DETERMINANTS OF FEMALE LABOR FORCE PARTICIPATION IN TR22 SUB-REGION

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ABSTRACT

Although there have been significant developments in the female labor force participation rate in Turkey in recent years, this rate is below the OECD average. There are various social and economic reasons behind this situation. This study, female labor force participation in the Türkiye TR22 Sub-region, investigates with a logit model, taking into account the variables of age, relationship to the head of the household, marital status, education level, and household size. The micro data set of the TURKSTAT Labor Force Survey of 2021 was used in the study. The findings obtained from the analysis show that female labor force participation in the region examined in Turkey is affected by the variables of age, education level, and marital status. The results highlight that female labor force participation can be increased through education, vocational training, and entrepreneurship. The results highlight that female labor force participation can be increased through education, vocational training, entrepreneurship, and the necessity of creating a new perspective on sharing responsibility within the family.

Keywords: Female Labor Force Participation, Logit Model, TR22.

JEL classification: J21, C25.

1. INTRODUCTION

Labor markets are one of the most studied topics in the economics literature. Increasing evidence of the role of human capital, particularly in sustainable growth and development processes, has increased interest in labor markets. This issue is frequently evaluated with its theoretical and empirical aspects and is also an essential component of policymakers' national strategies. In this context, the labor force participation rate is one of the most critical labor market indicators affecting sustainable growth and development. The labor force participation rate is the primary indicator of the extent to which the working-age population participates in the economic activities of any country. In other words, this indicator shows at what level the existing human capital accumulation is utilized in the production processes of a country. Based on this definition, the labor force participation rate is a particular topic

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that needs to be evaluated separately in the context of gender. There are gender inequalities in the inclusion of human capital in production processes, and this situation is against women.

In the 20th century, there has been a significant increase in the proportion of women participating in the labor market in the early industrialized countries. Despite this increase, the gender gap in labor force participation continues around the world. While the average labor force participation rate of women was reported as approximately 47% in 2021, the male labor force participation rate was about 72%. In the same period, the regions with the highest gender gap had the lowest female labor force participation; South Asia, North Africa, and the Arab States. The gender differences in the mentioned regions were reported as 53%, 47%, and 58%, respectively. These differences are well above the 25% difference reported for the world in the same period. Sub-Saharan Africa, Northern, Southern, and Western Europe, and North America were the countries with the lowest gender gaps in 2021. In these regions, the gender gap was 11.2%, 11.7%, and 12.1%, respectively (ILOSTAT, 2022). In addition, in the same period, Sub-Saharan Africa was the highest female labor force participation rate among the regions. However, it is noteworthy that this high participation rate is due to poverty and lack of social protection rather than a good economic outlook (ILO, 2017). This finding for the difference between the gender is also valid for economies with different levels of development. Such as, even in developed economies where the female labor force participation rate is higher than in other countries, the female labor force participation rate is lower than the male labor force participation rate. The data for 2020 show that the female labor force participation rate is from 69% to 80% in selected developed economies such as Switzerland, Denmark, Estonia, Norway, the Netherlands, Spain, and Canada. However, in the same period, the male labor force participation rate is between 78% and 88% (OECD, 2022). While these data reveal the difference between the gender, it shows that female labor force participation rate in developed countries is quite close to that of men. However, the female labor force participation rate in developing countries is still low.

Turkey has the lowest female labor force participation among OECD countries. However, there have been significant developments in the female labor force participation rate in recent years. It is seen that the increasing trend in the female labor force participation rate has continued, especially since 2007. The labor force participation rate, which was 25% in 2007, was reported as 38.7% as of 2019. In 2020, this rate decreased to 35.1%, with a decrease of 3.6% due to the Covid-19 outbreak. As of the second half of 2021, with the end of the precautions against the epidemic, the female labor force participation rate increased by 2.2% compared to the previous year and reached 37.3% (OECD, 2022). Continuing the increase in female labor force participation in the upcoming periods is critical for Turkey and emerging economies such as Turkey. As a matter of fact, the active role of women in the labor market supports sustainable growth and development processes and also contributes to the increase of women's social status.

