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Determinants of women's labour force participation and wages in the agricultural sector: Evidence from Anuradhapura District

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ABSTRACT

The main objectives of the study are to examine how the demographic and socio-economic characteristics influence women's participation in the agricultural sector and how these factors determine the wages in the sector in Anuradhapura district. Cross-sectional data were collected from 3 villages in the Talawa Divisional Secretariat in the district, and from these villages, 175 rural women were selected randomly in 2022. Results of frequency showed that 66% of the women participated in the agricultural sector, and 34% of them did not participate. The Heckman selection model was applied in two stages, and in the first stage, the Probit regression model was used to identify the impact of demographic and socio-economic characteristics on women's labour supply. In the second stage, the ordinary least square method was applied to identify the factors influencing wages in the agriculture sector in the study. Determinants of women's labour supply in the Probit model found to be age, age squared, credit accessibility, opportunity of getting another job, level of education, and other income sources, while the number of children and husband's occupation were found to be insignificant as a determinant of women's labour force participation in the model. Results of the ordinary least square method suggested that education, farm experience, and experience squared were significantly influencing the wage in the agricultural sector in the district.

KEYWORDS: Credit Accessibility, Demographic Characteristics, Heckman Selection Model, Women's Participation.

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INTRODUCTION

The agriculture sector plays a vital role in Sri Lanka, contributing 7.3% to the country's GDP, accounting for 21.8% of total export earnings, and employing 27.3% of the national workforce (Central Bank of Sri Lanka, 2021). According to the Department of Census and Statistics (2022), nearly all secondary employment in the agriculture sector falls within the informal sector, with 97.9% being informal workers. The mean monthly income for wage earners in the agricultural sector is LKR 28,611, while daily wage earners earn an average of LKR 23,081 (Department of Census and Statistics, 2022). Furthermore, the Agricultural Household Survey for 2016–2017 reports that there are a total of 170,323 agricultural households in the Anuradhapura district (Department of Census and Statistics Sri Lanka, 2017). Paddy cultivation is a significant sub-sector of agriculture, with the total paddy production in 2019/2020 reaching 153,207,000 bushels and the highest yield coming from the Anuradhapura district, accounting for 25,418,000 bushels (Census and Statistics Department, 2021).

Given that approximately 82% of all households in Sri Lanka are in rural areas (International Fund for Agriculture Development, 2015), the rural population heavily relies on agricultural activities. The Anuradhapura district, being predominantly rural, sees a high participation of its residents in agriculture-related activities. This region boasts numerous paddy fields, tanks, lakes, and chena (shifting cultivation) areas. The residents engage in various agricultural tasks, including land clearing, tilling, planting, weeding, applying fertilizer or manure, harvesting, food processing, and livestock management. Notably, 51.9% of the employed population in the Anuradhapura district is involved in the agriculture industry group. In terms of gender representation, 51.8% of males and 52.2% of females in the district are engaged in the agriculture sector (Department of Census and Statistics, 2022). This demonstrates the significant contribution of female labour to the agriculture sector in the Anuradhapura district.

Therefore, it is imperative to conduct a study on women's labour force participation and wages in the agriculture sector in the Anuradhapura district. This study, therefore, seeks to shed light on the factors affecting women's participation and wages in the Anuradhapura District's agricultural sector, which plays a crucial role in Sri Lanka's paddy harvest while also filling a notable research gap in the region on this subject. Furthermore, this research addresses an important economic issue and provides valuable insights for government agencies and

other stakeholders interested in formulating policies related to female labour force participation and wages in the agriculture sector.

In this background, there are two research questions that need to be answered, focusing on how demographic and socio-economic characteristics influence the probability of women's participation and how those factors determine the wages in the agricultural sector in Anuradhapura district. Based on these research questions, this study intends to achieve the following two objectives:

- To identify how demographic and socio-economic characteristics influence the probability of women's participation, whether they participated or not in the agricultural sector in Anuradhapura district.
- To analyze how the socio-economic characteristics determine the wages of women in the above study area.

