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Informal employment in the health sector: Examining gender disparities

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Abstract

This paper investigates the association between informal employment as a form of non-standard employment and the prevalence of in-work poverty for women in the health sector. We measured in-work poverty using a binary indicator that provides information on whether an individual has earnings above or below the low earnings threshold. The indicator takes into account household size and whether other household members are also in paid work. Using data from the Egypt Labor Market Panel Survey for the years 2012 and 2018 and logit models, we found that being employed within the health sector increased the likelihood of in-work poverty among non-standard employees, both men and women. However, higher risks of in-work poverty were witnessed among women working informally in the health sector compared to other sectors. This increased risk was particularly observed when comparing non-standard employment in the health sector to non-standard employment in non-health sectors. Furthermore, marital status plays a critical role in economic wellbeing, with never-married women being more susceptible to in-work poverty compared to ever-married women.

KEYWORDS

female employment, health sector, in-work poverty, non-standard employment, precarious employment

INTRODUCTION

In recent years, the dualization of the labor market into standard and non-standard employment and its effect on economic wellbeing have received increasing attention. Non-standard employment refers to temporary, part-time and marginal employment, as forms of external and internal flexibility (De Cuyper et al., 2009; Lohmann & Marx, 2018; World Health Organization, 2019). Despite being considered a stepping stone (Booth et al., 2002; Gash, 2008), research has shown that non-standard employment, particularly temporary employment, has negative effects, including higher levels of insecurity, lower wages and increased social inequality, namely poverty risks (Fauser & Gebel, 2023; Gash & McGinnity, 2007; Gebel, 2009; Giesecke, 2009; Giesecke & Groß, 2003; McGovern et al., 2004; Westhoff, 2022). The negative effects are also gendered, with the risk of poverty tending to be higher for women in non-standard employment, and lower

Abbreviations: ELMPS, Egypt Labor Market Panel Survey; LFP, labor force participation.

for women in countries with a weaker male-breadwinner model (Giesselmann, 2015; Jaehrling et al., 2014).

In addition to temporary and part-time employment, informal employment is another aspect of non-standard employment that is extremely relevant worldwide and specifically for lower-middle income countries. Informal employment among women is widespread worldwide (55%), with the majority of such employment occurring in lower-middle income countries (83%) (International Labour Office, 2024). Nevertheless, important aspects of informal employment remain understudied due to a lack of good data, with some exceptions in the literature on wellbeing and health (Ehab, 2023a; Karabchuk & Soboleva, 2020; Pirani, 2017). Wage penalties exist not only for temporary employment (Gebel, 2011), but also for informal employment (Tansel et al., 2020). Despite this, two-thirds of workers in developing countries suffer from extreme or moderate poverty (International Labour Office, 2017). The high share of informal employment and the associated high risk of in-work poverty raise concerns about the extent of in-work poverty faced by women. In-work poverty, a situation which describes the working poor, provides information on whether an individual has earnings above or below the low earnings line. The indicator considers the size of the household and whether other household members are also in paid work.

These disadvantages tend to be higher in sectors with high levels of horizontal and vertical segregation for women, such as the health sector (Meulders et al., 2010). Globally, the health sector is a major source of employment for women, yet many of these jobs are characterized by low wages and temporary employment (Schlenzka et al., 2020; World Health Organization, 2019). Women make up 70% of the health and social care workforce (World Health Organization, 2019), making it a female-dominated sector. These women work in essential and indispensable occupations, as demonstrated during the pandemic (Palomino et al., 2020). In addition to horizontal segregation, women in the health sector are concentrated in low-paid jobs, a sign of vertical segregation (Meulders et al., 2010; World Health Organization, 2019). The majority of doctors and pharmacists are men, while the majority of women work as nurses (World Health Organization, 2019). A gender wage gap of 26% in high-middle income countries and 29% in upper-middle income countries is prevalent in the sector, which is also higher than in other economic sectors (World Health Organization, 2019). Non-standard employment, in the form of temporary employment, is also common. Worldwide, one in five workers in health and social care work operate under informal conditions. This issue is more prevalent in low- and middle-income countries, where 30.5% of workers face informal employment, compared to only 10.4% in high-income countries (International Labour Office, 2024). Yet, a recent literature review of 170 studies found that little is known about the situation in low- and middle-income countries in the health sector (World Health Organization, 2019).

Egypt is an excellent case study for lower-middle income countries for several reasons. Egyptian working women are highly concentrated in the health sector, similar to women in other countries (Krafft & Ehab, 2023). On average, Egyptian women are overrepresented in health and social services compared to men, with a rising share of their employment in this sector (Fedi et al., 2019). Women employed in the health sector account for 19% of total female employment in Egypt (Open Access Micro Data Initiative, 2019). Healthcare jobs are one of the nine job categories in the Egyptian private sector with a high concentration of women (Assaad & Arntz, 2005). Yet, 59% of women in the care sector suffer from higher risks of in-work poverty compared to 49% of men (Krafft & Ehab, 2023). In the period 2015–2017, the proportion of women formally employed in Egypt's private health and social care sector was 47%, a decline from 74% for the period between 2009 and 2011 (Economic Research Forum & United Nations Women, 2020).

