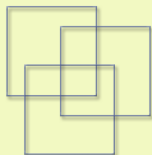ASIAN **DECENT WORK** DECADE 2006 2015

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ILO Asia-Pacific Working Paper Series

The gender wage gap in Bangladesh

Steven Kapsos
May 2008

Regional Office for Asia and the Pacific

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Preface

Since it was founded in 1919, the ILO has been committed to promoting women's rights at work and to achieving equality between women and men. The ILO's mandate in this area is enshrined in its Constitution and is also expressed in a number of resolutions on gender equality adopted by the International Labour Conference. The most recent of these resolutions, adopted in 2004, concerns the promotion of gender equality, pay equity and maternity protection.

This paper by Steven Kapsos examines the role that gender plays in determining wage rates in Bangladesh. This analysis was made possible due to a new national occupational wage survey that was conducted by the Bangladesh Bureau of Statistics in 2007, with technical and financial support from the ILO.

Using econometric modelling techniques, the paper presents the first estimates of hourly gender wage gaps by level of education, establishment size and by individual industry. It highlights the significant effect of gender-based occupational and industrial segregation in shaping men's and women's average wage rates in Bangladesh and provides evidence of gender-based wage differences in the country.

The paper finds evidence of high and persistent returns to education, which suggests that the economic benefits of increased investment in education – starting with basic primary education for all – could be significant. In addition to benefiting workers' wages, there is evidence that increased education could play a substantial role in lowering the overall gender wage gap in Bangladesh, which could yield further dividends for society.

This paper is part of the ILO Asia-Pacific Working Paper Series, which is intended to enhance the body of knowledge, stimulate discussion and encourage knowledge sharing and further research for the promotion of decent work in Asia and the Pacific.

Sachiko Yamamoto
Regional Director
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Acknowledgements

Abstract

This study utilizes the 2007 Bangladesh Occupational Wage Dataset to investigate determinants of earnings and to estimate gender wage differentials in a large sample of non-agricultural workers in the country. The Mincerian regression model and Blinder-Oaxaca wage decomposition model are utilized to estimate and decompose the observed gender earnings gaps into the portion that can be explained by differences between women and men in their productive endowments (in factors such as education) and the portion that is unexplained, owing to differences in returns to these productive factors and due to other unknown effects. The paper presents the first estimates of hourly gender wage gaps by industry, level of education and establishment size that control for other characteristics of workers in Bangladesh and the first quantitative estimates of the effects of industrial and occupational segregation on average wage rates for women and men in the country. It also provides a thorough decomposition of industry-level gender wage gaps into explained and unexplained components, which sheds light on the potential role played by gender-based discrimination in wage setting in different industries in Bangladesh.

The study finds that women earn an average of 21 per cent less per hour than men. Controlling for differences in age, educational background, industry, occupation and geographic location, yields an estimated gender wage gap of 15.9 per cent, but including the effects of industrial and occupational segregation into the estimate yields an estimated wage gap of 23.1 per cent. Industrial segregation increases the overall wage gap by an estimated 7 percentage points. Gender gaps are observed in every industry, across all levels of education and in every establishment size class, with the largest gaps observed in the hotels & restaurants and construction industries, among workers with primary education or less, and in mid-sized establishments. Gender-based occupational segregation increases the gender wage gap in the construction, financial intermediation and manufacturing industries, but mitigates it in the education, hotels & restaurants and other services industries. The results make clear that increased education has an important role to play to lower the gender wage gap in Bangladesh: the largest gender gap is observed among illiterate workers and the second largest gap is observed among literate workers with less than a primary school education.

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1. Introduction

That women's earnings tend on average to be less than men's throughout all regions of the world is an oft-cited indicator of gender-based inequality in labour markets. Indeed, a recent report by the International Trade Union Confederation finds an average "global" gender pay gap of 16.5 per cent, with an average pay gap in Asian countries of 21.2 per cent based on countries with available sex-disaggregated earnings data.[1] In Bangladesh, a country with low per-capita GDP and limited resources for conducting surveys on wages, relatively little is known about differences between women and men with regard to earnings and the extent to which any gender-based earnings differential can be explained by women's and men's relative endowments in productive factors such as human capital (education and experience) versus outright labour market discrimination.

This study seeks to estimate the gender wage gap among a large sample of non-agricultural workers in Bangladesh, by controlling for differences between women and men in terms of relative endowments, and differences in industry, occupation and the geographic location of employment. In addition to the overall gender wage gap, industry-level wage gaps are estimated, as are gaps among women and men with different educational levels. These disaggregated results are calculated to provide a fuller picture of ongoing drivers of wage differentials in the country. The wage gaps are further analysed using the Blinder-Oaxaca decomposition methodology to identify the extent to which they can be explained by differences in relative endowments versus differences in the returns that women and men receive to these endowments, which may be indicative of discrimination. The role that industrial and occupational segregation plays in wage outcomes is examined in detail.

The 2007 Bangladesh Occupational Wage Survey reveals very low average hourly wages of 16.8 taka, the equivalent of approximately 25 cents/hour in current 2007 US$, or about $1.21 per hour at purchasing power parity exchange rates. The survey results also highlight the existence of a significant and persistent gap in earnings between women and men: on average, men in the surveyed industries earn over 21 per cent more per hour of work than women.

As wages provide a crucial link to living standards – particularly for the poor who rely on the earnings derived from their labour for survival – it is important to identify determinants of wages, including returns to human capital, and to ascertain why wages vary among different groups, such as women and men, younger and older workers and workers in different industries. Furthermore, as expectations with regard to returns to labour are likely to influence individual and household decisions vis-à-vis investments in education and other productive factors, understanding the determinants of wages and wage differentials can lead to a more efficient and equitable allocation of resources within households. That is, the existence of a gender wage gap and failure to understand the root causes of the gap could result in a negative feedback loop: if it is seen that women earn less than men, this could discourage parents from investing in girls and lower girls' future employability. If, on the other hand, it is understood that women earn less than men because of differences in their endowments of productive factors (perhaps that they have less education due to poor access to schooling) or because they do not have access to the same types of jobs as men, policy measures could be enacted and awareness campaigns launched to address the specific underlying causes. Better labour market information in this regard can thus inform the overall policy environment and lead to more appropriate and effective labour market interventions in the context of economic development and poverty reduction in Bangladesh.

The remainder of this paper proceeds as follows: Section 2 examines the relevant literature on wages and the gender wage gap in Bangladesh, with an eye on identifying current knowledge gaps that could be addressed by using the new dataset. Section 3 provides a description of the survey

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[1] The report is available at http://www.ituc-csi.org/IMG/pdf/gap-1.pdf. The ITUC figures are based on country-level earnings gaps, where gaps may be based on hourly, weekly, monthly or annual earnings.

and database, including an examination of key summary statistics. The estimates of wage determinants and the gender wage gap for the full sample as well as by industry, level of education and establishment size are discussed in Section 4. Section 5 provides the results of decompositions of the gender wage gaps for the whole sample and for individual industries. The goal is to examine the extent to which differences in wages between women and men are explained by differences in relative endowments versus potential discrimination. Section 6 concludes.

2. Wage determinants and gender gaps in Bangladesh: A review

Understanding the factors that affect the wages individuals receive for their labour is a fundamental goal in labour economics, as better understanding of this mechanism can help direct public and private resources to invest in those factors that can boost workers' incomes and promote economic growth. Identifying wage determinants in the least developed countries is of even greater importance, as wages are directly linked to living standards and the extent of poverty.

Mincer (1974) provided the analytical foundation for empirically investigating wage determinants, by estimating monetary returns to factors such as age, education, schooling quality, work experience, and occupation, among others. Countless studies have since been conducted, with a variety of different purposes such as estimating returns to productive factors such as education and experience, and estimating the extent of discrimination in a labour market due to factors such as race and gender.[2] A key motivating feature of many studies of earnings gaps is the conviction that raw observed differences in wages between groups of individuals are biased, as they do not take into account differences in the relative endowments such as education, experience and other characteristics of the groups under investigation that determine wage rates. These factors must be sufficiently controlled for in order to produce robust estimates of wage gaps – a task often complicated by data inadequacies. Estimates of returns to productive factors are also often fraught with difficulties. For instance, the estimated rate of return to schooling may be biased upward since wealthier or more motivated children are likely both to stay in education longer and receive higher wages.[3]

Identifying the key control variables in Bangladesh requires understanding the underlying determinants of wages in the country. Rahman (2004) finds that workers' age is positively related to earnings, though the positive effect diminishes over time. Years of education and a dummy variable for skill level are positively related to wages, and the results are greater in urban areas, implying a higher return to human capital in urban jobs. Land ownership and regular employment are positively associated with earnings. Asadullah (2005) analyzed hourly wage data from 20,602 wage/self-employed workers in Bangladesh and also found large, significant returns to education.

Industry and occupation type are of significant potential importance in Bangladesh. A recent study by the ILO finds that women in Bangladesh are often considered to be lesser or inferior participants in the labour market, largely owing to traditional societal views that the primary role of women is to fulfil reproductive and domestic functions, rather than fully participate in education, training, and paid work.[4] This, in turn, limits women's choice of income-earning activities and results in industry-level or occupational segregation, whereby women are relegated disproportionately to jobs viewed as less important, requiring lower skills, and with lower earnings.

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[2] Kunze (2000) provides an excellent discussion of the literature on wage determinants and the gender wage gap.
[3] Asadullah (2005)
[4] ILO (2006)

In terms of estimated gender-based wage gaps in the country, numerous studies provide evidence that a significant gender gap exists. In looking at data for 2000, Rahman and Islam (2003) find that women in rural areas earned 45 per cent less than men, while women in urban areas earned 31 per cent less, both calculated on the basis of daily wages. They posit that a number of factors contribute to women's lower relative wages, including faster growth in the female labour force vis-à-vis the male labour force due to social changes favouring women's employment, higher female unemployment and underemployment rates, higher poverty rates among female wage workers' households, which reduces their relative bargaining position, and job segmentation (occupational segregation) along gender lines. Collectively, these factors imply an oversupply of available female labour, which, in the context of industrial and occupational segregation would tend to depress female wages. However, they also find that there has been an increase in demand for female workers, evidenced by an expansion of urban employment opportunities for women, which has worked to increase average female wage rates (as wages in urban areas tend to be higher than in rural areas). At the same time, women's wage rates have also benefited from increased education, skills and experience of female workers, as women have had greater access to schooling and a longer history in the labour market.

