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RURAL WOMEN'S ATTITUDE AND INVOLVEMENT IN POST-HARVEST PROCESSING OF VEGETABLES

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ABSTRACT

Traditionally women are mostly engaged in household-based income generating activities. Post-harvest processing of vegetables has recently gained much attention due to its value addition utilities. Therefore, in this study, we tried to understand women farmers' attitudes towards and involvement in, post-harvest processing of vegetables. Data were collected through face-to-face interviews using a pre-tested questionnaire from 212 respondents in Dhaka district of Bangladesh. The data were interpreted with descriptive statistics, multivariate regression analysis and a logit model. About 71% of rural women had a favorable attitude towards post-harvest processing; 43% were involved in the post-harvest processing of vegetables. Women's attitude towards post-harvest processing of vegetables was influenced by age, education, household size, and their frequency of traveling outside of their social system. Their involvement in post-harvest processing of vegetables was affected by education, group membership, media contact and time spent in home management. 'Gender disparity in earnings' was the most severe barrier to expanding women's involvement in vegetable processing, followed by 'lack of land ownership status', 'spouse dominance' and 'social norms and tradition'. Motivating women in income-generating activities and introducing advanced yet low-cost and less-labour-intensive technologies would enable them to participate in the post-harvest processing of vegetables.

Keywords: agriculture, attitude, constraints, gender, logit model

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INTRODUCTION

Vegetables are an essential part of the human diet, considered a good source of vitamins and minerals. After fulfilling local demand, Bangladesh has started exporting vegetables. In the last fiscal year, USD 850 million worth of agricultural produces were exported, out of which USD 164 million was from vegetable exports (Dhaka Tribune, 2021). To expand the global market, the government of Bangladesh has taken initiatives to increase the quantity and quality of vegetables. The quality and shelf-life of vegetables often depend on the quality and technique of post-harvest practices (Masarirambi *et al*., 2010). Post-harvest is the stage that comes immediately after the harvest of produce that includes cooling, cleaning, sorting, grading, processing, and packaging.

With an increasing demand for agricultural production, women's participation in the post-harvest treatment of vegetables has increased (Jannat & Akhter, 2017). A number of studies reported that women, on average, spend 85 to 90 percent of their time on household food processing and preparation across the world (FAO, 2011, p. 16). Males are mostly engaged in more labor-intensive work such as land preparation, seed sowing, and harvesting.

Despite women's participation in field activities (e.g., weeding, irrigation) not uncommon, they are more active in household-based farming activities such as vegetable production. Due to urbanization and industrialization, the numbers of male farmers have gradually decreased, creating a scarcity of labor, particularly for post-harvest care of vegetables (Nazli and Hamid, 2007). Moreover, women are now considered as the agents of change for the global food system. They make up almost half of the world's farmers and their participation in agriculture has been broadened significantly (Word Bank, 2017).

The overarching Knowledge-Attitude-Practice (KAP) model contributes to our understanding regarding the relationship of knowledge and attitude towards behavior. Through knowing one's knowledge or attitude, one can predict other behavior. Although knowledge does not always produce a favourable change in behavior in case individuals hold unfavourable attitudes, many socio-psychological studies reveal that attitude alone is often insufficient to predict actual human behavior (Petrzelka, Korsching and Malia, 2010). Therefore, other related

factors need to be studied in order to understand the underlying mechanism of human behaviour. Understanding women's attitudes and involvement in such activities is important to developing post-harvest practices. Studies regarding women's involvement in agricultural development (Ababakr and Akbay, 2018) and food production (Aneke and Alio, 2018) are common; their involvement in post-harvest processing of vegetables is limited.

The study was undertaken to: i) assess rural women's attitude and level of involvement in post-harvest processing of vegetables, ii) identify factors that affect their attitude and involvement in post-harvest processing, and iii) identify constraints faced by them in involving post-harvest activities with vegetables.

