

# 27<sup>th</sup> Annual Conference Online

May

June

2021



## WAGE INEQUALITY AMONG VOCATIONAL SECONDARY GRADUATES IN FORMAL AND INFORMAL URBAN AREAS OF EGYPT

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## SUSTAINABLE DEVELOPMENT GOALS AND EXTERNAL SHOCKS IN THE MENA REGION:

FROM RESILIENCE TO CHANGE IN THE WAKE OF COVID-19

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# **Wage inequality among Vocational Secondary Graduates in Formal and Informal Urban Areas of Egypt**

**May Gadallah and Rania Rosuhdy<sup>1</sup>**

## **1. Introductions**

Over the last few decades, the Egyptian labor market has been suffering from several challenges, which were exaggerated by the political changes which the country experienced since 2011. These challenges are related to both the supply and demand sides of the labor market. On the supply side, the main problem is that the supply of labor does not respond to the needs of the labor market, especially in terms of skills and specializations required. In addition to that, there is low female economic participation in the labor market. On the other hand, the most important demand side challenge is the insufficient economic growth to create new jobs, especially in the formal private sector, in light of the shrinking size of the government and public sectors. These challenges have led to an expansion of the informal employment with low skills, and to a larger mismatch between available employment skills and labor market need

These problems are particularly more apparent among the vocational education graduates, who constitute 38.5% of young people in the age group 18-29 years (41.6% among males and 35.7% among females) (ELMPS 2012). Every year approximately 50% of the third preparatory year graduates are channeled to vocational secondary education and nearly half a million student graduates from vocational education (Ministry of Education and Technical Education 2017). Yet, the quality of the education system in general and that of the vocational secondary education, in particular, has been a persistent concern over the years in Egypt. The expansion of the vocational education has traditionally been, and continued to be, supply-driven rather than a response to labor market needs of particular skills (Montenegro and Patrinos 2014; ETF 2015; ETF 2011). It has been significantly constrained by its poor curriculum, low quality equipments, unqualified instructors, limited access to on-job training and internships through connections with the private sector (Krafft 2018). Moreover, vocational education graduates suffer from a negative societal view towards them, as - on one hand - they include those who stumbled in public education, and on the other hand, they generally do not end in good quality jobs (Gadallah, forthcoming).

Despite the expansion in access to vocational education in Egypt and being subject to continuous interventions, few research has focused on investigating how the large group of young graduates of the vocational education system fair on the job market in terms of their employment and

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unemployment outcomes, wages and access to good jobs by their different specialization tracks. Dougherty (2014) demonstrated that vocational secondary graduates experience prolonged unemployment spells before transitioning into first jobs similar to university graduates; yet, their periods of unemployment tends to be shorter than that observed among university graduates as they are more likely to opt for informal employment faster (Dougherty, 2014; Amer, 2007). Salehi-Isfahani et al. (2009) found that the cumulative returns to completing vocational secondary education for men aged 20-54 residing in urban areas, as compared to not completing any level of education, were just 30 per cent in Egypt in 2006. However, the authors also highlighted that such returns to vocational education had substantially declined during the period 1988 to 2006, besides being much lower in Egypt than in Iran and Turkey. A more recent study by Krafft (2018) demonstrated that such returns to vocational secondary education have declined reaching almost zero in recent years.

The main objective of this paper is to contribute to the limited literature on the returns to vocational education in Egypt. The paper also investigate returns to education among vocational secondary graduates residing in informal urban areas as compared to their formal urban and rural peers. This is particularly important, as recent studies highlighted how young people living in informal urban areas experience different forms of marginalization on the job market due to their place of residence. According to Roushdy et al (2016), 11.0% of young people mentioned that they would not tell a potential employer where they live when applying for a new job due to their fear of being disqualified. Hence, vocational secondary graduates living in informal areas suffer from a double burden: the negative societal view towards vocational education as well as informal areas.

## **2. Data**

This research will use data from the 2014 Survey of Young People in Egypt (SYPE). The SYPE 2014 is a nationally representative survey implemented by the Population Council-Egypt office in partnership with the Central Agency for Public Mobilization and Statistics (CAPMAS). It re-interviewed a subsample of young people surveyed in the earlier wave of the survey in 2009 in all governorates of Egypt. The initial 2009 survey round targeted a nationally-representative sample of 15,029 young people aged 10 to 29.<sup>2</sup> The 2014 round were able to successfully tracked a 10,916 young individuals from the same SYPE 2009 sample who aged between 13 to 35 at the time of the second interview.

