



## MINIMUM WAGE COMPLIANCE IN PAKISTAN: A DEMOGRAPHIC ANALYSIS

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### ABSTRACT

This research study explores compliance with minimum wage legislation in the context of the Pakistan labor market. Despite the laws governing the enforcement of minimum wages, compliance varies among demographic and occupational groups. Based on data from the 2018-19 and 2020-21 Labor Force Surveys, our study shows that compliance is lowest among young and old workers, while noncompliance tends to be greater among female workers, those with lower education levels, contractual employees, and those working in the informal sector. These findings highlight the challenging nature of minimum wage enforcement in Pakistan, the need for targeted policy interventions.

**KEYWORDS:** Minimum wage, labor force survey, demographic analysis

### 1. INTRODUCTION

Standard minimum wages are enforceable by law. They put a legally binding duty on employers to pay employees a minimum wage for labor performed over a specific time, which cannot be decreased by a wage agreement or an individual contract. Nevertheless, just setting a minimum wage with legal force does not imply that it is really followed. In fact, compliance is never flawless, whether in developed or developing countries. Non-compliance with minimum wage rules has direct negative social effects, not just for workers and their families, but also for complying employers, because it provides non-compliant enterprises with an unfair cost advantage. Thus, increasing compliance may be perceived as driven by a variety of factors, including social justice, supporting the rule of law, and fairness.

According to a recent assessment by the International Labor Organization (ILO), out of 327 million wage earners only 19 percent earned at or below the applicable hourly minimum wage (ILO 2020a). The levels of compliance differ greatly between nations. Empirical data from industrialized nations reveals that in the United States in 2014, 2.2 percent of all hourly wage earners received wages below the legal minimum. In April 2013, it was projected that 7.3 percent of 16–17-year-olds, 5.5 percent of 18–20-year-olds, and 0.8% of adults in the United Kingdom earned less than the appropriate age-related minimum wage (World Bank 2016).

Rani et al. (2013) looked at the extent of minimum wage coverage and compliance in developing and emerging countries. The study reveals that 61 million workers in these nations—or 16 percent of all wage earners—are not subject to minimum wage laws, and a sizable fraction of them are women or belong to vulnerable groups like domestic workers or those employed in the informal economy. Additionally, almost one-third of wage employees in these nations have coverage yet are paid less than the minimum wage. These underpaid workers typically get only between 50 percent and 75 percent of the appropriate minimum wage, which is frequently substantially less than the amount necessary for them and their families to live comfortably.

Although wage employment makes up a very tiny portion of all employment in many developing nations, these countries' minimum wage laws often cover both formal and informal pay employment. However, minimum wage coverage and compliance are frequently ignored in the literature even though they play a significant role in determining the degree of protection.

This research paper in this regard contributes to literature of minimum wage in two diverse ways. The first objective of this study is to bring focus to the gaps in minimum wage compliance for the economy of Pakistan. This paper ignores the heated debate regarding the impact of minimum wages on employment. It makes no attempt to experimentally analyze the theoretical foundations of the compliance literature<sup>4</sup>. Instead, it presents empirical estimates of the percentage of wage earners who get less than the minimum wage. The investigation, to the best of its ability, demonstrates levels of compliance among employees from certain demographic and labor market characteristics such as age, gender, education, formal and informality of work, pieces of training etc. The second objective of the study is to explore the demographic and labor market traits that determine the likelihood of minimum wage compliance through logistic regression analysis. In this regard the study uses data from the most recent Labor Force Survey (LFS) for the years 2020–21 and selects 2018–19 as a baseline to represent the period prior to

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<sup>4</sup> See, for example, Ashenfelter and Smith (1979); Squire and Suthiwart-Narueput (1997); Weil (2004 and 2005); Basu, Chau and Kanbur (2010)

the COVID-19 outbreak. By analyzing labor market patterns and features both before and after the pandemic's onset, this analytical strategy aims to give a neutral knowledge of the dynamics of the labor market. The remainder of the paper is organized as follows. Section 2 describes the literature review on the compliance rate of minimum wage. Section 3 describes the data and methodology. Section 4 presents the estimates of compliance rate, and the determinants of noncompliance and section 5 concludes.

## **2. LITERATURE REVIEW**

Belman and Wolfson (2014) report on over 200 policy and academic papers on minimum wages published between 1992 and 2013. However, a rigorous literature search reveals only a few scholarly studies on noncompliance, with only two concentrating on its quantification. Similarly, a literature analysis commissioned by the UK Low Pay Commission (LPC) on noncompliance resulted in mostly reports and evidence presented to the LPC itself (13).