Looking at data for the 1990s, Hossain and Tisdell (2005) examine wages across 16 manufacturing industries and find that women earn an average of approximately 20 per cent less per year than men, with lower yearly earnings observed across all 16 sectors. They conclude that lower average educational attainment by women is likely to explain part of the observed gender wage differentials, though the educational gap narrowed substantially in the country over the period.

In examining returns to education, Asadullah (2005) finds the presence of significant gender wage gap, despite the fact that females enjoy a higher return to education than males. He suggests that subsequent studies should further decompose the wage gap into differences in productive characteristics and differences in returns to these characteristics – in order to examine whether lower average female schooling or discrimination could potentially explain the gap.

Using data on hourly wages from Household Income and Expenditure Surveys (HIES) from 2000 and 2005, Al-Samarrai (2007) finds that women in Bangladesh have made substantial gains in the labour market, reflected by a narrowing of the gender wage gap. The wage gap among salaried workers narrowed from 52 per cent in 2000 to 32 per cent in 2005, which has been driven by "an upward shift of female salaried workers in the occupation hierarchy". He finds that increasing levels of education have also been a key factor leading to increased wages in the country. In terms of returns to productive factors, he finds that additional years of age benefit men more than women in terms of wages (which may be due to differences in experience, whereby experience among men increases at a faster rate with additional years of age than for women since women may exit the labour market for childrearing), while additional years of education benefit women more than men. In carrying out a detailed decomposition of the wage gap, he finds that while in 2000, 31 per cent of the overall gender wage gap was explained by differences in women's and men's characteristics, with the remaining share due to differences in relative returns to characteristics, by 2005, the gap was almost entirely made up of the unexplained component – implying that women had nearly caught up to men with regard to endowments such as education, and the remaining wage gap is largely caused by labour market discrimination.

Taken together, the previous studies on wage determinants and the gender wage gap have identified numerous correlates of wages in Bangladesh, including education, age (experience), occupation, geographic location, skill level, land ownership and regularity of employment. The studies have found a persistent, although narrowing gap in earnings between women and men. While some disaggregated estimates of gender wage gaps have been conducted – e.g. for different manufacturing industries – a wider-reaching survey of industry-level wage gaps and the role that industry- and occupation-based segregation plays in determining wages and wage gaps in Bangladesh has not been carried out, which is striking given the large potential role played by

these factors. Owing to data limitations including the general use of daily or monthly wage data in Bangladesh, analyses of gender-based differences in hourly wages are also scarce, which is a significant missing link in the literature given that differences in hours worked could be responsible for a large share of daily, monthly, or yearly earnings gaps. This paper attempts to address these gaps in the literature through a detailed analysis of industry-level wage determinants and gender-based hourly wage differentials. It presents the first estimates of gender wage gaps by industry, level of education and establishment size in Bangladesh; quantitative estimates of the effects of industry and occupational segregation on average wage rates for women and men in the country; and a thorough decomposition of the gender wage gap into explained and unexplained components, both for the full sample as well as by industry.

3. Description of survey and dataset

Background

In April and May 2007, the Bangladesh Bureau of Statistics (BBS), with technical and financial support from the International Labour Organization, conducted a national occupational wage survey which gathered data on earnings, weekly hours of work, type of industry, occupation, education completed, age, sex and geographic location for 60,347 individuals.[5] This represents the largest ever occupational wage survey in the country.[6] The survey was conducted in 150 locations (primary sampling units or PSUs) throughout the country. The PSUs were formed on the basis of the latest industrial censuses (2001 and 2003).

A total of 202 non-farm occupations in 37 industry groups were included in the survey. One of the industry groups is comprised of "day labourers" across 44 different occupations, and average daily wages were collected for this group.[7] For the remaining 36 industry groups, data on average monthly earnings were collected. This paper focuses on the 36 industry groups and 158 occupations for which average monthly earnings are available (comprising a total of 40,923 workers), as it is only possible to calculate reliable hourly wage rates for these workers.[8] For day labourers it was not possible to produce reliable hourly wages since the average number of work days per week for these labourers is unknown.[9]

Survey limitations

Data on wages/earnings and hours of work are typically derived from establishment surveys. BBS did not conduct a traditional establishment survey in this exercise. The survey was conducted as follows: Each enumerator, equipped with 3 surveys, was assigned to one of the 150 PSUs. The enumerators' goal was to collect up to 6 data points (3 male and 3 female) for each of the 202 occupations. Each enumerator could therefore collect wage and other data on a maximum of 1,212 workers and a maximum of 3 establishments per occupation. Wherever

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[5] For more information, see "Report on wage survey, 2007", Bangladesh Bureau of Statistics, August, 2007. http://www.bbs.gov.bd. The survey also collected information on the size of the establishment in which each individual was engaged as well as the total number of men and women working in the same occupation within the establishment.

[6] The previous pilot occupational wage survey covered 18 urban districts (6 cities) with data on approximately 8,775 wage-earners. The most recent Household Income and Expenditure Survey (2005) included data on 10,080 households, which included 48,500 individuals and thus approximately 14,000 wage-earners.

[7] Detailed occupations and industry groupings are given in Appendix Table A1.

[8] Hourly wages were calculated by first dividing total monthly earnings by 4.35 (in order to derive average weekly earnings), and then by the reported average weekly hours worked.

[9] In the future, this problem could be avoided by asking day labourers for their average daily wage together with average number of hours worked in a day, rather than their average weekly hours of work.

possible, enumerators were instructed to visit one small enterprise (less than 10 workers), one mid-sized enterprise (10-99 workers) and one large enterprise (100+ workers) for each occupation. However, outside the metropolitan areas of Dhaka, Chittagong and Khulna, the majority of enterprises are small. The enumerators visited establishments and interviewed a maximum of one male and one female worker within each occupation.

As a result of this methodology, establishments in the survey were not selected strictly at random. This was largely due to the lack of a reliable frame, since the existing establishment censuses only contain information on establishments with at least 10 employees. Of note, a full two-thirds of the workers surveyed in this dataset are engaged in establishments with fewer than 10 workers. In addition, the vast majority of day labourers do not work in a formal establishment. Rather workers in these occupations, which include rickshaw drivers, shoe shiners, sweepers and similar occupations, work for daily wages, often on sidewalks and street corners. There is simply no suitable frame from which one could construct a random sample of workers in these occupations.

Another point related to the survey methodology is that information was not collected on all workers within the surveyed establishments. Rather, in many cases only a subset of workers within each occupation was surveyed (specifically, a maximum of one male and one female worker for each available occupation in the establishment). It is not possible to ascertain whether the chosen workers are representative of the "average" worker in each of the occupations. Enumerators were instructed to choose workers at random, but this does not ensure that this was fully achieved.

The survey captured an average of 260 observations for each of the 158 occupations for which monthly earnings were calculated and an average of 434 observations for each of the 44 "day labourer" occupations. Thus, there are a large number of observations for each individual occupation. Furthermore, potential biases are reduced when one utilizes the dataset for purposes such as examining differences in wage rates among women and men, workers with different levels of education, of different ages, and so on, as these differences are observed across the entire sample rather than in individual occupations. Accordingly, this paper focuses attention on differences in wage rates between women and men in the sample.

Summary statistics

Table 1 provides summary statistics by sex for the variables of interest. Of the 40,923 workers for which hourly wage data are available, 87.5 per cent are males, reflecting the very low labour force participation and employment rates among females in the country. According to the latest official figures for the country, males accounted for 85.4 per cent of non-agricultural employment, implying that women may be slightly underrepresented in the current sample.[10]

The average hourly wage among males in the sample is 17.2 taka, compared with 14.2 taka per hour for women, representing 21.1 per cent higher hourly wages for men. The hourly wage rates by sex that were calculated from this dataset represents a significant piece of new information, as official wage data from the country typically include only monthly, weekly or daily earnings.

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[10] One likely factor for this is that the occupations included in the current sample – those that were included in the BBS occupational wage survey and for which it was possible to calculate hourly wages – have a greater tendency to be more formal, operating in the "organized" sector, which may favour male employment. The full BBS Occupational Wage Dataset contains information on an additional 19,051 individuals classified as day-labourers, operating in the informal economy. As it was not possible to calculate reliable hourly wages for these observations (strong assumptions would have to be made regarding the number of hours worked per day, which would reduce confidence in the calculated hourly wage rates), the observations have not been included in the present analysis. Women comprised 13.3 per cent of these observations versus 12.5 per cent of the observations in the current sample. See http://www.bbs.gov.bd/dataindex/labour_%20force05-06.pdf for a summary of the 2005/06 Labour Force Survey.

While these levels of aggregation are more relevant, as the majority of workers in the country are not paid on an hourly basis, for the purpose of estimating the gender gap in earnings, it is preferable to use hourly wages, as this takes into account differences in the number of hours worked, which is likely to be a significant source of differences in total earnings. Indeed, in the current sample, monthly earnings for men are 3,913 taka, compared with 2,780 for women – a difference of 40.8 per cent. This additional gap arises because men work an average of 56 hours per week, compared with 47.5 for women. Ignoring differences in hours of work would result in a significant overestimation of the gender pay gap, highlighting a clear benefit that would result from future wage surveys in the country including the variables needed to calculate hourly wage rates.

