is called the influence function (Hampel, 1974). Firpo et al. (2009) demonstrated that first, we would calculate the values of $f(x, u, and\ G)$ 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, occupations with respect to various skill levels, sector of employment, region and provinces). In the prior literature, the resultant influence on wage distribution statistics is identified as a "counterfactual effect," "unconditional partial effect," or "policy effect" (Rothe, 2010; Gallo and Pagliacci, 2020). Finally, similar to the conventional Oaxaca-Blinder decomposition, the GWG is divided into an endowment component and a coefficients component. We apply the same approach for various skill levels, as explained previously.

5. Results and discussions

In Table 5, we have estimated the average GWG for the year 2021 and also for various occupational groups based on skill levels. The GWG is decomposed between the explained and unexplained components. The GWG is negative and significant (in favour of women) for the year 2021. The explained component represents -21 per cent of the total GWG. In contrast, most of the GWG is reflected by the unexplained component, which indicates the presence of discrimination in the Pakistani labour market. We have observed that the GWG is the highest for the workers engaged in high-skilled occupations, but interestingly, it is in favour of women workers. On the other hand, the empirical analysis reveals the incidence of the highest discrimination in these occupations.

Table 5. Estimates and decomposition of the average GWG

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

Table A1 presents the average GWG decomposing into explained and unexplained components for the year 2021. We have inferred from the empirical outcomes that the estimated GWG is significantly negative at mean and 0.80 and 0.90 quantiles. The negative explained component describes that the GWG is in favour of women in Pakistan. However, it is not significant at all quantiles, and most of the GWG is related to unexplained components, i.e., labour market discrimination. In developing nations, women are not given equal preferences in the hiring process; men are always preferred for highly paid jobs. In addition, women are not given equal preferences to get promotions in various occupations compared to their male counterparts. This situation is called the glass ceiling effect in the labour economics literature. Besides, women are disproportionately represented in specific jobs and occupations, such as teaching or nursing (occupation segregation). Furthermore, our empirical results also provide evidence of glass ceiling effects, i.e., the GWG at 0.90 quantile is greater than the GWG at the median quantile (0.50).

On the same lines, to examine the GWG for various groups of occupations, we have divided our overall sample by skill levels and estimated the GWG for four groups of occupations. As mentioned previously, we have divided ISCO's nine occupations (ISCO) into four skill levels, i.e., low-skilled, average-skilled, high-skilled and very high-skilled occupations.

First, we discuss the GWG for workers who work in low-skilled occupations (Table A2). We have observed an interesting pattern: at mean, the GWG is positive and in favour of men; however, on all quantiles, the GWG is negative and in favour of women, but it is only significant at higher quantiles. In addition, a large part of the GWG comes from the unexplained part, which means that discrimination is prevalent in low-skilled occupations. The GWG is higher at the higher quantiles, which reflects the glass ceiling; women are excluded from top positions.

Table (A 3) estimates the GWG 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 quantiles; it means men earn more than women workers in average-skilled occupations. However, most of the gender gap reveals discrimination in the labour market.

In Table (A 4), we have also estimated the GWG for high-skilled workers. The analysis depicts that the GWG favours women till 0.70 quantile, but at 0.80 and 0.90 quantiles, the GWG is positive and reveals that males earn more than female workers. However, the results show the presence of discrimination here as well. After that, we estimated the GWG for very highly skilled occupations (Table A 5). The mean GWG estimates illustrate that males earn more than

female employees. Nonetheless, the quantile regression provides evidence of the opposite scenario, where females earn better than their male counterparts in very high-skilled jobs. We inferred from our empirical analysis that women earn higher wages in high and very high-skilled occupations than in lower and average-skilled occupations.

Our empirical estimates for various occupations based on skill levels also provide evidence for the sticky floor (the GWG at 0.10 quantile is higher than the GWG at the median 0.50 quantile) and glass ceiling (the GWG at 0.90 quantile is higher than the GWG at the median 0.50 quantile). According to empirical estimation, individuals working in low, average and very high-skilled occupations face the glass ceiling effects. The empirical outcomes of the study are supported by 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).

To assess the robustness of our findings, we have adhered to the methodologies of Acemoglu and Autor (2011) by categorising jobs along two dimensions: cognitive vs manual and non-routine versus routine. These descriptions are derived from the diverse duties executed within the professions. The differentiation between cognitive and manual occupations can be defined by the variance in the degree of mental vs physical activities involved. Occupations that include several activities necessitating creativity, adaptability, and problem-solving abilities will be classified inside the non-routine cognitive category. Conversely, work that entails a limited range of specialisations is a routine task. According to this classification, we have developed our dependent variables based on skill sets: cognitive non-routine (managers, professionals, and associate professionals), cognitive routine (clerks and sales personnel), manual routine (craft and plant workers), and manual non-routine (service workers). Cognitive non-routine jobs are classified as high-skilled, whereas manual non-routine jobs are deemed low-skilled.