This paper focuses on young people aged 15-35, who were no longer in school during the SYPE 2014<sup>3</sup> interview. About 3,233 of this sample of young people were wage workers during the 2014

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<sup>2</sup> See Roushdy and Sieverding (2014) and Population Council (2010) for more details on the 2014 and 2009 SYPE samples and the sampling weights.

<sup>3</sup> The SYPE 2009 was conducted in collaboration with the Information and Decision Support Center of the Egyptian Cabinet (IDSC), while the 2014 survey was conducted in collaboration with Central Agency for Public Mobilization

interview and reported a non-missing wage.<sup>4</sup> Around 875 of this sample of wage workers were residing in urban areas, 1390 in rural areas and 203 in informal urban areas across Egypt. In the analysis of this paper, we group education level into three categories: below secondary<sup>5</sup>, vocational secondary and higher education. The analysis also distinguishes between four types of employment: (1) public sector wage work (i.e., in the government or public enterprise)<sup>6</sup>; (2) formal regular wage work in the private sector (i.e. with either the benefit of a contract or social insurance coverage); (3) informal but regular wage work in the private sector; (4) irregular wage work which is not only informal but is also casual or seasonal; (5) non-wage (this includes employers who are running their own businesses and employing others as well as the self-employed individuals).

### **3. Young People Education and Wage Structure**

According to the SYPE 2014 data, the majority of young people who are no longer in education are vocational secondary graduates (44.7% among young males and 37.2% among young females), and over a fifth of young people have an above secondary education degree (Figure 1). Below secondary education is more prevalent among females (44%) than males (33%) in Egypt. As expected, above secondary education is more predominant among young people living in urban areas followed by informal areas, while vocational education is more common in rural and informal areas.

#### **Figure 1 Distribution of Young People (aged 15-35 and not in Education), by Education Level and Residence**

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and Statistics (CAPMAS). The SYPE was funded by a large group of donors and partners including USAID, various UN agencies, the Ford Foundation, Silatech and the University of Tennessee.

<sup>4</sup> Due to wage outliers, the highest 1% of wage distribution was excluded from this sample.

<sup>5</sup> Due to the very small sample of the general secondary (9 in urban, 36 in rural, and 5 in informal areas) they were combined to the less than secondary group.

<sup>6</sup> The public sector jobs are mostly formal permanent jobs. In 2014, only 3% of young people reported working informally in the public sector and 7% reported working temporarily. In addition to the possibility of misreporting on own formality status, those who work informally in the public sector are likely to get formalized in the short run. Accordingly, we decided not to distinguish between the type of contract among those working in the public sector.