Initial academic research Ashenfelter, O, and Smith R. (1979), Gramlich, Flanagan and Wachter (1976), Kennan (1995), concentrated on determining the causes of noncompliance in developed countries. Gramlich et al (1976) used data from the United States to demonstrate statistical correlations between noncompliance and other characteristics. Ashenfelter and Smith (1979) used the same data but created a cost-benefit framework that served as the theoretical foundation for the works that followed. In these publications, the accuracy of the non-compliance measure is secondary: slight differences do not have a significant impact on the broad functional correlations that are being found (for example, between non-compliance rates and industry or profession). Even in research that precisely estimates the likelihood of noncompliance at the individual level (Garnero et al. (2015), Le et al 2013), (Ye et al 2015), the quantitative and qualitative results don't seem to be sensitive to the standards of noncompliance used.

Since 2000, the focus of non-compliance analysis has turned to low-income countries, notably Latin America and Sub-Saharan Africa (Ye et al (2015)). These articles seldom address data accuracy concerns. A possible cause might be that the data are restricted; for example, Strobl and Walsh (2003) only had categorical data, whereas Ye et al (2015) only had yearly salary, with extra payments not correctly defined. However, a more likely reason is the extremely high rates of non-compliance in LMICs. Cross-country studies such as Bhorat et al (2015) and Randolph et al (2015) demonstrate compliance levels significantly below 100%; for Mali, Rani et al (2013) estimate compliance at 10%. Small data errors are less significant since they have less effect on the outcomes. Yamada (2012) observes, for example, that accounting for measurement error changes compliance rates, but with compliance rates below 40% in all sectors, conclusions are extremely resilient to alternative specifications.

In the past couple of years, there has been a resurgence of interest in non-compliance in high-income countries, partly spurred by OECD-sponsored research and an awareness that the OECD's high compliance rates are not without problems. In Europe, for example, Kampelmann et al (2013) consistently emphasize the importance of measurement inaccuracy on non-compliance estimations. In response, they provide alternate metrics of noncompliance in which the genuine minimum wage is decreased by 25% to obtain 'lower bound' estimates. Garnero et al. (2015a) present for both 25% and 15% margins of error, which is primarily to allow for near compliance in nations where the minimum wage has been agreed upon rather than mandated.

Addressing the issue that what compliance really means, Bhorat et al (2013) suggest that there is a qualitative difference between being paid one or two cents less than the minimum wage and being paid a dollar or euro less. Authors offer a weighted index that ignores minor violations while also including counts and linear summations as special situations. They find a connection between the volume and scope of infractions by applying their methods to South Africa. Using data from Honduras and Ham (2015) gets to the same result.

To summarize, academic researchers have agreed to accept mistakes in the measurement of noncompliance since the scale connections they are interested in are not sensitive to the exact specification. This conclusion may, however, result from the fact that many analyses make ad hoc changes to account for incomplete or low-quality data, which gives rise to the circular reasoning that low-quality data proves high-quality data are not required.

## **3. METHODOLOGY AND VARIABLE CONSTRUCTION**

### **3.1. DATA AND VARIABLE DESCRIPTION**

#### **3.1.1. DATA SOURCE**

The data is taken from the Pakistan labor force survey for year 2018-19 and 2020-21 that is published yearly since 1963 through the Federal Bureau of Statistics. The Labor Force Survey reports labor force involvement for whole family members of more than 10 years. The survey also contains queries lying on labor market, education as well as socioeconomic determinants of household work.

#### **3.1.2. SAMPLE SELECTION**

A representative sample was drawn from the dataset to ensure the generalizability of the findings. The sample selection criteria included all the employed workers, as the Regular paid employees with fixed wage, Casual paid employees, Paid worker by piece rate or work performed and paid non-family apprentice.

