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Factors Affecting the Participation Rate of Women in the Labor Force in Lima Puluh Kota Regency Using Probit Regression Analysis

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Abstract- Labor currently plays a very important role in a country's economy. In the labour sector, women still experience discrimination, which causes the Labor Force Participation Rate (LFPR) of women to remain low compared to men. The LFPR of men in Kabupaten Lima Puluh Kota is higher than the LFPR of women. In 2022, the female LFPR was 63.75%, meaning that of the total labour force, around 63.75% of them were working or looking for work. This study aims to determine the factors that influence women's participation in the labour force in Kabupaten Lima Puluh Kota. This research is applied using the probit regression analysis method. The data used is secondary data, which is microdata from the National Labor Force Survey (SAKERNAS). Based on the results of the analysis, the factors that influence the level of women's participation in the labour force in Kabupaten Lima Puluh Kota in 2022 are education level, age, job training status, and status as head of household.

1. Introduction

Human resources play a very important role and position in encouraging the economic growth of a country (Tyas & Ikhsani, 2015). The state must make every effort to optimize the potential of human resources to support economic and social development. The state must implement strategies and policies to improve education, skills, health, and participation in the workforce. Every member of society has the right to work both men and women. Equal rights for workers are guaranteed in the constitution, so men and women have the same rights in the world of work (Susiana, 2019).

According to (Susiana, 2019), although normatively, there are equal rights between female workers and male workers, in reality, the condition of women in the field of labour is still far from expectations, both in terms of

Quantity and quality. In the current era of emancipation, women are often considered a second-class group (subordinate), which causes them not to get the same rights as men, including in the world of work (Indriastuti et al., 2023). In 2022, the population in Lima Puluh Kota Regency was 388,375 people, consisting of 194,292 male residents or around 50.03% and 194,083 female residents or around 49.97% (BPS,2023). Along with the increasing population, women's desire to enter the world of work is also increasing. This can be seen from the value of the Labor Force Participation Rate (LFPR). Lima Puluh Kota Regency occupies the 4th position with the highest LFPR value in West Sumatra. However, it is realized that women's involvement in economic activities is still less than that of men.
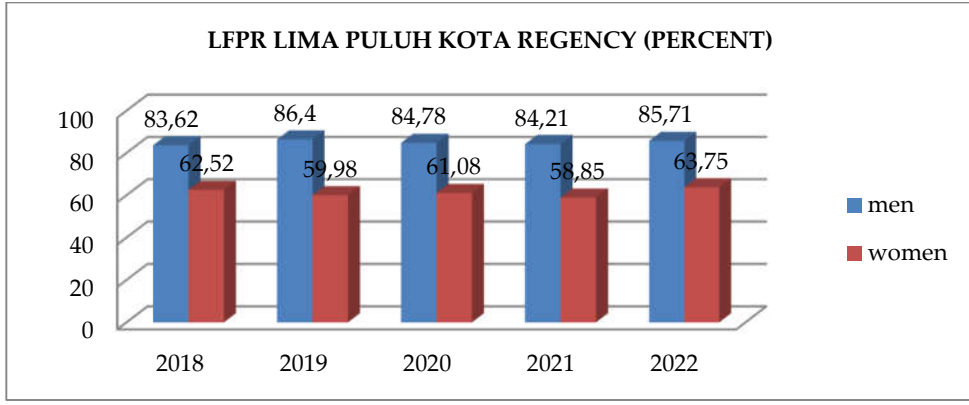
Source: Statistics of Lima Puluh Kota Regency in Figures 2023

Figure 1. Labor Force Participation Rate of Lima Puluh Kota Regency in 2018-2022

Based on Figure 1 above, it can be seen that in the last five years, the LFPR value in Kabupaten Lima Puluh Kota has fluctuated. The LFPR of men in Kabupaten Lima Puluh Kota is higher than that of women. In 2022, the LFPR of women was 63.75%, meaning that of the total labour force, around 63.75% of them were working or looking for work. The significant difference in LFPR between women and men is due to the fact that women's role is often identified as working in the household (domestic sector). In contrast, the role of men is identified with working outside the home (public sector)(Herlina, 2020). However, the differentiation of women's roles has resulted in the obstruction of women's participation in economic activities.

