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ORIGINAL ARTICLE

Determinants of labor informality: an analysis for Peru 2019 and 2022

Determinantes de la informalidad laboral: un análisis para el Perú 2019 y 2022.

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Abstract

The increase in high rates of labor informality in the country, exacerbated by the arrival of the pandemic crisis, shows the need to evaluate the socioeconomic determinants and their marginal effects in Peru according to the years 2019 and 2022. The methodological route was at an explanatory level with a non-experimental - cross-sectional design, having as a secondary source of information the ENAHO data with a sample of 64,954 people for the year 2019 and 61,181 for the year 2022. With the application of the Logit econometric model, the findings record that the level of education, number of children from 6 to 12 years old, income, type of work, economic sector, age, sex, marital status, rural geographic area, company size, Spanish language and poverty based on 2 NBI are determinants. However, the variables number of children from 0 to 5 years old, head of household and work experience were not determinants of informality. Along these lines, the binomial Logit model was able to understand the socioeconomic determinants of labor informality with a good predictive fit ROC=0.934 and ROC=0.933 for the years of study. It was concluded that, in Peru, labor informality in the years 2019 and 2022 is largely explained by socioeconomic determinants. Furthermore, there is no absolute trend in terms of marginal effects for both periods, so their individual evaluation is key to generating policies in favor of economic development.

Keywords: Determining factors, Informality, Education level, Pandemic.

Thematic classification: SDG8:*Decent work and economic growth.*

Resumen

El incremento de las altas tasas de informalidad laboral en el país, agudizadas por la llegada de la crisis pandémica, evidencia la necesidad de evaluar los determinantes socioeconómicos y sus efectos marginales en el Perú según los años 2019 y 2022. La ruta metodológica fue de nivel explicativo con diseño no experimental transversal, teniendo como fuente de información secundaria los datos de la ENAHO con una muestra de 64,954 personas para el año 2019 y 61,181 para el año 2022. Con la aplicación del modelo econométrico Logit los hallazgos registran que el nivel de educación, número de hijos de 6 a 12 años, ingreso, tipo de trabajo, sector económico, edad, sexo, estado civil, área geográfica rural, tamaño de empresa, lengua castellano y pobreza en base a 2 necesidades básicas insatisfechas (NBI) son determinantes de la informalidad. Sin embargo, las variables número de hijos de 0 a 5 años, jefe de hogar y experiencia laboral no resultaron ser determinantes. En esa línea, el modelo binomial Logit admitió comprender los determinantes socioeconómicos de la infor-

malidad laboral con un buen ajuste predictivo ROC=0.934 y ROC=0.933 para los años de estudio. Se concluyó que, en el Perú, la informalidad laboral en los años 2019 y 2022 se explica en gran medida por determinantes socioeconómicos; asimismo, se carece de una tendencia absoluta en cuanto a los efectos marginales para ambos períodos, por lo que, su evaluación individual es clave para generar políticas en favor del desarrollo económico.

Palabras clave: *factores determinantes, informalidad, nivel de educación, pandemia.*

Clasificación temática: *ODS8: Trabajo decente y crecimiento económico.*

1. Introduction

The economic development of countries has been deeply influenced by informal activities, which continue to be a topic of debate in the formulation of public policies due to the complexity of their approach and understanding. According to the World Bank (WB, 2021), informality has become widespread in Latin American and Caribbean countries, and the economic conditions in these nations have made it difficult to address this structural problem, which has undoubtedly worsened with the arrival of COVID-19.

Before the pandemic crisis, 56 % of workers in the region worked in the informal sector (Bentata et al., 2020). By 2022, this percentage had increased significantly, reaching between 60 % and 80 % (Bañez, 2023). Furthermore, it is highlighted that, before the health crisis, some countries already had high levels of informality, such as Honduras (84 %), Nicaragua (77 %), Guatemala (76 %) and Bolivia (71 %). These countries now face greater challenges in improving their employment situation (Bentata et al., 2020).

In this context, informal employment, by operating outside the legal framework, leads to workers facing precarious conditions, including lack of access to social security and insufficient minimum wages, among other problems. At the national economic level, this situation contributes to high poverty rates, limits the dynamism of economic growth, exacerbates inequality in income distribution, and widens structural gaps, which negatively affects general well-being (Bentata et al., 2020).

In countries like Peru, various factors encourage the creation of informal jobs. These include limited regulatory capacity (ComexPerú, 2022), high formalization costs, growth in the economically active population (EAP), and insufficient public and private investment to generate quality jobs. These elements contribute to the fact that most people in the EAP end up working in the informal sector (La Cámara, 2023).