### 3.2. VARIABLES CONSTRUCTION

**Table 1: Variable construction**

Variable	Explanation	Source
Monthly Wages	For workers without available monthly wages, we applied the ILO's established method, wherein a month is considered to comprise an average of 4.33 weeks. <sup>5</sup>	Authors own
Compliance rate	The percentage of workers earning more than the legal minimum wage. <sup>6</sup>	Authors own/LFS
Age	Child labor (for workers below 15 years) "15-18" (for workers aged 15 to 18 years) "19-25" (for workers aged 19 to 25 years) "25-65" (for workers aged 25 to 65 years) "Above 65" (for workers aged above 65 years)	Authors own/LFS
Sectors and occupation classification	We have used Annexure-A provided by Pakistan bureau of statistics which contains the classification of the nature of the work or sectors such as classification of agriculture, industry, and services sectors and the classification of occupations <sup>7</sup> .	PBS
Education	"Uneducated" (for individuals without formal education) "Below Metric" (for individuals with education below the metric level) "Metric and Intermediate" (for individuals with metric and intermediate education) "Professional Degree" (for individuals with professional qualifications) "Higher Degrees" (for individuals with higher academic degrees)	Authors own/LFS
Informal sector	The formal sector employment refers to all those persons that are employed in entities and organizations that fall under the purview of the Federal Government, Provincial Governments, Local Body Governments, Public Enterprises established through acts of the national or provincial assembly, Public Limited Companies, and all other enterprises with more than ten employees.	LFS
Formal sector	The informal sector includes all economic activities and firms that do not fit the criteria and are not governed by the official sector's regulatory framework. Small-scale firms, microenterprises with less than ten employees.	LFS
Training	Has... ever completed/ currently receiving any. technical, vocational, and educational training/courses such as auto or engine mechanics, carpentry, typing, computer, tailoring etc.	LFS
Region	Geographic regions were categorized into provinces such as Punjab, Sindh, Baluchistan, and Khyber Pakhtunkhwa, and rural and urban areas. These were defined based on the available information in the dataset	LFS

### 3.3. METHODOLOGY

The present study aims identify the workers who are getting minim wage and vice versa, and to examine the factors influencing the likelihood of minimum wage compliance for employed workers in Pakistan. The research question centers around identifying which labor market characteristics contribute significantly to the likelihood of the compliance rate. To address the research question and identify the significant predictors minimum wage compliance we employ bivariate and logistic regression analysis.

Across-tabulation (crosstab) is a common bivariate method used to analyze the relationship between two categorical variables. It provides a straightforward way to examine the distribution of one variable relative to another and allows researchers to identify patterns and associations between the two variables. The cross-tabulation generates a table, often referred to as a contingency table, which displays the frequency counts or percentages of the joint occurrence of the two variables.

Similarly, we apply Kramer (1991) Logit Logistic regression specifically designed for modeling binary outcomes, making it well-suited for analyzing the probability of a dichotomous event, such as success or failure.

To check the likelihood between labor market characteristics and minimum wage compliance econometric model can be specified for each year as:

$$y = \beta_0 + \beta X + \mu \dots \dots \dots (3.1)$$

Here X is the vector of demographic variables while  $\mu$  is error term which is assumed to be normally distributed with mean zero and

<sup>5</sup> <https://ilostat.ilo.org/resources/concepts-and-definitions/description-wages-and-working-time-statistics/>

<sup>6</sup> At the time of the 2018-19 the minimum wage in Pakistan was 15000 for all provinces and in 2020-21 it was Rs 19000. but for the year 2020-21 we used the minimum wage of 2019-20 that is Rs.17500. The reason for using the minimum wage of 2018-19 is because minimum wage takes time to implement.

<sup>7</sup> [https://www.pbs.gov.pk/sites/default/files/labour\\_force/publications/lfs2020\\_21/Pakistan\\_Standard\\_Industrial\\_Classification.pdf](https://www.pbs.gov.pk/sites/default/files/labour_force/publications/lfs2020_21/Pakistan_Standard_Industrial_Classification.pdf)

constant variance while  $y = \begin{cases} 1 \\ 0 \end{cases}$

$y$  is 1 if there is compliance of minimum wage and otherwise it is zero. While the independent variables are the matrix of workers characteristics.

the intercept term ( $\beta_0$ ), it serves as the baseline log-odds when all predictor variables are held at zero. The individual coefficient of independent variable indicates the change in the log-odds of the outcome for a unit change in the corresponding predictor variable, assuming all other variables remain constant. Positive coefficients denote an increase in the log-odds, implying a higher likelihood of the outcome occurring, whereas negative coefficients suggest the opposite.

#### 4. RESULTS

##### 4.1. DESCRIPTIVE STATISTICS

The compliance rate of wage earners between the years 2018–19 and 2020–21 is shown in table [2], which has been segmented down by age, education, and gender as well as other factors associated to the workforce. Compliance rates are an important indicator of the extent to which wage workers are getting the minimum wage. This table provides important insights into the link between socio-demographic characteristics and compliance with minimum wage and by analyzing these compliance rates across various demographic features.