Until recently, the majority of jobs in the Egyptian health sector were standard employment due to the prevalence of public sector recruitment (Krafft & Ehab, 2023; Economic Research Forum & United Nations Women, 2020). Working in the public sector, which usually entails a formal and permanent employment contract, is the most preferred option for women (Barsoum, 2019, 2020). However, in recent years, a trend of contracting hiring in the public sector has emerged (Assaad & Barsoum, 2019). As a result, jobs are instead being created in the private sector, leading to an increase in non-standard employment across the economy, including in care employment which extends to the health sector (Krafft & Ehab, 2023). A decline in social security insurance coverage has led to a deterioration of working conditions. The proliferation of informal jobs in the Egyptian labor market and the health sector is concerning, especially in light of the deterioration of the working conditions in the care and health sectors and the proliferation of the care pay gap, despite efforts for improvement (Krafft & Ehab, 2023). The increase in informal jobs in the health sector exacerbates the problem of insecurity, especially for women (Krafft & Ehab, 2023). On top of the care pay gap, informal employment often lacks protections, benefits, and stability, leaving workers susceptible to exploitation and poverty (Assaad, 2009; Assaad et al., 2019; Assaad, Krafft, & Yassin, 2020). The rising informal employment and deteriorating working conditions raise concerns about the effect of employment in

this sector for women, who face multiple disadvantages due to informal employment (Ehab, 2022; Krafft & Ehab, 2023).

To fill this gap, we asked: are there any gender differences in in-work poverty for those working in the health sector compared to other sectors? In addition, we focus on standard and non-standard employment relations. This paper adopts an employment taxonomy that classifies jobs according to their formality (whether or not there is a contract). Thus, we classify employment as standard if the job is formal and as non-standard if the job is informal, in order to provide a better picture of the situation in lower-middle income countries. To answer our question, we used the Egypt Labor Market Panel Survey (ELMPS) for the years 2012 and 2018 and estimated logit models. We examined the relationship between non-standard employment and in-work poverty by gender. Understanding the relationship between non-standard employment and in-work poverty is crucial for designing effective policy interventions, especially in sectors such as health care where women are disproportionately affected. Our findings are presented as partial correlations, providing insights into associations rather than claiming causal relationships.

Our main contribution to the literature is twofold. First, we investigated the relationship between non-standard employment and in-work poverty in a lower-middle income country, considering informal employment as non-standard employment in the health sector. This research is particularly relevant in the context of Egypt, where in-work poverty was reported to be 57% in 2018 (Said, 2012; Said et al., 2022). We delved deeper into the precariousness of these non-standard jobs to investigate the level of economic precariousness in terms of in-work poverty. Second, we looked at the gendered implications, which have not been studied in such detail in the health sector. Focusing on this sector is crucial given its role in women's employment worldwide in general and in Egypt in particular.

BACKGROUND AND HYPOTHESES

Women in the Egyptian labor market

Women in Egypt have significantly improved their educational attainment and closed the gender gap (Assaad, Hendy, et al., 2020; Krafft & Kettle, 2019). However, this gender equality in education is not reflected in their labor force participation (LFP). In 2018, the LFP for women was 21%, compared to 76% for men (Krafft et al., 2022), which remains one of the lowest labor force participation rates for women globally (International Labour Office, 2017).

Previous research has shown that 57% of women in Egypt transition from school to inactivity (Heyne & Gebel, 2014). This pattern is also observed in other countries but usually after women have taken on greater family responsibilities, given the prevalence of the traditional division of labor (Moen, 2016). Furthermore, in Egypt, the transition back into the labor force is limited. The majority of those who transition to inactivity for family reasons do not re-enter the labor market (International Labour Office, 2016).

Standard employment is the most preferred employment for Egyptian women. Women prefer to work in the public sector, which is usually a standard job in terms of formality and indefinite contract duration (Barsoum, 2019, 2020). Job stability and characteristics of formal jobs, such as availability of social insurance are the main features that improve women's job satisfaction (Ezzat & Ehab, 2019). In addition, the transition from non-employment to informal employment has negative effects on women's health (Ehab, 2023a).

However, due to decreasing employment opportunities in the public sector, the standard employment situation in the Egyptian labor market and the deterioration of working conditions in the private sector have resulted in a shortage of standard employment (Assaad & Barsoum, 2019; Assaad, Hendy, et al., 2020; Assaad, Krafft, & Yassin, 2020; Barsoum, 2019, 2020). This situation has resulted in limited access to formal or permanent jobs. Thus, the access that women have to employment opportunities is predominantly either temporary or informal in the private sector (Amer & Atallah, 2022; Assaad & Krafft, 2015; Roushdy & Sieverding, 2015). The prevalence of informal employment characterizes the segmentation of the labor market in Egypt, which places women at high risk. Non-standard employment, especially informal employment, is associated with poor job quality such as irregularity, lack of access to paid leave and health insurance, or social protection in general (Assaad, 2009; Assaad et al., 2019; Assaad, Hendy, et al., 2020; Assaad, Krafft, & Yassin, 2020).

Informal employment plays a major role in the Egyptian economy, despite significant efforts by the government to reduce informal employment as shown by Wahba and Assaad (2017). They conducted a study to examine the impact of introducing more flexible arrangements in a new labor law that would allow workers without contracts to be formally contracted. Using the difference-in-difference method, they found that the introduction of the new law would increase the likelihood of transitioning into a formal job for non-contracted workers in formal establishments by about 3%–3.5% (Wahba & Assaad, 2017). Despite these efforts, informality is still prevalent in the Egyptian economy (Assaad, Hendy, et al., 2020; Assaad, Krafft, & Yassin, 2020).

Egyptian women, in various sectors, suffer from hiring discrimination that is overt and not stigmatized (Barsoum, 2023; Osman et al., 2024). However, these differences have not been found in the callback rates for women, at least for online job ads, where one study found no differences in callback rates by gender or marital status, (Krafft, 2023). However, gender stereotypes do exist in certain occupations where a high percentage of ads overtly state that a man is needed for the job (Krafft, 2023).

