

Informal Employment, Working Conditions, and Self-Perceived Health: A Cross-Sectional Study in Urban Working Population in Peru

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Abstract: Peru has one of the highest informal employment rates in Latin America (73%). Previous studies have shown higher prevalence of poor self-perceived health (P-SPH) in informal workers compared to formal. The study's aim is to analyse the role of working conditions in the association between informality and SPH in urban working population in Peru. We conducted a cross-sectional study based on 3098 workers from the working conditions survey of Peru 2017. Prevalence of P-SPH and exposure to poor working conditions were calculated separated by formal and informal employment and stratified by sex. Poisson regression models were used to assess the association between P-SPH and informal employment, with its prevalence ratios (PR) crude and adjusted for working conditions. Informal employment was 76% in women and 66% in men. Informal workers were more exposed to poor working conditions than formals and reported worse SPH. Workers in informal employment showed higher risk of P-SPH than formals: PR 1.38 [95% CI: 1.16 – 1.64] in women and PR 1.27 [95% CI: 1.08 – 1.49] in men. Adjustment by working conditions weakened the association in both sexes. In women, this association was only partially explained by worse working conditions 1.23 [95% CI: 1.04 – 1.46]. The negative effect on informal workers' health is partially explained by poor working conditions. However, there is a part of the effect explained by informality per se.

Keywords: Informality, working conditions, self-reported health, survey

1. Introduction

Informal employment is probably the most precarious type of employment and is one of the most extensive forms of employment in the world, affecting more than 60% of workers worldwide [1]. It is an important social determinant of health that represents a serious public health problem [2]. Informal workers are not recognized or protected by legal and regulatory frameworks, and they do not have social protection and any power to negotiate working and employment conditions [3]. According to the World Bank, this high percentage of informality could be a reason that delays the recovery of the economy after COVID19 [4]. As a response to the increasingly unprotected situation of working people, particularly in middle and low-income countries, the ILO has included among its priorities the formalization of the informal economy [5], and the UN's global agenda 2030 for sustainable development has included the objective of a decent work for

all, in the 8th goal [6]. In Peru, informal employment involves 73% of the working population [7], well above of the Latin American average 53% [8]. Therefore, informal economy plays an important role in the dynamics of Peru's economy generating around one-third of the gross domestic product [4].

The literature on the impact of informal employment and health is scarce. Previous studies have found that high rates of informal employment are associated with poor mental and poor self-perceived health (P-SPH) [9–11]. One possible hypothesis is that informal employees are more likely to be exposed to poor working conditions and precariousness, which are related to work diseases, injuries and disabilities that reduce their work capacity and earning potential [12]. However, the role of working conditions in the association between SPH and informality and its differential effect on men and women remains unclear. The objective of this study is to assess the role of working conditions on the relationship between informal employment and health status in urban workers in Peru.

2. Materials and Methods

This is a cross-sectional study based on 3098 urban workers from the first working conditions survey of Peru conducted between November 2016 and June 2017 [13]. The sampling was probabilistic and the resulting sample was representative of people over 14 years old that had worked at least one hour the week prior to the survey or that were temporarily absent from work due to vacation, illness or leave. The questionnaire was administered in a face-to-face interview at the dwelling of the worker. Agricultural and military workers were excluded.

Informal employment was the main explanatory variable. We considered informal workers those who responded negatively to the item: *Currently, do you have a discount, contribute, are you affiliated or registered in a retirement system (ONP/AFP)?* Self-perceived health (SPH) was the outcome of our study, which was dichotomized into good SPH for those workers who reported good and very good, and poor SPH those who reported fair, poor, and very poor health to the item: *How do you consider your health status has been in the last two weeks?*

As secondary explanatory variables we considered exposure to the following working conditions items: safety dimension: falls on the same level, falls from different level, and machines or tools exposure; ergonomic dimension: awkward postures, load lifting and repetitive movements; hygienic dimension: noise, chemical risk, dust and fumes breathing, biological risk and radiation; and psychosocial dimension: high work rate, low work control, hiding emotions, not applying knowledge, not learning, high workload, lack of supervisors' support, lack of co-workers' support, lack of recognition (Supplementary table 1). The exposure level was measured by a general item: *In your workplace, how often are you exposed to...?* and the possible responses on a five-category Likert scale were dichotomized for descriptive analyses into poor working conditions for those who answered "always, many times, and sometimes"; and good working conditions for those reporting "rarely and never". However, for regression analysis, exposure to working conditions was treated as a continuous variable. The possible responses in which each category represented a numerical value on the Likert scale (always=5, many times=4, sometimes=3, rarely=2 and never=1, except for positive psychosocial conditions phrased positive that scored the other way around) were summed-up in an individual score for each working condition dimension (safety, hygienic, ergonomic, and psychosocial dimensions), the higher the score, the higher the exposure level (Supplementary table 1). Finally, we considered age (≤ 24 , 25 to 44, 45 to 64, and ≥ 65) as a covariate in the association model. All analyses were stratified by sex and weighted by the by age groups, sex, and industry sector (primary, secondary, and tertiary).