According to the National Institute of Statistics and Informatics [INEI] (2020), Peru is among the countries with the highest rates of informal employment. Since 2007, a decrease in this rate has been observed, from 80 % in that year to 72.7 % in 2019. However, the health crisis caused a significant increase, reaching 76.8 % in 2020, the highest figure in the last 11 years. This indicates that approximately 700 thousand workers moved to the informal sector compared to pre-pandemic levels.

This led to a number of negative effects, including a significant deterioration in labour income. Workers' wages were 15 % below the levels recorded in 2019. (Instituto Peruano de Economía [IPE], 2022). In addition, there was a decline in productivity, exclusion from the social security and tax system, as well as an increase in inequality and poverty levels, among other problems (ComexPerú, 2022).

In relation to the above, within the determining factors of labor informality , studies such as that of Robles et al. (2019)in Mexico characterize it with the presence of only basic education, age over 30 years, being a woman and low income; Pardo and Sánchez (2020)in Colombia also add a long work day, lack of a contract, retirement plan and health regime as conditions; Pérez (2020)in Guatemala adds factors such as infrastructure, basic services, storage, security and contract as key elements to reduce informality. Likewise , Castillo et al. (2022) in Ecuador found that migration (+), household size (-), age (-), and gender inclined to the female (+) lead to informal work. In relation to this, Nava

and Varela (2020) found) in Ecuador that education and the capacity of the formal sector to absorb the available labor force are the variables that most influence the categorization of a person's employment.

Likewise, investigations in Peru, such as that of Tomaselli (2021)) point out that only six regions have a level of informality lower than the national average; these are in coastal areas, particularly in rural areas that were meant to be similar to informality; and in 17 regions, informality borders on 75 % of the employed. Finally, being a woman, young, and with low education are characteristics of the informal workforce. For their part, Pariona et al. (2019) pointed out that the majority of informal traders (69.7 %) reach the secondary education level, the majority (56.8 %) migrated from the interior of the country and were economically dependent on their partners, so the prevalence of the female gender was higher. A year later, Pérez (2020) earners found that the factors also respond to gender, age, educational level, work experience, company size, economic activity and basic balance ratio.

1.1 The informal labour sector as an economic phenomenon

From a historical perspective, the beginning of theoretical studies regarding informal employment dates back to Adam Smith (1776), considering that informal employment can be conceptualized within free competition and individual interest, since when individuals pursue their own selfish interests, it contributes to general welfare; therefore, some people decide to opt for informal work, either as independents with their own project or in informal businesses, instead of being employed formally. In the crisis of the 1930s, the Keynesian school coined the term "disguised unemployment" to refer to street vendors, who were later classified as informal. The concept of "informal sector" originated with the economic anthropologist Keith Hart in 1971, defining it as the urban labor force that is located outside the formal market made up of non-salaried workers, in self-employed condition; therefore, most of the research on this subject is based on the analysis of the labor force being directly linked to this type of market (Lódola & Moccero, 2001).

The informal sector provides jobs in appalling conditions, since it is limited to work units with variable incomes below the average established by the State, making it impossible for them to meet their basic needs, in addition to the physical and mental exhaustion that this represents (Anaya, et. al, 2021). On the other hand, in Latin America and the Caribbean (LAC), the sector causes people to distance themselves from the political sphere, affecting their incorporation into trends that seek their well-being, due to certain conceptions that sharpen their discontent. In addition, it is evident that one of the most tangible effects of informality is tax avoidance and tax evasion, which harm the economy and the distribution of the tax burden, causing problems with economic agents at all levels of the market (Alava & Valderrama, 2020).

1.2 Theories related to labour informality

The dualistic approach of the Regional Employment Programme for Latin America and the Caribbean (PREALC), created in 1971 by the International Labour Organization (ILO), explains that the presence of two disconnected and independent sectors within the labour market is the result of the inability of just one to accommodate the existing workforce, leading people to opt for precarious employment outside the legal framework and, therefore, to lack access to social and health benefits that they would obtain in the formal sector (Alfaro y otros, 2019). This leads to the existence of two sectors at the same time, hence the term "dualistic" (Ludmer, 2019).

The structuralist approach, advocated by neo-Marxists , argues that the capitalist system is responsible for informality, since it is the latter that has segmented the economy into, on the one hand, a sector that demands skilled labor and first-class processes with advanced technology, and on the other, a sector that, without much rigor, demands unskilled labor to produce goods and services, being the provider of the former (Masello, 2021). In this way, the labor discarded for high productivity and investment level jobs is placed in "invented" jobs that, without having sufficient capital, implement activities to survive, mostly part of small business units (Carboneto et al., 1988).