Table 1. Working-age Population Classified as Labor Force by Sex and Type of Activity in 2022

Activity Type	Male	Female	Total (person/life)
Labor Force	122.490	94.399	216.889
Working	118.003	90.812	208.815
Looking for work	4.487	3.587	8.074
Not Labor Force	20.421	53.671	74.092
Attending School	11.286	10.721	22.007
Housekeeping	2.401	37.059	39.460
Others	6.734	5.891	12.625

Source: Statistics of Lima Puluh Kota Regency in Figures 2023

Table 1 shows that the labour force in 2022 is still dominated by men, reaching 122,490 people with an LFPR of 85.71 per cent and a female labour force of 94,399 people (with an LFPR of 63.75 per cent). On the other hand, the number of people not in the labour force is dominated by women, with 53,671 people and only 20,421 men. In terms of benefits, increasing women's LFPR has good implications for the country's economy. Countries with many women who are ready to participate in the labour force can increase economic growth rapidly (Khairunnisa et al., 2022). According to Psacharopoulos & Tzannator (Rahma, 2017), although more and more women are entering the labour market, women's participation is still less than that of men, both in the labour force and in achieving levels of education and expertise. According to (Hidayat et al., 2017), the presence of working women will be able to raise the welfare of the worker's family because they get additional income from the results of women's work. Then, women's labour force participation can reduce the burden of poverty with income and improve household welfare (Hosney, 2015).

One of the factors that influence women to participate in the labour force is the level of education. Brenke (Rahman, 2019) explains that the increase in women in the labour force can be through higher

educational attainment, which makes women more qualified to participate in the labour force. The age factor also affects the level of women's participation in the labour force. According to Simanjuntak (1998), age affects the supply of labour. The increase in labour supply will increase according to age. Becker (1964) also explains that investment in education, training, and health can improve a person's knowledge and welfare, which in turn can increase their productivity and income in the future.

From the problems described above, it is necessary to conduct a more in-depth analysis related to what factors have a significant effect in influencing women's participation in the labour force in Lima Puluh Kota Regency in 2022. In this study, the dependent variable (Y) is women's participation in the labour force, which has two categories: women participating in the labour force and women not participating in the labour force. Meanwhile, the independent variables (X) that will be used are education level, age, job training status, status as head of household, and the presence of children under five. This means that women's participation in the labour force is categorical with a nominal scale, so in this study, the regression analysis in statistics functions to see the relationship between the dependent variable, which is categorical (qualitative), and the independent variables, which are qualitative and quantitative is probit regression analysis (Chaster Bliss (Merdekawati et al., 2019)).

The probit regression model is an extension of the logistic regression model that sets the logistic regression equation to follow a normal distribution. The probit model is suitable for this model because it is used to analyze the relationship between one dependent variable and several independent variables, with the dependent variable being dichotomous qualitative data, which takes the value 1 to indicate the presence of a characteristic and 0 to indicate the absence of a characteristic.

2.   Methods

This research includes applied research. This research aims to apply, test, and evaluate the ability of a theory to solve a problem (Abubakar, 2021). The type of data used is secondary data in the form of the August 2022 National Labor Force Survey microdata collected by the BPS-Statistics of Lima Puluh Kota Regency. The data obtained were analyzed using Eviews software. The variables used consist of the dependent variable (Y), namely women's participation in the labour force and independent variables (X), namely education level, age (Utami & Ariusni, 2023), job training status, status as head of household (Hussain et al., 2016), and the presence of children under five (Faridi et al., 2009). The data processing results were obtained using EViews 10.

Data analysis technique:
1.   Classify or categorize variables
     Categorizing variables in the context of data analysis refers to the process of dividing them into groups or categories based on certain characteristics.
2.   Describe the condition of the data.
     The data was described and then presented in diagrams with clear and concise descriptions.
3.   Estimating probit regression parameters
     Estimation of probit regression parameters is carried out to form an initial model by including all independent variables referring to the following equations:
$$L(\beta) = \prod_{i=1}^{n} F(\beta'X_i)^{y_i}(1 - F(\beta'X_i)^{1-y_i}$$
4.   Form a probit regression model between the dependent variable and the independent variable. Which refers to the following equation:
$$Y_i^* = Probit\ (P_i) = \Phi^{-1}(P_i) = \beta_0 + \sum_{i=1}^{n} \beta_i X_i + \varepsilon_i$$
5.   Test the significance of the probit regression model
     The significance test of probit regression using the G test is conducted to check whether the independent variables have a real effect in the model, referring to the following equation:
$$G = -2\ln\left[\frac{L_0}{L_1}\right] = -2(\ln L_o - \ln L_1)$$
6.   Conduct a parameter significance test.
     The parameter significance test is carried out using the Wald test with the aim of finding out whether the regression coefficient is significant or not in the model.
$$W = \frac{\hat{\beta}_j}{SE(\hat{\beta}_j)}$$

