

PARTICIPATION OF RURAL WOMEN IN ORGANIC FARMING

ABSTRACT

The study assessed the participation of rural women in organic farming and to explore the relationship between selected characteristics of the rural women and their extent of participation in organic farming. This investigation was a survey type of research involving descriptive and diagnostic type of research design. The study was conducted at seven unions of Batiaghata Upazila under Khulna district namely Amirpur, Gangarampur, Jalma, Batiaghata, Baliadanga, Bhanderkote and Surkhali. Data were collected from randomly selected 140 respondents during the period of 20th January to 15th February, 2019. Correlation(s) test was used to ascertain the relationships between the concerned independent variables and the dependent variable and simple linear regression was done to determine the effect of the selected five independent variables (agricultural training, knowledge, attitude, practice and problem) on participation. Majority (52.1%) of the women had medium participation followed by high (44.3%) and low (3.6%) participation. Considering broadly selected 7-aspects of organic farming, the rural women's participation was highest in land management while it was lowest in marketing the product. Among 24 issues women were found to be greatly involved in collection of organic product from their own residence while it was least in case of collection of organic product from farm. Agricultural training, knowledge, attitude and practice showed positive significant relationship out of fifteen selected characteristics of rural women and only problem showed negative significant relationship with their participation in organic farming. In case of simple linear regression 7%, 14.44%, 18.85%, 18.96% and 8.69% of the participation can be explained by the variables as agricultural training, knowledge, attitude, practice and problem respectively. It can be concluded that women participation was confined only in small scale crop production and there is a need for further enhancement of the extent of participation of rural women in organic farming.

Key words: Agricultural activities, organic farming, rural women, participation.

1. INTRODUCTION

Organic farming is the production of crops and livestock without the use of synthetic chemicals and inorganic fertilizers. Organic agriculture aims at human welfare without any harm to the environment which is the foundation of human life itself (Hoque, 2012). The US Department of Agriculture defines organic farming as "Organic farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives" (FiBL, 2019). Bangladesh is basically an agricultural country. The economy of Bangladesh is largely dependent on agriculture. Agriculture contributes about 14.74% to country's total GDP (BBS, 2017). In 2018, the growth of GDP of Bangladesh was 7.86%. Rice export contributed a good share to this growth. The Executive Committee of the National Economic Council (ECNEC) reported on March 2019 that, the growth of GDP expanded to 8.13%, and the contribution of agriculture to this growth is also tremendously increasing (<http://www.thedailystar.net>, March 19, 2019). In Bangladesh, the

32 modern agriculture is truly accompanied with traditional organic form of agriculture from the time
33 immemorial where women are typically and functionally contributing from the very beginning. That
34 experience of organic farming can be an option for economically and ecologically sound farming in
35 Bangladesh.

36 The growing participation of women in agriculture has made a big change in our rural economy,
37 making them a big contributor to country's overall economy. 10% rise in women workforce raised
38 Bangladesh's GDP by 1% in 2017. The overall contribution of women workforce in our GDP is 34%; it
39 would take the country forward in attaining higher GDP growth in line with achieving the SDGs by
40 2030 (<http://www.dhakatribune.com>, March 8, 2017). The major SDGs for Bangladesh, such as "end
41 poverty", "end hunger", "gender equality and women empowerment" etc. could be better addressed by
42 ensuring the functional participation of rural women in production activities in both agricultural and
43 non-agricultural sectors (Bangladesh Planning Commission, 2018).

44 Empowerment puts a name to the process of change in women's sense of self-confidence and ability
45 to deal with the world, changes which can be seen on the ground. The empowerment of rural women
46 in organic and sustainable farming sector must take into account the interrelatedness between
47 biodiversity, local and indigenous knowledge. Women are playing a crucial role in the organic food
48 cultivation processes. Sustainable women farmers appear to have had more success in becoming
49 part of and contributing to the development of sustainable farming system. On the farm, women are
50 very important for saving seeds, maintaining biodiversity, production of traditional crops and livestock,
51 which in turn provides healthy and safe food and good nutrition. Food security as a priority for
52 organics may also enabling women's empowerment since they hold, in most cultures, a central role in
53 providing nutrition for the household.

54 Women in our rural area greatly contribute through their household and agricultural work but their
55 work has hardly been recognized by measuring their participation extents in a formal research
56 approach (Biswas et al., 2019, Islam et al., 2018). Considering this fact the researchers persuaded to
57 conduct the present research.