Gender differences extend beyond discrimination in hiring to wage inequality and in-work poverty. For example, wage differentials have been calculated showing a gender pay gap. The wage gap between men and women seems to diverge over time, especially in the private sector. Worker characteristics do not explain most of this gap, revealing discriminatory biases and exacerbating segmentation based on gender (AlAzzawi, 2016; Biltagy, 2014, 2019; Said et al., 2022). This situation is associated with a deterioration in the relative wage position of women in the private sector, resulting in an increase in in-work poverty when comparing 2012 and 2018 (Said et al., 2022). The increase in in-work poverty is also prevalent in the service sector (which puts workers' health at risk). In 2018, in-work poverty stood at 56%, a deterioration of 14% compared to 2012, showing the rise of in-work poverty in the sector, affecting both men and women (Said et al., 2022).

Non-standard employment and in-work poverty

To understand the relationship between non-standard employment and in-work poverty, it is important to recognize the different types of contracts and what they entail. According to psychological contract theory, there are four types of contracts in the labor market (Beard & Edwards, 1995). Transactional contracts refer to an employment relationship based solely on the extrinsic aspects of the job (such as wages) and reflect a short-term perspective. These types of jobs provide flexibility for the employer and increase insecurity for the employee. Relational contracts are contracts that include both intrinsic and extrinsic job aspects in the employment relationship and involve a longer-term perspective. Such a perspective results in greater job security for the employee. Symmetrical contracts refer to an equal balance of power between the employer and the employee. Finally, asymmetrical contracts are characterized by an imbalance of power (De Witte & Näswall, 2003). On the one hand, informal employment is considered an asymmetrical and transactional psychological contract, which entails an imbalance of power in favor of the employer and a high level of insecurity for the employee (Assaad & Barsoum, 2019; Kalleberg, 2009). On the other hand, formal employment represents symmetrical and relational contracts, with a balance of power and more rights and security for the employee.

The contract type might have consequences on the economic situation of an individual, in particular for women. Previous research studied the association between temporary employment and in-work poverty at the individual level. A study of 24 European countries investigated that relationship, taking into account the gender aspect. By using a logistic multilevel model, it found that being a temporary employee does increase the risk of in-work poverty compared to permanent employees. This increased risk of poverty for temporary employees was primarily attributed to lower wages (Van Lancker, 2012). The same result was found in Spain, where fixed-term workers were found to be linked to poverty incidence using Spanish panel data and maximum-likelihood binary models (Amuedo-Dorantes & Serrano-Padial, 2010). On average, higher poverty risks are expected for women who are in non-standard employment (Giesselmann, 2015; Jaehrling et al., 2014).

Commonly used measures of in-work poverty in the literature include income-based thresholds and relative deprivation measures (Delhausse et al., 1993). These measures often rely solely on individual income levels to determine poverty status, without taking into consideration household structure or dependency. In contrast, our proposed measure of in-work poverty considers both individual and household dimensions. As the number of working people living in low-income households increases, in-work poverty is seen as a phenomenon (Crettaz, 2015). Building on this concept, we calculated the low-income threshold. By calculating this threshold adjusted for household composition, we were able to provide a more comprehensive understanding of poverty in the context of wage employment. This approach allowed us to capture not only the individual's wage earnings, but also the household's ability to support its members, considering factors such as the number of earners and dependents. Moreover, by linking our measure to the national poverty line, we were able to assure its validity and applicability within the specific socioeconomic context of Egypt. Thus, our measure of in-work poverty provides a nuanced assessment that takes into account both individual-level income and household-level vulnerability, making it particularly well-suited for examining the complexities of poverty risks in the Egyptian health sector.

Working hypotheses

As indicated in the previous section, the literature mainly differentiates between permanent and temporary

employment in developed countries. However, working in developing countries involves other dimensions of inequality such as the differentiation between formal and informal employment (International Labour Office, 2013). Hence, we examined the relationship between non-standard employment (differentiating between formal and informal employment) and the risk of belonging to the group of the in-work poor in the health sector.

Research on the Egyptian labor market has investigated the link between various types of non-standard employment and health outcomes (Ehab, 2023a; Ehab, 2023b; Sharaf & Rashad, 2020). For example, Ehab (2023a) has shown how the effect of transitioning from non-employment to temporary and informal employment differs by gender. For women, moving into formal employment can provide the most significant improvements to wellbeing, as it typically offers greater job security, access to benefits, and a stable income. This sensitive position with regard to the formality of the job might have effects that extend beyond the health outcomes to economic outcomes.

Some studies explored the relationship between informality and poverty in Egypt for men only. Nazier and Ramadan (2015) focused on heads of households who were males to study their informality and poverty levels. By using the EMLPS 2012, they were able to investigate the impact of individual, socio-demographic household and firm characteristics, and regional dummies, on the likelihood of being an informal wage worker as well as on the incidence of being poor for a male head of household. They found that being an informal wage worker in the private sector does increase the likelihood of being poor significantly. However, this paper focuses only on men's employment and poverty.

Using the segmentation of the labor market into primary and secondary markets is an appropriate entry point. Primary markets are characterized by formal and stable jobs. Secondary markets are characterized by short-term contracts and unstable employment (Weiss & Reid, 2005). For women, marginal employment often serves as a means to balance work and caregiving responsibilities during their employment years. Comparative cohort studies have highlighted the increasing importance of non-standard employment as a tool for women to manage these dual roles (Bachmann et al., 2020). The traditional gendered division of labor means that women's employment patterns typically include more interruptions and part-time work due to family care responsibilities, making non-standard employment more likely for women compared to men (Moen, 2016). This concentration in non-standard employment could have consequences on women's outcomes, particularly their risks of in-work poverty.