The institutionalist approach maintains that this phenomenon responds to the regulation and discretion of the State; that is, the bureaucracy established by rules and laws forces people to decide to omit requirements and establish themselves in order to operate quickly, minimizing operating and establishment costs (Valencia & Ricardo, 2022). With this approach, the informal sector is defined as a survival mechanism for the most disadvantaged, becoming a pillar of support for social problems that are not resolved by the State and the government in power, but in which people must get involved in order to develop economically and socially (Longhi, 1998).

2. Materials and methods

The research is of an applied type, explanatory scope and with a non-experimental - cross-sectional design, since it was aligned in order not to alter the behavior of the population, allowing it to be understood through links subjected to multivariate econometric models, lacking manipulation of variables (Ander, 2011; Palella & Martins , 2012), and adhering to the analysis of data during the years 2019 and 2022 provided by the National Household Survey (ENAHO) of the National Institute of Statistics and Informatics (INEI).

In this sense, the method used was the hypothetical-deductive one, which allows the formulation and resolution of hypotheses around an object of study (Valderrama, 2018). In this regard, the sample size was equivalent to 64,954 people and 61,181 people who belong to the economically active population employed (EAP - Employed) at the Peru level, for the years 2019 and 2022, respectively. The sampling was probabilistic, by areas, stratified and multistage.

Through the use of STATA software, data processing was carried out, considering the following econometric models:

Logit Model: Considering the assumption that $E(Y_i = 1/X_i)$, estimates the probability of "success" of the endogenous variable; following a cumulative logistic distribution, such as:

$$F(Z_i) = F(X_i\beta) = \wedge(X_i\beta) = P_i \tag{1}$$

Therefore, for P_i, the likelihood function is shown below:

$$P_i = \frac{exp(X_i\beta)}{1 + exp(X_i\beta)} = \frac{1}{1 + exp(-X_i\beta)} = 1 - \frac{exp(-X_i\beta)}{1 + exp(-X_i\beta)} \tag{2}$$

The estimation form of the logistic equation is:

$$L_i = Ln(\frac{P_i}{1 - P_i}) = Z_i, where Z_i = \beta_1 + \beta_2 X_2 + ... + \beta_k X_k \tag{3}$$

The above equation represents the semi-elasticity function that expresses relative changes in probability ratios (success and failure).

Marginal effects: It is, the change in the probability that $Y_i = 1$, given unitary change in the exogenous variables X_i, keeping th rest of the exogenous variables constant.

$$\bar{X}_i = [1\bar{X}_{2i}\bar{X}_{3i}\bar{X}_{4i}\bar{X}_{5i}...\bar{X}_{ki}], where \quad j = 1, 2, 3..., k \tag{4}$$

If the exogenous variable X_i is numerical, the marginal effect is calculated by the derivative of the probabilities that $Y_i = 1$, given tha X_i and the probability that $Y_i = 1$ given that $X_i = 0$.

$$\frac{\partial[Y_i = 1]}{\partial X_i} = F(X_i\hat{\beta})\beta_i = \wedge(X_i\hat{\beta})[1 - \wedge(X_i\hat{\beta})] = \hat{P}_i(1 - \hat{P}_i)\beta_i \tag{5}$$

If the variable X_i is categorical, the marginal effect is obtained as the difference between the probabilities that $Y_i = 1$ given that X_i and the probability that $Y_i = 1$ given that $X_i = 0$.

$$\frac{\partial[Y_i = 1]}{\partial X_i} = \frac{exp(X_i\hat{\beta}_i)}{1 - exp(X_i\hat{\beta})}|_{x_i=1} - \frac{exp(X_i\hat{\beta})}{1 - exp(X_i\hat{\beta})}|_{x_i=0} \tag{6}$$

Marginal effects: When the exogenous variable X_i is quantitative, the marginal effect will be:

$$\frac{\partial[Y_i = 2]}{\partial X_i} = \varnothing(X_i\hat{\beta})\hat{\beta}_i \tag{7}$$

Where $\varnothing(X_i\hat{\beta})$ represents the standard normal density function for $u_i = X_i\hat{\beta} \backsim N(0, 1)$.
If the exogenous variable X_i is categorical, the marginal effects take values of 0 and 1.