**Table 2: Percentage of Workers who are Getting the Minimum Wage**

	2018-19		2020-21	
	noncompliance	compliance	noncompliance	Compliance
<b>Panel A Age</b>				
child labor	88.31	11.69	88.28	11.72
15_18	70.75	29.25	73.75	26.25
19_25	50.50	49.50	57.09	42.91
25_65	30.51	69.49	37.51	62.49
65_92	55.25	44.75	53.43	46.57
<b>Panel B Gender</b>				
Female	68.93	31.07	65.03	34.97
Male	34.77	65.23	42.54	57.46
<b>Panel C Education</b>				
Uneducated	56.96	43.04	65.66	34.34
Below metric	42.93	57.07	51.77	48.23
Metric and intermediate	27.82	72.18	31.15	68.85
Professional degree	5.26	94.74	2.30	97.70
Higher degrees	13.13	86.87	13.95	86.05
<b>Panel D: contractual status</b>				
Permanent	5.41	94.59	2.44	97.56
Contractual	20.21	79.79	20.19	79.81
Without contract	50.15	49.85	56.59	43.41
<b>Panel F training status</b>				
Without training	40.46	59.54	47.28	52.72
With training	34.63	65.37	38.39	61.61

The table presents the compliance rate of specific age groups for the years 2018-19 and 2020-21. In both periods, child labor remained the least compliance, with percentages of 11.69 and 11.72 percent respectively. Among adolescents aged 15 to 18, there was a minor decrease from 29.25 to 26.25 percent. Notably, the age group 19 to 25 saw a more significant decline from 49.50 percent to 42.91 percent over the two years. For adults aged 25 to 65, the compliance rate decreased from 69.49 percent to 62.49 percent. However, individuals aged 65 to 92 exhibited a slight increase from 44.75 percent to 46.57 percent.

Similarly, the compliance rate of females employed works grew from 31.07 percent in 2018–19 to 34.97 percent in 2020–21. The proportion of men workers on the other hand, fell from 65.23percent in 2018–19 to 57.46 percent in 2020–21. These findings point to a meaningful change in the compliance rate in gender across the period in question. While the compliance rate in male workers in the total employees declined, the percentage of females showed a slight increase.

The percentage of workers with their education level that are paid the minimum wage for the years 2018-19 and 2020-21. As shown in the figure in 2018–19, 43.04 percent of uneducated workers were getting the minimum wage and in 2020–21, this percentage dropped to 34.34percent, indicating a fall in the compliance rate in uneducated workers. The compliance rate for wage earners with less than a metric level of education decreased from 57.07percent in 2018–19 to 48.23percent in 2020–21. Like this, the percentage of workers with intermediate and metric education also saw a little decline, falling from 72.18 percent to 68.85 percent. Interestingly, the compliance rate of workers with professional degrees increased significantly from 94.74percent in 2018–19 to 97.7percent in 2020–21. With 86.87percent in 2018–19 and 86.05percent in 2020–21, the proportion of people with higher education remained very consistent.

The compliance rate was 94.59 percent of workforce that was employed in Permanent jobs during the 2018–19 year. While 79.79 percent of the employed workers reported having minimum wage having Contractual employment, whereas compliance rate was just 49.85percent for wage earners having Without contract work. The compliance rate of job status gradually changed in 2020–21, with only minor adjustments. The compliance rate of permanent employees climbed to 97.56percent, while compliance rate for workers with contractual jobs stayed mostly unchanged at 79.81percent, while work that was Without contract fell to 43.41percent.

Likewise, the compliance rate in workers having training is more in both years. In 2018-19 it was 65 percent in workers with training while it was 59 percent in workers without training. The compliance rate for both the workers with and without training declined in the year 2020-21.

The compliance rate of minimum wage varies across the provinces. In 2018-19 the compliance rate was highest in Baluchistan with 76.72 percent, followed by Khyber Pakhtunkhwa with 70.65 percent. while in Punjab and in Sindh it was 58.89 percent and 57.89 percent, respectively. In 2020-21 the compliance rate in all provinces declined while the order remained same with Baluchistan with highest and Sindh with the lowest compliance rate.