LITERATURE REVIEW

Early theoretical literature relating to women's workforce participation derives from the standard neoclassical model (Blundell and MaCurdy 1999) and focuses on the role of the expected market wage. The theory predicts that an increase in the expected wage, given local market conditions and an individual's human capital, can either increase or decrease the supply of an individual's labour depending on the combined effect of the income and substitution effect. The individual may want to work less because she can enjoy more leisure for the same amount of work (income effect), or she may want to work more because she can earn more with a higher wage (substitution effect). The income effect can also work at the level of the household: the individual may no longer need to work if other household members are working or experience a wage increase.

The U-shaped female participation curve hypothesizes that the agricultural sector is the dominant sector for female and male employment in developing countries, and women are economically active due to the large number of employment opportunities in the agricultural sector, and female labor force participation rates are high. During the process of development, especially at the initial stages of economic development, home-based production patterns change to market-oriented production patterns. Market-oriented activities dominate home-based production; henceforth, the expansion of market-oriented activities or the introduction of new technologies lead to a decrease in female labor force participation. After a certain point, economic development requires more female labor, and demand for female workers will increase. Hence, female labor force participation will increase (Goldin, 1995). For example, women's labour force

participation may be high in agricultural economies where women work on family-owned farms. With industrialization, men find jobs in manufacturing in cities as they are relatively better educated. Their wives withdraw from the labour market to preserve the household's newfound social status and because they cannot get jobs commensurate with that social status given their lower skill endowment. But women's labour force participation rises again as a growing service sector expands white-collar job opportunities, which women, who are now better educated, can take up. Thus, before industrialization, poorly educated women were forced to combine farm work with care work, and better education may not increase labour force participation if the jobs available are not commensurate with the social aspirations fueled by more schooling. However, further education may enable women to get jobs in higher-skilled occupations, which further validate the household's higher social status and make it acceptable for them to work.

In the case of females, age is intricately linked with fertility and childbearing years, making marital status and the ratio of dependent children also influential factors at the individual level that impact the decision to participate in the labour force (Gupta, 2023).

In India, Gupta (2023) focused on examining the factors influencing female labour force participation between 2005 and 2019. The findings derived from probit regression analysis show women's age, educational attainment, marital status, the presence of children, household size, the socioeconomic status of the household, and the type of occupation will impact female labour force participation. In Sri Lankan context, (Siyama & Samaraweera, 2021) examined the factors influencing labour force participation among married women, with a specific focus on ethnicity, using a binary logistic regression model. Using data from the 2018 Sri Lankan Labour Force Survey, the study revealed that ethnicity played a significant role in shaping married women's labour force participation. Sinhalese, Sri Lankan, or Indian Tamil females are more likely to engage in the labour market, whereas married women from the Moor community are less likely to participate due to their strong adherence to traditional and cultural norms. The study also identified other influential factors, including the husband's employment and occupational sector, age of children, family income, the woman's age, residential sector, province, disability, vocational training, and digital literacy. A study conducted by (Amarathunga et al., 2022) used a sample of 387 women based on Mogen's table and employed an explanatory research approach to study determinants of female labour force participation in Sri Lanka. The findings highlighted that educational qualifications, marital status, and access to various income sources significantly influenced female labour force participation in Sri

Lanka. Surprisingly, sector location did not have a substantial impact. These studies provide valuable insights into the complex dynamics of female labour force participation in Sri Lanka, emphasizing the roles of ethnicity, education, marital status, and income sources in shaping women's participation in the labour market.