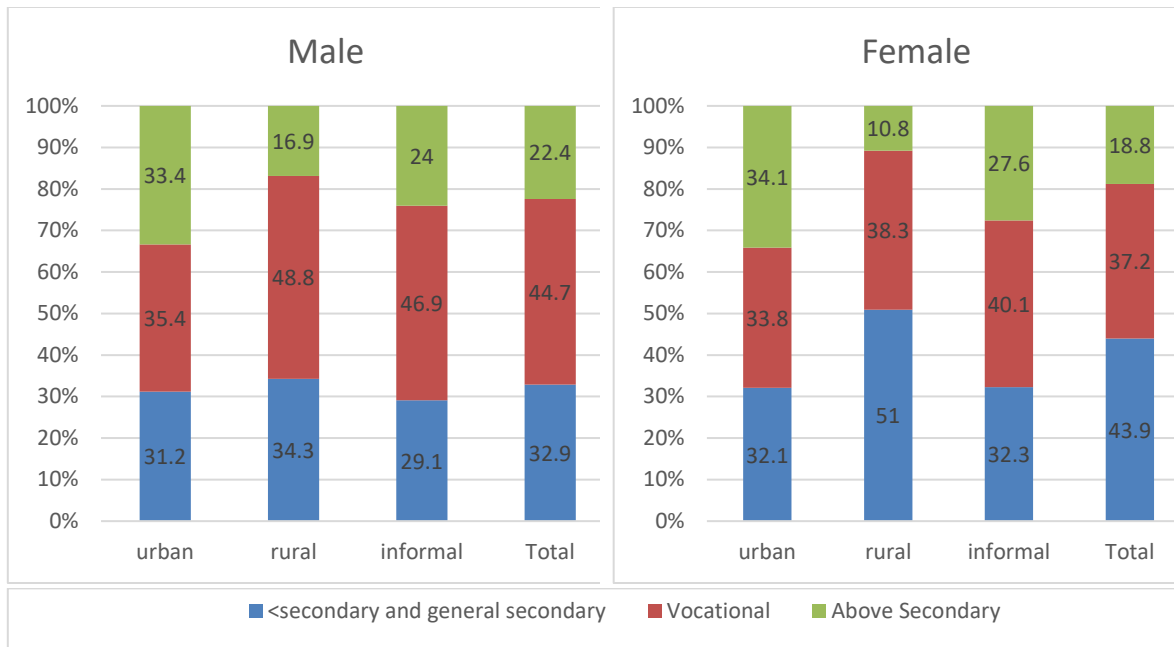
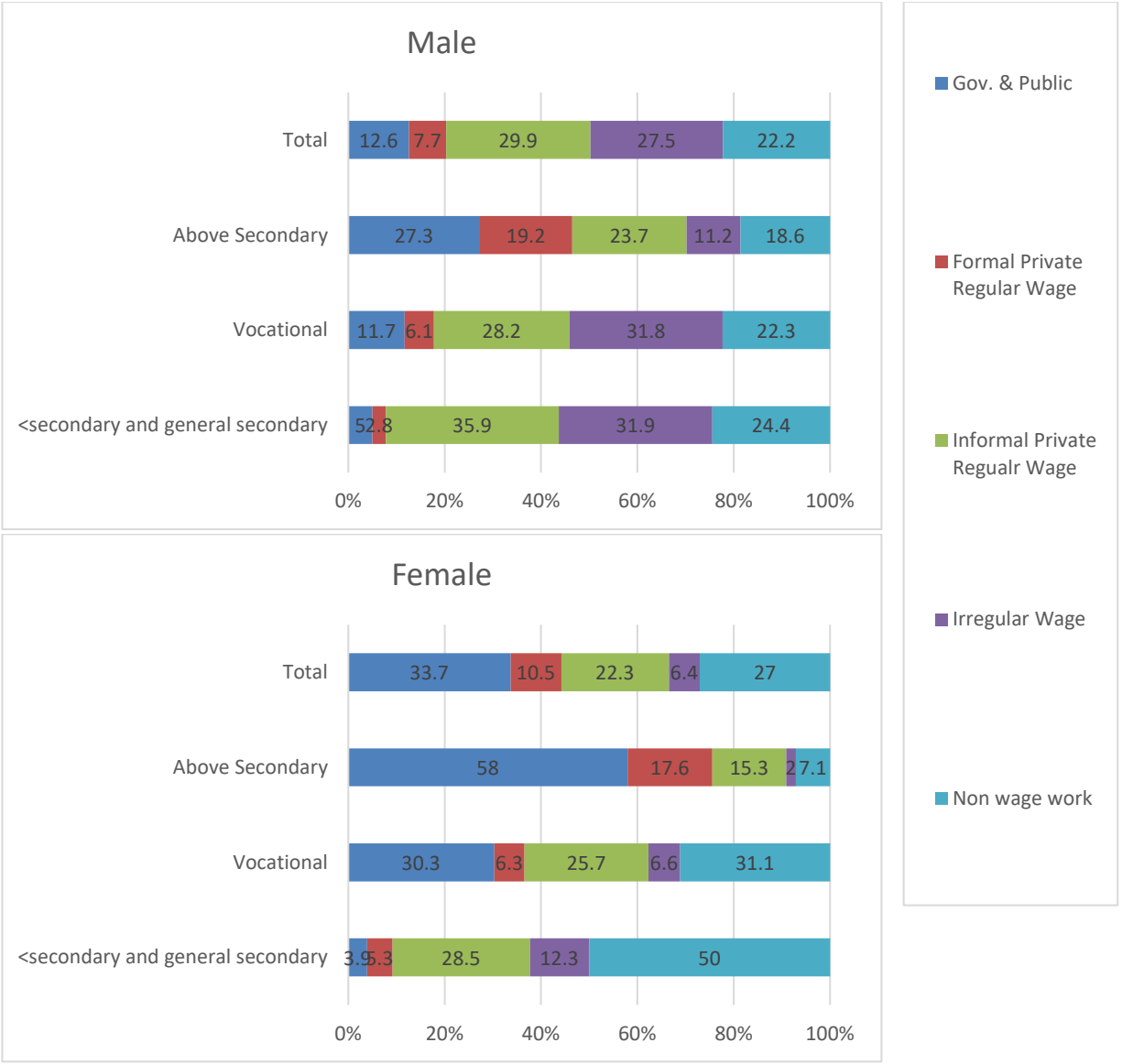