Given the fact that women are concentrated in the health sector, it is crucial to study their situation in this sector and their economic wellbeing. Hence, we examined the variation of in-work poverty by gender, specifically in the health sector in Egypt. This sector has been characterized by a high share of formal employment, as it was predominantly a public sector (Barsoum, 2020). It also reflects the situation of women in Egypt who still prefer working in the public sector due to the nature of its work arrangements, namely formality and indefinite contracts (Assaad & Barsoum, 2019; Barsoum & Abdalla, 2022). Said et al. (2022) conducted a study using the four waves of the ELMPS and found that real wages declined for wage workers in Egypt. Women were most affected by this decline, especially in the private sector and suffered from increasing in-work poverty.

Women bear the greater share of domestic and care work as they try to reconcile family and work, both in Egypt and in other countries (Addati et al., 2018; Assaad & Krafft, 2021; United Nations, 2019). This reconciliation tends to lead to their concentration in jobs and occupations that offer lower wages (Kalleberg, 2009; Mandel, 2012; United Nations, 2019). This means that women, in general and in the health sector, are concentrated into occupations that tend to offer greater flexibility but are associated with low wages (World Health Organization, 2022). Hence, we expect that the magnitude of the association between working in the health sector and in-work poverty to be higher for women compared to men (Hypothesis 1).

The situation is expected to be worse for women employed in informal employment compared to women in formal employment. Women prefer formal employment, given that it provides benefits such as sick and maternity leaves, which are a necessity in light of the anticipated work interruptions for women caused by pregnancy or caregiving responsibilities (Assaad et al., 2022; Selwaness & Krafft, 2021). Informal employment, on the contrary, does not provide these benefits, making it harder for women to make ends meet during periods of sick leave or maternity leave and might lead to wage penalties in comparison to formal employment (Tansel et al., 2020). Hence, our second hypothesis is that the rise in the risk of in-work poverty is higher for those employed in informal employment compared to formal ones (Hypothesis 2).

On average, women have a higher rate of transition to non-employment, especially after a major life course transition (Ehab, 2022; Heyne & Gebel, 2014; Selwaness & Krafft, 2021). Marriage significantly increases the likelihood that women will transition to non-employment (Ehab, 2022; Selwaness & Krafft, 2021). This transition typically occurs around the time of marriage, with a noticeable increase starting in the year before marriage,

suggesting an anticipation effect (Ehab, 2022; Selwaness & Krafft, 2021). A recent study showed that there is a marriage premium in the Egyptian labor market and no evidence of an occupational penalty after marriage or childbirth (Ehab, 2023b). This finding indicates that married women are a rather select group with good employment trajectories and are expected to have better economic outcomes. Moreover, the traditional gender division of labor means that a woman's income is seen as a supplement to the household's income rather than as the main source of income. Overall, married women in the Egyptian labor market are a rather select group with good employment trajectories. Therefore, we expect the magnitude of the association between non-standard employment and in-work poverty to be higher for single women than for married women (Hypothesis 3).

DATA AND METHODS

Data

To answer our research questions, we used repeated cross sections from the ELMPS for the years 2012 and 2018.[1] The ELMPS is the most suitable dataset for our analysis since it is nationally representative, following households and individuals (Krafft et al., 2021). It includes several modules such as employment, characteristics of the main job, marriage and fertility that are relevant to our research. The ELMPS 2012 covered 12,060 households, consisting of 49,186 individuals (Assaad & Krafft, 2013), while the ELMPS 2018 covered 15,746 households with 61,231 individuals (Krafft et al., 2021).

Sample weights were used in the descriptive statistics and the multivariate analysis. Since the scope of the paper focuses on in-work poverty in the two rounds of the ELMPS 2012 and 2018, we included only wage workers, aged from 15 to 64 years old. Hence, the final sample includes 24,171 observations for men and 5522 for women.[2]

Variables

The main dependent variable of the individual in-work poverty risk is a binary variable indicating whether the individual's wage is below the low earnings line. Being in-work poor is seen as a measure of poverty that addresses both the individual and household dimensions. For the individual dimension, the individual is a wage-earner and therefore earns a wage. For the household dimension, this wage may not be sufficient, considering the structure of the household, namely the number of earners and the number of dependents in the household (such as children under 15 and senior citizens over 65 who are not working). To account for the household structure, we follow the methodology of Said (2012) and Said et al. (2022) to identify individuals at risk of in-work poverty by calculating the low-income line. This line is a rescaling of the national poverty line by the mean of the ratio of dependents to earners in each household. Individuals at risk of in-work poverty are then those who are in paid employment but fall below the low-income threshold. This poverty measure does not fully capture household in-work poverty, which considers household income. However, it is still an indicator of in-work poverty at the individual level as it is anchored to the national poverty line.

Our two main independent variables are both binary variables. The first is being employed in the health sector, which is defined based on the industry and occupation definition. It takes 1 if the individual works in the health sector and 0 otherwise.

The second is non-standard employment, which is defined as informal employment (no-contract employment) while formal employment represents the standard employment in this case. It takes 1 if the individual is working in an informal job and 0 otherwise. It is important to note that given the small sample size of temporary employment that is formal in the health sector in the ELMPS data, it is impractical to put it in a separate category. Therefore, we have decided to differentiate only by the formality of the job and not by the length of the contract.

Other covariates are accounted for in the models. These include ever married (which takes zero if the person is currently single and never married before and 1 otherwise), having kids, working in the private sector, the number of working hours, age as a categorical variable, divided into 15–29, 30–44 and 45–64 age groups, education, gender, occupation (ISCO-3 digits), living in rural areas and health status. Furthermore, a dummy variable for 2018 is also controlled for. Table 1 shows the summary statistics for all the variables used in the models separated by sector and gender.