The study was carried out in Thirappane Veterinary Division (covering four selected villages) in Anuradhapura district. Data were collected by a household survey using a structured questionnaire from 104 households rearing indigenous chickens. The first step of the Heckman two-stage procedure results showed that households' decision to participate in the poultry market was significantly ($p<0.05$) affected by the sex of the household head and religion. The second stage estimation results revealed that the value of poultry sales was significantly ($p<0.05$) affected by the availability of market information, the number of children below 15 years in the household, bicycle ownership, type of breeds owned, and the location of households (village). Further, the results suggest that the establishment of an effective market information service and the identification of high-yielding indigenous chicken breeds will enhance the sales of indigenous chicken farmers (Abeykoon et al., 2013), identifying the factors influencing the participation and sales of indigenous chicken farmers in Sri Lanka's Anuradhapura district. This investigation employed a Heckman two-stage econometric model and gathered data through a structured questionnaire administered to 104 households engaged in indigenous chicken farming. In the first stage of the Heckman procedure, it was observed that the decision of households to engage in the poultry market was significantly influenced by the gender of the household head and their religious affiliation. Subsequently, in the second stage estimation, it was revealed that the value of poultry sales was notably affected by several factors, including the availability of market information, the number of children under 15 years of age within the household, ownership of a bicycle, the types of chicken breeds in possession, and the location of the household. It's noteworthy that this study concentrated solely on chicken farming and did not encompass an investigation into paddy farmers within the Anuradhapura district of Sri Lanka. This district holds substantial significance in the context of paddy cultivation within the country.There is significant literature on married women's labor force participation (Killingsworth and Heckman, 1986; Blundell and MaCardy, 1999), but few works have compared the thirteen European countries in a framework of panel data for eight years. In the global context, several studies were carried out in relation to the determinants of female labour force participation, focusing generally on the agricultural sector.

In the case of Sri Lanka, there is a lack of papers published focusing on married women and their labour force participation in other sectors except in agriculture. Also, most of them done their research to identify the factors influencing the participation of women in the labor force using the Probit regression model, and they did not analyze the determinants of wage for the respondents who participated in the labour force using the Heckman selection model. Consequently, there is a research gap in this context, and the current study tries to fill the gap by applying the Heckman selection model to explore the factors determining the women's labour force participation and their wages in the agricultural sector, particularly in Anuradhapura district in Sri Lanka. Therefore, the review was useful to explain how demographic and socio-economic characteristics influence the decision of labour force participation of women and the wages in the study area.

Sample selection and method of data collection

The primary data was collected through a semi-structured questionnaire in 2022, and the sample survey was carried out in Anuradhapra district, which has 23 administrative divisions. From these divisions, the Talawa DS division was selected, which has 3 villages such as Katiyawa, Mediyawa, and Kadigawa in the district. Over 45,000 hectares of paddy have been cultivated in Anuradhapura district during the Yala season, although it was initially planned to cultivate paddy on 91,500 hectares in the district. (Daily news, May 25, 2022). Since Anuradhapura district is one of the major paddy production areas in the country, it is the rationale for selecting this district to identify the women's participation and their wages in the agricultural sector. A random sample of 175 women in those areas was selected with the primary data including the preferences of women participation in the agricultural sector and other demographic and socio-economic characteristics of the women in the study. Hence, the study focuses on a specific geographical area in the district, which might limit the generalizability of findings to other regions in the district as well as to entire Sri Lanka.

Methods of data analysis

The collected data were analyzed using frequency and independent samples t-tests to describe the basic characteristics of the variables as well as compare the mean differences in selected data across participant and non-participant women in agriculture. To investigate the factors influencing the determinants of women's participation in agriculture and their wages, the Heckman selection model was applied with two steps using Probit Regression in the first stage and Ordinary Least Square (OLS) regression in the second stage.

The Econometric Model: Heckman Selection Model

Selection bias arises in non-random samples when unobserved factors are correlated both with the probability of being selected in the sample and with the explanatory variables. A common identification strategy when selection bias is suspected is to apply the 'heckit model' proposed by James Heckman in 1976, whose seminal work reconceptualized selection bias as a form of omitted variable bias that can be corrected by adding a control to the model that reflects the probability of selection into the sample. It is a technique used to estimate regression models when there is a problem of sample selection bias, also known as selectivity bias. Thus, the Heckman Selection Model is a statistical framework designed to identify, correct, and omit the sample bias in econometric analysis for acquiring empirical research predictions. Also, it is a two-stage estimation method such as a selection equation where the researchers gauge the probability of a variable being selected as a sample and the outcome equation to determine the relation between the variables of interest.