$$\frac{\partial P[Y_i = 1]}{\partial X_i} = P[Y_i = 1|X_i - 1] - P[Y_i = 1|x_i = 0] = \varnothing(X_i\hat{\beta})|_{x_i=1} - \varnothing(X_i\hat{\beta}|_{x_i=0}) \tag{8}$$

Goodness of fit and likelihood ratio: In contrast to classical regression models, discrete choice models lack a defined coefficient of determination, so some approximate values are detailed to be taken as goodness of fit indicators:

R_2 of account

This indicator shows the percentage of correctly predicted probabilities. If the probability is equal to or less than 0.5, it is classified as 0, if it is greater than 0.5, it is classified as 1.

$$R_2 descuenta = \frac{N \quad de \quad predicciones \quad correctas}{N \quad total \quad de \quad observaciones} \tag{9}$$

If $\hat{Y}$ it matches Y_i, then the model fits well.

Pseudo R_2 McFadden

It represents the classical coefficient of determination R_2. It is given by:

$$R_2 = 1 - \frac{Ln(L_nr)}{Ln(L_r)} \tag{10}$$

Where $Ln(L_nr)$ is the logarithm of the maximum likelihood value of an unrestricted model and $Ln(L_r)$ is the logarithm of the maximum likelihood value of a restricted model. If $Ln(L_nr) > Ln(Lr)$; therefore, in absolute value, we have that: $0 < \frac{Ln(L_nr)}{Ln(L_r)} < 1$. That is, the value of the R_2 McFadden pseudo will always be in an interval of $0 < R_2 < 1$.

Likelihood Ratio Statistic (LRT)

It is equivalent to the F statistic of overall significance. In this case, the likelihood ratio statistic is:

$$\begin{aligned} &RV = 2(Ln(L_nr) - Ln(Lr)) \\ &H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0 \\ &H_i : Al \quad menos \quad un \quad \beta_i \neq 0 \end{aligned} \tag{11}$$

The econometric model used is detailed:

$$
\begin{aligned}
logit(1 = empleo\ \ informal/0 = empleo\ \ formal) = \\
\beta_1 + \beta_2 * Education\ \ Level + \beta_3 * Years\ \ of\ \ education + \beta_4 \\
* Number\ \ of\ \ children + \beta_5 * Head\ \ of\ \ household + \beta_6 * Income + \beta_7 \\
* Type\ \ of\ \ work + \beta_8 * Economic\ \ sector + \beta_9 * Age + \beta_10 * Sex + \beta_11 \\
* Marital\ \ status + \beta_12 * Geographic\ \ area + \beta_13 * Company\ \ size + \beta_14 \\
Language + \beta_15 * Poverty(Based\ \ on\ \ NBI) + e
\end{aligned}
\tag{12}
$$

Where: And: Informal employment, C: Constant, X_2 : Education level, X_3 : Years of education, X_4 : Number of children, X_5 : Head of household, X_6 : Income, X_7 : Type of work, X_8 : Economic sector, X_9 : Age, X_10 : Sex, X_11 : Marital status, X_12 : Geographic area, X_13 : Company size, X_14 : Language, X_15 : Poverty (Based on NBI), e : Random disturbance.

3. Results

3.1 Descriptive analysis

It is evident that there is an increase of 0.5 % of the unemployed EAP for the year 2022 compared to 2019. In 2022, as a result of the effects of the pandemic, the percentage value increased, so much so that 75.7 % of the EAP in Peru was in a situation of informality. Considering the educational level, it was found that for 2022 there is an increase in labor informality of 1.1 % over those without an education level, 2.4 % secondary, 4.5 % non-university higher and 5 % higher university, compared to 2019. When involving the geographical area, in the rural area, in both periods there was a higher proportion of informal workers; while, when considering the Spanish language, for 2022, informality increased by 0.3 % in contrast to 2019; while poverty was reduced in terms of informality by 0.8 %, considering the same years. (see table 1).

Regarding the type of work, the results show that for 2022 there is an increase in labor informality of 1.2 % in dependent workers and 2.8 % in independent workers, compared to 2019, which is why there is a higher proportion of informality in independent work. Taking the size of the company, for 2022 there is an increase in labor informality of 1.4 % in those with 1 to 20 people and 0.9 % in those with more than 51 workers, compared to 2019; inferring that, in organizations with a greater number of workers, the levels of informality are lower than in small ones.