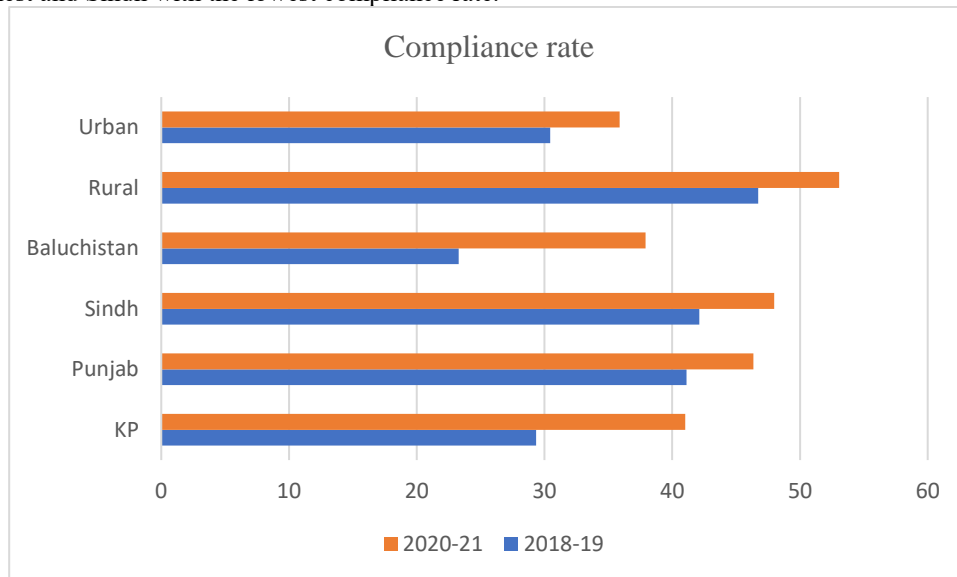


Figure 1: Authors own calculations

The overall compliance rate is higher in urban areas as compared to rural areas. In 2018-19 it was 53.27 percent in rural areas while 69.55 percent of the employees were getting the minimum wage. In the year 2020-21 the compliance rate declined in both regions.

As shown in the table provided in appendix A Table [2], the assessment of compliance rates regarding the minimum wage is expanded to include various sectors, professions, and employment status.

The compliance rate in the category of Managers has the largest representation out of all the mentioned categories, with a representation of 97.07percent, followed by Clerks with 92.48 percent and Technicians associate professionals (85.99percent). Professionals made up 71.63 percent, while Plant machine operators and Skilled Agriculture workers made up almost 71 percent and 68 percent of the population, respectively. The compliance rate was made up of 61.77 percent for Crafts trade workers and 59.43percent Services sale workers. Elementary workers have the lowest proportion of any group, with 43.65percent. The compliance rate in all categories decreased in 2020-21 as compared to 2018-19 except for the professional. In 2018–19, the compliance rate in three major sectors—agriculture, industry, and services—contributed a combined 20.31 percent, 62.05 percent, and 68.08 percent of the total. In terms of the compliance rate during this time, the Services sector had the highest, followed by Industry, and Agriculture had the smallest compliance rates. However, there is a noticeable change in the compliance rate in the years 2020–21. in Agriculture sector the compliance rate drops to 17.36percent, showing a relative



reduction in the sector's compliance rate. Similarly, in the industry sector it fell sharply to 51.25percent, showing a sharp reduction. With a share of 63.42percent, the compliance rate in the Services sector remained highest.

In 2018–19 around 71.95 percent of the workforce classified as Regular paid employees were getting the minimum wage which makes up most of the workforce. The compliance rate for Casual Paid Employees was 51.82 percent and Paid Employees by Task 39.95percent, respectively. While the compliance rate among Paid nonfamily apprentices was 8.47 percent. In 2020–21, there were significant shifts in the compliance rate. The proportion of Regular paid employees fell to 66.77percent, showing a reduction in the number of people with secure, long-term jobs. The compliance rate in Casual paid employees fell to 39.09 percent, showing a fall in temporary or part-time employment. Additionally, paid employees by task saw a decrease to 36.25percent. The biggest shift was seen in Paid nonfamily apprentices, which fell to just 1.6percent, indicating a major decline in those participating in formal apprenticeship programs.

In 2018–19, the compliance rate in formal sector was 83.68 percent, percent compared to 45.67percent of those working in Informal employment. This suggests that a sizeable number of people engage in informal employment, which frequently do not get the minimum wage. In 2020-21 the compliance rate for both the formal and informal sector falls.

#### 4.2. REGRESSION RESULTS

Insightful information about the complex link between workers characteristics and a binary variable that is the compliance of minimum wage result is extracted through the logistic regression analysis, which leads to a detailed knowledge of the variables influencing the observed outcomes. The findings, which are outlined below, offer insight on the independent variables' relevance and contributions within the defined model framework by demonstrating how they affect the log-odds of the outcome variable.