In cases where the data is collected through random sampling, traditional regression methods like least squares work effectively. However, when data is collected using non-random sampling procedures, standard techniques are not suitable. Within the Heckit framework, it is important to note that the dependent variable Y is observable only for a portion of the dataset where the women are involved in agricultural activities, and where the women are not involved in the sector, they have zero wage. For instance, in labour economics, an individual's market wages are observed solely when that individual actively engages in the labour force. This typically occurs when a worker's market wage is higher than their reservation wage, as per economic theory. When studying wages, there is no access to information about the reservation wage, and for those who are not participating in the labour force, we record a zero-market wage. This type of sample is considered censored because it includes information about both labour participants and non-participants, and if the data consider the individuals who are actively participating in the labour market, it becomes limited to this subset. In such cases, it is crucial to consider the data because the censoring is not directly linked to the dependent variable. Instead, it depends on the difference between the market wage and the reservation wage. As a result, the latent variable that influences sample selection shows a correlation with the dependent variable

E (Z_{i^*}, Y_i)0., leading to a situation where applying least squares to this model introduces selectivity bias. A sample resulting from such self-selection may not accurately represent the actual population distribution, regardless of how

extensive the sample is. Nevertheless, it is possible to address self-selection bias if we have a clear understanding of the underlying sampling process and possess pertinent identification criteria.

When dealing with sample selection biases, relying on OLS regression for estimation often results in inconsistent parameter estimates due to the lack of sample representativeness with respect to the population. To achieve the consistent estimation, alternative methods must depend on robust distributional assumptions, and this is precisely where our reviewed model plays a crucial role.

The Heckit Model comprises two econometric equations:

$$Y_i = X_i\beta + \varepsilon_i \qquad i = 1,\ldots,n,\ N > n \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

$$Z_i = W_i\,\mathrm{Y} + \mu_i \qquad i = 1,\ldots,N \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where Z_i^* is a binary latent variable, with$Y_i$only observed when Z_i = 1, the latent variable is not observed, but we do observe the indicator variable. $Z_i = [1\ Z_i * > 0\ 0\ Otherwise\ ]$

$\varepsilon_i\ and\ \mu_i$ are error terms which follow a bivariate normal distribution.

$$[\varepsilon_i\ \mu_i\ ] \quad \sim \left[\sigma^2\ \rho^\sigma\ \ \rho^\sigma\ 1\ \right]$$

Given a scale parameter "σ" and a correlation coefficient "ρ," it's important to note that we have normalized the variance of "μ_i" to 1, as the variance remains unidentifiable within the model.

The first equation is a linear model of interest, generally referred to as the response equation with "Y_i" the main variable of interest. Equation two, on the other hand, is called the selection equation, and it determines whether "Y_i" is observed or not. The sample comprises N observations, but the variable of interest is only observed for n < N of them. The selection equation (Z_i^*) depends on one or more explanatory variables. To obtain consistent estimates, however, rely on the conditional regression equation given as,

$$E\ (\mathrm{Y}_i|Z_i\ *) > 0) = \beta_1 + \beta_2 X_i + \beta\lambda\lambda_i \qquad i = 1,\ldots\ldots,n \qquad \ldots\ldots\ldots\ (3)$$

Where the additional variable lamda (λi) is the inverse mills ratio and it is created from the first step probit estimation of(Z_i^*) in equation (2) and accounts for the fact that the observed sample is not random due to selectivity bias (truncation).