In the analysis, firstly we estimated prevalence of P-SPH by formal and informal employment, and calculated the prevalence of exposure to poor working conditions as a dichotomous variable in people who reported P-SPH. Chi-square test was calculated to assess differences in distribution between comparison groups. In the second step, Poisson regression models were used to measure the association between P-SPH and informal employment, taking formal employment as the reference group. The Prevalence Ratio (PR) and its 95% CI were estimated crude and adjusted by age and exposure to working conditions as a continuous variable. The analysis was conducted with Stata v.13 and SPSS v.23.

3. Results

Overall, 71% of the sample was working in informal employment, 77% among women and 66% among men. Median age among informal employees was 34 years in men and women, 38 and 35 years respectively for formal employees. Informal workers showed higher P-SPH than formal workers, especially women (47.3%) compared to men (37.6%) (Table 1).

Informal workers reported higher prevalence of poor safety, hygiene and ergonomic working conditions than workers in formal employment, especially among men. The highest prevalence of poor working conditions was found in informal employees in relation to repetitive movements (71.7% in men and 62.6% in women), followed by load lifting in men (63.1 %). Prevalence of poor psychosocial conditions differs from the other working conditions. Both men and women within formal jobs showed a high prevalence of low control at work (men 64.9%, women 69.8%) and hiding emotions (men 50.0%, women 62.7%) (Table 1).

Table 1 Prevalence of poor working conditions and poor self-perceived health of working population, stratified by sex and employment status, Peru's Working Conditions Survey 2017.

	Men (N=1621)		p value	Women (N=1477)		p value
	Informal (66.2%)	Formal (33.8%)		Informal (76.6%)	Formal (23.4%)	
Health status						
Poor self perceived health	37.6	29.6	<0.05	47.3	34.3	<0.001
Safety dimension						
Fall on the same level	34.5	26.1	<0.001	16.4	13.2	0.2
Fall from height	32.5	26.9	<0.001	14.5	12.0	0.3
Risk of accident with machines or tools	45.4	35.2	<0.001	23.2	12.1	<0.001
Hygienic dimension						
Noise exposure	49.9	40.8	<0.001	26.5	23.7	0.3
Chemical risk exposure	28.5	16.8	<0.001	12.1	8.4	0.1
Dust and fumes exposure	44.8	27.3	<0.001	21.6	15.7	<0.05
Biological risks exposure	8.4	9.5	0.5	8.9	13.7	<0.05
Radiations exposure	53.9	37.3	<0.001	24.4	19.6	0.1
Ergonomic dimension						
Awkward postures	62.7	48.2	<0.001	50.8	36.3	<0.001
Loads lifting	63.1	39.4	<0.001	44.3	22.2	<0.001
Repetitive movements	71.7	57.6	<0.001	62.6	53.7	<0.05

Psychosocial dimension	Pre-Intervention	Post-Intervention	P-value	Pre-Intervention	Post-Intervention	P-value
High work rate	62.6	55.4	<0.05	63.8	61.0	0.4
Low control at work	56.6	64.9	<0.05	57.2	69.8	<0.001
Hiding emotions	41.8	50.0	<0.05	50.7	62.7	<0.001
Not applying knowledge	14.9	8.1	<0.001	20.1	7.4	<0.001
Not learning	18.7	7.8	<0.001	25.0	12.1	<0.001
High workload	36.7	48.8	<0.001	42.7	56.6	<0.001
Lack of supervisors' support	55.9	41.7	<0.001	56.1	37.5	<0.001
Co-workers support lack	34.0	21.4	<0.001	41.2	25.0	<0.001
Recognition lack	31.7	21.5	<0.001	36.5	20.7	<0.001

Workers who reported P-SPH showed high poor safety, hygiene and ergonomic conditions (Table 2). Women with P-SPH consistently reported higher prevalence of exposure than men. Women reported the highest value in exposure to machine tools (58.9%) and falls to different level (56.3%). Men followed same trends with lower estimates, being the highest value exposure to chemical risk (44.7%).