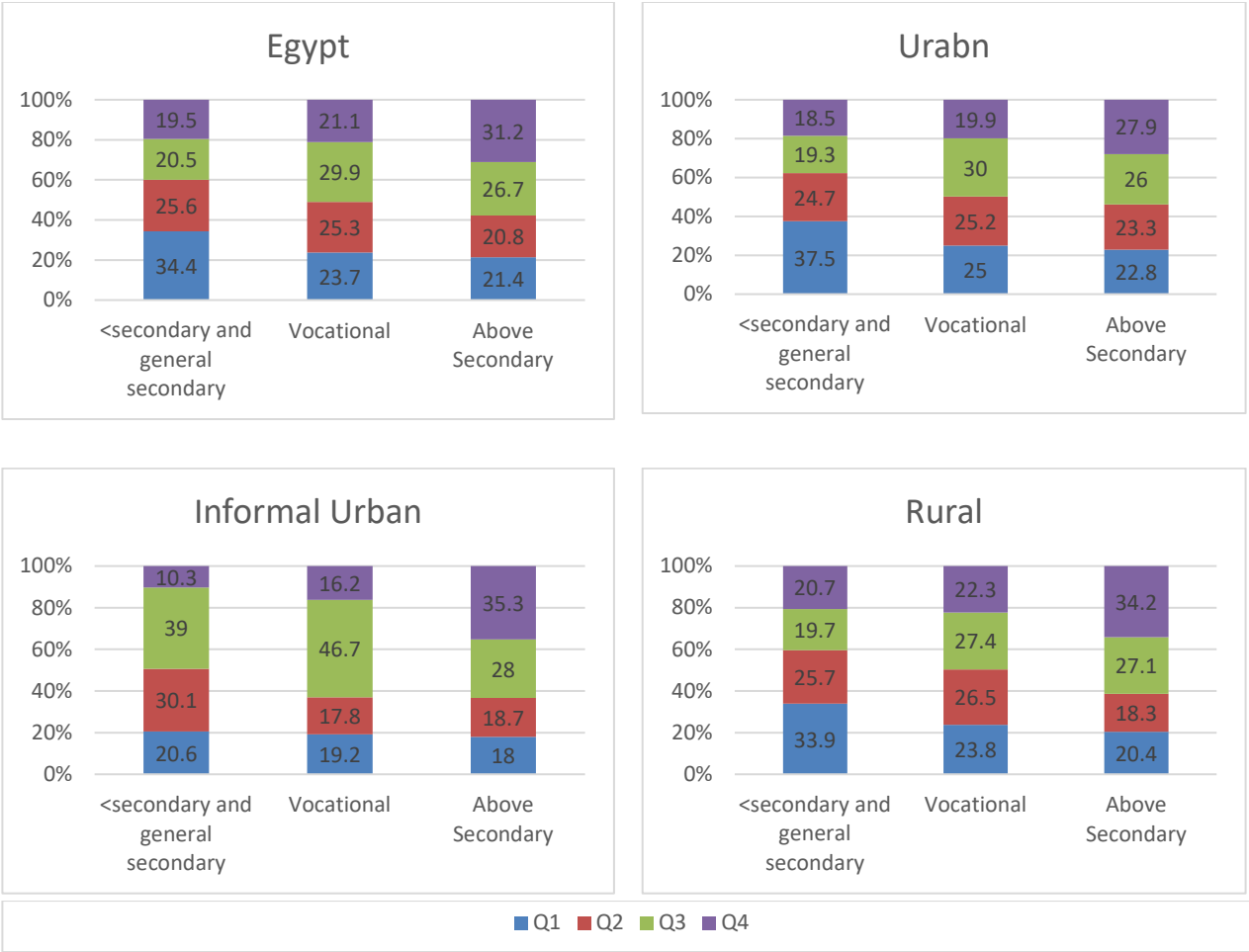
Figure 2 shows that vocational secondary graduates are more likely to end in an informal private regular or irregular wage job (60% among males and 33% among females) or in a non-wage job (23% among males and 32% among females). Only about 11% (30%) of young men (women) with vocational education work in a government job as compared to 27% (57%) among young men (women) with above secondary education.