This study aims to empirically examine the factors affecting female labor force participation in the TR22 sub-region (Balıkesir, Çanakkale) in Turkey. For this purpose, data from the 2021 Labor Force Survey conducted by the Turkish Statistical Institute (TURKSTAT) were used. The female labor force participation in the TR22 sub-region was analyzed with the logit model, taking into account the variables of age, proximity to the head of the household, marital status, education level, and household size. Factors affecting female labor force participation in Turkey have been the subject of many studies. However, there is no study in the literature regarding the TR22 sub-region. Therefore, this study is expected to contribute to the reviewed region literature and guide the analyses for other NUTS-2 regions.

2. LITERATURE REVIEW

In the empirical literature, there are studies that deal with the determinants of female labor force participation in micro and macro dimensions. In line with the purpose of this study, the literature summary consists of studies that examine female participation in the workforce with its micro dimensions. Most of these studies analyzed female labor force participation in different country/country groups using logistic regression. A summary of the literature regarding the studies reviewed is given in Table 1. As can be seen in Table 1, the factors affecting female labor force participation differ according to the country/country groups selected, the period under consideration, and the econometric method. However, when the results of these studies are evaluated, it is seen that some factors come to the fore. These factors are; education level, age, marital status, number of children, household size, women's situation in the family compared to the household head, and household income.

Table 1. Literature Review

Author(s)	Period	Country/Country Group	Method	Summary of Findings
Vlasblom and Schippers (2004)	1992, 1999	Selected European Countries	Logit model	They reported that the variables of education level, number of children, and age could not explain the female labor force participation rate increase.
Lisaniler and Bhatti (2005)	2001	Turkish Republic of Northern Cyprus	Logit model	This study revealed that education level and age are the most important factors affecting female labor force participation.
Şengül and Kıral (2006)	2003	Türkiye	Probit model	While the increase in the number of children, age, and fertility decreases female labor force participation, the increase in the education level of women and their spouses increases female labor force participation.

Yıldırım and Doğrul (2008)	2003	Türkiye	Logit model	In the study conducted for women living in urban areas, it has been concluded that the increase in the education level of the spouse, household income, and the number of children decreased female labor force participation.
Doğrul (2008)	2003	Türkiye	Logit model	In this study, it has been concluded that the factors affecting female labor force participation after the 2001 crisis were age, number of children, household income, and housing ownership.
Contreras and Plaza (2010)	2002	Chile	Probit model	The findings show that as the education level increases, labor force participation increases. As the number of children increases, the decision to participate in the force is negatively affected, and cultural values affect participation in the workforce.
Mishra et al. (2010)	1960-2006	G-7 Countries	Panel Data Analysis	Education level, spouse's income level, spouse's job status, having children, and fertility rate have been reported as factors affecting female labor force participation.
Bhalla and Kaur (2011)	1983-2004	India	Tobit model	Personal income, education level, rural-urban distinction, and birth rate have been determined as factors affecting female labor force participation.
Euwals et al. (2011)	1992-2004	Netherlands	Logit model	As a result of the study, the researchers reported that the increase in the level of education increased the labor force participation rate of women.
Ayvaz-Kızılgöl (2012)	2002-2008	Türkiye	Logit model	According to study findings, education level, age, dependency ratio, residence ownership, and household income are the most important determinants of women's labor force participation.
Gasparini and Marchionni (2015)	1992-2012	18 Latin American Countries	Panel Data Analysis	An increase in education level and a decrease in marriage and fertility have