Table 1. Summary Statistics, full sample

	Males n=35,789		Females n=5,134	
	Mean	Std. Dev.	Mean	Std. Dev.
Hourly wage	17.2	11.58	14.2	10.91
Age	33.3	10.34	30.6	8.20
Average weekly hours worked	56.0	14.33	47.5	13.96
Illiterate	0.116	0.32	0.165	0.37
Literate with less than primary education	0.275	0.45	0.191	0.39
Primary education	0.295	0.46	0.203	0.40
Secondary education	0.223	0.42	0.274	0.45
Tertiary education (diploma)	0.078	0.27	0.124	0.33
Tertiary education (technical)	0.013	0.12	0.043	0.20
Manufacturing	0.334	0.47	0.264	0.44
Electricity, gas & water	0.030	0.17	0.000	0
Construction	0.108	0.31	0.060	0.24
Wholesale & retail trade	0.070	0.25	0.001	0.03
Hotels & restaurants	0.101	0.30	0.027	0.16
Transport, storage & communications	0.119	0.32	0.003	0.06
Financial intermediation	0.027	0.16	0.073	0.26
Education	0.039	0.19	0.244	0.43
Health & social work	0.080	0.27	0.221	0.42
Other services	0.091	0.29	0.106	0.31

Source: BBS Occupational Wage Survey (2007)

The average age for women in the sample is 30.6 years versus 33.3 years for men.[11] This could reflect the lower participation rates of older female workers in the country, as increasing numbers of younger women workers enter the workforce – particularly in formal wage-based occupations. Indeed, according to the most recent Bangladesh Labour Force Survey, between 2000 and 2005/6, the number of women in formal-sector employment increased from 1.2 to 1.6 million, while the number of men increased only modestly from 8.4 to 8.6 million. The data in the current sample bear this out: 41 per cent of the sample of women is aged 20-29 and 36 per cent is aged 30-39; with only 17 per cent aged 40 and above (versus 30 per cent for men) and only 5 per cent of women aged less than 20. This could imply that younger women workers are finding improved access to employment as compared with their predecessors. With regard to literacy and

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[11] The minimum legal working age in Bangladesh varies by sector/industry. The minimum employment age for work in factories is 14. Nevertheless, child labour is widespread in the country. In the sample of workers used in the present paper, 0.56% of the sample is made up of children below the age of 14.

education, 16.5 per cent of women in the sample are illiterate versus 11.6 per cent of men. However, a larger share of women completed secondary education (27.4 per cent versus 22.3 per cent for men) as well as tertiary education (16.8 per cent versus 9.2 per cent for men). 57 per cent of men in the sample are literate, but have less than a secondary education. The average education level of women in the sample is therefore somewhat higher than that of men, which echoes the finding of Al-Samarrai that the gender-based gap in education has narrowed substantially in the country.

Manufacturing is the top industry for employment for both women and men, after which the picture diverges. The second and third most prevalent industries for women are, respectively, education and health & social work, while for men they are transport, storage & communications and construction (followed closely by hotels & restaurants). This indicates significant gender-based segregation with respect to employment. Indeed, Table 2, which provides key summary statistics from the sample, shows that women make up only 10.2 per cent of manufacturing workers; 7.4 per cent of workers in construction; and less than 1 per cent in transport, storage & communications, wholesale & retail trade, and electricity, gas & water. Women comprise 14.3 per cent of workers in the "other services" industry, 27.8 per cent of the sample of workers in the financial intermediation and health & social services industries and over 47 per cent of the sample of workers engaged in education-related activities. Women's employment in the sample is therefore heavily skewed toward service-sector activities.[12]

Table 2. Summary statistics, by industry and sex

	Observations			Hourly wage			Hours worked		Age	
	M	F	% Female	M	F	Female as % male	M	F	M	F
Manufacturing	11,960	1,355	10.2	15.2	11.5	75.7	55.3	51.6	32.2	29.4
Electricity, gas & water supply	1,088	0	0.0	27.0	-	-	56.1	-	36.6	-
Construction	3,862	309	7.4	18.8	11.2	59.6	54.8	54.4	32.8	30.7
Wholesale & retail trade	2,498	6	0.2	13.2	-	-	60.6	-	30.2	-
Hotels & restaurants	3,628	138	3.7	12.3	8.5	69.1	67.3	57.4	31.2	35.3
Transp., storage & communications	4,265	17	0.4	17.8	-	-	59.5	-	34.7	-
Financial intermediation	972	375	27.8	40.0	28.3	70.8	47.7	43.8	36.0	30.4
Education	1,403	1,253	47.2	15.6	13.2	84.6	40.6	36.8	37.4	33.3
Health & social work	2,852	1,135	28.5	17.4	14.0	80.5	53.6	51.7	34.4	29.8
Other services	3,261	546	14.3	20.1	16.9	84.1	50.4	49.2	35.6	27.7

Source: BBS Occupational Wage Survey

In terms of hourly wages, the largest gender gap is in construction, where the average hourly wage for women is approximately 60 per cent that of men; followed by hotels & restaurants (69 per cent); financial intermediation (71 per cent) and manufacturing (76 per cent). The smallest

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[12] There are notable differences between the distribution of employment captured in the BBS occupational wage survey and that from the most recent labour force survey, which implies that the former should not be viewed as a representative national survey, but rather a survey of specific occupations within non-agricultural industries in the country. The occupational wage survey appears to over-sample males in the manufacturing industry, while under-sampling females. The shares of men and women employed in construction are lower compared with those from the labour force survey. Wholesale & retail trade and hotels & restaurants have been under-sampled. Males have been somewhat over-sampled in the transport, storage & communication industry while females have been over-sampled in the financial services, education and health & social work industries.

gaps are observed in the service industries in education, health & social work and other services – industries in which women have a fairly high share of employment.

Women work fewer hours on average than men across all industries, though the differences are very small in the construction and other services industries. The gap in hours worked is largest in the hotels & restaurants industry, where women work an average of 57.4 hours per week versus nearly 67.3 hours for men. There are also sizeable gaps in financial intermediation, education and manufacturing. With regard to age, the hotels & restaurants industry is the only industry in which the average age among women is higher than that of men. The largest differences in average ages between the sexes are observed in the other services, financial intermediation, health & social work and education industries.

Table 3. Education levels by industry and sex (%)

	Illiterate		Below primary		Primary		Secondary		Tertiary	
	M	F	M	F	M	F	M	F	M	F
Manufacturing	17	30	40	35	32	26	9	7	2	2
Electricity, gas & water supply	1	-	4	-	33	-	58	-	4	-
Construction	22	72	44	28	31	1	3	0	0	0
Wholesale & retail trade	7	-	32	-	44	-	15	-	2	-
Hotels & restaurants	17	71	32	24	25	4	20	0	5	1
Transport, storage & communications	5	-	17	-	37	-	34	-	6	-
Financial intermediation	0	0	0	0	4	15	39	51	57	33
Education	1	4	6	14	18	18	44	37	31	28
Health & social work	1	4	7	16	26	24	41	34	24	22
Other services	4	5	10	6	17	23	42	48	27	17

Source: BBS Occupational Wage Survey

Table 3 provides a picture of education levels by industry and sex. In every industry outside financial intermediation, there is a larger share of illiterate women than men. In manufacturing and construction the bulk of both women and men have less than a secondary education. In the hotels & restaurants industry, women are largely uneducated, whereas approximately 25 per cent of men have secondary education or higher. In service industries including financial intermediation, education, and health & social work, the majority of workers of both sexes have at least completed secondary education. In financial intermediation, a greater share of men has tertiary education, while in education and health & social work roughly the same proportion of women and men have completed tertiary education.

The cross-tabulations of industry and education reveal an important feature of the sample: A large segment of the male sample is lumped in industries with low average education levels, such as manufacturing and construction, while women in the sample tend to work in industries characterized by higher average education levels. The overall effect is that over the entire sample, women have somewhat higher average education levels, but at the individual industry-level – that is, within individual industries – men tend to have higher education levels than women. This has potentially important implications for overall and industry-level wage gaps – a point that will be explored in more detail below.

4. Estimation of wage determinants and the gender wage gap

In order to estimate economic returns to various productive factors such as education and to estimate the gender wage gap after controlling for differences in age, education, location, industry and occupation, the standard Mincerian model is used:

$$\ln w_i = \alpha + \beta_i x_i + \varepsilon_i \qquad (1)$$

The dependent variable is the log of person i's hourly wage, w_i. Independent variables in the present analysis include a female dummy variable, age and age squared, 6 education dummy variables, 10 industry dummy variables, 158 occupation dummy variables and 94 geographic dummy variables.[13]

Estimating the gender wage gap

Table 4 provides the results across 6 separate specifications. The first specification includes only the female dummy variable and hence provides the unadjusted gender wage gap. Each of the subsequent regressions add additional explanatory variables including age and its square, the education dummy variables, district dummy variables to control for differences in wages across geographic areas, and finally the industry and occupation controls. The raw gender wage gap, given in specification 1, is 22.5 per cent. Adding in age control variables, as in specification 2, reduces the estimated gap to just below 19 per cent, reflecting the lower average age of women in the sample relative to men. As the sample of females is younger on average than the sample of males, it is clear that omitting the age variable results in upward bias on the estimated gender gap – without inclusion of the age variables the female dummy captures effects that are not only due to gender, but also due to age.

Specification 3 includes education dummy variables, and introduces estimates of the returns to different educational milestones. The base case is illiteracy and thus the coefficients provide the expected additional wage for a given educational level above and beyond that for someone who is illiterate, after controlling for age and sex. Adding the education variables increases the estimated gender gap to 23.9 per cent. The increase in the estimated gender gap reflects women's somewhat higher education levels across the full sample. That is, failure to control for women's higher human capital and the positive effect this has on their wages, biases the estimated gender wage gap variable downward. The negative effect on the age variable most likely reflects the positive correlation between age and education, as the age variables previously reflected some of the effects of education. Specification 4 adds in geographic (district) control dummies, which are not shown in the regression output. Controlling for differences across districts has only a marginal effect on the estimated gender gap and the other independent variables.

The fifth specification adds ten industry dummy variables, with the base case set as manufacturing. Including these variables reduces the estimated gender gap from 23.1 per cent to 17 per cent, while increasing the estimated effects of education. The large reduction in the estimated gender gap that occurs with the inclusion of industry dummies is likely due to the substantial gender-based segregation across the different industries. That is, a large proportion of women work in industries with lower average wages, such as manufacturing, education and health & social work. However, it is important to note that gender-based segregation across industries is itself a potential signal of discrimination and thus by adding in these variables, the

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[13] As it was not possible to directly measure experience, skill level, land ownership or regularity of employment and given that research had found these variables to be significantly related to wage levels, future surveys and analyses of wages in the country would benefit from the inclusion of questions to measure these variables.

estimated gender gap is likely to be biased downward, as the coefficient on the female dummy variable no longer captures discrimination due to industry segregation. The increase in the estimated returns to education that occurs with the inclusion of the industry dummy variables could be attributed to relatively higher returns to education within industries. This point will be investigated further in the next section.