The empirical estimations in Table 6 indicate that the average GWG is significant and positive in cognitive non-routine, manual routine and manual non-routine occupations. It shows that men earn more than women in these occupations. In addition, the unexplained part is significant for cognitive non-routine, manual routine and manual non-routine occupations. However, in the case of cognitive routine occupations, the GWG is negative, which elaborates that women earn better than men. The unexplained part is not significant here.

Table 6. Estimates and decomposition of average (at mean) GWG

	Cognitive non-routine	Cognitive routine	Manual routine	Manual non-routine
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

6. Conclusions and Policy Implications

The study examined the GWG in Pakistan as an example of a developing economy. We estimated the overall GWG for the years 2020-2021 and for four different groups of occupations divided into skill levels. The empirical estimations highlighted that the GWG 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 to decrease wage discrimination in developing economies.

Addressing the GWG in low and average-skilled jobs is essential to advancing socioeconomic equality and enhancing the well-being of women, particularly in developing economies where a large share of employed women is working in low and average-skilled occupations. In the same regard, increasing minimum wage levels is crucial to compensate workers, especially women, adequately. 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 with a significant number of female employees with low or average skills, such as housekeeping, retail, and hospitality.

The empirical results described that technical and vocational training are negatively associated with the GWG. Therefore, advancing vocational training initiatives designed for women will provide them with the necessary expertise to meet the job market requirements of high-skilled occupations. 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. It is also necessary to promote the recruitment and hiring of women in traditionally male-dominated roles, which provide high remuneration. There is a need to advocate for flexible working hours, remote work alternatives, and job-sharing possibilities to help women effectively manage their work and family obligations. 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 GWG for low- and average-skilled occupations and all other occupations, the first and most important step is to provide women with easy access to higher education in developing economies. A higher education level provides access to professional and managerial positions that usually come with higher pay. In addition, education enables women to access traditionally male-dominated sectors such as science, technology, engineering, and mathematics (STEM). 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. 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.

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Appendix

Tables

Table A1. Full estimates of the GWG at the mean and along the distribution (Overall sample)

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
Overall										
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***
Explained										
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
T & V training	-0.002***	0.001	0.003	0.004	0.005*	0.002	0.002	0.002	0.007**	0.003**
Below secondary level	0.023***	0.017	0.028	0.025	0.021	0.007	0.007	0.007	0.005	0.002
Secondary or above-level	-0.063***	-0.013	-0.018	-0.024	-0.037*	-0.021**	-0.021**	-0.021**	-0.046***	-0.027***
Average-skilled occupations	0.019***	-0.034**	-0.043**	-0.054**	-0.027	-0.019**	-0.019**	-0.019**	-0.039***	-0.023***
High-skilled occupations	0.000***	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Very high-skilled occupations	-0.066***	0.043**	0.032	0.063**	0.045	0.048***	0.048***	0.048***	0.089***	0.051***
Formal sector	-0.010***	-0.002	-0.003***	-0.015***	-0.011**	-0.006**	-0.006**	-0.006***	-0.010***	-0.005***
Informal sector	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 five children	0.000	0.001	0.003	0.001	0.001	0.000	0.000	0.000	0.001	0.001

Unexplained										
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
T & V training	0.017***	0.088	0.026	0.024	-0.007	0.020	0.008	0.008	-0.037	-0.021
Below secondary level	-0.011*	-0.189	-0.050	-0.077	-0.049	-0.060	-0.033	-0.033	-0.035	-0.030
Secondary or above-level	-0.055***	-0.327	-0.117	-0.140	-0.124	-0.161*	-0.097**	-0.097**	-0.042	-0.074*
Average-skilled occupations	-0.005	0.010	-0.084	-0.015	0.000	0.009	0.031	0.031	0.011	-0.015
High-skilled occupations	-0.007**	0.012	-0.011	-0.008	0.004	0.006	0.006	0.006	0.002	-0.002
Very high-skilled occupations	0.048***	0.047	-0.086	-0.049	0.042	0.038	0.030	0.030	-0.029	-0.005
Formal sector	-0.022	0.144	0.169***	0.341***	0.242	0.168***	0.104***	0.104***	0.164***	0.139***
Informal sector	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 five children	-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***

Table A2. Full estimates of the GWG at the mean and along the distribution (low-skilled occupations)

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
Overall										
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***
Explained										
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
T & V training	0.000	-0.003	-0.012*	0.000	0.000	0.000	0.000	0.000	-0.001	-0.002
Below secondary level	0.019**	0.050	-0.196	-0.014	-0.014	-0.014	-0.014	-0.014	-0.003	-0.019
Secondary or above-level	-0.007	0.003	0.000	0.001	0.001	0.001	0.001	0.001	0.003	0.002