**Table 3: Logistic regression and the Odd Ratios**

VARIABLES	2018-19		2020-21	
	Logit	odds	Logit	Odds
Compliance				
15-18	1.009*** (0.133)	2.743*** (0.364)	0.807*** (0.0932)	2.241*** (0.209)
19-25	1.615*** (0.125)	5.029*** (0.629)	1.278*** (0.0882)	3.591*** (0.317)
25-65	2.457*** (0.123)	11.67*** (1.436)	2.067*** (0.0869)	7.899*** (0.686)
> 65	1.424*** (0.237)	4.154*** (0.984)	1.428*** (0.155)	4.170*** (0.646)
Male	1.818*** (0.0477)	6.161*** (0.294)	1.363*** (0.0305)	3.909*** (0.119)
Below metric	0.409*** (0.0338)	1.505*** (0.0508)	0.402*** (0.0212)	1.496*** (0.0316)
Metric intermediate	0.899*** (0.0427)	2.458*** (0.105)	1.099*** (0.0267)	3.000*** (0.0801)
Professional degree	3.339*** (0.239)	28.18*** (6.723)	4.356*** (0.220)	77.93*** (17.15)
Higher degrees	2.299*** (0.0869)	9.961*** (0.866)	2.434*** (0.0555)	11.41*** (0.634)
Contractual	-1.518*** (0.0953)	0.219*** (0.0209)	-2.347*** (0.0748)	0.0956*** (0.00715)
Without contract	-2.404*** (0.0712)	0.0904*** (0.00643)	-3.402*** (0.0655)	0.0333*** (0.00218)
Training	0.566*** (0.0340)	1.761*** (0.0599)	0.654*** (0.0236)	1.923*** (0.0453)
Constant	1.046*** (0.0886)	2.846*** (0.252)	2.082*** (0.0761)	8.021*** (0.610)
Observations	28,815	28,815	68,486	68,486

Robust standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

As given in the table [3] The odds ratios show the relative possibility of earning a minimum wage in various age groups between 2018-19 and 2020-21. An odds ratio of 2.743 for the age group 15-18 shows that persons in this age range are roughly 2.7 times more likely to get minimum wage than child labor. Similarly, the odds ratio of 5.029 for the age group 19-25 implies that those between the ages of 19 and 25 have a 5 times greater chance of earning the minimum wage. Age 25 to 65 has the greatest odds ratio of 11.67, meaning that this age group has an approximately 11.7-times higher likelihood of receiving minimum wage than child labor. Finally, the odds ratio of 4.154 for those above 65 suggests that individuals over the age of 65 have about 4.2 times higher odds of compliance rate. The order of the compliance rate stays the same for both years.

Similarly, the odds ratio of 6.161 shows that males had about 6.2 times higher probability of compliance rate as compared to females during the period of 2018–19. In other words, during the time, men were approximately 6.2 times more likely than women to get the minimum wage. In 2020-21 the odds ratio of male is 3.909. men remained to have greater odds compliance result than females, although the strength of the association lowered. During this time, males were around 3.9 times more likely than female workers.

Compared to the uneducated group, people with education below the metric level had somewhat greater probabilities of the stated result in both 2018–19 and 2020–21. The workers with education below then matric roughly 1.5 times more likely to get minimum wage than the uneducated group, according to the odds ratios of 1.505 for 2018–19 and 1.496 for 2020–21. The odds ratio increased from 2.458 in 2018–19 to 3 in 2020–21 for the metric intermediate education level. This suggests that, compared to the uneducated group, those with a metric intermediate education had probabilities of the result that were roughly 2.5 times greater in 2018–19 and nearly 3 times higher in 2020–21.

Individuals with professional degrees have odds ratios that are noticeably greater than 1, which suggests a strong link with the outcome. The probability of the minim wage compliance is roughly 28.18 times greater for those with a professional degree in 2018–19 than uneducated workers. those with a professional degree having around 77.93 times higher likelihoods than the uneducated group in 2020–21, this link got even stronger. In 2018-19, individuals with higher degrees had approximately 9.961 times higher odds of the outcome compared to the uneducated group, and this increased slightly to about 11.41 times higher odds in 2020-21. Among the wage earners, the individual having professional degrees have more likelihood to get minim wage as compared to other levels of education.

Compared to permanent contracts, contractual workers had noticeably lower probabilities of the minimum wage compliance. Contractual workers had around 22percent and 9.56 percent of the likelihood of getting minimum wage as compared to permanent contract workers, respectively, according to odds ratios of 0.219 for 2018–19 and 0.0956 for 2020–21. This suggests that the likelihood of the result differs noticeably between the two groups.

Similarly, individuals without a contract had much lower odds of the outcome compared to permanent contract employees. The odds ratio of 0.0904 for 2018-19 and 0.0333 for 2020-21 suggests that individuals without a contract had about 9.04 percent and 3.33 percent of the odds of experiencing the outcome compared to permanent contract employees, respectively. This highlights a significant disparity in the risk of the outcome between employees with permanent contracts and those without contracts.