Empirical strategy

To answer our research questions, we rely on both descriptive and multivariate analyses. Using data from the 2012 and 2018 ELMPS, we estimate the association

[1]ELMPS's data collection is conducted every 6 years (Krafft et al., 2021).
[2]Egyptian women are concentrated in unpaid family work with about 58% of working women. The focus of our research excludes women who are not in wage work, that is, in unpaid family work.

between in-work poverty and being employed in informal jobs using logit models. The logit coefficients are transformed into average marginal effects. In addition, predicted probabilities are presented for ease of comparison between formal and informal employment and between health and non-health sectors for men and women.

The following models were calculated separately for men and women, as shown in Table 2. Models 1 and 2 include informal employment, health sector and all control variables for men and women, respectively. The health sector coefficient is the coefficient of interest for testing the first hypothesis. Models 3 and 4 add an interaction term between informal employment and health sector for the male and female subsamples, which addresses the second hypothesis. Models 5 and 6 add, in comparison to the Models 3 and 4, a triple interaction between informal employment, health sector and marital status, again for men and women, which is used to test the third hypothesis. It should be emphasized that this paper focuses on the health sector in comparison to other sectors. Nevertheless, we provide analysis for the disaggregation of the non-health sectors into industry, agriculture and other sectors in addition to the health sector for the full sample (Model 7).

TABLE 1 Descriptive statistics for health and non-health sectors.

	Health sector			Non-health sectors				
Variable	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**	**Min**	**Max**
In-work poverty	0.36	0.604	0.522	0.294	0.06	0.176	0	1
Have kids	0	0.402	0.267	0.001	0.363	0.183	0	1
Private sector	0.198	0.145	0.163	0.789	0.775	0.785	0	1
Job formality								
Informal (non-standard)	0.105	0.124	0.118	0.661	0.508	0.634	0	1
Formal (standard)	0.895	0.876	0.882	0.339	0.492	0.366	0	1
Urban	0.578	0.501	0.526	0.420	0.427	0.423	0	1
Job occupations (3-digit based on ISCO88)	270	290	283	571	529	558	111	962
Marital status								
Never married	0.215	0.139	0.165	0.356	0.208	0.282	0	1
Ever married	0.785	0.861	0.835	0.644	0.792	0.718	0	1
Individual health								
Very good or excellent	0.471	0.393	0.42	0.377	0.359	0.368		
Good	0.488	0.544	0.525	0.506	0.512	0.509	0	1
Fair	0.041	0.053	0.049	0.092	0.105	0.099	0	1
Bad	0	0.009	0.006	0.021	0.02	0.021		
Very bad	0	0	0	0.004	0.003	0.004	0	1
Education								
No education	0.012	0.021	0.018	0.214	0.329	0.272	0	1
Primary and preparatory	0.006	0.015	0.012	0.229	0.201	0.215	0	1
Secondary and post-secondary	0.36	0.565	0.496	0.407	0.339	0.373	0	1
University and post-university	0.622	0.399	0.475	0.15	0.13	0.14	0	1
Weekly working hours[a]	48,318	43,491	45,125	48,339	38,368	46,562	24	72
Age group								
15–29	0.32	0.503	0.441	0.435	0.452	0.443	0	1
30–44	0.506	0.361	0.41	0.338	0.308	0.323	0	1
45–64	0.174	0.136	0.149	0.227	0.24	0.234	0	1
Observations	172	338	510	14,460	15,051	29,512		

Note: Weights are used in the calculations.

[a]Weekly working hours are winsorized at 10%.

Source: Authors' calculations based on ELMPS 2012 and 2018.

TABLE 2 The analytical strategy.

Models 1 and 2	Informal employment, health sector + all control variables, once for men and once for women	3	1
Models 5 and 6	Models 1 or 2 + a triple interaction between informal employment, health sector and marital status	5	3

To increase the number of observations with non-missing values in the health sector, we pooled data from 2012 and 2018. Pooling the data allows us to increase the sample size, which in turn increases the power to estimate accurate coefficients and test statistics (Wooldridge, 2010). We are interested in understanding the determinants of being at risk of in-work poverty rather than the effect of the transitions into this status or its long-term effects. It is therefore crucial to explain our findings as partial correlations rather than interpreting them as causal effects.

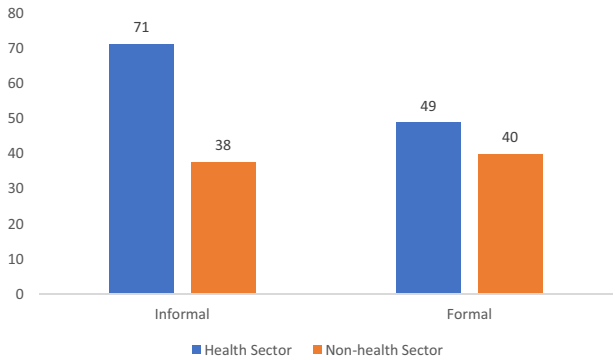

FIGURE 1 Share of in-work poor workers in health and non-health sectors. *Source*: Authors' calculations based on ELMPS 2012 and 2018, weighted.

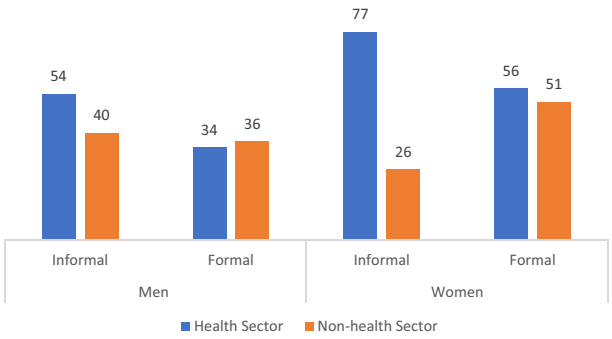

FIGURE 2 Share of workers in in-work poverty by gender in health and non-health sectors. *Source*: Authors' calculations based on ELMPS 2012 and 2018, weighted.