In Figure 3 we plot the quintiles of the wage distribution by education level and residence. As one would expect, young people with above secondary education are more prevalent in the two highest quintiles of the wage distribution, while below secondary education are more common in the two lowest quintiles in the wage distribution in both rural and urban areas. In contrast, vocational secondary graduates are slightly more predominant among the two middle quintiles of wages. In informal areas, the distribution of wage by education level is quite mixed. This might probably be due to their smaller sample size across the wage quintiles.

**Figure 2 Distribution of Young People (aged 15-35 and not in Education), by Education Level and Type of Employment**



**Figure 3 Distribution of Young People (aged 15-35 and not in Education), by Education Level and Real Hourly Wage Quintiles**



#### 4. Estimating Young People Returns to Education

To investigate the monetary returns to each level of education among wage workers, the following Mincer equation is estimated using both OLS and Unconditional Quantile Regression models<sup>7</sup>:

$$\ln w_i = \beta_0 + \beta_1 S_i + \beta_2 E_i + \beta_3 E_i^2 + \beta_4 X_i + \varepsilon_i$$

Where the natural logarithm of real hourly wage ( $\ln w_i$ ) is regressed on wage workers' education level dummies ( $S_i$ ), labor market experience ( $E_i$ ) (and its square). Additional control variables ( $X_i$ )

<sup>7</sup> We also computed mills ratio to correct for selection into waged worker status, but preliminary results show no effect of selection.

include gender, sector of employment and economic activity. Separate regression models are estimated by urban, rural and informal urban residency.

Using the ordinary least squares (OLS) as a typical wage equation in measuring the returns to education means that it will be based on the mean of the conditional distribution of the wages. Hence, using the OLS does not reflect the differences of the impact of the exogenous along the conditional distribution (Martins and Preira 2004). Patrinos et al. (2007) emphasizes that the wage distribution, in addition to reflecting the education, it also reflects unobservable factors such as ability and social skills. They argue that at the bottom of the wage distribution may have little education as well as lesser endowment of unobservable skills, i.e. the effects of education on wages may not be independent of unobservable skills.

Many researchers applied the quantile regression in studying the returns to education, such as Martins and Preira 2004, Patrinos et al. 2007, Tansel and Bircan 2012, Andini 2017) in order to estimate the wage returns to education across quantiles of the conditional distribution. In this context Andini (2017) shows that if these returns are found to be increasing along the conditional wage distribution, this means that education increases the within-groups wage inequality, i.e. the "unobservable skills return", i.e. a high-ability individual earns relative to a low-ability individual, holding all the other individual characteristics constant – including the education level.

Alejo et al. 2014 argues that quantile regression focuses on the effect of education on the conditional distribution on the wages, despite that the interest should be the unconditional, and marginal distribution. The aforementioned paper used the unconditional quantile regression proposed by Firpo et al. (2007, 2009, 2018) in order to allow quantifying the effects of education by integrating with respect to alternative distributions of education and comparing resulting distributions.

In this paper apply the RIF regression approach (Unconditional Quantile Regression) proposed by Firpo et al. 2009 to estimate the impact of the explanatory variables on quantiles of the unconditional (marginal) distribution of hourly log wages. The method is based on running a regression of the (recentered) influence function (RIF) of the unconditional quantile on the explanatory variables.

#### **4.1 RIF Regression (The Unconditional Quantile Regression)<sup>8</sup>**

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<sup>8</sup> This part draws heavily on Fortin et al. 2009 (Unconditional Quantile Regression)



The influence function  $IF(Y; v, F_Y)^9$  of a distributional statistic,  $v(F_Y)^{10}$ , represents the influence of an individual observation on that distributional statistic. The recentered influence function of the distributional statistic  $v(F_Y)$  can be written as:

$$RIF(Y; v, F_Y) = v(F_Y) + IF(Y; v, F_Y)$$

The expectation of the RIF is equal to  $v(F_Y)^{11}$ , which is not the case in the regular quantile regression. Because influence functions can be computed for most distributional statistics, the method can be extended to other choices of  $v$  beyond quantiles, such as the variance, the Gini coefficient and other commonly used inequality measures.<sup>12</sup>

For the quantile  $q_\tau$ , the recentered influence function (RIF) will have the form:

$$RIF(Y; q_\tau) = q_\tau + \frac{\tau - I(Y \leq q_\tau)}{f_Y(q_\tau)}$$

The conditional expectation of the RIF ( $Y; v, F_Y$ ) can be modeled as a function of the explanatory variables:  $E [RIF (Y; v, F_Y) | X] = m_v(X)$ , i.e. the RIF *regression model*, which is the same as an OLS regression of Y on X in case of the mean.