In both 2018-19 and 2020-21, individuals who received training had higher odds of the specified outcome compared to those without training. The odds ratio of 1.761 for 2018-19 and 1.923 for 2020-21 suggests that individuals with training had about 1.76 times and 1.92 times higher odds of experiencing the outcome compared to those without training, respectively.

In both 2018-19 and 2020-21, individuals from Punjab had lower odds of compliance compared to those from Khyber Pakhtunkhwa. The odds ratio of 0.552 for 2018-19 and 0.62 for 2020-21 suggests that individuals in Punjab had about 55.2percent and 62percent of the odds of compliance compared to individuals from Khyber Pakhtunkhwa, respectively. This shows that compliance rates were relatively lower in Punjab compared to Khyber Pakhtunkhwa.

Similarly, individuals from Sindh had lower odds of compliance compared to those from Khyber Pakhtunkhwa. The odds ratio of 0.411 for 2018-19 and 0.435 for 2020-21 suggests that individuals in Sindh had about 41.1percent and 43.5percent of the odds of compliance compared to individuals from Khyber Pakhtunkhwa, respectively. This shows that compliance rates were notably lower in Sindh compared to Khyber Pakhtunkhwa.

In both time periods, individuals from Baluchistan had higher odds of compliance compared to those from Khyber Pakhtunkhwa. The odds ratio of 1.204 for 2018-19 and 0.832 for 2020-21 suggests that individuals in Baluchistan had about 1.204 times and 0.832 times higher odds of compliance compared to individuals from Khyber Pakhtunkhwa, respectively. This shows that compliance rates were relatively higher in Baluchistan compared to Khyber Pakhtunkhwa, but the effect seems to have decreased in 2020-21.

The odds ratio of 2.122 for 2018-19 shows that individuals living in urban areas had approximately 2.122 times higher odds of compliance compared to those living in rural areas during that time. This suggests that compliance rates were notably higher in urban areas. For the year 2020-21 the odds ratio of 2.144 for 2020-21 suggests that individuals living in urban areas had approximately 2.144 times higher odds of compliance compared to those living in rural areas during that time. This shows that the higher compliance rates observed in urban areas persisted in 2020-21 as well.

As shown in the table provided in appendix B Table [3] the probability of minimum wage compliance across different sectors, occupations and employment status is estimated. Results show that individuals working in the industry sector had considerably greater probability of getting minimum wage in both 2018-19 and 2020-21 than those working in the agriculture sector. Workers

in the industry sector had probabilities of meeting the result that were respectively 3.94 times (or nearly 394percent) and 3.03 times (or approximately 303 percent) greater than those in the agriculture sector, according to odds ratios of 3.938 for 2018–19 and 3.031 for 2020–21.

Individuals engaged in the Services sector had greater probability of the result than those involved in Agriculture. Individuals in the services sector had around 2.96 times (or approximately 296percent) and 2.22 times (or approximately 222percent) better odds of being paid minimum wage respectively, according to odds ratios of 2.964 for 2018–19 and 2.221 for 2020–21.

Likewise, Professionals had much lower probabilities of getting minimum wage than managers did in both 2018–19 and 2020–21. The chances ratio of 0.188 for 2018–19 and 0.19 for 2020–21 shows that professionals had probabilities of encountering the result around 0.19 times (or nearly 19 percent) higher than managers. In other words, they had a considerably lower likelihood of contributing to the relevant result.

Regarding managers, the technicians and associate professionals had a lesser chance of success. They had around 0.63 times (or nearly 63percent) and 0.59 times (or approximately 59percent) the odds of encountering the result compared to managers, respectively, according to odds ratios of 0.634 for 2018–19 and 0.594 for 2020–21. Elementary workers are those who are least likely to get the minimum wage in both years among all professions.

Employees in the formal sector had considerably greater probabilities of minimum wage compliance than those in the informal sector in both 2018-19 and 2020-21. The odds ratios of 2.248 for 2018-19 and 2.136 for 2020-21 show that formal sector employees had about 2.25 times and 2.14 times higher than informal sector workers. This suggests an important variance in the likelihood of minimum wage compliance across the two sectors.

## 5. CONCLUSION

Minimum wages are becoming more prevalent as a policy approach in developing countries to tackle worker exploitation and increase living conditions. However, a law like this can only be effective if it is properly enforced. We discover that noncompliance is an important component of the Pakistan labor market, with noncompliance rates as high as 88.31 percent for some classes of employees, using labor force survey data for years 2018-19 and 2020-21.