				been reported to contribute to the increase in female labor force participation.
Kıral and Karlılar (2017)	2017	Türkiye/Adana Province	Logit model	In the study, the researchers determined that age, marital status, education level, total family income, place of residence, and environmental perspective affect female labor force participation.
Özer and Özgenç (2018)	2005-2015	Türkiye/TRA1 Sub-region	Logit model	According to the study's findings, the variables of marital status, education level, age, and year affect the probability of labor force participation of women.
Tunalı and Göksu (2018)	2012	Türkiye	Logit model	Education level, age, marital status, place of residence, and proximity to the head of the household affect the probability of female labor force participation.
Levent et al. (2018)	2017	Türkiye/Van Province	Probit model	Findings from a survey of 400 women have revealed that education, age, and marital status are the most important variables determining female labor force participation.
Klasen vd. (2019)	2000-2014	8 Low and Middle-Income Countries	Probit model	The results have revealed that increasing education levels and decreasing fertility increased the female labor force participation rate. However, in relatively poorer countries, the effect of household income is negative.
Bilik (2020)	2014	Türkiye	Probit model	While the effects of child ownership, age, and household income on female labor force participation are negative, the impact of university graduation has been reported as positive.
Chattopadhyay and Chowdhury (2022)	1993-1994 2004-2005 2011-2012	India	Logit model	The study found that women from higher-income classes were more likely to have higher graduation rates. It has been concluded that this increased the probability of women participating in the labor force. In addition, it has been determined that the probability of

				women's participation in the workforce decreases over time, regardless of income and education.
Lari et al. (2022)	2019-2020	Qatar	Logistic regression	The results reveal several indicators that affect female labor force participation, including education level, marital status, and age.

3. DATA AND METHODOLOGY

This study analyses female labor force participation in the TR22 Sub-region with a logit model, taking into account the variables of age, proximity to the head of household, marital status, education level, and household size. For this purpose, the data of the year 2021 of the TURKSTAT Household Labor Force Survey microdata were used in the study. After the necessary classification and arrangement processes were made, the data of 4527 women between the ages of 15-64 were analyzed. Whether or not women participate in the labor force is the dependent variable in the model. This variable in the Household Labor Force Survey; consists of three categories: employed, unemployed, and not included in the labor force. Since the binary logistic regression model was used as the empirical analysis method in the study, the dependent variable with three categories was made into two categories by combining the employed and the unemployed. Thus, the dependent variable used as labor force participation status in the model consists of two categories not participating in the labor force (0) and participating in the labor force (1). The age variable, which is one of the independent variables of the study, comprises five categories, 15-24, 25-34, 35-44, 45-54, and 55-64, with the 15-24 age range being the reference class. Relationship to the head of household; It consists of eleven categories as himself, his wife, son/daughter, father/mother, brother, father-in-law/mother-in-law, son-in-law/daughter-in-law, grandchild, grandfather/grandmother, other relatives, and unrelated. In the study, categories other than himself, his wife, and his son/daughter were combined into one category. Marital status variable; It consists of four categories: single, married, divorced, and widowed. The single category was determined as a reference. In the Household Labor Force Survey, the variable of educational status consists of six categories those who have not completed a school, primary school, secondary school-vocational secondary school or primary school, public high school, vocational or technical high school, college and above. Primary school, secondary school-vocational secondary school, or primary education categories were combined in the primary or secondary education category. The category of college and above were chosen as the reference class. Household size, which is another independent variable of the model, is a continuous variable. In this study, the binary logit model was estimated, taking into account that the dependent variable is two-state. The choice between the logit and probit models was made by considering the information criteria.

In cases where the dependent variable consists of two alternatives, the linear probability model, the logit model, and the probit model can be used. However, the linear probability model is not preferred due to some hypothetical problems. Logit and probit models are generally used in economic literature. These two models differ only in terms of the cumulative distribution function on which they are based. The probit model is derived from the normal cumulative distribution function, and the logit model is derived from the logistic cumulative distribution function. The probit model has the normal cumulative distribution function, and the logit model has the logistic cumulative distribution function. The binary logit regression model is shown in Equation (1) (Özer, 2004: 75-76).

$$P_i = E(Y_i = 1|X_i) = F(I_i) = F(\beta_0 + \beta_1 X_i) = \frac{1}{1+e^{-I_i}} \qquad (1)$$
$$= \frac{1}{1+e^{-[\beta_0+\beta_1 X_i]}}$$

A non-linear relationship is observed between I, which takes a value between -∞ and +∞, and P, which takes a value between 0 and 1, in terms of coefficients and variables. It is necessary to convert the equation into linear form in such a case. In order to convert equation (1) into linear form, both sides of the equation must be multiplied by $1 + e^{-I_i}$ and divided by P_i, and one should be subtracted. The resulting $e^{-I_i} = \frac{1-P_i}{P_i}$ expression defines the odds ratio. The logit model represented by L_i is obtained by taking the natural logarithm of both sides of this equation. This model, which is linear in terms of coefficients and variables, is given in Equation (2).