	Men (n=1621)			Women (n=1477)		
	% Poor Self-Perceived Health			% Poor Self-Perceived Health		
	Poor Working Conditions	Good Working Conditions	P value	Poor Working Conditions	Good Working Conditions	P value
Safety dimension						
Fall on the same level	39,06	32,12	0,002	53,77	41,84	<0,001
Fall from height	41,78	31,05	<0,001	56,30	41,75	<0,001
Machines or tools exposure	40,20	30,08	<0,001	58,85	39,80	<0,001
Hygienic dimension						
Noise exposure	36,16	32,71	0,767	48,10	42,17	0,041
Chemical risk exposure	44,67	31,08	<0,001	54,91	42,19	<0,001
Dust and fumes exposure	41,66	29,76	<0,001	52,63	41,49	<0,001
Biological risks exposue	40,59	33,66	0,033	46,62	43,40	0,47018
Radiations exposure	39,01	30,10	0,001	51,93	41,31	0,001
Ergonomic dimension						
Awkward postures	38,88	28,12	<0,001	52,57	35,92	<0,001
Loads lifting	38,86	28,93	<0,001	54,13	37,27	<0,001
Repetitive movements	39,33	24,25	<0,001	47,88	37,26	0,001
Psychosocial dimension						

High work rate	33,86	35,22	0,525	42,70	45,58	0,251
Low control at work	32,81	36,60	0,058	43,21	44,48	0,278
Hiding emotions	36,17	32,86	0,977	44,65	42,67	0,707
Not applying knowledge	34,28	33,76	0,673	42,58	49,02	0,085
Not learning	33,06	40,87	0,01	41,65	51,64	0,002
High workload	35,09	32,85	0,304	43,53	43,10	0,537
Lack of supervisors' support	28,67	35,41	0,003	36,41	48,00	<0,001
Co-workers support lack	32,08	35,99	0,294	37,50	50,00	<0,001
Recognition lack	30,28	38,48	<0,001	36,57	53,37	<0,001

Working conditions were treated as dichotomous (Poor/Good). Poor working conditions for those who answered "always", "many times", "sometimes"; and good working conditions for those who answered "rarely" or "never".

Self-perceived health (SPH) was good SPH for those workers who reported "good" and "very good", and poor SPH those who reported "fair", "poor", and "very poor" health.

When we examined the association between P-SPH and informal employment (Table 3), both women and men in informal employment, showed higher probability of reporting P-SPH than those in formal employment (1.27 [95% CI: 1.08 – 1.49] men and 1.38 [95% CI: 1.16 – 1.64] women). When the analysis is adjusted by age, the association becomes stronger in both sexes (1.35 [95% CI: 1.15 - 1.58] men and 1.41 [95% CI: 1.18 - 1.67] women). When adjusted individually for each working condition score, this association holds among women and men. When analysis is adjusted by all working conditions and age the association loses strength, especially in men (1.17 [95% CI: 1.0 - 1.38]).

Table 3. Prevalence ratios (PR) of poor self-perceived health between informal and formal employees (reference category), crude and adjusted by working conditions and age with 95% confidence intervals (95% CI), Peru's Working Conditions Survey 2017.

	Men		Women	
	PR (IC95%)	P Value	PR (IC95%)	P Value
Crude				
Formal	1		1	
Informal	1,27 (1,08 - 1,49)	0,004	1,38 (1,16 - 1,64)	<0,001
Individually adjusted by:				
Age	1,35 (1,15 - 1,58)	<0,001	1,41 (1,18 - 1,67)	<0,001
Individually adjusted by working conditions				
Safety conditions	1,22(1,04-1,44)	0,017	1,33(1,12-1,58)	0,001

Hygienic conditions	1,18(1,01-1,40)	0,038	1,36(1,14-1,62)	<0,001
Ergonomic conditions	1,14(0,97-1,35)	0,107	1,25(1,05-1,48)	0,012
Psychosocial conditions	1,22(1,04-1,44)	0,016	1,28(1,08-1,53)	0,004
All working conditions	1,10(0,93-1,29)	0,250	1,19(1,01-1,42)	0,042
Adjusted by all working conditions and age	1,17(0,997-1,38)	0,054	1,23(1,04-1,46)	0,017

Working conditions were treated as a continuous variable, the possible responses in which each category represented a numerical value on the Likert scale (always=5, many times=4, sometimes=3, rarely=2 and never=1, except for positive psychosocial conditions phrased positive that scored the other way around) were summed-up in a score by each working condition dimension (safety, hygienic, ergonomic, psychosocial).