3.2 Multivariate analysis

It is recorded that the two econometric models for the years 2019 and 2022 have a good fit, with a pseudo R2 of 0.511 for 2019 and 0.507 for 2022. Thus, the variables level of education, number of children aged 6 to 12, marital status, gender, age, type of employment, geographic area, economic sector, company size, language, poverty and income were statistically significant, since the p-value of the explanatory variables are below 0.05 and the signs are expected. (see table 2).

odds ratio of the model is shown , explained for each variable, keeping everything else constant, for the year 2019, the highlight is that, considering a company with more than 51 people, the individual has (1/0.0739 = 13.5317) times less chance of not belonging to the informal market; and with a company of 21 to 50 people, the individual has (1/0.2037 = 4.9091) times less chance of not belonging to the informal market, in both cases compared to those who belong to companies with less than 20 people. With a university level of higher education, the individual has (1 / 0.1627 = 6.1467) times less chance of not belonging to the informal market, and with a non-university level of higher education achieved, the individual has (1/0.1766 = 5.6625) times less chance of not belonging to the informal market, in both cases compared to the one who does not have a level of education. (see table 3).

By 2022, a similar behavior was observed; that is, by belonging to a company with more than 51 people, the individual has (1 / 0.0633 = 15.7977) times less chance of not belonging to the informal

Table 1. Sociodemographic characteristics considering the years 2019 and 2022

Indicators	Year			
	2019		2022	
PEA Not occupied	30.2 %		30.7 %	
Occupied EAP	69.8 %		69.3 %	
Formal force	72.7 %		24.3 %	
Informal force	27.3 %		75.7 %	
Language	Formal	Informal	Formal	Informal
Castilian	90.7 %	75.9 %	90.1 %	76.2 %
Quechua	7.9 %	20.1 %	8.3 %	20.2 %
Other languages	1.4 %	4.0 %	1.5 %	3.7 %
Education level	Formal	Informal	Formal	Informal
No level	2.4 %	97.6 %	1.3 %	98.7 %
Primary	6.4 %	93.6 %	6.1 %	93.9 %
Secondary	19.2 %	80.8 %	16.8 %	83.2 %
Sup . Non-university	45.5 %	54.5 %	41.1 %	58.9 %
Sup . University	59.5 %	40.5 %	54.7 %	45.3 %
Type of work	Formal	Informal	Formal	Informal
Dependent work	47.7 %	52.3 %	46.5 %	53.5 %
Freelance work	26.4 %	73.6 %	23.6 %	76.4 %
Geographical area	Formal	Informal	Formal	Informal
Urban	33.7 %	66.3 %	29.6 %	70.4 %
Rural	4.9 %	95.1 %	4.7 %	95.3 %
Company size	Formal	Informal	Formal	Informal
Up to 20 workers	12.0 %	88.0 %	10.6 %	89.4 %
From 21 to 50 workers	53.2 %	46.8 %	54.1 %	45.9 %
More than 51 workers	79.4 %	20.6 %	78.5 %	21.5 %
Poverty and Unmet Basic Needs (UBN)	Formal	Informal	Formal	Informal
Not poor	99.4 %	96.8 %	99.5 %	97.3 %
Poor2 NBI	0.6 %	3.2 %	0.5 %	2.7 %

Source: Prepared by the authors based on ENAHO

market, while, in a company with 21 to 50 people, the individual has (1 / 0.1624 = 6.1567) times less chance of not belonging to the informal market, in both cases compared to those who belong to companies with less than 20 people. Having reached a university higher education level, the individual has (1 / 0.0880 = 11.3636) times less chance of not belonging to the informal market, while, with a non-university higher education level, the individual has (1 / 0.0991 = 10.0908) times less chance of not belonging to the informal market, in both scenarios compared to those who do not have a level of education.

Table 2. Results and marginal effects by year of study. 2019 and 2022 of the logit econometric model