MATERIALS AND METHODS

The study was conducted in 4 villages of Keraniganj upazila (sub-district) under Dhaka district from Bangladesh. Vegetables were grown year-round with other crops. In order to keep the quality and extend shelf life, post-harvest practices received attention among vegetable farmers in the study area.

A multi-stage sampling design was adopted for this study. In the first stage, Dhaka district was purposively selected and one sub-district, namely Keraniganj, was randomly selected in the second stage. Finally, four villages from Keraniganj sub-district were randomly selected as the study area. Keranigani is 15 km away from the capital city Dhaka with a size of 166.87 square kilometers, where population density is around 3614 persons per kilometer. This sub-district has about 11420 hectares of cultivable land, out of which the net cropped year is around 10257 hectares. The literacy rate of this area is 85% which is above the national average. Although this region is not blessed with any natural resources, two major rivers pass through this sub-district. Both rivers bring rich alluvial soil and organic matter, for which the land of this area is very suitable for growing various crops like paddy, jute, and vegetables.

The number of respondents from villages was 530, which constituted the study population. Considering time and other logistic support, forty percent of the population, i.e., 212 respondents, were randomly selected as the study sample. Five percent of respondents were kept in the reserved list, used when a respondent in the original sample list was unavailable during data collection.

Data were collected with face-to-face interviews using a pre-tested structured questionnaire with respondents. The questionnaire had 4 parts: the first comprised of respondents' socio-economic characteristics, the second was designed to capture women's attitudes towards post-harvest processing of vegetables, and the third and fourth parts covered women's level of involvement in post-harvest processing of vegetables and constraints they faced. Socio-economic factors were age, level of education, household size, land size, time spent in home management, group membership, media contact, frequency to travel outside of their social system or community, and annual household income. Women's attitudes were measured using 11 statements regarding post-harvest processing of vegetables. Respondents were requested to state agreement or disagreement with statements on a 5-point scale: strongly agree, agree, no opinion, disagree and strongly disagree, where '1' was assigned of 'strongly disagree,' and '5' was assigned for 'strongly agree' (Kabir *et al*., 2018; Oluwasus and Akann, 2014).

Respondent involvement in post-harvest processing of vegetables was measured using a binary scale (yes/no). The questionnaire contained open and closed-form questions. Open-ended questions were formulated to identify problems faced by women involved in post-harvest processing.

The study considered independent variables and dependent variables. The independent variables were women's socioeconomic factors. The dependent variables were women's attitudes toward post-harvest processing and women's involvement in post-harvest processing. Each socioeconomic factor's contribution to the dependent variables, attitude and involvement, was calculated separately.

Mean, range, frequency and percent were used to explain the socio-economic profiles of women respondents, their attitude and involvement in vegetable processing, and problems in vegetable processing involvement. In order to identify determinants of women's attitudes toward post-harvest processing of vegetables, a linear regression model was applied. The binary logistic regression, logit model, was used for identifying the effects of each explanatory predictor on women's involvement in post-harvest processing of vegetables (Raut *et al*., 2011; Thapa and Rattanasuteerakul, 2011). A one-way ANOVA was computed to see if women who were involved and did not involve were statistically different in terms of their attitude towards post-harvest processing of vegetables. The analysis was done using SPSS (ver. 22, IBM Crop., Armonk, New York).

RESULTS

Age of the respondent ranged from 19 to 65 years, with an average of 39 years. The average family size was five members, and the literacy rate was 64% which is inconsistent with the national figure of 4.4 members and 75%, respectively (BBS, 2020). On average, most women households owned a small farm and spent seven hours per day managing their household activities. Respondents' average media use and social

movement scores were 6 and 7, with a range of 2 to 12 and 3 to 14, respectively. On average, their household income was 167,000 BDT (= USD 2000, 1 USD = 85 Bangladesh Taka) per year, and only 14% of the respondents had membership in various agro-based groups involved in integrated pest management (IPM) club, Common Interest Group (CIG).