The main idea of the Heckman model is that it seems theoretically rather likely that unobservable or unmeasured factors may affect both the outcome y and the probability of selection z, and these unmeasured factors would be contained in the residuals of both equation (1) and equation (2). Given selection into the main sample, the expected value of the outcome in the main equation is given by regress equation (3), which used the inverse mills ratio (λi) as one of the regressors in the model. In this background, the choice of the Heckman selection model is more appropriate for addressing potential biases than other models. Also, this model was chosen over others due to its suitability for capturing the nuances of women's participation and wages in agriculture sector in the study.

Application of the Heckman Selectivity Model

According to the Heckman procedure, before estimating the wage equation of women, first run a Probit model or the selection model to determine the labour force participation for women in agriculture. Thus, in the first stage, participation or not as a binary dependent variable where 1 for participated, 0 for did not participate, and as explanatory variables, the researchers used age, age squared, availability of credit, possibility of another job, number of children, education, other income sources, and the husband's occupation. The estimated Probit model is given as,

$$P(LFP) = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{ Age squared } + \beta_3 \text{ Availability of credit } + \beta_4 \text{ possibility of other job} + \beta_5 \text{ Number of children} + \beta_6 \text{ Education} + \beta_7 \text{ Other income sources} + \beta_8 \text{ Husband's occupation.}$$

In a Probit regression equation, age squared refers to the variable that has been derived by squaring the age variable. This is done when there is a non-linear relationship between age and the dependent variable. In this case, age squared is included to capture any curvature in the relationship between age and the probability of participation in the labour force. It allows for the possibility that the effect of age on the probability of labour force participation may not be linear but may vary based on the age of the employee.

This indicates that age may have a non-linear relationship with labour force participation, and including age squared helps to capture this relationship. The

coefficient for age squared represents the change in labour force participation for a one-unit change in the square of age, holding all other variables constant.

Thus, the Probit model was used in the first stage of the Heckman model to identify the significant factors influencing women's participation in agriculture. This study considered the above variables to be the main factors in determining the preferences of women's participation in agriculture. Yet, there might be other unexplored variables like cultural factors, land ownership, or family dynamics that could also impact participation that were not considered in the study.

In the second stage of the Heckman selection model, wage is a function of education, farming experience, and the squared term of farming experience. Thus, in the OLS model, wage is the dependent variable, and the above three are the independent variables taken in the model, as given below:

$$Wage = \beta_0 + \beta_1 \text{ Education} + \beta_2 \text{ Farming experience} + \beta_3 \ Squared\ of\ farming\ experience.$$

According to the Mincer earning function, the wage of the workers is determined by the experience and experience squared, where the experience squared explains the non-linear relationship between age and experience. In the beginning, as experience increases, it will lead to earning more income, and after a certain level, even as experience increases, income will not increase further because of the diminishing marginal return of experience on wage. Due to this reason, in the second stage, experience and its squared term are also included in the model.

The following Table 1 describes the variables used in Stage 1 for the determination of women's participation in the agricultural sector in the study.

Table 1: Description of the variables used in stage 1

Stage 1: Participate or not in the agricultural sector

Variables	Unit	Description
Dependent variable		
Participation of women in the agricultural sector	1 for yes, 0 for no	Categorical variable of a woman is whether she participates in the agricultural sector or not.
Independent variables		
Age	Years	Age of the women in years
Age squared	Years	Age squared of the women in years
Availability of credit	1 yes, 0 for no	Categorical variable of a woman is whether she is able to get credit or not.
Possibility of other jobs	1 yes, 0 for no	Categorical variable of a woman is whether she has a possibility to get another job or not.
Number of children	Number	Number of children in the household.
Education	Years	Number of years spent by the women for schooling.
Other income sources	1 for yes, 0 for no	Categorical variable of a woman is whether she is able to earn other income or not.
Occupation the husband	1 for agricultural related, 0 for not	Categorical variable of a husband is whether he is working in an agricultural-related field or not.

Source: Developed by Authors

The following Table 2 describes the variables used in Stage 2 for the determination of wage earns by the women in the study.