Variables	2019 Model		2022 Model	
	logit (1/informality)	Marginal effects (dy/dx)	logit (1/informality)	Marginal (dy/dx)
Education level				
Primary	-0.4264** (0.1849)	-0.0369	-0.9807*** (0.2318)	-0.0753
Secondary	-0.9526*** (0.1822)	-0.0882	-1.5710*** (0.2290)	-0.1305
Non-university higher education	-1.7335*** (0.1839)	-0.1764	-2.3114*** (0.2341)	-0.2111
University graduate	-1.8153*** (0.1866)	-0.1865	-2.4295*** (0.2354)	-0.2252)
Number of children aged 6-12 years	0.0935*** (0.0335)	0.0093	0.1087*** (0.0402)	0.0104
Marital status: married	-0.1414*** (0.0460)	-0.0141	-0.1453*** (0.0496)	-0.0140
Gender: Male	0.2095*** (0.0436)	0.0209	0.1333*** (0.0486)	0.0128
Age	-0.0283*** (0.00172)	-0.0028	-0.0268*** (0.0018)	-0.0025
Employment type: self-employed	1.0128*** (0.0790)	0.1015	1.3262*** (0.0845)	0.1277
Geographical area: rural	0.7227*** (0.0634)	0.0724	0.9377*** (0.0687)	0.0903
Economic sector				
Secondary	-0.7283*** (0.0749)	-0.0675	-0.7052*** (0.0752)	-0.0623
Tertiary	-0.9385*** (0.0664)	-0.0891	-0.9867*** (0.0657)	-0.0900
Company size				
from 21 to 50 people	-1.5910*** (0.0894)	-0.2164	-1.8176*** (0.0983)	-0.2469
More than 51 people	-2.6047*** (0.0525)	-0.3742	-2.7588*** (0.0569)	-0.3969
Language				
Quechua	-0.1355 (0.1408)		-0.2277 (0.1495)	
Castilian	-0.4113*** (0.1285)	-0.0400	-0.4527*** (0.1342)	-0.0420
Poor with 2 NBI	0.6771*** (0.2044)	0.0678	0.5108** (0.2096)	0.0492
Ln (income)	-1.2745*** (0.03811)	-0.1277	-1.0866*** (0.0422)	-0.1047
Constant	13.1151*** (0.3542)		12.3140*** (0.4195)	
McFadden´s R2	0.511		0.507	

Legend : * p<0.05; **p<0.01; ***p<0.001
Note: () = standard deviation

Source: Own elaboration

The values of the marginal effects for each variable analyzed for the years 2019 and 2022 are observed. The marginal analysis of the model, considering all other variables constant for the year 2019, notably indicates that the probability of having an informal job in Peru, if the size of the company is more than 51 employees, is 37.42 pp. lower than for one with less than 20 employees. The same happens for a company with 21 to 50 people with 21.64 pp. (see figure 1).

Likewise, the probability of having an informal job in Peru, provided that one has an independent job, is 10.15 pp. higher than that of an employed job, where, considering the economic sector of performance, the tertiary sector has a probability of 8.91 pp. lower than the primary sector of having an informal job. Along these lines, in the same scenario, the probability of developing informal activities

Table 3. Odd ratio

Variables	2019 Model odds ratio	IC 95 %	Model 2022 odds ratio	IC 95 %
Education level				
Primary	0.6528	(0.4542 – 0.9382)	0.3750	(0.2380 – 0.5908)
Secondary	0.3857	(0.2698 – 0.5514)	0.2078	(0.1326 – 0.3256)
Non-university higher education	0.1766	(0.1231 – 0.2533)	0.0991	(0.0626 – 0.1568)
University graduate	0.1627	(0.1128 -0.2347)	0.0880	(0.0555 – 0.1397)
Number of children aged 6-12 years	1.0980	(1.0283 – 1.1724)	1.1148	(1.0303 – 1.2063)
Marital status: married	0.8681	(0.7931 – 0.9502)	0.8647	(0.7845 – 0.9531)
Gender: Male	1.2331	(1.1319 – 1.3433)	1.1426	(1.0386 – 1.2570)
Age	0.9720	(0.9688 – 0.9753)	0.9734	(0.9699 – 0.9767)
Employment type: self-employed	2.7533	(2.3580 – 3.2150)	3.7668	(3.1912 – 4.4461)
Geographical area: rural	2.0601	(1.8191 – 2.3330)	2.5542	(2.2320 – 2.9229)
Economic sector				
Secondary	0.4827	(0.4167 – 0.5590)	0.4939	(0.4262 – 0.5725)
Tertiary	0.3912	(0.3434 – 0.4456)	0.3727	(0.3276 – 0.4240)
Company size				
from 21 to 50 people	0.2037	(0.1709 – 0.2427)	0.1624	(0.1339 – 0.1969)
More than 51 people	0.0739	(0.0666 – 0.0819)	0.0633	(0.0566 – 0.0708)
Language				
Quechua				
Castilian	0.6627	(0.5150 – 0.8528)	0.6358	(0.4887 – 0.8273)
Poverty 2 NBI	1.9682	(1.3182 – 2.9386)	1.6666	(1.1049 – 2.5138)
Ln (income)	0.2795	(0.2594 – 0.3012)	0.3373	(0.3105 – 0.3664)

Source: Own elaboration

decreases by 12.77 pp. when income increases.