Women were categorized based on the mean value of attitude scores. The observed score range was 18-46 against the possible score of 11-55, with a mean value of 31.34. The women were divided into two groups based on the mean value: favourable and unfavourable. Respondents with less than the mean value were grouped as unfavourable and respondents with equal or higher scores than the mean value were classified as favourable attitudes (Oluwasus, and Akann , 2014). The results show that nearly three-fourths (70.85%) of the respondents possessed a favourable attitude towards the post-harvest processing of vegetables. On the other hand, 29.15 percent of the respondents possessed an unfavourable attitude towards post-harvest practices. Aldosari *et al*. (2017) found a similar result where they mentioned that the majority of the female respondents had a favourable attitude towards farming.

In order to assess women's involvement in post-harvest vegetable processing, respondents were asked whether they were involved in post-harvest processing of vegetables or not. Less than half of the women were involved in post-harvest processing of vegetables; more than half were not involved in any post-harvest practices. Despite most respondents possessing a favorable attitude towards post-harvest practices, less than half were involved in such activities. This indicates inconsistency between women's attitude and their behavior regarding post-harvest activities. Maybe the problems that women faced were the reason for their poor involvement in the post-harvest processing of vegetables.

A Variation Inflation Factor (VIF) was used to establish multicollinearity among explanatory variables, which indicates household family income showed a high VIF value (Table 1). The other variables indicate some correlations yet not enough to affect the analysis. A variable with a high VIF value may affect regression and logit models; therefore, household family income was dropped from the model before running the final analysis (Mazumder and Wencong, 2015).

Determinants of women's attitudes towards post-harvest processing varied (Table 2)**Error! Reference source not found.**. Age, educational level, household size, and social movement contributed the most to women's attitudes toward post-harvest processing. Education negatively contributed to women's attitudes, indicating that higher education levels lower respondents' attitudes towards post-harvest processing. Maybe educated women consider other income-generating opportunities more profitable than the post-processing of vegetables. However, all variables jointly explained the variance of women's attitudes indicating a moderate to a good level of strength, of the model (Kabir, *et. al,* 2020). The F value was significant at the 1% level of confidence, indicating the model is statistically fit.

Table 1. Variance inflation factor (VIF) analysis results.

Explanatory variable	Collinearity statistics	
	Tolerance	VIF
Age	0.813	1.31
Educational background	0.961	1.10
Household land size	0.786	2.72
Family size	0.846	3.21
Annual household income	0.882	4.83
Group membership	0.927	0.95
Frequency to travel outside	0.814	1.27
Use of media	0.705	2.86
Time spent in home management	0.831	1.39

A non-significant relationship between women's attitudes and involvement (Table 3) indicates women's attitudes towards post-harvest processing of vegetables were not different from the women group who did not participate in post-harvest processing of vegetables. The finding implies that although women hold a similar attitude, their involvement in the post-harvest processing of vegetables may not only be explained through their attitudes but also by other factors that jointly explain their actual behavior. This finding was found to be consistent with the earlier study done by Petrzelka, Korsching and Malia (2010).

Maximum likelihood estimates (

Table 4) indicate education, group membership, media contact, and time spent in home management were significant predictors of women's involvement in post-harvest processing of vegetables. Educational level and time spent in home management were negative, while group membership and media contact positively contributed to their involvement. The negative coefficient of education and time spent in home management indicates that higher education and doing household work lower the probability of involvement in post-harvest processing of vegetables. The negative influence of women's level of education on their involvement in post-harvest processing of vegetables supports our earlier assumption that educated women might consider other income-generating opportunities more favorable than post-harvest practices. Besides, their higher engagement in family affairs may not allow them to think positively about the post-harvest processing of vegetables. Higher media use and group membership increased the probability of involvement in the post-harvest processing of vegetables. The Chi-square test statistics and -2 log-

likelihood value indicate the data fit well in the model. The Nagelkerke R^2 value indicated the explanatory factors explained less than half of the variation of women's involvement. The model accurately predicted most of the variation in the involvement of the sample women.