RESULTS

Descriptive results

Figure 1 provides descriptive evidence on the prevalence of in-work poverty across formal and informal jobs for workers in the health and non-health sectors. These initial results show that having an informal job is associated with higher in-work poverty in the health sector. Those in informal employment have an incidence of in-work poverty of almost 71%, compared to 49% for those in formal employment in the health sector. For other sectors,[3] there is not much difference between standard and non-standard employment in terms of in-work poverty. The same trend is seen for women (Figure 2) when comparing formal and informal employment in the health sector (77% to 56%, in informal vs. formal employment).

Comparing health and non-health sectors, men have a lower risk of in-work poverty if they are health workers with formal jobs (34%) compared to workers in non-health sectors (36%). Compared to women, their level of in-work poverty is lower if they are in non-standard jobs in the health sector (54%) compared to women in the same jobs (77%). Women in standard jobs in the health sector have higher poverty risks (56%) compared to men in the same jobs (34%). These percentages show that in-work poverty risks are particularly higher for women in the health sector and particularly in informal employment compared to men.

Multivariate analysis of in-work poverty

This section presents the results of our analysis of in-work poverty risk and informal employment across

[3]In-work poverty, among waged workers, is highest in the health sector compared to the other sectors, where 51% of the health sector workers suffer from in-work poverty.

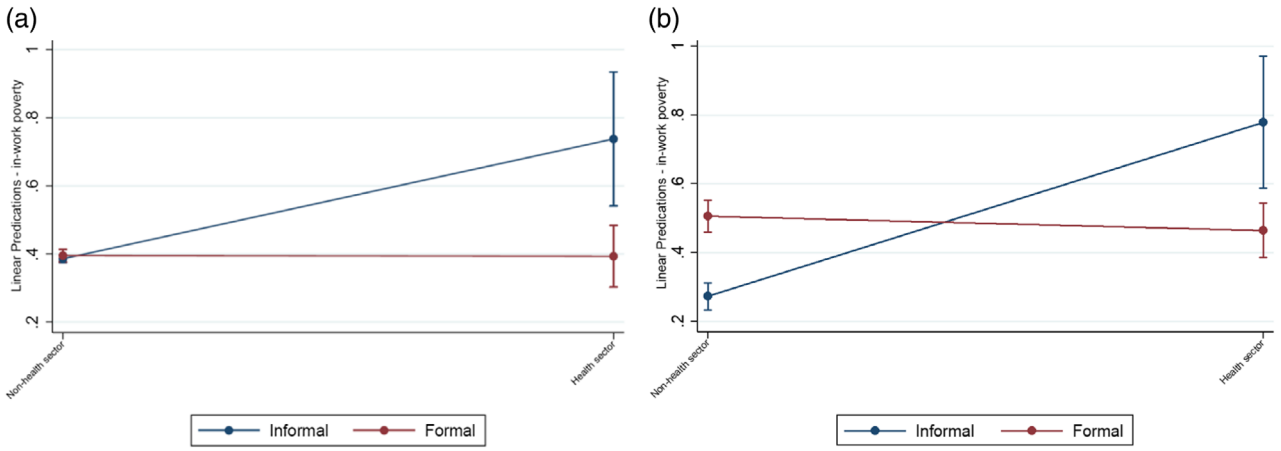

FIGURE 3 (a) Linear predictions of in-work poverty risk and standard employment for men. (b) Linear predictions of in-work poverty risk and standard employment for women. *Source*: (a) Authors' calculations based on Model 3 in Table 4. (b) Authors' calculations based on Model 4 in Table 4.

gender and sectors. The analysis, which is based on logit models, highlights the association between informal employment and in-work poverty. Given the use of interaction terms, we now consider the prediction of in-work poverty across standard and non-standard employment for men and women in both the health and non-health sectors. The linear predictions of in-work poverty risk and informal employment are shown in Figure 3a,b, based on models that include all control variables (Models 3 for men and 4 for women, as shown in Table 4). These figures show the predicted probabilities of experiencing in-work poverty for men, and women, respectively.

We hypothesized that the magnitude of the association between working in the health sector and in-work poverty would be higher for women than for men (Hypothesis 1). The coefficient for the health sector in Table 3 shows that the average marginal effect (AME) is very close in magnitude between men and women (3.3 and 2.8 percentage points, respectively). However, neither coefficient is statistically significant. These results provide evidence against our first hypothesis, showing on average, no difference between men and women when working in the health sector.

On the contrary, the results differ when looking into differences between formal and informal employment in the health sector compared to other sectors (Table 4). The analysis reveals that for men in standard employment, there is no statistically significant difference in the risk of in-work poverty between the health sector and other sectors, despite a generally lower risk of in-work poverty in the health sector. However, for men in non-standard employment, the risk of in-work poverty is significantly higher in the health sector than for those in non-standard employment in other sectors. This statistically significant difference highlights that non-standard employment in the health sector is associated with a greater risk of in-work poverty for men, in contrast to both standard employment in the same sector and non-standard employment in non-health sectors. This result indicates a negative association between non-standard employment and in-work poverty for men in the health sector.

For women, the relationship between employment type and in-work poverty risk varies significantly by sector. In the health sector, women face higher risks of in-work poverty when working in non-standard employment. This increased risk is observed both when comparing non-standard employment in the health sector to non-standard employment in non-health sectors and when comparing it to standard employment within the health sector. However, there is no statistically significant difference in the risk of in-work poverty for women working in standard employment between the health and non-health sectors. Another striking finding is that standard employment in the health sector is associated with higher risk of in-work poverty compared to non-standard employment in other sectors.