Table 4. Mincer regressions

	(1)	(2) Eq.1+ age	(3) Eq.2+ education	(4) Eq.3+ districts	(5) Eq.4+ Industry	(6) Eq.5+ occupation
Female dummy	-0.225 (0.01)**	-0.189 (0.01)**	-0.239 (0.01)**	-0.231 (0.01)**	-0.170 (0.01)**	-0.159 (0.01)**
Age		0.08 (0.00)**	0.07 (0.00)**	0.07 (0.00)**	0.06 (0.00)**	0.04 (0.00)**
Age²/100		-0.08 (0.00)**	-0.07 (0.00)**	-0.07 (0.00)**	-0.05 (0.00)**	-0.04 (0.00)**
Less than primary education dummy			0.10 (0.01)**	0.09 (0.01)**	0.11 (0.01)**	0.06 (0.01)**
Primary education dummy			0.19 (0.01)**	0.17 (0.01)**	0.22 (0.01)**	0.14 (0.01)**
Secondary education dummy			0.37 (0.01)**	0.35 (0.01)**	0.43 (0.01)**	0.26 (0.01)**
Tertiary education (diploma) dummy			0.64 (0.01)**	0.61 (0.01)**	0.66 (0.01)**	0.43 (0.01)**
Tertiary education (technical) dummy			0.73 (0.02)**	0.68 (0.02)**	0.90 (0.02)**	0.50 (0.02)**
Electricity, gas & water industry dummy					0.34 (0.02)**	0.25 (0.06)**
Construction industry dummy					0.27 (0.01)**	-0.07 (0.03)*
Wholesale & retail trade dummy					-0.14 (0.01)**	-0.08 (0.03)*
Hotels & restaurants dummy					-0.27 (0.01)**	-0.49 (0.04)**
Transport, storage & communications dummy					-0.07 (0.01)**	0.44 (0.15)**
Financial intermediation dummy					0.41 (0.01)**	0.84 (0.03)**
Education industry dummy					-0.31 (0.01)**	-0.55 (0.03)**
Health & social work dummy					-0.25 (0.01)**	-0.34 (0.04)**
Other services dummy					-0.04 (0.01)**	-0.51 (0.04)**
Constant	2.67 (0.00)**	1.12 (0.02)**	1.10 (0.02)**	0.98 (0.03)**	1.12 (0.03)**	1.69 (0.04)**
Observations	40923	40923	40923	40923	40923	40923
R-squared	0.02	0.14	0.24	0.28	0.37	0.48
Standard errors in parentheses. * significant at 5%; ** significant at 1%						

Source: Author's calculations based on BBS Occupational Wage Survey

The final specification adds occupational dummy variables. The gender wage gap declines to 15.9 per cent, which, as with the inclusion of industry dummy variables, reflects the fact that occupational segregation has now been controlled for. The estimated returns to education decline in this specification, implying that differences in education have a smaller impact on wages within occupations than within industries. This makes sense given the large number of occupations (and thus the high degree of occupational disaggregation) in the survey.

Taken together, with all control variables included, the estimated gender wage gap in this sample of non-agricultural wage workers in Bangladesh is 15.9 per cent, though this is likely an understatement of the true gender wage gap given the existence of industrial and occupational gender segregation. If controls for occupation and industry employment distribution are omitted and we allow the effects of segregation to be included in the coefficient, the estimated gender wage gap is 23.1 per cent, which can be viewed as a plausible upper-bound estimate.

Estimating the determinants of wages

The regression coefficients in Table 4 also provide estimates of "returns" to productive factors, such as age and education as well as industry-level wage premiums. Looking at specification 6, we see that an additional year is associated with an expected increase in hourly wage of 0.2 per cent per hour for a thirty-three year-old worker. The quadratic specification of age in the model allows for decreasing marginal return to age over time, which is observed in the sample. After controlling for other factors, a thirty year-old worker receives, on average, a 2.4 per cent higher average hourly wage as compared with a twenty year-old; whereas a forty year-old worker earns only 1.6 per cent more than a thirty year-old worker. It is clear that the relationship between age and hourly wage is statistically significant, but it is not particularly large from an economic perspective.[14] It should be noted that a better indicator to use would be years of actual work experience, however as the survey did not ask probing questions on experience, it was not possible to include this variable.

With regard to education, with all control variables in place, literacy increases the expected hourly wage by 6 per cent, completing primary education raises it by 14 per cent, a secondary education raises it by 26 per cent and a tertiary education increases it by 43 per cent. Controlling for occupation reduces the estimated benefits of education as compared with the estimates in specification 3, which implies that some of the estimated benefits of increased education are actually due to the occupation in which individuals are working. To the extent that better education is likely to open the doors to working in occupations characterized by higher wages, the coefficients on education are likely to understate the true benefit of higher education on expected wages. However, as previously mentioned, it may also be the case that the education variable is likely to capture the effect of individual motivation or household wealth, which are also likely to be positively correlated with wage rates. This effect would tend to bias the coefficients on education upwards. While further work to probe the potential biases in the education variables would clearly be beneficial, the large estimated coefficients on education provide solid evidence that the benefits of education to wages among this sample of workers in Bangladesh are significant.

In terms of wages by industry, as shown in specification 5 and reflected in the summary statistics, the highest observed wages are in the construction, financial services and electricity, gas & water industries.[15] The lowest average wages are observed in the education, health & social work and hotels & restaurants industries. The education and health & social work industries contain the largest shares of female workers, which once again points to gender segregation, whereby females tend to work in lower-wage industries. To provide a clearer picture of the dynamics driving women's employment and wages as well as overall wages in the different industries, it is necessary to examine estimates of industry-level gender wage gaps.

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[14] While the overall returns to age are not large across the full sample of workers, it will be shown later that there are large gender-based differences in returns to age.

[15] Given the very small number of females in the sample of workers in the electricity, gas & water and wholesale & retail trade industries, these industries are not included in the analysis of industry-level wage gaps.

Estimated gender wage gaps by industry

Table 5 provides the estimates of the raw gender gap in each industry, together with estimates of the gap controlling for all factors excluding occupation and finally controlling for all factors including occupation.[16] Column 1 therefore shows the difference between female and male average wages. Column 2 shows the difference between female and male average wages after controlling for differences in age, education and location. Column 3 shows the wage gap with all control variables, including occupational segregation.

As previously discussed, the largest raw gender gap is observed in the construction industry, followed by financial services, hotels & restaurants and manufacturing. There are smaller gender gaps in education, health & social work and other services, but the lowest observed gap in any industry is 20 per cent. Introducing controls for age, education and location reduces the gap in all industries. After controlling for these factors, the largest observed gap is in hotels & restaurants, and construction where women earn an average of 32 and 31 per cent less than men, respectively. Controlling for age, education and location, shown in column 2, greatly reduces the observed gender wage gaps in the financial services, education, health & social work and other services industries. In the latter three industries, the estimated gap is 10 per cent or less. Taken together, the results provide a clear case that women in all major non-agricultural industries in Bangladesh earn less on average than men; however the results differ substantially across industries.

Table 5. Estimated gender gap by industry

	(1) Raw gender gap	(2) Control variables ex-occupation		(3) All controls	
		Gap	R²	Gap	R²
Construction	-0.49	-0.31	0.39	-0.22	0.57
Financial intermediation	-0.37	-0.12	0.33	-0.15	0.51
Hotels & restaurants	-0.34	-0.32	0.43	-0.42	0.54
Manufacturing	-0.30	-0.24	0.32	-0.19	0.44
Education	-0.22	-0.08	0.37	-0.05	0.39
Health & social work	-0.20	-0.09	0.48	-0.08	0.55
Other services	-0.20	-0.10	0.23	-0.24	0.35

Source: Author's calculations based on BBS Occupational Wage Survey

The difference between the gaps in columns 2 and 3 provides a rough indication of the impact of occupational segregation on average wage differentials between women and men: if the gap shrinks, this implies that women are engaged disproportionately in lower-paying occupations in the industry or they are receiving lower average wages than men within occupations in the industry (or a combination of these factors); if the gap increases, women are engaged disproportionately in higher-paying occupations in the industry or they are receiving higher average wages within occupations (or again, a combination of these factors).

Taking the construction industry as an example, introducing the occupational segregation control variables in column 3 reduces the estimated gender wage gap from 31 per cent to 22 per cent (while increasing the R-squared from 0.39 to 0.57). This implies that occupational segregation in construction or differences in returns between women and men within individual occupations in the construction industry (or some combination of these two factors) are increasing the gender wage gap in the industry. These occupation-related factors account for approximately 9 percentage points of the total gender wage gap in the industry.

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[16] Industry-level Mincer regression coefficients are given in Appendix Table A2.

Adding a control for occupational distribution has an important effect in several of the other industries as well. As in the construction industry, occupational effects work to the disadvantage of women in the manufacturing industry. Occupational segregation and/or differences in within-occupation returns tend to benefit women in the hotels & restaurants industry, and, to a lesser extent, in the other services industry. Further decomposition of the industry-level data to identify whether it is predominantly occupational segregation or rather gender-based differences in returns within occupations that is driving these results is carried out in more detail in section 5.

Estimated gender wage gaps by education level

It is also instructive to examine wage gaps for workers with different levels of education. This is given in Table 6. Gender-based wage gaps are observed across all levels of education, with the largest gaps observed among workers with primary education or less. It is interesting to note that the gap is larger among workers with tertiary education versus workers having completed secondary education only. Adjusting for age, industry, occupation and location again reduces the estimated gender gap. The largest gap is among illiterate workers, followed by workers with less than primary education and workers with primary education only.