Table 2. Determinants of women's attitude towards post-harvest processing of vegetables.

Dependent variable	Explanatory factor	β	*P*
Rural women's attitude towards post-harvest processing of vegetables	Age	0.241	0.41*
	Educational background	-0.432	0.001**
	Land size	0.130	0.180
	Group membership	-0.071	0.431
	Household size	0.224	0.29*
	Frequency to travel outside	0.113	0.34*
	Use of media	0.061	0.456
	Time spent in home management	0.122	0.107
	R^{2a}	0.491	
	F	14.87**	

**, * significant at p≤0.01or p≤0.05

[a]F-value indicates overall model fit and R^2 indicates the variance of women's attitude towards post-harvest processing explained by the selected independent variables.

Table 3. Analysis of variance showing a relationship between women's attitude and involvement in post-harvest processing of vegetables.

Source	Analysis of variance			F	Prob > F
	SS	Df	MS		
Between groups	142.102	1	142.102		
Within groups	14433.459	210	68.730	2.07NS	0.152
Total	14575.561	211	69.078		

NS = Not significant; involvement in post-processing of vegetables was used a dependent variable (categorical) while women's attitude towards post-processing of vegetables was used as independent variable (continuous).

Table 4. Maximum likelihood estimates of the women's involvement model.

Dependent variable	Independent Variable	B	S.E.	Sig.	Exp (B)
Rural women's involvement in post-harvest processing of vegetables	Age	-.112	.797	.471	.790
	Educational level	-.712	.242	.039*	.988
	Land size	.072	1.216	.723	1.149
	Group membership	.812	.316	.046*	2.872
	Household size	.005	.283	.053	1.795
	Frequency to travel outside	-.262	.625	.096	.774
	Use of media	.513	.027	.021*	3.836
	Time spent in home management	-.981	.149	.005**	.883
-2 Log likelihood[a] = 261.12 Negelkarke R^2 = 0.389 Prediction power = 78.7%					

**, * significant at p≤0.01or p≤0.05;

[a]-2 Log likelihood value indicates overall model fit, R^2 indicates the variance of women's involvement in post-harvest processing explained by the selected independent variables and prediction power indicates model accuracy prediction capacity.

Gender disparity in earnings', 'lack of land ownership status', 'spouse dominance, and 'social norms and tradition' were barriers that women faced while being involved in the post-harvest processing of vegetables (Table 5). Among these constraints, cheap labor or wage value for women was the most severe barrier. Women are paid less for their labor in agriculture compared to males. It creates less interest among women in post-harvest processing. In most cases, they did not own or have control over land, which was another barrier to women's involvement in vegetable processing.

Table 5. Severity of problems faced by women involved in post-harvest activities.

Problem	Frequency	Percent	Severity/ Rank order
Gender disparity in earnings	86	81.13	1
Lack of land ownership	79	74.52	2
Spouse dominance	51	48.11	3
Social norms and tradition	44	41.50	4

DISCUSSION

In developing countries, rural women's involvement in post-harvest processing activities can create new avenues for income generation. Age is an important demographic factor that can determine an attitude toward farming. An aged person is generally considered experienced with aspects of life and farming. They might be better able to predict the benefits of post-harvest processing of vegetables. Their attitude towards this was higher than younger respondents. The finding is consistent with studies conducted by Islam *et al*. (2018) who reported that women's experience at home management increases with time. They could better manage family affairs and became more interested in household income generation activities.

Women's attitude was negatively influenced by their level of education, indicating those with higher schooling had unfavorable attitudes towards post-harvest processing of vegetables. There might be two reasons for such findings. Educated women might be more interested in engaging in other income-generating activities than post-harvest processing of vegetables. Alternatively, due to gender disparity, lack of land ownership and spouse dominance, they might develop unfavorable attitudes towards farming in general and post-harvest processing of vegetables in particular. Further verification is needed to test associations between women's level of education and farming practices.