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = I_i = \beta_0 + \beta_1 X_i \qquad (2)$$

In the logit model, it is not preferred to interpret the coefficients. Because in this model, the rate of change of the probability according to the independent variable depends on both the relevant coefficient β and the level of the probability at which the change is measured. For this reason, marginal effect values should be calculated to interpret the coefficient. The marginal effect values expressing the unit effect of the independent variable on the dependent variable are calculated through Equation (3) (Özer vd., 2006: 49).

$$\frac{dP_i}{dX_i} = P_i(1 - P_i)\beta_1 \qquad (3)$$

4. EMPIRICAL FINDINGS

Table 2 summarize descriptive statistic of independent variables included in the model. Table 2 shows that 41.31% of the women in the sample participated in the labor force. 26.26% of the women participating in the survey are in the 55-65 age group, and 7.11% are in the 15-24 age group. According to the evaluation made regarding the relationship to the head of the household, 71.28% of women are in the spouse category, while 2.89% are in the other category. It is seen that 78.51% of the women

participating in the survey are married, 54.45% are primary school graduates, and 6.10% have not completed school.

Table 2. Descriptive Statistics

Variables		Frequency	Percent	VIF	1/VIF
Labor force participation status	No	2657	58.69		
	Yes	1870	41.31		
Age	15-24*	322	7.11		
	25-34	748	16.52	3.84	0.260
	35-44	1087	24.01	5.19	0.192
	45-54	1181	26.09	5.74	0.174
	55-65	1189	26.26	6.23	0.160
Relationship to the household head	Household head*	717	15.84		
	Spouse	3227	71.28	3.60	0.277
	Son/Daughter	452	9.98	3.29	0.304
	Other relative	131	2.89	1.32	0.754
Marital status	Single *	454	10.03		
	Married	3554	78.51	7.70	0.129
	Divorced	251	5.54	2.30	0.434
	Widowed	268	5.92	2.92	0.342
Educational status	No school educated	276	6.10	1.37	0.728
	Primary and Secondary school	2465	54.45	2.17	0.460
	High School	557	12.30	1.49	0.671
	Vocational and technical high school	378	8.35	1.38	0.726
	Higher education and above*	851	18.80		
		Mean	**Std. Deviation**		
Household size		3.093	1.206	1.54	0.651

* indicates reference categories.

Variance Inflation Factor (VIF) analysis was performed to determine the multicollinearity problem among the variables before the estimation of the model, and the results are shown in Table 2. A VIF value greater than 10 indicates a harmful collinearity problem among independent variables (Kennedy, 2008: 199). As seen in Table, the VIF values of all independent variables included in the model are less than 10. Therefore, there is no harmful multicollinearity problem among the variables in the model. In addition, some tests were conducted regarding the goodness of fit for the model. Akaike Information Criterion (AIC) value is 1.245, Bayes Information Criteria (BIC) value is -32344.746, the log-likelihood value of the model is -2797.1725, the LR Chi-Square value is 543.90 (prob=0.000), and

Hosmer-Lemeshow Chi-Square value is 10.33 (prob=0.4225) calculated. According to these findings, it can be stated that the fit of the model is good.

Binary logistic regression analysis is conducted to determine the factors affecting the female labor force participation in the TR22 Sub-region, and the analysis results are shown in Table 3. The findings show that women in the 25-34 age range, 35-44 age range, and 45-54 age range are more probability to participate in the labor force compared to the reference category. Women aged 55-65 are less probability to participate in the labor force compared to the reference category. Single women, the reference category, participate more in the labor force than married and widowed women. The probability of participating in the labor force for female who has no school educated, primary school graduates, secondary school graduates, and high school graduates is lower relative to the reference category.