Table 6. Estimated gender gap by education level

	Raw	Adjusted	R^2 (adjusted)	Average age		Average hours worked	
				M	F	M	F
Illiterate	-0.33	-0.28	0.46	32.0	34.2	58.2	51.1
Below primary	-0.33	-0.22	0.48	31.3	30.5	57.6	50.3
Primary	-0.35	-0.11	0.47	32.8	29.2	57.0	49.2
Secondary	-0.18	-0.04	0.37	35.2	29.1	54.1	45.5
Tertiary	-0.24	-0.08	0.39	37.3	31.0	49.7	42.1

Source: Author's calculations based on BBS Occupational Wage Survey

Female workers with tertiary education appear to be somewhat more disadvantaged than their male counterparts as compared with female workers with secondary education, but the difference between these two groups is not large. This may be due to greater relative occupational segregation for workers with higher education than for workers with only secondary education. That is, having a higher education may theoretically open up new employment possibilities in new industries, but women with advanced degrees may find themselves more likely to be segregated into lower-paying occupations within these more skilled industries, while their counterparts with only a secondary education (working in somewhat lower-skill industries), may be less likely to experience occupational segregation. However, taken collectively, these results indicate that increased education could play a substantial role in lowering the overall gender wage gap in Bangladesh: while women with less than primary education earn over 20 per cent less than men with less than primary education, the gap between women and men with secondary education is only 4 per cent, and the gap between women and men with tertiary education is 8 per cent.

Estimated gender wage gaps by establishment size

Table 7. Estimated gender gap by size of establishment

Establishment size	Average wage	Raw gap	Adjusted	R² (adjusted)	Share of sample (%)
All	19.0	-0.16	-0.13	0.43	-
1-5	16.7	-0.13	-0.11	0.36	50.6
6-10	18.5	-0.25	-0.16	0.44	18.8
11-20	22.3	-0.20	-0.14	0.49	12.9
21-99	23.9	-0.29	-0.13	0.47	12.1
100+	23.9	-0.40	-0.13	0.47	5.6

Source: Author's calculations based on BBS Occupational Wage Survey

Table 7 provides a look at the gender gap by establishment size class for the 20,527 workers for which data on establishment size is available. This is therefore a subsample of hourly workers. Average wages among this subset of workers are higher than among the full sample, with wages rising steadily with enterprise size.

The largest observed gender gap is in the largest establishment size class (those with at least 100 workers), where the average female worker earns 40 per cent less than the average male worker, while the smallest establishments have the smallest gender gap. On the face of it, this implies a strong relationship between enterprise size and gender-based wage inequality; however this relationship does not hold when controls for age, industry, occupation and location are introduced. While the smallest companies still have the smallest gender gap, it is establishments with 6-10 workers, and, to a lesser extent, establishments with 11-20 workers that have the largest gender wage gap, with larger companies having somewhat smaller gaps. What could explain this finding? One plausible explanation is that in the smallest establishments, which have the lowest average wages, there is less "room" for gender-based wage discrimination, as overall variation in wages is lower. These establishments would tend to have simple workplace organization and individual wages would be strongly tied to the performance of the overall company, rather than to individual workers' characteristics. Wages in companies with more workers would be likely to be based to a larger extent on individual characteristics (such as gender) and thus there is more scope for gender-based discrimination. Yet the largest, most formal enterprises are likely to have more progressive workplace policies in place that would discourage gender-based wage discrimination.

The analysis of gender wage gaps by industry, level of education and establishment size provides a strong case for a detailed analysis of wage gaps based on disaggregated data. It also highlights the importance of controlling for differences in individual workers' characteristics in order to obtain a reliable estimate, as the estimated wage gap is often considerably different when these characteristics are taken into account.

5. Decomposition of the gender wage gap

Given the persistence of the gender wage gap after controlling for age, education, industry, occupation and geographic location, the final step is to decompose the factors underpinning the gender wage gap, to distinguish the part of the gap that can be explained due to differences in relative endowments of women and men, versus the part of the gap that is unexplained and may instead be due to discrimination.

The decomposition technique put forth by Oaxaca (1973) is utilized for this purpose. First, wage regressions are estimated separately for men and women.[17] The regression coefficients on the variables of interest (age, age squared, education, industry, occupation and location), together with the mean values of these variables for men and women, are utilized as follows:

$$\overline{\ln w_m} - \overline{\ln w_f} = \hat{\beta}_m(\overline{x_m} - \overline{x_f}) + \overline{x_f}(\hat{\beta}_m - \hat{\beta}_f) \qquad (2)$$

The left hand side of the equation is the raw wage gap (the difference in mean wage rates for men and women), while the right hand side is broken down into two parts: the portion of the gap that can be explained by differences in endowments between men and women, which is given by $\hat{\beta}_m(\overline{x_m} - \overline{x_f})$, and the portion of the gap that is unexplained and could be due to discrimination, which is given by $\overline{x_f}(\hat{\beta}_m - \hat{\beta}_f)$. This latter portion is sometimes referred to as the theoretical gain that women would receive if they received the same returns as men on their productive endowments, such as education.

To examine the detailed wage decompositions, regressions are normalized in order to avoid the potential identification problem caused by choice of reference groups. That is, for the sets of indicators in this regression for which dummy variables are used (industry, occupation, education and district), in order to avoid influencing the outcome of the decomposition through the choice of the reference group (which arbitrarily dictates the values in the coefficients on all the other dummy variables), no group is omitted from the regression, and instead coefficients on dummy variables are expressed as their deviation from the mean. In this way, the sum of the coefficients on a given set of dummy variables always equals zero and there is no identification problem due to choice of reference group.[18] Male wages are assumed to be at or near the prevailing market wage rate in the absence of discrimination. Given that males make up more than 80 per cent of the non-agricultural workforce in Bangladesh, this assumption appears very reasonable.[19]

Table 8 provides the results for the full sample. The average gender wage gap of 22.5 per cent is divided into the portion that is explained due to differences in relative endowments (-4.2 per cent) and the portion that is due to different returns to productive factors (26.8 per cent). This result implies that across the full sample, differences in relative endowments would tend to favor women and if returns to endowments were precisely the same for women and men, we would expect female wages to be slightly higher than male wages. But differences in returns to relative endowments, along with factors that are not fully captured in the model, result in a reduction of average female wages by 26.8 per cent relative to male wages. Part of this gap may be due to factors such as time out of work due to child-rearing, a higher share of women engaged in part-time work, etc, that are likely to have a negative impact on women's wages, but cannot be explicitly controlled for in the model.

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[17] Female and male earnings regressions are provided in Appendix Table A3.

[18] This follows Yun (2003). The choice of reference group will affect the coefficients on the various dummy variables and hence can influence the outcomes of the Oaxaca decomposition. This effect was not found to be large in this case. Also see Horrace and Oaxaca (2001).

[19] Following Cotton (1988), the decompositions were also performed using the weighted average wage of the male and female wages as the non-discrimination wage. This did not have a significant effect on the results.

Table 8. Oaxaca decomposition, full sample[20]

	Gap due to relative endowments	Gap due to relative returns	Total gap
Age	0.02	0.32	0.35
Education	-0.03	0.00	-0.03
Industry	0.07	0.02	0.08
Occupation	-0.11	0.14	0.03
Location	0.00	0.01	0.01
Other	-	-0.21	-0.21
Total	-0.042	0.268	0.225
Total (%)	-18.8	118.8	

Source: Author's calculations based on BBS Occupational Wage Survey

Looking at the effects of specific variables, industry-level segregation contributes 7 percentage points to the explained portion of the gap with another 2 percentage points resulting from different returns that women and men receive within the industries. This is a significant finding – one that shows that women tend to work in industries with lower average wages, and within industries they receive lower average wages than men. It can be seen that the distribution of women across occupations actually works to decrease the gender gap by 11 percentage points (as within industries, women tend to work in somewhat higher paying occupations), but the lower relative returns that women receive within occupations cancels out this beneficial effect, and the net occupational effect is an increase in the gender gap of 3 percentage points. The role played by occupational effects is investigated in greater detail below.

Differences in education reduce the gap by 3 percentage points, reflecting the slightly higher average education levels among women (with a higher share of women having completed secondary and tertiary education). Age clearly plays a large role in determining wages, though the effects are mainly due to differences between women and men in returns to age. This could be due to various forms of discrimination, including faster promotion of men, but it also could reflect less actual work experience for women due to time spent in childrearing versus employment. The available data do not allow for more detailed investigation, and further investigative work on this would clearly be beneficial given the important role that age plays in shaping the gender wage gap.

Decomposition of wage gaps by industry

Table 9 provides the summarized Oaxaca decompositions by industry, while Appendix Table A4 provides the detailed outputs of the decompositions. The rows in Table 9 are sorted by industries with the highest share of the wage gap that is due to observable differences in endowments – versus the portion that is due to differences in returns to these endowments and may be due to discrimination. In the financial intermediation industry, approximately 63 per cent of the wage gap is explained by differences in endowments. In construction, 53 per cent is due to differences in endowments. On the other hand, in manufacturing, health & social work and education, the bulk of the gender wage gap cannot be explained by differences in endowments

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[20] While this paper focuses on 10 industrial groupings, Table 6 shows the results for decompositions using 23 disaggregated industry groupings, as the level of disaggregation in occupational and industrial dummy variables has been found to have an impact on the estimates for these variables. In the present case, movement from 10 to 23 industry groupings reduced the explained contribution of industry from 0.11 to 0.07, while marginally increasing the unexplained contribution of this variable. A slight shift in the occupation variable was also observed, with the explained portion increasing from -0.15 to -0.11 and the unexplained portion decreasing from 0.18 to 0.14.

and in the other services and hotels & restaurants industries, differences in endowments provide no explanation for the observed wage gap. As was mentioned earlier, in the hotels & restaurants industry, differences in average hours worked likely accounts for some of the gap. This could also provide part of the explanation for the wage gap in the education and other services industries.

Table 9. Oaxaca decompositions by industry

		Male wage as market wage			Proportional market wage		
	Total gap	Gap due to relative endow-ments	Gap due to relative returns	Explained by endow-ments (%)	Gap due to relative endow-ments	Gap due to relative returns	Explained by endow-ments (%)
Financial intermediation	0.38	0.24	0.14	63.2	0.23	0.15	60.5
Construction	0.49	0.26	0.23	53.1	0.25	0.24	51.0
Manufacturing	0.30	0.12	0.18	40.0	0.12	0.18	40.0
Health & social work	0.20	0.06	0.14	30.0	0.11	0.09	55.0
Education	0.22	0.06	0.16	27.3	0.10	0.12	45.5
Hotels & restaurants	0.34	-0.09	0.43	-26.5	-0.09	0.43	-26.5
Other services	0.20	-0.12	0.32	-60.0	-0.10	0.30	-50.0

Source: Author's calculations based on BBS Occupational Wage Survey

Changing the market wage rate from the average industry-wide wage rate to a proportional wage rate (with the proportions of women and men in employment in the industry used as weights) has a significant effect on the estimates for the health & social work, education and other services industries, as these three industries have a high share of female workers. Using this benchmark, 55 per cent of the wage gap in the health and social work industry is explained (versus 30 per cent using the male wage rate as the market wage), while in the education industry the explained portion increases to 45.5 per cent from 27.3 per cent. Nevertheless, the unexplained portion of the gender wage gap remains large in all industries.