58 In order to proper direction to the research the following specific objectives were formulated:

- 59 i. To determine and describe the personal socioeconomic characteristics of the rural women.
- 60 ii. To determine extent of participation of rural women in organic farming.
- 61 iii. To explore the relationships between selected characteristics of rural women and extent of
62 participation in organic farming practices.
- 63 iv. To identify those inhibiting factors associated with participation.

64 2. METHODOLOGY

65 The study was conducted at seven unions (Amirpur, Gangarampur, Jalma, Batiaghata, Baliadanga,
66 Bhanderkote and Surkhali) of Batiaghata Upazila in Khulna District under which eleven villages were
67 selected for this research which is situated at the convenient distance from Khulna University.
68 Batiaghata Upazila under Khulna District possesses 248.32 sq km of area, bounded by the latitude
69 from 22°34' to 22°46' north latitudes and in between 89°24' to 89°37' east longitudes. This upazila has
70 an average literacy rate of 53.18%, having agriculture (57.45%) as major source of income with
71 51.92% inhabitants residing in rural villages (Banglapedia, 2019). The rural women of the study area
72 who were participating in organic farming were treated as population of this study. The primary data
73 were collected through the use of interview schedule. In total 140 women were selected through
74 Purposive random sampling technique who cultivated crops organically in their homestead area or in
75 farm.

76

77 **Table 1. Sampling plan for the study**

Upazila	Union	Selected village	No. of selected rural women
Batiaghata	Amirpur	Narayankhali	20
	Gangarampur	Debitola	20
		Katialangla	20
	Jalma	Guptomari	20
		Sachibunia	20
	Batiaghata	Hatbati	20
		Kismot fultola	20
	Baliadanga	Birat talbunia	20
		Talbunia	20
	Bhanderkote	Lokkhikhola	20
Surkhali	Surdara	20	
Total			140

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79 Reviewing related studies, the researcher considered 15 personal, socioeconomic and psychological
80 characteristics of rural women as independent variables such as, personal (age, education, family
81 size, farming experience, organic farming experience), economic (annual income, farm size), social
82 (organizational participation, agricultural training, cosmopolitanism, extension contact), psychological
83 (knowledge, attitude, practice and problem related to organic farming) (Table 2) and participation of
84 rural women in organic farming (Table 3) was treated as dependent variable. Seven important broad
85 aspects along with 24- issues (Table 4) were considered for measuring women participation in organic
86 farming. The seven broad aspects were land management, seed management, fertilizer
87 management, intercultural operation, harvesting the product, collecting organic product, marketing the
88 product (Table 4).

89 The researcher converted all qualitative data to quantitative form by means of applying some
90 appropriate scoring technique. A coding plan was developed and code numbers were given to each
91 category of measurements. For determining the extent of participation of rural women in organic
92 farming they were categorized into three groups as low participation (≤ 24), medium participation (25-
93 48) and high participation (> 48). A rating scale was used to determine the extent of participation
94 where 'extreme', 'moderate', 'rarely' and 'not at all' were assigned for 3, 2, 1 and 0 scores
95 respectively. So, the score of the women could range from "0 ($=0 \times 24$) to 72 ($=3 \times 24$)" where score "0"
96 indicating no participation and score "72" indicating highest level of participation of rural women in
97 organic farming. To compare the level of participation in seven major aspects as well as 24 issues
98 participation score (PS) and participation index (PI) for each of the seven major aspects and 24 issues
99 were calculated by using the following formula:

$$100 \quad \text{PS} = (N_1 \times 0) + (N_2 \times 1) + (N_3 \times 2) + (N_4 \times 3)$$

101 Where,

102 PS = Participation Score

103 N_1 = No. of respondents participated not at all

104 N_2 = No. of respondents participated rarely

105 N_3 = No. of respondents participated occasionally

106 N_4 = No. of respondents participated regularly

$$107 \quad \text{Participation score} = \frac{\text{Observed participation score}}{\text{Possible highest participation score}} \times 100$$

108 The score for extent of individual participation in each aspect of organic farming by rural women could
109 be ranged from “0 (=0×60) to 420 (=3×140)” where “0” means no participation and “420” means
110 regular participation. The status of rural women for organizational participation, cosmopolitanism,
111 extension contact, knowledge, attitude, practice and problem faced in organic farming were computed
112 following standard procedures (Sheel et al., 2019; Pervin et al., 2018; Shiduzzaman et al., 2018;
113 Islam et al., 2018 and Biswas et al., 2019).

114 The researcher collected data through face to face interview during the free time of the respondents.
115 Statistical treatments such as range, means, standard deviation, maximum, minimum, rank order, etc.
116 were used to interpret data. Correlation(s) test was used to ascertain the relationships (for ratio data
117 Pearson’s product moment correlation score “*r*” and for ordinal data Spearman’s rank order
118 correlation score “*ρ*” was used) between the concerned independent variables and the dependent
119 variable. Simple linear regression was done to determine the contributing effects of the independent
120 variables on participation. Statistical Package for Social Science (SPSS) version 20.0 was used for
121 data analysis.