4. Discussion

Our results show that workers in informal employment had statistically significant higher prevalence of P-SPH than formal ones, and that this association was stronger in women. When adjusted by working conditions, the association weakened and almost disappeared in men, although it remained in women. These results suggest that the observed negative effect on informal workers' health is partially explained by poor working conditions. However, there is a part of the effect explained by informality per se, which could be related to other mechanisms such as income insecurity, poverty, precarious living conditions, lack of access to health services and absence of social protection benefits. This is in line with previous literature that shows the protective role of social protection on health [14,15].

The higher prevalence of P-SPH among workers in informal employment is consistent with previous studies in the region. For example, in Argentina, where a study showed that informal workers had a greater prevalence of P-SPH and low psychophysical well-being, as well as higher the prevalence of poor working conditions (hygienic and ergonomic) compared to formal workers [16]. A study in Brazil revealed that informal part-time workers reported arthritis, bronchitis, heart disease, cirrhosis, depression and chronic disease more often than their counterparts in full-time with social protection [17]. Also, a study in 15 Latin American countries found that manual (skilled and non-skilled) jobs had the highest P-SPH, and that around 42% of P-SPH in men and 31% in women could be avoided if they had the working and employment conditions of the workers in non-manual skilled jobs [18]. Due to lack of government control, working conditions in informal employment are frequently not in accordance with health and safety laws often to avoid costs associated to regulation's requirements (safety training or protective equipment) or to pay lower salaries. As a result, health determinants such as education and income are related to informal employment and occupational hazards are more common[19].

Men showed worse working conditions than women, but women had higher prevalence of P-SPH than men and showed a stronger association between informality and P-SPH. Studies about P-SPH prevalence among men and women without considering employment status (formal or informal) concluded that this prevalence is consistently

higher in women than in men [26]. Our results suggest that P-SPH associated with informal employment could have a double explanation, although this effect is slightly different by sex. While working conditions seem to have a greater impact on men's health probably because they have riskier jobs, in women there could be other determinants such as the burden of double presence of paid and unpaid reproductive work that could be affecting health of informal women [1,20]. These findings are consistent with other studies in Central America, Argentina, Colombia, Uruguay, Chile, and Ecuador that found that men had poorer working conditions than women [21–23]. Other recent study in 13 Latin American countries found that women are not more vulnerable to the effects of informal employment than men hypothesizing that gender inequalities inherent to the labor market could be explaining how even if the increasing risk of poor health for men could be related to informal employment, for women, formal employment may not have reached the standards that make it a protective determinant of health [24] which agrees with other studies [23].

This study, as any other, has limitations, mainly related to the data source. Data from the survey in Peru only includes urban workers, excluding rural workers where agricultural workers are in majority. However, the ILO recommends excluding agriculture for measuring informality [25]. Furthermore, the sample was randomly selected and weighed by the total working population's distribution of Peru. Another limitation is that we assessed health status based on people's self-perception, and this measurement could be affected by cultural and social factors. However, this item has been several times validated, and is commonly used in public health studies demonstrating been reliable and cost-effective [26]. Finally, as in any cross-sectional study, there is a possible reverse causality bias, which could mean that people in P-SPH could have more difficulty to find a formal employment. However, given the high informality in Peru, more than 70%, this bias will be negligible.

Regarding strengths, it is worth seeing that informality percentage was similar with those found officially by the ILO [1]. Our results could be thus assumed to be representative of Peruvian working population. This is the first attempt to assess the association between informal employment and health status by sex considering the role played by working conditions. Finally, we used all available working conditions and used a novel approach to understand exposure to poor working conditions by calculating a single score that takes into account all dimensions.

5. Conclusions

In summary, our results suggest that poor working conditions associated with informal employment could be partially explaining the higher prevalence of P-SPH in informal workers, more in men than women. This is an expected result, poor working conditions could be a mechanism to explain the effect of informal employment on poor health. In fact, and this is the main implication of this study, the transition from informal to formal employment is probably the best way to improve working conditions, since unlike informal jobs, formal jobs, by involving a legal employment relationship, are susceptible to labor inspection supervision and other control measures [27]. Future studies should analyse other labour, economic and social mechanisms related to informal employment that could better explain this association.

Supplementary Materials: The following supporting information can be downloaded at: www.mdpi.com/xxx/s1, Supplementary table 1: Items from Peru's Working Conditions Survey 2017 as they were originally asked.

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to the interpretation and drafting the manuscript. FGB made substantial contributions to design, interpreting the results and reviewing the manuscript. All co-authors critically revised the manuscript for important intellectual content and gave final approval of the version to be published.

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Data Availability Statement: Data is available on request from the National Institute of Health of Peru and the National Centre for Occupational Health and Environmental Health Protection (CEN-SOPAS for its spanish acronym).

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