Figure 1. Contribution of differences in endowments to industry-level gender gaps
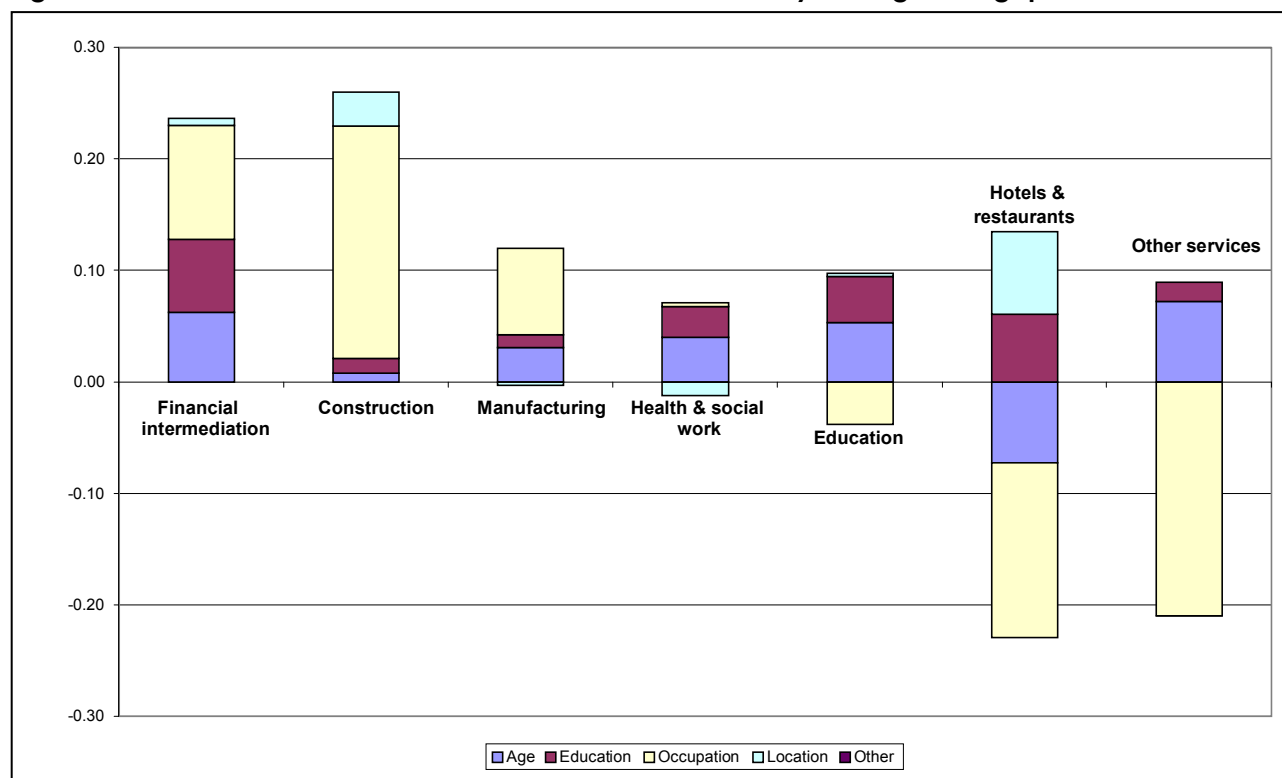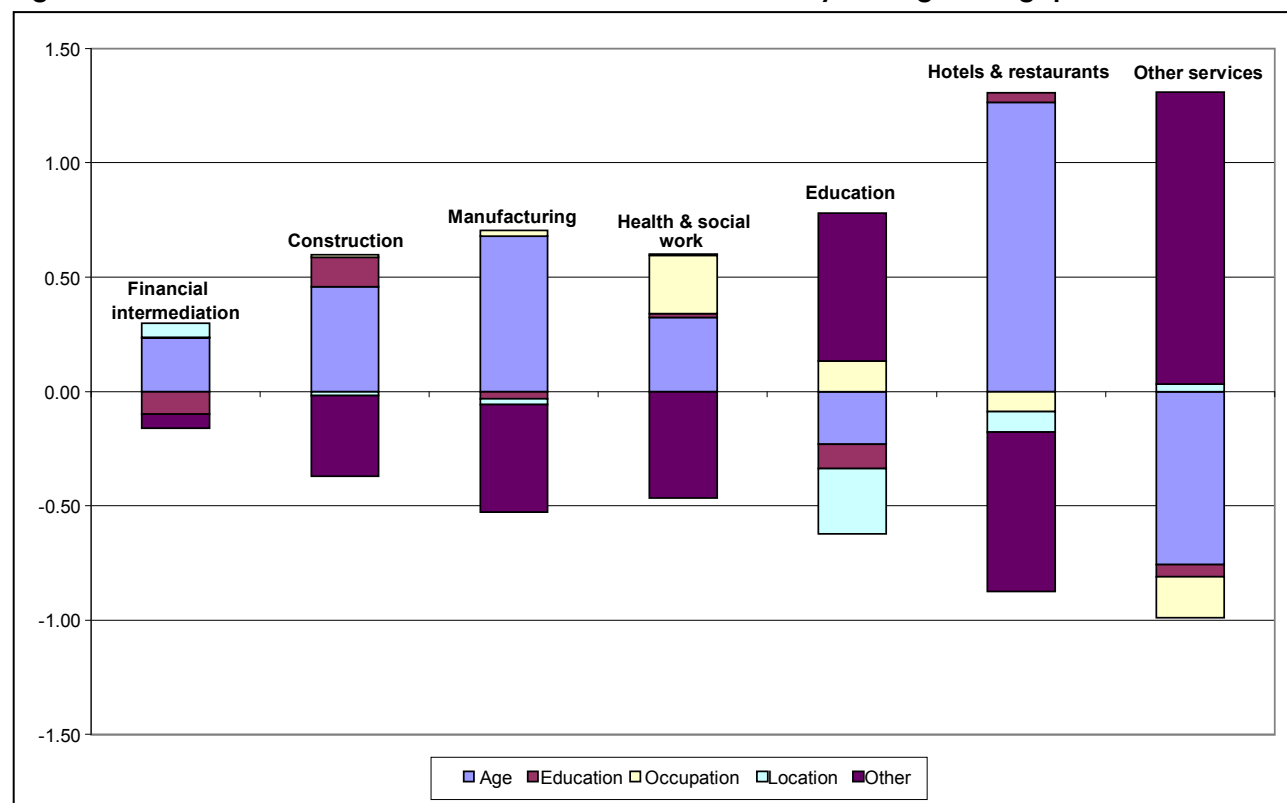

Source: Author's calculations based on BBS Occupational Wage Survey

Figure 1 provides a picture of the factors making up the portion of the gender gap due to differences in relative endowments. If the effect of a given factor is shown as positive (above zero) in the graph, the difference between women and men's relative endowments in the factor works to increase the gender wage gap. If it is negative, it tends to mitigate the wage gap. The relative size of the boxes corresponding to each factor indicates the relative importance of the factor in determining the wage gap. For instance, in the hotels & restaurants industry, age and occupation-related effects work to decrease the gender wage gap, while differences in education and location increase the gap. The largest effect in this case is due to occupation: women tend to be in higher-paying occupations in the hotels & restaurants industry, which effectively reduces the gender wage gap.

Differences in average ages of men and women increase the gender pay gap in every industry except hotels & restaurants, reflecting the higher average ages of men in every other industry. Differences in average education levels increase the gender wage gap in every industry, which contrasts the earlier finding that women's average education levels reduce the gender gap. As previously discussed, this is explained by the distribution of women across industries: whereas women tend to be somewhat less educated than men in every industry, they tend to work in industries with higher average education levels and hence their overall average education level is somewhat higher than that of men. Differences in the occupational distribution of women and men increases the wage gap in three industries (financial intermediation, construction and manufacturing), which reflects the fact that women tend to being engaged in lower-paying occupations in these industries. Occupational differences decrease the wage gap in another three industries (education, other services, and as previously mentioned in hotels & restaurants), which means that women tend to work in higher-paying occupations within these industries. These results indicate that occupational segregation plays a significant role in shaping wage outcomes. Finally, geographic differences in terms of where women and men work somewhat increase the gender wage gap in the construction and hotels & restaurants industries.