Table 3. Estimation Results of Binary Logit Model

Variables		Coef.	Std. Error	Prob.	Conf. Interval		Odds
Household size		-0.051	0.033	0.124	-0.116	0.014	0.950
Age	25-34	0.360	0.168	0.032	0.031	0.689	1.433
	35-44	0.958	0.170	0.000	0.625	1.290	2.605
	45-54	0.614	0.174	0.000	0.274	0.955	1.849
	55-65	-0.456	0.184	0.013	-0.817	-0.095	0.634
Relationship to the household head	Spouse	-0.261	0.133	0.050	-0.523	-0.000	0.770
	Son/Daughter	-0.006	0.193	0.976	-0.385	0.373	0.994
	Other relative	0.214	0.222	0.336	-0.222	0.650	1.239
Marital status	Married	-0.457	0.216	0.034	-0.880	-0.034	0.633
	Divorced	-0.287	0.211	0.175	-0.701	0.128	0.751
	Widowed	-1.177	0.246	0.000	-1.659	-0.695	0.308
Educational status	No school educated	-1.505	0.175	0.000	-1.848	-1.163	0.222
	Primary and secondary school	-0.742	0.093	0.000	-0.923	-0.560	0.476
	High school	-1.110	0.118	0.000	-1.341	-0.879	0.330
	Vocational and technical high school	-0.851	0.133	0.000	-1.111	-0.590	0.427
Constant		0.754	0.225	0.001	0.314	1.194	2.125

Table 4 presents the marginal effects of independent variables on female labor force participation status. As seen in Table 4, women in the 25-43, 25-44, and 45-54 age categories increase the probability of participating labor force by 8%, 23%, and 14%, respectively. Women in the 55-64 age range are 9% less likely to participate labor force than other age levels. While other variables are constant, married, divorced, and widowed women are 12%, 7%, and 26% less likely to be in the labor

force, respectively. Similarly, the fact that women are primary school graduates reduces the probability of their participation in the labor force by 34%. Women who are secondary or high school graduates reduce their probability of being in the labor force by about 20%.

Table 4. Marginal Effects on Labor Force Participation

Variables		dy/dx	Std. Error	Prob.
Household size		-0.012	0.007	0.124
Age	25-34	0.083	0.375	0.027
	35-44	0.231	0.038	0.000
	45-54	0.145	0.039	0.000
	55-65	-0.091	0.038	0.019
Relationship to the household head	Spouse	-0.632	0.032	0.052
	Son/Daughter	-0.001	0.047	0.976
	Other relative	0.053	0.055	0.337
Marital status	Married	-0.112	0.053	0.036
	Divorced	-0.071	0.052	0.174
	Widowed	-0.267	0.054	0.000
Educational status	No school educated	-0.343	0.033	0.000
	Primary and secondary school	-0.183	0.022	0.000
	High school	-0.266	0.026	0.000
	Vocational and technical high school	-0.208	0.031	0.000

5. CONCLUSION

The aim of this study is to determine the individual factors affecting female labor force participation in TR 22 Sub-region. The reason for choosing this region is to contribute to the regional literature on women's labor force participation. For this purpose, the micro data set of the 2021 TURKSTAT Labor Force Survey has been used for the TR22 Sub-region. The binary logit regression model as the analysis method has been selected in the study.

According to the findings obtained from the model, the effects of age, education status, and marital status variables on female labor force participation are statistically significant, and this finding is consistent with economic expectations. With the evaluation for the age variable, the age range with the highest probability of female labor force participation is reported as 35-44. This result is consistent with the conclusion that age is an important variable, considered work experience. In addition, the probability of women having college graduates participating in the labor force is higher than in the other categories. This finding obtained from the study highlights the importance of education. As a matter of fact, the importance of qualified human capital factor that produces information processes information, and catches up with the speed of technology has increased with globalization. Therefore, changes in

labor market demands have been shaped in this direction. It is generally accepted that qualified human capital will be obtained through education. The result reported for the marital status variable shows that single women are more likely to participate labor force than other categories. This finding can be associated with married women more time spent on unpaid domestic and care work than single women. The results of the 2021 TURKSTAT Family Structure Survey confirm the finding that women generally undertake housework. As a result, the study's findings emphasize that female labor force participation can be increased through education, vocational training, and entrepreneurship. The result obtained from the marital status variable shows the necessity of creating a new perspective on sharing responsibility within the family.

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