As for 2022, the probability of being part of the informal workforce in Peru in organizations with 21 to 50 employees and more than 51 employees is 24.69 pp. and 39.69 pp. lower, respectively, than being in organizations with less than 20 members. Along these lines, being a self-employed worker gives a probability of 12.77 pp. above that of dependent workers of having an informal job in the country.

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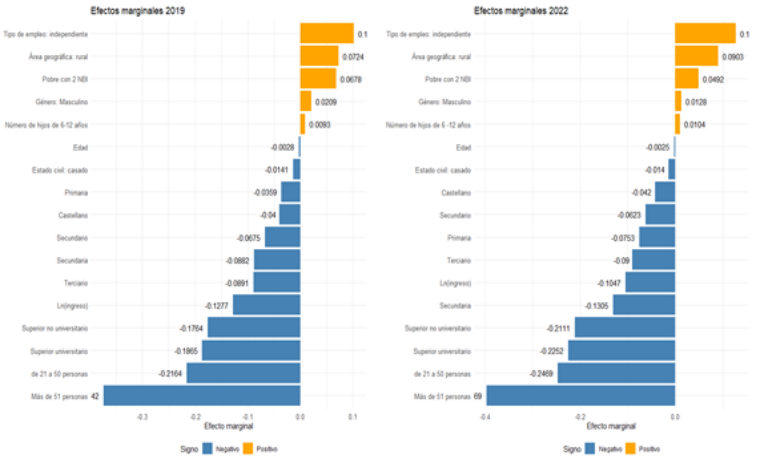
And, regarding the income variable, it was recorded that the probability of informal employment is reduced by 10.47 pp. if income increases.

Comparing the variables in the 2019 scenarios, it is interpreted that a person lacking Spanish-speaking education from a rural area, classified as poor with 2 NBI, with three children aged 6 to 12, being a self-employed worker in the tertiary sector in a company with less than 20 people, has a 96.4% probability of belonging to an informal job; while in the same context but considering that the person belongs to an urban area and is part of a company with more than 51 employees, the probability is reduced to 42.3% of having an informal job.

In the meantime, for the year 2022, it is interpreted that a person lacking education with a Spanish language from a rural area classified as poor with 2 NBI with three children aged 6 to 12, self-employed in the secondary sector in a company with less than 20 people, has a 99% probability of belonging to an informal job; while the same description, but considering that it is a person from the urban area as a dependent worker in the tertiary sector in a company with more than 51 collaborators, has a 55.5% probability of having an informal job.

Figure 1. Marginal effects for the year 2019 and 2022 respectively



Source: Prepared by the authors based on ENAHO

4. Discussion

The concept of informal employment originated in the framework of the International Labour Organization (ILO) World Employment Programme and was introduced by economic anthropologist Keith Hart, who used the term to describe a problem observed in urban employment in two African countries, where people worked in small businesses and trades that operated outside the legal framework, without registration or protection (Espejo, 2022). The evolution of the concept has revealed significant implications for economies. On the one hand, workers in the informal sector are excluded from employment benefits and lack stability and security due to the absence of a formal contract. On the other hand, companies operating in informality evade taxes and circumvent labor regulations, which creates unfair competition in the market. As a result, the State faces a reduction in its tax revenues, which limits the resources available to provide quality public services.

The research was limited to evaluating the socioeconomic determinants and their marginal effects according to the years 2019 and 2022. The findings show that the determinants of labor informality in Peru, for the years 2019 and 2022, are the level of education, Spanish language , poverty based on 2 NBI, number of children from 6 to 12 years old, income, type of work, economic sector and company size. In addition, the control variables age, sex, marital status, rural geographic area. This is explained because the p-values were lower than the level of significance. Likewise, the variables number of children from 0 to 5 years old, head of household and work experience did not qualify as determinants of informality.

In 2019 and 2022, 72.7% and 75.7% of the employed EAP in Peru, respectively, were in an informal condition. First, it was shown that the level of education as a socioeconomic determinant is inversely related to labor informality in Peru in the years 2019 and 2022; which coincides with Pardo and Sánchez (2020), who indicate that in Colombia having a low educational level is a determinant of those who are in the informal labor sector . Similarly, in Pakistan, Tanveer et al . (2021)found that the level of education and professional training turns out to be a determinant; congruently , Pariona et al. (2019)explain that the level of education prevails, since the higher this is, the greater the possibility of accessing better jobs. Pérez also (2020)pointed out that the university education level is key to transitioning from informal to formal employment.