Table 2: Description of the variables used in Stage 2

Stage 2: Amount of wage

Variables	**Unit**	**Description**
Dependent variable		
Wage	Rupees	Earnings by the women from the agricultural sector
Independent variables		
Education	Years	Number of years spent by the women for schooling.
Farm experience	Years	Years of farming
Squared of experience	Years	Years of farming

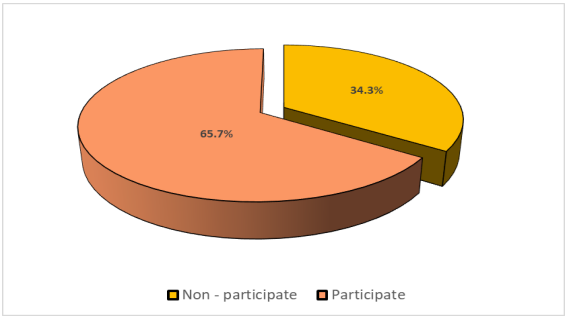
Source: Developed by Authors

Results and Discussions

Frequency analysis

In order to describe the frequency of the women's participation in the agricultural sector who live in the study area, frequency analysis was done, and it is shown by figure 1. It represents that 65.7% of the women engaged in the agricultural sector, while 34.3% of them were not engaged in those agricultural activities in the study. The findings of this analysis revealed that women have a remarkable role in involvement in agriculture in the study area.

Figure 1: Frequency of women's participation in the agricultural sector



Source: Developed by Author

Independent samples t-test

To compare the average differences in selected demographic characteristics such as age, family size, number of children, and education across participants and non-participants in the agricultural sector, they were analyzed using an independent samples t-test. The results from the analysis are depicted in Table 3.

Table 3: Results of independent samples t-test

Variables	Point estimate	Participants (115)		Non-participants (60)		Sig
		Mean	SD	Mean	SD	
Age	0.445	38.80	8.61	35.22	6.83	0.006
Family size	0.451	3.92	1.17	3.45	0.74	0.005
Number of children	0.495	1.87	1.21	1.32	0.89	0.002
Education	-0.801	9.11	2.39	10.98	2.20	0.001

Source: Author's computation from sample survey data, 2022.

The above results revealed that mean values for the above all variables were significant differences across the participants and non-participants of the women in the agricultural sector in the study. According to that, the average age of both participants and non-participants of women in agricultural activities was nearly 38 and 35, respectively, and it is a statistically significant difference at the 1% level. This indicates that relatively older women are more likely to participate in

agriculture than younger women. The value of the point estimate reveals the strength of the differences between two groups in the given variable. According to that, compared to all other demographic variables, education has a highly significant difference between two groups, which represents that the women who spent more years for education are not willing to engage in agriculture than their counterparts.

Results of Heckman Selection Model Two-Step Estimates

Determinants of women's participation in agriculture

The results of the Heckman Two-Stage Selection Econometric Model shown in Table 4 provide the estimates of both the selection or probit equation and the response equation with separate estimations of rho (ρ) and sigma (σ). Both Wald chi^2 (3) = 793.44 and the probability of chi^2 is zero indicate that the estimated model has statistically significance at 1% level demonstrating that the variables used in the model are relevant and explains a significant portion of the variations in the dependent variable.

Further, the Lambda (Inverse Mills ratio—IMR) or selectivity bias correlation factor was a negative value of 64.226, and it is statistically insignificant, implying that there is a selection bias present in the least squares results, thereby validating the use of the Heckman selectivity model for this estimation. This result suggests that there appear to be no unobserved factors that might affect both the probability of women's participation and the wage rate. Since the lambda is not significant, which implies that this selection probability term does not work in an unconditional conditional expectation. Hence, the selection is essentially random, and this term does not deviate from the ordinary least square model, meaning that the results will converge to the ordinary least squares. Moreover, rho is positive with closer to zero, which indicates that unobservable factors are very less but positively correlated with one another. The inverse Mills Ratio (λ) is -2.475 with a p value of 0.101 implying that there is a selection bias present in the least squares results thereby validating the use of the Heckman selectivity model for our estimation.