Figure 2. Contribution of differences in relative returns to industry-level gender gaps
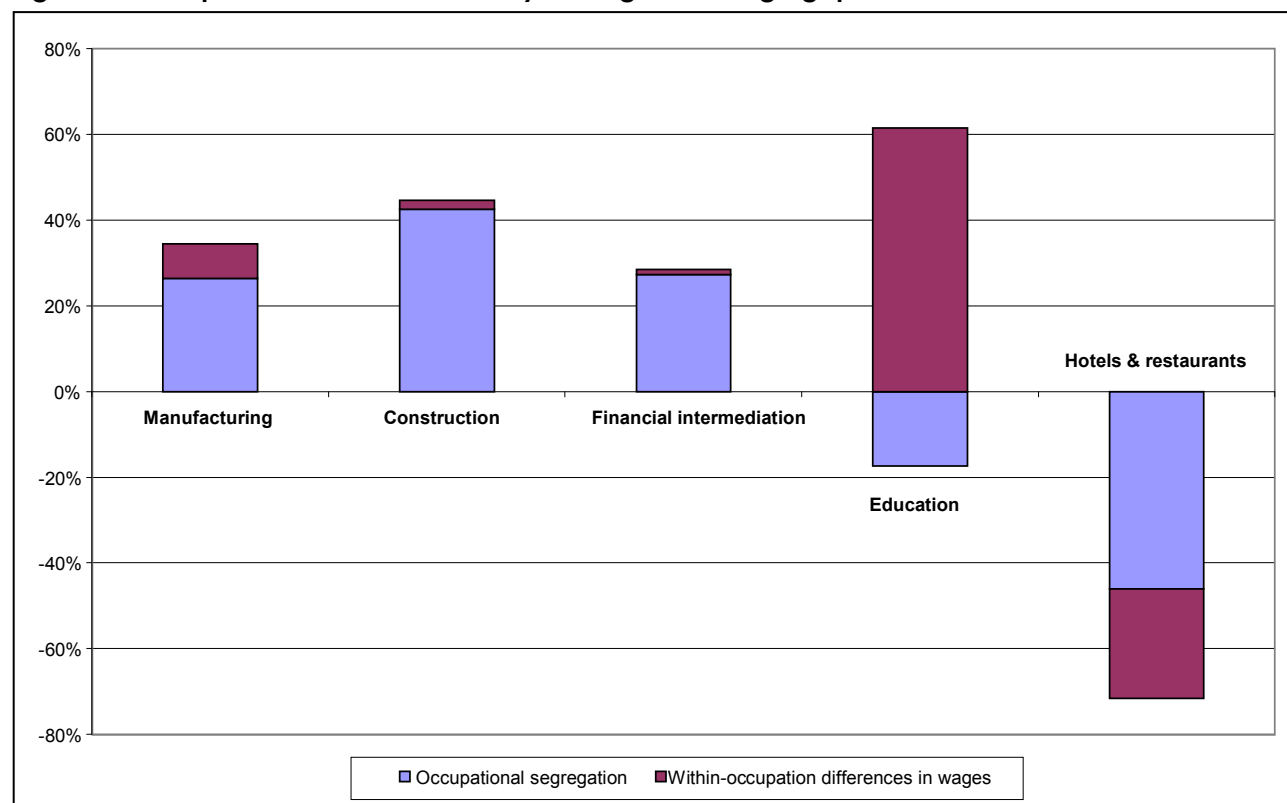

Source: Author's calculations based on BBS Occupational Wage Survey

Figure 2 provides a picture of the factors making up the "unexplained" portion of the gender gap. It shows how differences in the returns that women and men receive from their endowments of different variables such as age and education affect the gap between male and female wages in each industry. As with the previous graph, if the effect of a factor is shown as positive (above zero) in the graph, the difference in the returns that women and men receive to this factor tends to increase the gender wage gap, and if it is shown as negative, it tends to mitigate the gap. The large "other" category is worth noting. This category represents the portion of the gap that is fully unexplained by the model due to factors that have been omitted from the model, which could range from differences in levels of experience (as age is an imperfect proxy for this) to outright gender-based discrimination in the labour market. This category is very large in nearly all industries, which implies that further work is needed to better understand the other forces that are shaping the gender wage gap. Given this large "other" category, it is also necessary to exercise caution in interpreting the effects of other variables on the unobserved portion of the gender wage gap.

Differences in returns to age increase the gender wage gap in all industries except education and other services. In the education and other services industries, women receive greater returns to additional years of age, while men receive greater returns to age in each of the other industries. Differences in returns to education decrease the gender wage gap in all industries except education and other services, which implies that women receive a higher return to education than men in most industries. This once again underscores the significant potential contribution of increased education to reducing the wage gap in Bangladesh. Differences in returns to occupation and location have smaller relative effects in most industries than the other factors. In the health & social work, financial intermediation and education industries, the differences in wages received by women and men within occupations increase the gender gap, while in occupations in the hotels & restaurants and other services industries, women tend to receive higher returns than men, which mitigates the gender wage gap.

Figure 3. Occupational effects in industry-level gender wage gaps

Source: Author's calculations based on BBS Occupational Wage Survey

Combining the findings on returns to occupation with the findings regarding the distribution of women and men across different occupations reveals some key insights into the role of occupational distribution and occupational gender pay gaps in different industries in Bangladesh. Figure 3 shows the percentage of the total gender wage gap in each industry that is due to occupational effects. Some key findings from the figure include the following:

- In manufacturing, both occupational segregation and gender-based pay gaps within individual occupations in the industry work to the disadvantage to women. The dominant effect is due to occupational segregation.

- In construction, occupational segregation is a large contributing factor to the overall gender gap in the industry – accounting for over 40 per cent of the full gap – while differences in returns to women and men within occupations plays only a small role.

- In financial intermediation, occupational segregation is responsible for over 27 per cent of the total gender pay gap in the industry, but gender-based differences in within-occupation returns do not play a large role.

- In the education industry, occupational segregation tends to favour women, but differences in within-occupation returns cancel out this positive effect.

- In the health & social work industry (not pictured), occupational segregation does not contribute to the gender pay gap, but within-occupation differences in pay between women and men is a substantial contributor to the overall gap.

- In the hotels & restaurants industry, both occupational segregation and differences in wages within occupations benefit women, as they tend to work in higher paying occupations and receive somewhat higher pay within occupations, however differences in returns to age and other unknown factors contribute to the gender pay gap in the industry.

- In the other services industry (not pictured), occupational segregation and differences in within-occupation returns both work to reduce the gender wage gap.

Looking across the various decompositions, a striking trend across the full sample is the role that industry-level segregation plays in shaping the overall gender wage gap in the country. It is also clear that the difference in returns that women and men receive for additional years of age plays a very important role. Further work is needed to identify the extent to which differences in work experience versus forms of discrimination, such as slower promotion for women, are at play.

The results of the decompositions show the clear benefits of looking at industry-level trends rather than focusing solely on overall trends. For one, while the aggregate figures indicate that women benefit from higher average education levels across the full sample, the industry-level decompositions show that differences in education actually increase the gender wage gap in 5 out of 7 industries. The industry-level results also highlight the important role played by occupational effects. Looking at the portion of the gap due to differences in endowments, occupational segregation is the most important factor contributing to the gender wage gap in the construction, manufacturing and financial intermediation industries.

6. Conclusions

The large and rich dataset on wages produced by the Bangladesh Bureau of Statistics provides a wealth of new insights into current dynamics shaping wage outcomes in the country. It is clear that wages remain very low in Bangladesh and it is equally clear that there is a persistent and large gap in earnings between women and men. Women in the sample earn an average of 21 per cent less per hour than men. Controlling for differences in age, educational background, industry, occupation and geographic location, yields an estimated gender wage gap of between 15.9 per cent (which excludes the effects of industrial and occupational segregation) and 23.1 per cent (which includes the effects of segregation). The analysis found that differences in women's and men's relative endowments do not fully explain the gender gap. Across the various industries, at most around 60 per cent of the gap can be explained by differences in endowments, and in most industries less than half the difference is explained, which could be indicative of labour market discrimination.

An investigation of the determinants of wages shows that the benefits of education are substantial in Bangladesh. Being literate increases the expected hourly wage by 6 per cent, completing primary education raises it by 14 per cent, a secondary education raises it by 26 per cent and a tertiary education increases it by 43 per cent. Increasing education levels would require additional investment, yet evidence of high and persistent returns to education suggests that the benefits could be significant. In addition to benefiting workers' wages, there is evidence that increased education could play a substantial role in lowering the overall gender wage gap in Bangladesh: while women with less than primary education earn over 20 per cent less than men with less than primary education, the gap between women and men with secondary education is only 4 per cent, and the gap between women and men with tertiary education is 8 per cent.

The examination of industry-level wages shows that the highest observed wages are in the construction, financial services and electricity, gas & water industries. The lowest average wages are in the education, health & social work and hotels & restaurants industries. The largest gender wage gaps (after controlling for differences in age, education and location) are observed in the hotels & restaurants and construction industries, where the gap exceeds 30 per cent, but gender gaps are observed in every industry.

Establishment size is positively correlated with average wages and with the size of the gender wage gap. However, when other factors are controlled for, it is mid-sized establishments (those with 6-20 workers) that have the highest average gender wage gaps. This may be due to the fact

that the activities of workers in the very smallest establishments are not highly specialized, which would tend to narrow the distribution of wages within the establishments, while the largest establishments are more likely to fall in the formal economy and be subject to greater scrutiny vis-à-vis national wage laws and issues of gender equality. Mid-sized establishments, on the other hand, would tend to be less formal and more specialized, which provides scope for greater gender-based wage discrimination.

A further decomposition of the wage gap shows that age plays a large role in determining wages, though the effects are mainly due to differences between women and men in terms of returns to age. This could reflect various forms of discrimination, including faster promotion of men, but it also could reflect less actual work experience for women due to time spent in childrearing versus employment. In order to explore this issue in greater detail, subsequent wage surveys in Bangladesh would benefit from the inclusion of a question on years of experience.

The distribution of women and men across industries and occupations has an important effect on the overall wage gap in the country. Gender-based industrial segregation increases the overall wage gap by 7 percentage points. This implies significant potential benefits to increasing women's access to job opportunities across a variety of economic sectors, some of which may currently be viewed as "male" industries. Occupational segregation within industries increases the gender wage gap in 3 out of 7 industries (manufacturing, construction and financial intermediation). Further investigation of the roles that occupational segregation and within-occupation wage gaps play in different industries in Bangladesh is clearly needed. Additional work is also needed to identify appropriate policies to promote equal access to different occupations in the country.

The fact that a large share of the gender wage gap across different industries is due to unknown factors indicates that potentially important variables have been omitted from the analysis. Further work is needed to incorporate factors such as experience into the model, which would promote a more comprehensive understanding of the forces that are shaping the gender wage gap in Bangladesh. Furthermore, as the survey upon which this paper is based only covers non-agricultural workers and the analysis presented in this paper only looks at those workers in the dataset for which hourly wage rates could be calculated, it is clear that the results should not be generalized to the full employed population in Bangladesh. Nevertheless, the results provide clear evidence of the existence of gender-based wage differentials in the country, particularly in the construction, hotels & restaurants and manufacturing industries. They also point to issues deserving greater policy attention, including the need to reduce industrial and occupational segregation and to promote education for all as a means to improved living standards and improved gender equity.