The number of family members in a farm household often plays a role in determining adoption decisions, particularly labor-intensive practices such as organic farming or post-processing (Thapa and Rattanasuteerakul, 2011). A larger family requires generating more income; they would explore various options for income generation. Our study supports similar reasoning that demonstrated a positive, significant influence of farm family size on women's attitude towards post-harvest processing of vegetables.

Women tend to travel outside more and are supposed to get more chances to interact with people from other social systems and update themselves with the latest information, technology and practices. Women who frequently moved, or traveled outside of their social system, could observe a change in farming. They could better identify family needs and choose solutions to address those needs, which drives them to be engaged in income generation activities and value addition of their produce. Our finding is consistent with Alam (2001) and Islam *et al*. (2019a) reported that respondents' tendency to move outside helps them enhance their awareness level that ultimately positively influences attitudes toward improved farming practices.

That more than half of the respondents were not involved in post-harvest processing of vegetables indicates the possibility of greater involvement with post-harvest activities. The logit model indicated that increased media contact and group membership caused more women to be involved in post-harvest activities but decreased with increased educational level and time spent in home management. The negative influence of time spent in home management on women's involvement is likely since women engage more in-home tasks, which means they do not have enough time to concentrate on income-generating activities. Their exposure to post-harvest processing of vegetables decreases with increasing time spent on family affairs.

Group membership and its effect on the choice of post-harvest processing practices of vegetables are consistent with the study of Islam *et al*. (2019b). Some rural respondents engaged with agro-based groups such as the IPM club and Common Interest Group (CIG). During discussions, respondents mentioned the importance of memberships to learn about the production and processing of vegetables. They got to know how to maintain the quality of their harvest from other members of the groups. Despite having the opportunity, women's group participation was few in the study area. Encouraging rural women to participate in agro-based groups may facilitate learning new technology, particularly post-harvest and value addition practices, enhancing income-generation involvement.

Information seeking behavior always has a positive role in farming decision making (Tatlidil *et al*. 2009; Mazvimavi and Twomlow, 2009; Kabir *et al*. 2017). We found similar findings that women's media use positively and significantly influenced the choice of post-harvest processing activities. Women had various sources to know about farming. However, the Sub-assistant Agriculture Officers (SAAOs) who worked at rural level extension for agricultural development were the available source of information for women. Women who were more in contact with SAAOs were more interested in post-harvest vegetable processing than those who had less contact.

Concerning women's involvement in post-harvest processing of vegetables, there existed a variety

of problems, among which the most prominent was 'gender disparity in earnings. Despite being given equal time, women were paid at a lower scale than males. Furthermore, women were given less priority than men in getting institutional financial support (Yisehak, 2008). Low land ownership of women was another detrimental factor for women's participation in post-harvest processing. Women's work outside the home is not consistent with social norms and traditions in Nigeria (Aneke and Alio, 2018). Women's work at the homestead is much appreciated over their outside work. Nonetheless, working at a homestead provides them convenience in controlling family affairs and at the same time engaging in income generation activities.

Conclusion: This study identified a number of predictors of women's involvement in the post-harvest processing of vegetables. However, finding regarding women's attitude is mixed. We found that women did not differ much in attitude irrespective of their nature of involvement in vegetable processing activities. Hence, addressing the question of women's involvement in income-generating activities requires knowing their socio-economic factors along with their psychological issues. Women in Bangladesh are mostly responsible for family care. The study observed women who spent more time at home management did not get much time for income-generating activities like the processing of vegetables. Therefore, providing education and training to women for improving skills in home management might be useful for them to possess a favourable attitude toward post-harvest processing

Encouraging women to participate in various social groups would enable them to overcome their problems and facilitate their learning and motivation to participate in income-generating activities. Using mass media to promote advanced and low-cost vegetable processing techniques could be another strategy that encourages women to be involved in the post-processing of vegetables and contribute to improving their livelihoods.

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