The above output provides estimates of both the selection or probit equation and the response equation with separate estimations of ρ and σ. Both Wald chi2 (2) = 50.62 and Prob > chi2 = 0.0000 indicates that our model is statistically significant demonstrating that the variables used are relevant and explains a significant portion of the variations in our dependent variable.

Table 4: Results of Heckman's two-stage model and marginal effects

Variables	Coefficients	Standard error	z	P>|z|	Marginal effects
Stage 1: Participation					
Age	.116	0.034	3.33	0.001	….
Age squared	-.0013	. 00055	-2.38	0.017	….
Accessibility to credit	.746	.272	2.74	0.006	….
Other job possibility	-.590	.251	-2.34	0.019	….
Number of children	.234	.140	1.68	0.094	….
Education	-.245	.058	-4.21	0.000	….
Other income sources	.757	.253	2.99	0.003	….
Husband's occupation	-.406	.374	-1.09	0.277	….
Stage 2: Wage					
Education	1545.37	345.09	4.48	0.000	1545.37
Farming experience	2124.06	416.56	5.10	0.000	2124.06
Experience squared	-42.79	16.27	-2.63	0.009	-42.79
Mills					
Lambda	-64.226	3427.527	-0.02	0.985	
rho	0.00816				
Sigma	7867.4043				

Number of observations = 175

Censored observations = 60

Uncensored observations = 115

Wald chi2(3) = 793.44

Probability > chi2 = 0.0000

Source: Author's computation from sample survey data, 2022.

Estimated results of stage 1 confirmed that the participation of women in the agricultural sector is significantly influenced by age, age squared, availability of credit, possibility of other jobs, number of children, education, and other income sources. Among these factors, most of them are statistically significant at the 1% level except the number of children, which is significant at the 10% level in the model. However, the occupation of the husband was insignificant in determining the women's participation in the agricultural sector in the study.

The coefficient of age appears positive and highly significant, indicating that if the age of the women increases by one more year, the probability of participating by women also increases. Older women are more likely to engage in the agricultural sector than young women, and the negative sign of the age squared illustrates that after a certain age, as the women become older, the probability to engage in agricultural activities will decline.

An increase in access to credit would increase the participation of women in agricultural activities. This indicates that access to credit and credit facilities reduces the financial burden of the women and helps them to engage in agricultural activities in the study area. As expected, the probability of women's participation in the agricultural sector was found to be affected negatively by the possibility of other jobs. If the women found any other job opportunities in the rural or city areas, they tried to leave agricultural work and join other non-agricultural-related jobs. The positive effect of the number of children shows that as the number of children increases in the family, the probability for a mother to engage in the agricultural sector also increases, but it is significant at the 10% level. As the number of presence children increases, the cost of living of the household also increases because, to manage the family expenditures, they need to be involved in agricultural activities.

Education is an important factor not only for women's participation in the agricultural sector but also for the number of wages that they are earning. An increase in education by a year reduces the probability of women's participation in agriculture, suggesting that, as women acquire more years of education, there is an increased tendency to participate in agricultural activities. The result suggested that most women perceived agricultural production is not profitable enough or yields fast income as compared to non-agro-based businesses. Therefore, seek out greener pastures (white collar jobs) in the urban area, neglecting farming. This result is also in agreement with the research findings of Akpan et al. (2013), who reported that educated people give less priority to farming because they have a higher chance to find less tedious jobs in the cities

that can earn them a huge sum of income. However, the coefficient of education in the wage equation model has a positive value of 1545/=, which implies that, as the number of years for schooling increases, that will increase the earning capacity by LKR 1545/=. This suggests that acquired knowledge and skills by spending more years for education help them to adopt new techniques and innovations in farming, and thus they are able to earn more income. The coefficient of the existence of other income sources for women was positive and highly significant, indicating that, as the women have other financial supports from income earned by other sources, it will motivate them to invest more in agricultural production activities, and their participation will also increase. It seems that among the monetary variables, accessibility to credit and other income sources played the most important role in women's participation in the agricultural sector. Regarding the other variables describing the husband's occupation status, their impact on women's workforce participation in the agricultural sector did not seem to be significant. It was found that the husband's occupational status had no impact at all in the study.