(Hosmer, 2000)

7. Selecting the best model
    The selection of the best probit regression model is done using the backward elimination method. The backward method is a method that includes all explanatory variables and then eliminates them one by one until only significant explanatory variables are left.
8. Interpret the model
    Model interpretation is carried out on the regression parameters in the probit model formed. By looking at the parameters in the regression model, we can see how the independent variables affect the dependent variable.

3. Results and Discussion

(a) Parameter Estimation of Probit Regression Model

The probit regression model was formed by including all independent variables. The estimated values of probit regression parameters are obtained in Table 2.

Table 2. Estimated Results of Probit Regression Parameters with Including All Independent Variables

Independent Variable	B
Constant	0,214618
Education Level (X_1)	0,456290
Age (X_2)	0,309505
Job Training Status (X_3)	0,566594
Head of Household Status (X_4)	1,097974
The Presence of Children Under Five (X_5)	-0,142241

Based on Table 2, the probit regression model obtained from all variables is as follows:
$$\Phi^{-1}(P_i) = 0,214618 + 0,456290X_1 + 0,309505X_2 + 0,566594X_3 + 1,097974X_4 - 0,142241X_5$$

The probit regression model that was formed was an initial model that described women's participation in the labour force. Therefore, it is important to revise and re-examine the model to determine its significance in more depth.

(b) Significance Testing of Regression Model

Testing the significance of the model by including all independent variables using the G test. The hypothesis used is:
$H_0: \beta_1 = \beta_2 = \cdots = \beta_5 = 0$
H_1: there is at least one $\beta_j \neq 0$, untuk j = 1,2,…,5
Equation (3) shows the result of the model significance test using the G test, which can be seen in Table 3.

Table 3. Significance Test of Probit Regression Model

Log Likelihood	G	Df	p-value
-379,4496	75,84089	5	0,000

Based on Table 3, it can be seen that the p-value in the probit regression model is 0,000. This value is smaller than the $\alpha = 0,05$ value, so the H. $_0$ hypothesis is rejected, meaning that there is at least one independent variable that affects the dependent variable.

(c) Significance Testing of Probit Regression Parameters

The parameter significance test was conducted by partially testing the parameters. The Wald test is used to test the significance of these parameters. The hypothesis used is:
$H_0 : \beta_j = 0$
$H_1 : \beta_j \neq 0$, for : j = 1,2,3,…,5
Sing equation (4), the result of the parameter significance test using the Wald test, can be seen in Table 4.

Table 4. Significance Test of Probit Regression Parameters

Independent Variable	Z	p-value
Constant	2,820831	0,0048
Education Level (X_1)	2,090211	0,0366
Age (X_2)	2,329536	0,0198
Job Training Status (X_3)	3,810020	0,0001
Head of Household Status (X_4)	4,548043	0,0000
The Presence of Children Under Five (X_5)	-1,165232	0,2439

Based on Table 4 above, it can be seen that the variables that have a significant effect on women's participation in the labour force in Kabupaten Lima Puluh Kota are education level (X_1), age (X_2), job training status (X_3), and head of household status (X_4) because the p-value is smaller than the $\alpha = 0,05$. Therefore, it is necessary to select the best model by reducing it in order to get independent variables with an α value smaller than 0,05.