In the case of quantiles,  $E [RIF (Y; q_\tau, F_Y) | X] = m_\tau (X)$ , which can be viewed as an *unconditional quantile regression* (UCQ). In the RIF-regression (*unconditional quantile regression*) the dependent variable is replaced by the recentered influence function (RIF) of a distributional statistic of interest (for example the quantile).

In other words, an estimate of the influence function corresponding to an observed wage  $y$  for a distributional statistic of interest,  $v_\tau$  ( $\tau$ -quantile), is found and then recentered. This RIF then becomes the dependent variable in a regression of RIF on the covariates and the effect of each covariate on different quantiles of the of log hourly wages is estimated.

Firpo et.al. 2009 computed the UCQ by estimating the sample quantile  $q_\tau$ , estimating the density  $f_Y(q_\tau)$  at that point  $q_\tau$  using kernel methods, and forming a dummy variable,  $I(Y \leq q_\tau)$ , indicating whether the value of the outcome variable is below  $q_\tau$ . Then run an OLS regression of this new

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<sup>9</sup> Let the  $v(F_Y)$  be a statistic of interest (mean, percentile, Gini coefficient). The influence function of  $v$  is a function of  $y$  and  $F$  defined as:

$$IF(y; v, F) = \lim_{\varepsilon \rightarrow 0} \frac{v(1 - \varepsilon)F + \varepsilon \Delta_y) - v(F)}{\varepsilon}$$

The IF captures the effect on  $v(F)$  on an infinitesimal of  $F$  at point mass  $y$ .

From: [https://www.stata.com/meeting/uk15/abstracts/materials/uk15\\_vankerm.pdf](https://www.stata.com/meeting/uk15/abstracts/materials/uk15_vankerm.pdf)

<sup>10</sup> The illustration is for the percentiles but it also applies for other distributional statistics such as variance and Gini coefficient.

<sup>11</sup> In Firpo, Fortin and Lemieux (2007b), the recentering is useful because it allows us to identify the intercept and performs Oaxaca-type decomposition at various quantiles.

<sup>12</sup> See Firpo, Fortin and Lemieux (2007b) for such regressions on the variance and Gini.

dependent variable on the covariates (RIF-OLS), other estimation methods were suggested in Firpo et.al. 2009.

The RIF-OLS approach estimates the "unconditional quantile partial effect" (UQPE) or the average marginal effect in case of quantiles which provides consistent estimates if  $\Pr [Y > q_\tau | X = x]$  is linear in  $x$ .

Firpo et.al. 2009 showed that the average derivative of the unconditional quantile regression corresponds to the marginal effect on the unconditional quantile of a small location shift in the distribution of covariates, holding everything else constant<sup>13</sup>. The analysis will be applied to different quantiles, in addition to the inequality measures.,

## 5. Empirical Results

Table 1 and 2 show the OLS and unconditional quintile regression estimates at the 25th, 50th, 75th percentiles of the Mincer earnings equation for urban, rural and informal areas residents.<sup>14</sup> The estimated returns to schooling are also plotted by percentiles of the wage distribution in the Appendix I.

It is clear from the Tables and figures in Appendix I that there is a large dispersion or inequality in return to education across the quantile of wages amongst individuals in the same educational group. Hence, this supports the fact that labor force in Egypt may not be well described by considering constant returns to education for all workers. In other words, the average may not provide a proper description of the variation in the magnitude of the pay gap across the wage distribution as it implicitly assumes that the schooling-related earnings increment is constant across the wage distribution. According in this section we focus on the results of the quintiles regression rather than that of the OLS.

Table 2 shows that, in both urban and rural areas, having a vocational education as compared to below secondary education level is mostly associated with a positive wage premium in both urban and rural areas among the 25<sup>th</sup> and 50<sup>th</sup> quantile of the wage distribution, while having above secondary education is associated with a positive wage premium across all the quintiles of the wage distribution. In other words, vocational education does not seem to have significant returns among young people in the highest quintile (75<sup>th</sup> quintile) of the wage distribution. The returns to vocational education is higher in urban areas. It increases from 20% to 23% between the 25<sup>th</sup> and 50<sup>th</sup> quintile in urban areas, compared to only around 12% for the same two quintiles in rural areas.