Determinants of wage of women participation in agriculture

The bottom panel provides the probit coefficients for the selection equation, where it is shown that in the absence of education (coef. 0.104), ceteris paribus, the probability of a married woman participating in the labour force is negative (very slim) considering that all other variables in this model are negatively but significantly related to labor force participation.

The bottom panel provides the OLS coefficients for the wage equation, which show that education, farming experience, and experience squared were tested as influencing the wage of women in the study. Among the tested variables, all of them were statistically significant at the 1% level with expected signs. As in the Probit model, education has a significant impact on the wage equation represented by the OLS model. As the years of schooling for education will lead to an increase in earning capacity, wage earnings from the agricultural sector will also increase. The wages of women increase with the years of farming experience, which represents that one year of additional experience in farming leads to an increase in wages of LKR 2124/-. However, the coefficient of squared term on farming experience has a negative sign, implying that the effect on wages declines as experience accumulates by one more year, which indicates the law of diminishing returns in the production function.

CONCLUSION

This study aimed to explore the factors that determine the preferences of women's participation and the determinants of wages in the agricultural sector in the Anuradhapura district of Sri Lanka. Firstly, the study revealed that approximately 66% of the women actively participate in the agricultural sector in the study area. This underscores that the women have contributed a vital role in engaging in the agricultural sector in the region. The first stage of the Heckman selection model was applied in the beginning to identify the key determinants of women's participation in agriculture. According to that, determinants of women's participation in agriculture have been found to be age, access to credit facilities, the possibility of finding alternative employment, number of children, education level, and other income sources in the model. The analysis provides strong confirmation for the individual characteristics and the family context of the women's decision to participate in agriculture.

Notably, older women were more likely to participate in agriculture than younger women, suggesting the potential benefits of their experience and knowledge of farming activities motivate them to be involved in the sector. Additionally, access to credit was found to be a crucial factor, indicating that providing financial support to women could enhance their involvement in agriculture. Among these determinant factors, education has a negative impact on women's participation in agriculture, implying that the women who have more educational qualifications are less likely to engage in agriculture, and they try to find other jobs.

In stage 2, wages earned by women were taken as a dependent variable, and the estimated ordinary least square results revealed that education was the significant factor in determining women's wages in the agricultural sector. As women obtained more years of education, their earning capacity also increased, emphasizing the importance of educational opportunities for women in rural areas. While the study identifies education as having a negative impact on women's participation, it has positively influenced the wages in agriculture. As the educational knowledge increases, they try to leave the agricultural sector, but the educated women who still engage in the sector have more earning capability due to their application of skills and knowledge they gathered. Furthermore, farming experience had a positive impact on wages, with each additional year of experience leading to higher earnings. However, the law of diminishing returns was observed, as the effect on wages decreased as experience accumulated. Overall findings of the study might limit the generalizability due to constraints such as sample size and the areas covered for the analysis, data collection methods,

and the ignorance of some other variables in determining the participation of women and their wages in the sector. Therefore, identifying these limitations and trying to fill the potential gaps are important, and they could add depth and encourage further investigation in the future.

These findings have significant policy implications in terms of socioeconomics and women's empowerment. Hence, policymakers can use this research to formulate strategies aimed at increasing women's participation in agriculture by focusing on factors such as education, access to credit, and the promotion of agricultural skills and experience. While the conclusion helps policymakers to design the future strategies to develop the agricultural sector, by addressing these determinants it is possible to empower the women in agriculture, improve their economic and societal well-being, gender equality, community development, and finally, contribute to the overall development of the agricultural sector in the study area.

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