Secondly, it was found that income is inversely related to labor informality in Peru in the years 2019 and 2022; therefore, people with low incomes are predisposed to cover their needs, as Pardo and Sánchez refer (2020), with the inclination to look for informal employment. Also Pariona et al.

(2019)point out that income and economic independence are the motivators of self-generation of employment that is far from quality; therefore, in agreement with this, Tomaselli (2021)He explains that having higher income levels allows a person to have more time to look for a decent job that provides benefits according to the law. Otherwise, they will opt for the first option they find, which is usually in precarious conditions.

Thirdly, the number of children (6 to 12 years old) is a determining factor directly linked to labor informality in Peru in the years 2019 and 2022, so the greater the offspring, the greater the probability of accessing informal employment, explained by the domestic burden that this represents, as Tanveer and Nussain point out. (2021), the number of children and household members turns out to be a determinant with greater prejudice for women as heads of household. Fourthly, the type of work is also directly related. What Pariona et al. (2019)explained indicates that the type of independent work (especially women) is a driver of self-generation of employment lacking in quality due to its very nature and size; likewise, Tomaselli (2021)He pointed out that domestic and independent work determine informal employment .

Fifth, the economic sector was also found to be an inverse socioeconomic determinant of informal employment in the same scenario, where being in the secondary sector increases the probability of accessing informal employment compared to the primary and tertiary sectors. As Pérez also pointed out (2020), the primary sector does not require qualified human capital, which simplifies the system by requiring labor. Sixth, the number of workers in the company as a socioeconomic determinant is inversely linked to informal employment, so that, by being part of larger companies, the probability of being in informal employment is lower, as Tomaselli found. This (2021)is because having a greater scope of operation means greater responsibilities and legal provisions that must be met.

Seventh, the mother tongue, Spanish, was confirmed as a socioeconomic determinant of inverse correspondence, similar to what was pointed out by Escamilla (2020), who explained that language conditions access to formal employment and the perception of income, due to eligibility and the list of employment options. Lastly, poverty also qualified as a determining factor in inverse relation, this is compared with Sánchez et al. (2022), who explains that the structural problem of informality influences the quality of life of people; therefore, poverty conditions represent fewer job opportunities; likewise, Valera and Ocegueda (2020)indicated that socioeconomic deficiencies mean less access to the formal environment.

5. Conclusion

The research showed that, when analyzing the determinants of informality and its marginal effects in Peru in 2019, a person with no formal education, a Spanish speaker, living in a rural area, classified as poor with two unsatisfied basic needs (UBN) and with three children between 6 and 12 years old, who was self-employed in a tertiary sector company with fewer than 20 employees, had a 96.4% probability of being in the informal sector. In comparison, in 2022, similar characteristics—that is, lack of formal education, Spanish speaker, living in a rural area, poor with two UBNs, with three children between 6 and 12 years old, and self-employed in a secondary sector company with fewer than 20 employees—resulted in a 99% probability of being in the informal sector.

In particular, it was found that the level of education is a determining factor inversely linked to informality in 2019 and 2022, so that the individual, by reaching a higher educational level, reduces his chances of obtaining informal employment, explained by greater job opportunities, having more options and choosing the one that best suits his aspirations. Likewise, the size of the company was also established as a socioeconomic determinant that is inversely related to informality, having that, in the face of a larger company, with greater operating capacity, it represents a greater probability of access to formal employment, given that the very nature of the organization requires systematized activities and registered in State regulatory bodies.

Consequently, the findings show the importance of implementing measures within the education sector, as it represents a fundamental determinant for reducing the levels of informality that are evident

at the national level. To the extent that concrete and effective actions are established with an emphasis on providing a valuable education within the reach of the population, it will be possible to have educated individuals and thus quality human capital, which will lead to them being able to access decent jobs that provide them with the necessary working conditions that the law requires.

In this way, the development of economic policies that contribute to the creation of formal employment, where the establishment of flexible standards based on the economic capacity of companies and the reduction of labor costs that allow the prioritization of the labor obligations of workers without harming the company are considered, will be relevant to generate a virtuous circle in favor of the common good. It is also worth highlighting that, within Peru, the heterogeneity of its regions leads to establishing policies based on the reality of each of them, and thus accumulating knowledge and skills that allow them to perform optimally, since the accumulation of human capital reduces labor informality.

Author Contributions

Evelin Sheyla Bautista Prado: Conceptualization, data curation, formal analysis, writing—original draft.

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