Appendix

Table A1. Occupations by industry

Manufacturing	*Manufacturing (continued)*
Administrative assistant/computer operator	Rice/wheat mill machine operator
Bakery food products technician	Saw mill labourer
Bakery products machine man/foreman	Saw mill operator
Bidi/cigarette binding worker	Security guard
Book binding labourer	Shoe maker
Box maker	Shoe, sandal etc. swing machine operator
Carpenter	Shrimp processing labourer
Carpenter's assistant	Soft drinks producing machine operator
Ceramic goods production machine operator	Spices mill labourer
Cigarette producing machine operator	Spices mill machine operator
Cutting man	Spinning & winding machine operator
Daily labourer of similar works	Spinning machine helper
Dyer	Spinning machine mechanic
Dying machine mechanic	Spinning machine operator
Dying machine operator	Supervisor of labourer of match factory
Electrician	Sweet meat producer
Foreman	Sweet meat producer's assistant
Fruit juice producer	Swing operator
Fruit juice products machine operator	Tally clerk/time counter
Glass production machine operator	Tobacco leaf crashing man
Glass production worker	Tobacco leaf mixing worker
Helper	Toiletries goods production machine operator
Helper (Cutting knitting etc.)	Toiletries production labourer
Iron man	Weaver/weaving labourer
Knitting machine mechanic	Weaving line Sardar
Knitting machine operator	Weaving machine mechanic
Knitting man	Weaving machine operator - Jute textile
Knitting operator	Weaving machine operator - Textile mill
Labourer - cement	Wood dye/polish man
Labourer - basic metal	
Machine operator	*Electricity, Gas and Water Supply*
Maker of cane & bamboo furniture	Deep tube well operator
Maker of shoe sole	Electric lineman
Medicine production labourer	Electric meter reader
Medicine production machine operator	Water processing & plant operator
Metal heating plant operator	Water supply lineman
Milk & milk products producing machine operator	
Milk & milk products producing technician	*Construction*
Oil mill labourer	Brick breaking labourer
Oil mill machine operator	Construction labourer
Other leather products	Dying man
Packing & folding labourer	Helper - Plumber
Plastic goods production labourer	Helper
Plastic goods production machine operator	Mason
Printing machine operator	Mosaic/tiles fitter
Raw skin processing machine operator	Plumber
Re-rolling mill operator	Rod fitter
Rice/wheat mill labourer	

Table A1. (continued)

Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods
Automobile worker
Motor mechanic
Salesman - retail trade
Salesman - wholesale trade
Welder
Wholesaler's assistant

Hotels and Restaurants
Cook - restaurant
Cook - Chinese restaurant
Hotel manager
Manager - restaurant
Manager - Chinese restaurant
Room attendant
Tea server
Tea/breakfast maker
Waiter - restaurant
Waiter - Chinese restaurant

Transport, Storage and Communications
Cabin crew, cabin attendant
Clark/ticket seller
Conductor
Driver (bus, minibus)

Helper
Inspector (supervisor)
Port labourer
Porter/railway labourer
Post master
Postman
Railway guard
Runway security technician
Sareng/master
Signal man
Signal/points man
Sukani/engine operator
Supervisor
Ticket seller
Timekeeper
Travelling ticket examiner

Financial Intermediation
Cashier (bank)
Insurance representative
Money changer's assistant

Education
Aya
Clerk
Peon, guard etc.
Pre-primary school teacher
Primary school teacher
Health and Social Work
Aya – health related
Doctor's assistant
Guard
Homeopathic doctor
Nurse/midwives
Other health professionals (peon) etc.
Pathologist & other laboratory
Physiotherapist
Veterinary doctor
Veterinary doctor's assistant
Ward boy

Other Community, Social and Personal Service Activities
Accountant
Apartment security guard
Auditor
Computer composer/operator
Deed writer/lawyer assistant
Imam (mosque)
Labour of decorator
Moazzin
Mobile phone repairer
Supervisor of community centre
Worker in beauty parlour

Table A2. Mincer regressions by industry

	Manu.	*Elec.*	*Cons.*	*Whole.*	*Hotel*	*Trans.*	*Finance*	*Edu.*	*Health*	*Other*
Female dummy	-0.19**	-	-0.22**	-	-0.42**	-	-0.15**	-0.05*	-0.08**	-0.24**
Age	0.04**	0.04**	0.02**	0.06**	0.04**	0.04**	0.01	0.04**	0.03**	0.04**
Age^2/100	-0.05**	-0.04*	-0.02**	-0.06**	-0.04**	-0.03**	0.01	-0.03**	-0.03**	-0.05**
Less than primary education dummy	0.06**	0.06	0.03**	0.07*	0.03	0.07*	n/a	0.12	0.05	0.01
Primary education dummy	0.13**	0.19	0.04**	0.12**	0.10**	0.17**	-0.12	0.36**	0.12*	0.08
Secondary education dummy	0.25**	0.27	0.08*	0.26**	0.17**	0.28**	0.06	0.48**	0.32**	0.19**
Tertiary education (diploma) dummy	0.46**	0.28	-0.95**	0.40**	0.36**	0.48**	0.25	0.60**	0.51**	0.40**
Tertiary education (technical) dummy	0.42**	0.09	-0.05	0.22	0.36*	0.59**	0.56	0.73**	0.57**	0.17
Constant	1.67**	1.74**	2.25**	1.06**	1.51**	1.94**	2.77**	1.38**	0.92**	1.19**
Observations	13315	1088	4171	2504	3766	4282	1347	2656	3987	3807
R-squared	0.44	0.34	0.57	0.42	0.54	0.41	0.51	0.39	0.55	0.35
* significant at 5%; ** significant at 1%										

Source: Author's calculations based on BBS Occupational Wage Survey

Table A3. Wage regressions by sex

	Males	*Females*
Age	0.042 (0.001)**	0.024 (0.004)**
Age^2/100	-0.042 (0.000)**	-0.020 (0.000)**
Illiterate	-0.215 (0.008)**	-0.317 (0.028)**
Less than primary education dummy	-0.168 (0.007)**	-0.226 (0.021)**
Primary education dummy	-0.096 (0.006)**	-0.111 (0.019)**
Secondary education dummy	0.021 (0.006)**	0.085 (0.018)**
Tertiary education (diploma) dummy	0.191 (0.010)**	0.286 (0.026)**
Tertiary education (technical) dummy	0.267 (0.019)**	0.283 (0.036)**
Manufacturing dummy	-0.030 (0.027)	0.019 (0.296)
Electricity, gas, water industry dummy	0.029 (0.036)	0.019 (0.296)
Construction industry dummy	-0.111 (0.027)**	0.133 (0.281)
Wholesale and retail trade dummy	-0.103 (0.027)**	-0.542 (0.248)*
Hotels/restaurants dummy	0.082 (0.033)*	0.269 (0.278)
Transport, storage and communications dummy	0.409 (0.144)**	0.425 (0.450)
Financial intermediation dummy	-0.105 (0.043)*	0.079 (0.278)
Education industry dummy	-0.472 (0.028)**	-0.626 (0.134)**
Health and social work dummy	0.214 (0.038)**	0.237 (0.449)
Other services dummy	0.086 (0.035)*	-0.012 (0.451)
Constant	1.834 (0.025)**	2.072 (0.124)**
Observations	35789	5134
R-squared	0.49	0.43
Standard errors in parentheses. * significant at 5%; ** significant at 1%		

Source: Author's calculations based on BBS Occupational Wage Survey

Table A4. Decomposition of gender gap by industry

	Manufacturing				Construction		
	Explained	Unexplained	Total		Explained	Unexplained	Total
Age	0.03	0.68	0.71		0.01	0.46	0.47
Education	0.01	-0.03	-0.02		0.01	0.13	0.14
Occupation	0.08	0.02	0.10		0.21	0.01	0.22
Location	0.00	-0.03	-0.03		0.03	-0.02	0.01
Other	-	-0.47	-0.47		-	-0.35	-0.35
Total	0.118	0.178	0.30		0.260	0.230	0.490
Total (%)	39.8	60.2			53.1	46.9	
	Hotels and restaurants				**Financial intermediation**		
	Explained	Unexplained	Total		Explained	Unexplained	Total
Age	-0.07	1.27	1.19		0.06	0.23	0.30
Education	0.06	0.04	0.10		0.07	-0.10	-0.03
Occupation	-0.16	-0.09	-0.24		0.10	0.00	0.11
Location	0.07	-0.09	-0.02		0.01	0.06	0.07
Other	-	-0.70	-0.70		-	-0.06	-0.06
Total	-0.094	0.434	0.340		0.237	0.138	0.375
Total (%)	-27.6	127.6			63.1	36.9	
	Education				**Health and social work**		
	Explained	Unexplained	Total		Explained	Unexplained	Total
Age	0.05	-0.23	-0.18		0.04	0.33	0.37
Education	0.04	-0.10	-0.06		0.03	0.02	0.04
Occupation	-0.04	0.13	0.10		0.00	0.26	0.26
Location	0.00	-0.29	-0.28		-0.01	0.01	-0.01
Other	-	0.65	0.65		-	-0.46	-0.46
Total	0.060	0.159	0.219		0.059	0.138	0.197
Total (%)	27.4	72.6			29.9	70.1	
	Other services						
	Explained	Unexplained	Total				
Age	0.07	-0.76	-0.68				
Education	0.02	-0.05	-0.04				
Occupation	-0.21	-0.18	-0.39				
Location	0.00	0.03	0.03				
Other	-	1.28	1.28				
Total	-0.121	0.321	0.20				
Total (%)	-60.2	160.2					

Source: Author's calculations based on BBS Occupational Wage Survey

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The gender wage gap in Bangladesh

This study utilizes the 2007 Bangladesh Occupational Wage Dataset to investigate determinants of earnings and to estimate gender wage differentials in a large sample of non-agricultural workers in the country. The Mincerian regression model and Blinder-Oaxaca wage decomposition model are utilized to estimate and decompose the observed gender earnings gaps into the portion that can be explained by differences between women and men in their productive endowments (in factors such as education) and the portion that is unexplained, owing to differences in returns to these productive factors and due to other unknown effects. The paper presents the first estimates of hourly gender wage gaps by industry, level of education and establishment size that control for other characteristics of workers in Bangladesh and the first quantitative estimates of the effects of industrial and occupational segregation on average wage rates for women and men in the country. It also provides a thorough decomposition of industry-level gender wage gaps into explained and unexplained components, which sheds light on the potential role played by gender-based discrimination in wage setting in different industries in Bangladesh.