As shown in Table 4, the AME are higher for women compared to men when working informally in the health sector. Working in the health sector in informal employment increases a woman's risk of in-work poverty by 50.7 percentage points compared to 35.2 percentage points for men. Both coefficients are statistically significant. These findings indicate that on average working in the health sector increases the working poverty for women, whereas non-standard employment, in particular, poses a greater risk for women in the health sector.

TABLE 3 Logit model for the association between non-standard employment and in-work poverty by gender (average marginal effects).

	Outcome variable: In-work poverty	
	Men	Women
	Model 1	Model 2
Independent variables		
Health sector (ref. not in the health sector)	0.033	0.028
	(0.046)	(0.038)
Informal employment (ref. formal empl.)	−0.009	−0.210***
	(0.013)	(0.040)
Marital status (ref. never married)	−0.095***	−0.113***
	(0.013)	(0.034)
Have kids (ref. not having kids)	−0.310***	−0.017
	(0.064)	(0.046)
Private sector (ref. public sector)	−0.159***	−0.137***
	(0.014)	(0.039)
Age (ref. 15–29)		
30–44	−0.057***	−0.072***
	(0.011)	(0.022)
45–64	−0.185***	−0.292***
	(0.014)	(0.025)
Education (ref. no education)		
Primary and preparatory	−0.035***	0.032
	(0.013)	(0.035)
Secondary and post-secondary	−0.042***	0.102***
	(0.011)	(0.028)
University and post-university	−0.096***	0.052
	(0.015)	(0.037)
Weekly working hours (wins at 10%)	−0.005***	0.001**
	(0.000)	(0.001)
Individual health (ref. very good or excellent)		
Good	0.002	−0.021
	(0.008)	(0.017)
Fair	0.045***	0.022
	(0.014)	(0.036)
Bad	0.079**	−0.029
	(0.031)	(0.077)
Very bad	0.159	−0.235*
	(0.107)	(0.131)
Year: 2018	0.102***	0.069
	(0.008)	(0.043)
Rural (ref. urban)	0.037***	−0.041**
	(0.008)	(0.018)
Occupation	0.000***	0.000***
	(0.000)	(0.000)
Pseudo-R^2	0.0955	0.1314
AIC	1816.676	1863.279
N	24,032	5490

Note: Robust standard errors in parentheses. Weights are included.
*10% significance level;
**5% significance level;
***1% significance level.
Source: Authors' calculations of ELMPS 2012 and 2018.

TABLE 4 Average marginal effects of working in the health sector on in-work poverty for informal and formal employment by gender.

	Outcome variable: In-work poverty	
	Men	Women
	Model 3	Model 4
Independent variables: Health sector (ref. not in the health sector)		
Health sector#Informal	0.352***	0.507***
	(0.100)	(0.098)
Health sector#Formal	−0.002	−0.041
	(0.046)	(0.038)
Controls	Yes	Yes
Pseudo-R^2	0.0958	0.1373
AIC	1856.149	1850.623
N	24,032	5490

Note: Average marginal effects for working in the health sector calculated at the values of informal and informal employment. Robust standard errors in parentheses. Weights are included.
*10% significance level;
**5% significance level;
***1% significance level.
Source: Authors' calculations of ELMPS 2012 and 2018.

In line with our second hypothesis, the results indicate that women in informal employment in the health sector face higher risks of in-work poverty compared to women in formal employment within the same sector.

TABLE 5 Average marginal effects for the interaction of marital status with formal employment and health sector.

	Outcome variable: In-work poverty	
	Men	Women
	Model 5	Model 6
Independent variables: Ever married#		
Non-health sectors#informal	−0.089***	−0.174***
	(0.013)	(0.041)
Non-health sectors#formal	−0.111***	−0.049
	(0.028)	(0.047)
Health sector#informal	−0.249*	0.144
	(0.135)	(0.155)
Health sector#formal	−0.231**	−0.210**
	(0.098)	(0.106)
Controls	Yes	Yes
Pseudo-R^2	0.0959	0.1398
AIC	1815.887	1845.373
N	24,032	5490

Note: Average marginal effects for ever married women calculated at the values of the health and non-health sectors and at formal and informal employment. Robust standard errors in parentheses. Weights are included.
*10% significance level;
**5% significance level;
***1% significance level.
Source: Authors' calculations of ELMPS 2012 and 2018.

TABLE 6 Average marginal effects by sector for the whole sample.

	Outcome variable: In-work poverty Whole sample
	Model 7
Independent variables: Sectors (ref. Agriculture)	
Health sector	0.228***
	(0.030)
Industry	0.122***
	(0.011)
Others	0.138***
	(0.010)
Controls	Yes
Pseudo-R^2	0.0903
AIC	1850.970
N	29,522

Note: Robust standard errors in parentheses. Weights are included.
*10% significance level;
**5% significance level;
***1% significance level.
Source: Authors' calculations of ELMPS 2012 and 2018.

This increased risk is also observed when comparing informal employment in the health sector to informal employment in non-health sectors. These findings show how women are more disadvantaged in non-standard employment in the health sector.

The analysis reveals distinct patterns of in-work poverty associated with non-standard and standard employment within the health sector for ever-married women compared to never-married women. Working in formal employment in the health sector decreases the risk of in-work poverty for ever-married women by 21 percentage points compared to never-married women (Table 5). This effect is statistically significant. This shows that never-married women have higher risks of in-work poverty, in line with Hypothesis 3. This suggests that marital status plays a critical role in economic wellbeing, with never-married women being more susceptible to in-work poverty.

Overall, our analysis demonstrates that non-standard employment significantly increases the risk of in-work poverty for both men and women, particularly in the health sector. On one hand, men in non-standard employment in the health sector face greater risks compared to those in non-standard employment in other sectors. On the other hand, women in non-standard employment within the health sector have a higher probability of in-work poverty compared to their counterparts in both health sector and other sectors. These findings emphasize the importance of addressing the unique challenges faced by non-standard workers, especially women in the health sector, to reduce in-work poverty and promote economic wellbeing .