(d) Best Model Selection

The best model selection is done by the backward elimination method, namely by eliminating or removing independent variables that have an α value greater than 0.05. The independent variable that was excluded was the presence of toddlers (X_5) because it had a p-value of 0.2055. The reduction results can be seen in Table 5:

Table 5. Probit Regression Model I Reduction Results

Independent Variable	Before Reduction	Reduction Stage I
	p-value	p-value
Constant	0,0048	0,0096
Education Level (X_1)	0,0366	0,0438
Age (X_2)	0,0198	0,0438
Job Training Status (X_3)	0,0001	0,0097
Head of Household Status (X_4)	0.0000	0,0000
The Presence of Children Under Five (X_5)	0,2439	-

Based on reduction I, it can be seen that all independent variables already have a p-value smaller than $\alpha = 0,05$, so the reduction stage in the probit regression model is done only once, and the best probit regression model is obtained. The effect of the independent variables of the best probit regression model after reduction can be seen from the statistical value in the G test obtained in Table 6:

Table 6. Significance Test of Probit Regression Model

Log Likelihood	G	Df	p-value
-380,1265	74,48716	4	0,000

Based on Table 6, the p-value of the best probit regression model is 0.000; this value is smaller than the $\alpha = 0.05$ value. This means that the independent variables in the best probit regression model affect the dependent variable. Parameter estimation for the best probit regression model can be seen in Table 7:

Table 7. Best Probit Regression Results

Independent Variable	B	Z	p-value
Constant	0,170217	2,590337	0,0096
Education Level (X_1)	0,437701	2,015659	0,0438
Age (X_2)	0,337553	2,585839	0,0097
Job Training Status (X_3)	0,572629	3,849853	0,0001
Head of Household Status (X_4)	1,113370	4,618526	0,0000

Based on Table 7 above, the independent variables, namely education level, age, job training status, and status as head of household, have a significant influence on the model because the p-value of the independent variables is smaller than the value of $\alpha = 0,05$. Thus, the best probit regression model

obtained after reduction is:

$$\Phi^{-1}(P_i) = 0{,}170217 + 0{,}437701X_1 + 0{,}337553X_2 + 0{,}572629X_3 + 1{,}113370X_4$$

Where:

X_1: Education Level

X_2 : Age

X_3: Job Training Status

X_4: Head of Household Status

Based on the best probit regression model obtained, it can be interpreted that the variable education level (X_1), age (X_2), job training status (X_3), and head of household status (X_4) has a significant effect on female LFPR in Kabupaten Lima Puluh Kota in 2022.

To see the probability value of the above model, a standard normal distribution table is needed by calculating the probit value first. The probability can be seen in Table 8:

Table 8. Peluang TPAK Perempuan Berdasarkan Model Regresi Probit

No.	X_1	X_2	X_3	X_4	Y_i	P_i (%)
1	0	0	0	0	0,170217	56,75
2	0	0	0	1	1,283587	89,97
3	0	0	1	0	0,742846	77,04
4	0	0	1	1	1,856216	96,86
5	0	1	0	0	0,50777	71,57
6	0	1	0	1	1,62114	94,74
7	0	1	1	0	1,080399	85,99
8	0	1	1	1	2,193769	98,57
9	1	0	0	0	0,607918	74,86
10	1	0	0	1	1,721288	95,73
11	1	0	1	0	1,180547	88,1
12	1	0	1	1	2,293917	98,9
13	1	1	0	0	0,945471	82,64
14	1	1	0	1	2,058841	98,03
15	1	1	1	0	1,5181	93,57
16	1	1	1	1	2,63147	99,57

Based on Table 8, it can be seen that the highest probability is the participation of women in the labour force with the latest education of senior high school and above, in the age range of 50-64 years, having participated in job training, and being the head of a household.

(e) Interpretation

Based on the best probit regression model obtained, it can be interpreted that the constant gives a reduction of 0,170217. If the education level is higher, it will increase the chance of female LFPR by 0,437701. If the woman is of productive age, her chances of being in the labour force will increase by 0,337553. If the woman has participated in job training, it will increase her chances of being in the labour force by 0,572629, and if the woman has the status of head of the family, it will increase her chances of being in the labour force by 1,113370.

Based on the interpretation of the best model, the factors influencing the participation rate of women in the labour force in Kabupaten Lima Puluh Kota are education level, age, job training status, and status as head of household.

4. Conclusion

From this discussion, the probit regression model of female labour force participation in Lima Puluh Kota Regency is as follows:

$$\Phi^{-1}(P_i) = 0{,}170217 + 0{,}437701X_1 + 0{,}337553X_2 + 0{,}572629X_3 + 1{,}113370X_4$$

Based on the partial test analysis, the variables of education level, age, job training status, and status as head of the family influence women's participation in the labour force. The highest probability of these influential factors is the level of education with the latest high school education and above, age in the range of 50-64 years, having participated in job training, and status as head of the family with a probability of 99.57%.

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