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<sup>13</sup> The paper applies the STATA command rifreg-ado proposed by Firpo, Fortin and Lemieux in <http://faculty.arts.ubc.ca/nfortin/datahead.html>

<sup>14</sup> The unconditional quintiles regression has been estimated using the Stata command rifhdreg proposed by Rios-Avila (2019).

As expected, higher returns are observed for above secondary education, ranging between 27% to 33% in urban areas and 27% to 28% in rural areas across the quintiles.

In contrast, in informal urban areas, neither vocational nor above secondary appear to have any significant effect on wage across all the quintiles of the wage distribution. Hence, schooling does not seem to pay or to have any significant impact on wage inequality in informal areas. This confirms previous evidence regarding the labor market marginalization experienced by young people living in informal urban areas due to their place of residence (see Roushdy et al. 2016).

The table also highlight the large wage inequality experienced by females on the Egyptian labor market across all the quintiles in urban areas and among the lowest quintile of wage in rural and informal areas. In urban areas, females earn about 32% less than their male peers in the lower quintile of the wage distribution and about 22% less in the highest quintile. Such gender wage inequality is even larger among the low wage earners in informal areas, where females earns about 44% lower than their male counterparts.

## **6. Conclusions and Policy Recommendations**

The results of this paper demonstrate that while the Egyptian labor market suffers from several challenges, young people residing in informal areas are most vulnerable particularly those with vocational secondary education degree. Education does not seem to have any significant impact on wage inequality in informal areas. Also, the long lasting gender wage gap against female existing in the Egyptian labor market (Said 2015; Said et al. 2018) is exacerbated among the lowest quintile of wage distribution in informal areas.

It is worth noting here that the mandate of the vocational education in Egypt falls under several authorities that weakly coordinate. In light of this, the attempt to reform vocational education came through several initiatives, but there is no unified strategy between these different sides. Accordingly, given the long list of failed attempts to reform vocational secondary education in Egypt (see ILO 2016; World Bank 2014), it is an appropriate time for the government to consider organizing all the efforts under one umbrella.

Continuous communication should exist between the demand side of the labor market (employers and business owners) and the Ministry of Education. Sharing updated information is mandatory to develop curricula in line with the requirements of business owners. For example, the curricula for renewable energy and logistics have been developed in some schools (under the USAID-WISE initiative) through the cooperation of several bodies including the International Labor Organization (ILO), the United Nations Industrial Development Organization (UNIDO), the United Nations Development Program (UNDP), the German Foundation for International Cooperation (GIZ).

In addition to the curricula reforms, schools should expand the on -job training, through establishing links between school and employers at the local levels, through the employment offices. The Mubarak

Kohl Initiative (MKI) for Vocational Education Training and Employment Promotion, that was introduced in 1994, was a dual system that successfully integrated classroom-based and on-the-job training through an apprenticeship system.

The scale up of such a dual system is limited by the size of the private sector that can provide proper on-the-job training. According, there is an urgent need to help the private sector to formalize and grow given the shirking role of the government in providing jobs. On the other hand, to expand such dual system in Egypt well-thought incentives should be provided to employers and business owners to encourage them to appropriately train their workers (ILO 2016), regardless of the fact that they may eventually leave after being trained when getting a better job offer.

It is also important to provides vocational education students with career guidance during their three years of education. This should include rigorous information on the different tracks of the vocational education system and their potential labor market opportunities. Furthermore, there is an urgent need to design employment programs that are target specifically to the interests and needs of different groups of young people living in informal areas of Egypt – including young men versus women, and youth with different education levels. Such programs should focus on youth empowerment and leadership trainings that address the concerns young people from informal settlements had about their job prospects because of their area of residence.