	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
Formal sector	0.033***	-0.026	-0.016*	0.001*	0.001	0.001	0.001	0.001	-0.005*	-0.002
Informal sector	-0.024***	-0.102	-0.219	-0.017	-0.017*	-0.017*	-0.017*	-0.017*	-0.056***	-0.055***
Household size	-0.001	-0.015	-0.036	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.003
Under five children	0.001	0.007	0.036	0.004***	0.004**	0.004**	0.004**	0.004**	0.003	0.003
Unexplained										
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
T & V training	0.001	-0.004	-0.028	-0.005	-0.011	-0.004	-0.004	-0.018	-0.010	-0.012
Below secondary level	0.011	-0.014	0.411	0.105**	0.164**	0.077**	0.077**	0.085*	0.023	0.070
Secondary or above-level	0.015*	-0.016	-0.014	-0.010	-0.010	-0.003	-0.003	0.000	-0.003	0.000
Formal sector	-0.005	0.067	0.037	0.058**	0.100**	0.056***	0.056***	0.067**	0.035***	0.029***
Informal sector	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 five children	-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***

Table A3. Full estimates of the GWG at the mean and along the distribution (average-skilled occupations)

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
Overall										
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***
Explained										
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***

Variables										
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
T & V training	-0.014***	0.011	0.053	0.043	0.080	0.027	0.018	0.018	0.018	0.018
Below secondary level	0.017***	0.010	0.018	0.004	-0.010	-0.004	-0.004	-0.004	-0.004	-0.004
Secondary or above-level	0.020***	0.005	0.026**	0.010	0.009	0.004	0.004	0.004	0.004	0.004
Formal sector	0.083***	-0.012*	0.195	0.090	0.118	0.019	0.013	0.013	0.013	0.013
Informal sector	-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 five children	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000
Unexplained										
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
T & V training	0.127***	-0.024	-0.123	0.041	-0.043	0.078	0.099	0.315*	0.055	0.055
Below secondary level	-0.025	0.023	0.042	-0.164	-0.196	-0.182	-0.183	-0.421**	-0.136**	-0.136**
Secondary or above-level	-0.027***	0.007	0.041**	-0.022	-0.023	-0.031	-0.031	-0.092**	-0.024*	-0.024*
Formal sector	-0.039***	-0.010	0.158	0.021	0.043	-0.037	-0.042	-0.022	0.009	0.009
Informal sector	-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 five children	-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: Own calculations based on Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan. ***, ** & * illustrate the significance at 1%, 5% and 10 %.

Table A4. Full estimates of the GWG at the mean and along the distribution (high-skilled occupations)

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
Overall										
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***
Explained										
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
T & V training	-0.009***	-0.034	-0.008	-0.015	-0.023	-0.023	-0.032*	-0.017	0.018**	0.018**
Below secondary level	-0.002	0.004	-0.024	-0.022	-0.008	-0.008	-0.003	0.000	-0.004	-0.004
Secondary or above-level	-0.005	0.003	-0.018	-0.017	-0.010	-0.010	-0.007	-0.004	0.004	0.004
Formal sector	-0.093***	0.011	0.006	0.007	0.035	0.035	0.048*	0.042**	0.013	0.013
Informal sector	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 five children	-0.001	-0.012	-0.018	-0.015	-0.013	-0.013	-0.010	-0.011	0.000	0.000
Unexplained										
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
T & V training	-0.056***	0.087*	0.026	0.044	0.062	0.062	0.082**	0.049	0.055	0.055
Below secondary level	0.010	-0.093	0.601	0.547	0.199	0.199	0.068	0.011	-0.136**	-0.136**
Secondary or above-level	0.073	-0.154	0.898	0.852	0.496	0.496	0.330	0.207	-0.024*	-0.024*
Formal sector	-0.204*	-0.040	-0.013	-0.016	-0.177	-0.177	-0.256*	-0.220*	0.009	0.009
Informal sector	-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 five children	-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***

Table A5. Full estimates of the GWG at the mean and along the distribution (very high-skilled occupations)

Variables	Mean	q10	q20	q30	q40	q50	q60	q70	q80	q90
Overall										
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***
Explained										
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
T & V training	0.001	0.001	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001
Below secondary level	-0.006	-0.053*	-0.038**	-0.038**	-0.075***	-0.062***	-0.062***	-0.062***	-0.062***	-0.062***
Secondary or above-level	-0.033***	0.055***	0.056***	0.056***	0.067***	0.052***	0.052***	0.052***	0.052***	0.052***
Formal sector	0.003	-0.004	-0.004	-0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Informal sector	-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 five children	0.001	0.000	-0.001	-0.001	0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Unexplained										
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
T & V training	0.002	0.001	-0.012	-0.017*	-0.016	-0.044***	-0.044****	-0.016	-0.016	-0.016
Below secondary level	-0.057*	-0.034	0.048	0.105	0.077*	0.095***	0.095***	0.043***	0.043***	0.043***

Secondary or above-level	-0.836	-0.272	-0.285	-0.278	-0.381	-0.728	-0.728	-0.696	-0.696	-0.696
Formal sector	-0.089	0.124	0.121	0.121	0.040	0.026	0.026	0.026	0.026	0.026
Informal sector	-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 five children	-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: Own calculations based on Labour Force Survey 2020-2021, Pakistan Bureau of Statistics, the Government of Pakistan. ***, ** & * illustrate the significance at 1%, 5% and 10%.