CONCLUSION

This study examined the effect of non-standard employment on in-work poverty in Egypt, particularly within the health sector, using data from the ELMPS for 2012 and 2018. Previous research has focused on the health precarity of being employed in non-standard employment (Ehab, 2023a; Ehab, 2023b; Sharaf & Rashad, 2020). Our research complements these papers by looking into the economic precarity of such jobs.

The results indicate that non-standard employment increases the risk of in-work poverty, with a more pronounced effect for women in the health sector. This result is in line with the witnessed decline in real wages among wage workers in Egypt and the rising suffering of

women from in-work poverty (Said et al., 2022). Women in informal employment face higher poverty risks than those in formal ones or in other sectors. This finding reflects the situation of women in the health sector, in Egypt as well as globally, working in flexible employment to be able to reconcile their family and work roles (Krafft & Ehab, 2023; World Health Organization, 2022). Previous research has shown a rise in precarious employment in the care economy and a proliferation of a care pay gap in Egypt (Krafft & Ehab, 2023). The rise of precarity means that women have less protection, lower wages, and limited access to benefits such as health insurance or social security. Furthermore, this result could be due to the concentration of women in low-wage jobs due to the segregation and discrimination that is commonly present in the Egyptian labor market (Barsoum, 2023; Osman et al., 2024). Given in-work poverty is a measure on the household level, it could explain why women suffer more from in-work poverty, as they are more likely to be responsible for households with more dependents and insufficient income resources. In this case, family configurations and roles of other members play a crucial role (Ponthieux, 2018).

In contrast, while men in the health sector also experience a poverty risk associated with non-standard employment, the effect is less severe. This could be because men are more likely to be in more stable or higher-paying non-standard jobs within the sector (Meulders et al., 2010; World Health Organization, 2022). Therefore, the pronounced gender disparity in in-work poverty risk in informal employment within the health sector is not just a function of non-standard work itself but also a reflection of the types of roles women are likely to occupy, driven by social expectations and gender norms around caregiving and employment flexibility (Said et al., 2022; World Health Organization, 2022).

The analysis reveals that never-married women face a higher risk of in-work poverty when in non-standard employment compared to standard employment. This suggests that non-standard employment exacerbates economic vulnerability for never-married women. This highlights the role of marital status in shaping economic outcomes, with never-married women being particularly susceptible to in-work poverty. Both groups of women working in the health sector encounter economic precarity, but the risk is notably elevated for never-married women in this sector. This result is in line with previous studies that shows that married women are protected from poverty risks given their role in the family as a secondary earner where the common earning model is the male breadwinner model (Van Lancker, 2012). On the other hand, single women do not share their financial burdens with a partner, which makes them more prone to poverty. Another reason for the lower risks of poverty for married women compared to never-married women could be that working women in Egypt are a select group, where women have higher probability to leave employment in anticipation of marriage or upon marriage (Ehab, 2022; Selwaness & Krafft, 2021). In addition, women who remain employed witness an occupational premium after marriage (Ehab, 2023b).

A major contribution of this paper is its investigation of in-work poverty risk for non-standard employment including for informal workers. We attempted to look beyond the differentiation between permanent and temporary employment and examined informal employment as a form of non-standard employment, in comparison to formal employment. This is particularly crucial given the size of informal employment in developing countries. These results suggest that policy interventions targeting non-standard employment in the health sector could be beneficial, especially for women. One example could be encouraging employers, through incentives, to transform informal employment contracts into formal ones. Another example is to implement sector-specific interventions to address unique challenges faced by workers, particularly women, in high-risk sectors, such as health.

One limitation of this study is that the use of cross-sectional data also restricts the ability to draw causal inferences or track changes over time. Hence, the results represent a descriptive interpretation of the relationship between the variables of interest and the risk of in-work poverty. Future research could build on these findings to gain a deeper understanding of the causal relationship between non-standard employment, especially informal employment, and poverty risk in the health sector for women. Future research should aim to incorporate longitudinal data to investigate causal relationships and observe temporal changes.

Analyzing data from 2012 and 2018 provides an important perspective on gender disparities in in-work poverty across health and non-health sectors. While this comparison captures key differences at two points in time, it overlooks gradual shifts and deeper structural changes within the labor market. As such, this approach offers a snapshot rather than a comprehensive view of gendered in-work poverty trends. Future research would benefit from utilizing recurrent, annual data to better understand the evolving nature of gender disparities in employment-related poverty over time.

Another limitation is the use of informal employment as the main marker of non-standard employment. Other markers of non-standard employment might be necessary to include in order to arrive at more precise estimates. For example, future research can include the length of the employment contract measured by temporary (definite), and permanent (indefinite) employment.

This research has investigated an objective measure of poverty in relationship with non-standard employment. Future research could complement this study by investigating subjective poverty measures, such as the sufficiency of household income to cover basic needs. In addition, studying the relationship between non-standard employment and poverty could be considered in other Middle East and North Africa region countries such as Jordan or Tunisia, where the Jordan and Tunisia Labor Market Panel Survey are well developed.

In-work poverty has several implications, especially on the social exclusion of individuals. Poverty might lead to being severely materially deprived (Struffolino & Van Winkle, 2019). It could also have implications on the health of individuals, which can negatively affect their productivity and wellbeing. Furthermore, the impact of in-work poverty could be extended to the wellbeing of children in the household. An issue that should be considered when studying this topic in future research.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The ELMPS datasets used in this research are publicly available through the Economic Research Forum Open Access Microdata Initiative: www.erfdataportal.com.

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