**Table 1 OLS Estimates of Returns to Education**

VARIABLES	(2) Urban	(3) Rural	(4) Informal
Female (ref. Male)	-0.280*** (0.0788)	-0.127 (0.114)	-0.444** (0.193)
Education: ref. below secondary			
Vocational	0.128 (0.0798)	0.0819 (0.0612)	0.0649 (0.111)
Above Secondary	0.229*** (0.0836)	0.245*** (0.0851)	0.220 (0.146)
Experience	0.0549*** (0.0202)	0.0619*** (0.0188)	0.0253 (0.0337)
Exp squared	-0.00212** (0.00106)	-0.00267*** (0.000958)	-0.00129 (0.00146)
Sector: ref. Irregular Waged Worker			
Gov. & Public	0.185* (0.0976)	0.111 (0.0933)	0.424** (0.184)
Formal Private Regular Wage	-0.0731 (0.104)	0.169** (0.0845)	0.0612 (0.212)
Informal Private Regular Wage	-0.235*** (0.0769)	-0.0128 (0.0682)	-0.256** (0.125)
Economic activity: ref. Agriculture			
Industry	0.0900 (0.141)	0.185*** (0.0701)	-0.0769 (0.238)
Services	-0.0315 (0.145)	0.0110 (0.0854)	-0.272 (0.238)
Constant	1.762*** (0.169)	1.454*** (0.173)	2.316*** (0.402)
Observations	845	1,356	193
R-squared	0.091	0.045	0.138

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 2 Unconditional Quintile Regression Estimates of Returns to Education**

VARIABLES	Urban			Rural			Informal		
	25	50	75	25	50	75	25	50	75
Female (ref. Male)	-0.316*** (0.0844)	-0.180** (0.0752)	-0.222*** (0.0788)	-0.205** (0.0864)	-0.117 (0.0722)	-0.0677 (0.0987)	-0.437** (0.185)	-0.0583 (0.128)	-0.0927 (0.152)
<u>Education (ref. Below Secondary)</u>									
Vocational	0.203** (0.0822)	0.237*** (0.0763)	0.0958 (0.0817)	0.127** (0.0555)	0.115** (0.0505)	0.0330 (0.0673)	-0.149 (0.158)	0.0550 (0.115)	0.0134 (0.103)
Above Secondary	0.315*** (0.0876)	0.275*** (0.0819)	0.332*** (0.0913)	0.283*** (0.0691)	0.275*** (0.0700)	0.265** (0.111)	-0.0483 (0.185)	0.00978 (0.128)	0.179 (0.131)
Experience	0.0194 (0.0182)	0.0531*** (0.0200)	0.0408* (0.0232)	0.0598*** (0.0148)	0.0548*** (0.0134)	0.0685*** (0.0175)	0.0979** (0.0424)	0.0389 (0.0264)	0.0236 (0.0274)
Experience squared	-0.00047 (0.0009)	-0.00246** (0.00105)	-0.00164 (0.00125)	-0.0025*** (0.0007)	-0.0026*** (0.0006)	-0.0032*** (0.0008)	-0.0045** (0.00208)	-0.00119 (0.0012)	-0.00062 (0.0011)
<u>Sector (ref. Irregular Waged Worker)</u>									
Gov. & Public	0.0384 (0.0915)	0.0615 (0.0990)	0.157 (0.122)	-0.0433 (0.0787)	0.0682 (0.0698)	0.134 (0.103)	0.277 (0.201)	0.207 (0.152)	0.526*** (0.177)
Formal Private Regular Wage	-0.131 (0.107)	-0.177 (0.109)	0.00442 (0.124)	0.0736 (0.0712)	0.240*** (0.0780)	0.181 (0.141)	-0.109 (0.236)	0.150 (0.149)	0.354* (0.191)
Informal Private Regular Wage	-0.291*** (0.0815)	-0.313*** (0.0798)	-0.103 (0.0897)	-0.276*** (0.0597)	-0.106** (0.0540)	-0.0235 (0.0742)	-0.563*** (0.153)	-0.300*** (0.109)	0.137 (0.111)
<u>Economic Activity (ref. Agriculture)</u>									
Industry	-0.154 (0.191)	0.111 (0.248)	0.346** (0.142)	0.120* (0.0658)	0.145** (0.0660)	0.315*** (0.0858)	0.466 (0.488)	0.240 (0.261)	-0.0912 (0.286)
Services	-0.237 (0.193)	-0.0292 (0.251)	0.160 (0.139)	-0.119 (0.0819)	-0.0242 (0.0717)	0.130 (0.0907)	0.197 (0.490)	0.0182 (0.263)	-0.108 (0.281)
Constant	1.727*** (0.215)	1.638*** (0.274)	1.796*** (0.174)	1.297*** (0.134)	1.436*** (0.118)	1.678*** (0.152)	1.576*** (0.557)	1.686*** (0.343)	1.898*** (0.372)
Observations	845	845	845	1,356	1,356	1,356	193	193	193
R-squared	0.091	0.098	0.067	0.093	0.072	0.049	0.195	0.182	0.139

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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Appendix I