Compliance with minimum wage is marked by diverse trends across demographic and occupational characteristics. It is the lowest among young labor aged 15-18 and 19-25, as well as old labor over 65. Noncompliance, on the other hand, is higher among female workers, low-educated persons, contractual employees, and those in the informal sector, emphasizing vulnerabilities in these sectors of the workforce. These findings emphasize the need of targeted policy measures to guarantee that all employees, regardless of age, gender, education, or job type, get salaries that meet or surpass minimum wage standards, protecting their economic well-being and labor rights.

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## APPENDIX A

**Table 1: Minimum wage compliance across sectors/ occupations**

Panel A Industry	2018-19		2020-21	
	noncompliance	compliance	noncompliance	compliance
Agriculture	79.69	20.31	82.64	17.36
Industry	37.95	62.05	48.75	51.25
Services	31.92	68.08	36.58	63.42
<b>Panel B employment status</b>				
Regular paid employee	28.05	71.95	33.23	66.77
Casual paid employee	48.18	51.82	60.91	39.09
Paid employee by task	60.05	39.95	63.75	36.25
Paid nonfamily apprentice	91.53	8.47	98.40	1.60
<b>Panel D:contractual status</b>				
Permanent	5.41	94.59	2.44	97.56
Contractual	20.21	79.79	20.19	79.81
Without contract	50.15	49.85	56.59	43.41
<b>Panel E: Formality of the sector</b>				
Informal	54.33	45.67	60.80	39.20
Formal	16.32	83.68	19.99	80.01
<b>Panel F training status</b>				
Without training	40.46	59.54	47.28	52.72
With training	34.63	65.37	38.39	61.61
<b>Panel F: Professions</b>				
Managers	2.93	97.07	4.46	95.54
Professionals	28.37	71.63	27.77	72.23
Technicians_associate_professionals	14.01	85.99	17.40	82.60
Clerks	7.52	92.48	8.87	91.13
Services sale workers	40.57	59.43	47.04	52.96
Skilled Agriculture workers	31.88	68.12	31.38	68.62
Crafts trade workers	38.23	61.77	44.69	55.31

**APPENDIX B**

**Table 2 : logistic regression /odds ratios across sectors and occupations**

VARIABLES	2018-19		2020-21	
	2018-19 logit	odd ratio	Logit	Odd ratios
Compliance				
Industry	1.371*** (0.0522)	3.938*** (0.206)	1.109*** (0.0351)	3.031*** (0.106)
Services	1.087*** (0.0544)	2.964*** (0.161)	0.798*** (0.0381)	2.221*** (0.0845)
Casual paid employee	0.00123 (0.0372)	1.001 (0.0373)	-0.276*** (0.0251)	0.759*** (0.0191)
Paid employee by task	-0.434*** (0.0477)	0.648*** (0.0309)	-0.586*** (0.0350)	0.556*** (0.0195)
Paid nonfamily apprentice	-2.653*** (0.239)	0.0704*** (0.0169)	-3.963*** (0.359)	0.0190*** (0.00682)
Formal sector	0.810*** (0.0412)	2.248*** (0.0925)	0.759*** (0.0255)	2.136*** (0.0545)
Professionals	-1.670*** (0.222)	0.188*** (0.0418)	-1.660*** (0.120)	0.190*** (0.0228)
Technicians associate professionals	-0.456* (0.233)	0.634* (0.148)	-0.521*** (0.128)	0.594*** (0.0760)
Clerks	-0.101 (0.255)	0.904 (0.231)	0.00123 (0.143)	1.001 (0.144)
Services sale workers	-1.489*** (0.223)	0.226*** (0.0503)	-1.381*** (0.122)	0.251*** (0.0307)
Skilled Agriculture workers	-1.022*** (0.279)	0.360*** (0.100)	-0.813*** (0.172)	0.443*** (0.0762)
Crafts trade workers	-1.007*** (0.224)	0.365*** (0.0818)	-0.917*** (0.123)	0.400*** (0.0491)
Plant machine operators	-0.953*** (0.226)	0.385*** (0.0872)	-0.974*** (0.124)	0.378*** (0.0468)
Elementary workers	-1.827*** (0.223)	0.161*** (0.0358)	-1.818*** (0.122)	0.162*** (0.0198)
Constant	-2.452*** (0.258)	0.0861*** (0.0223)	-2.144*** (0.153)	0.117*** (0.0179)
Observations	28,817	28,817	68,486	68,486
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				