122 3. RESULTS AND DISCUSSION

123 RESULTS

124 3.1 Selected characteristics of the rural women

125 Young women (58.6%) were highly involved in organic farming followed by middle aged (29.3%) and
126 old aged women (12.1%). That means young aged women were more motivated towards organic
127 farming than old aged women. Highest proportion (47.1%) of women had secondary level of
128 education while 22.1% women could sign their name only and 18.6% of women had higher secondary
129 level of education. Majority (52.1%) of rural women possessed small size family followed by medium
130 size (36.4%) and large size family (11.4%). Majority of women (58.6%) had low farming experience
131 where 32.1% of farmers had medium farming experience and 9.3% had high farming experience
132 (Table 2)

133 Majority of the rural women (59.3%) had lower experience followed by 32.9% had medium and only
134 7.9% possessed higher experience in organic farming. Highest proportion of the respondents (52.9%)
135 had high income while 25% had low income and only 22.1% had medium income. Majority (85.7%) of
136 women had their revenue source from crop sector and only 14.3% were involved in other income
137 sectors. More than half (57.1%) of the respondents had small farm size and only 0.7% had large farm
138 size. However, 11.4% of the respondents had medium farm size and 27.9% of the respondents had
139 marginal farm size where only 2.9% of the respondents were landless (Table 2).

140 Among 140 of respondents, 42.1% of respondents had no interest towards participation in any
141 organization where 57.9% of the respondents had low participation. Highest proportion of women
142 (58.6%) had no agricultural training followed by 32.9% had low training and 8.6% had medium training
143 opportunity. In case of agricultural training exposure, majority of the women (57.1%) did not get the
144 opportunity to participate in agricultural training program where as more than one-third of the women
145 (36.4%) had training exposure followed by medium (4.3%) and only 2.1% of women had high training
146 exposure. In case of participation in different agricultural training majority (56.25%) of women
147 participated in rice cultivation followed by 47.5% in livestock rearing, 13.5% in fertilizer management,
148 12.5% in fish culture, 8.75% in integrated pest management, 3.75% in water management and 8.75%
149 of women get their training in other sectors (Table 2)

150 Majority (55%) of the rural women had low cosmopolitanism compared to 43.6% and 1.4% having
151 medium and high cosmopolitanism respectively. The highest proportion (47.9%) of the rural women
152 had low extension contact as compared to 25.7% had medium extension contact where there were no

153 women who possessed higher extension contact. Two-third (65%) of the rural women had medium
 154 knowledge on organic farming compared to 25% and 10% having low and high knowledge on organic
 155 farming respectively. The highest proportion (70.7%) of the rural women had highly favorable attitude
 156 towards organic farming compared to 29.3% having moderate attitude. There were no women who
 157 showed low attitude towards organic farming. Above three-fourth of the women (80.7%) belonged to
 158 medium practice categories followed by 15.0% in low practice category and only 4.3% women highly
 159 practice organic techniques (Table 2).

160 The majority of the women belonged to medium problem category classified highest proportion
 161 (85.7%) followed by 8.6% as low problem and (5.7%) as high problem category (Table 2). Weeds
 162 problem, lack of available information, poor research- extension-farmers linkage, lack of training,
 163 inadequate credit support were the major problems faced by organic farmers ranked by **Poddar et al.**
 164 (2017).

165 Participation of rural women in organic farming ranged from 18-69 against the possible range of 0-72,
 166 with a mean of 45.36 and standard deviation of 10.15 (Table 3). Based on categorization above half
 167 of the rural women (52.1%) of the study area had medium participation in organic farming activities
 168 compared to 44.3% and 3.6% having high and low level of participation in organic farming (Table 2).
 169 Data present in Table 3 show that rural women had medium to high participation in organic farming.

170 Organic farming is a traditional system of farming followed by rural women from a long time back.
 171 They choose organic farming as a sustainable source of income, easy method of farming, good and
 172 healthy source of nutrient.

173 **Table 2. Distribution of rural women according to their selected characteristics (N= 140)**

Parameter	Category	Score	Respondents (N=140)		Mean	SD	Min	Max
			Number	Percentage				
Age	Young	≤35	82	58.6	36.76	11.26	17	65
	Middle	36-55	41	29.3				
	Old	>55	17	12.1				
Education (Schooling years)	Illiterate	0	5	3.6	6.20	4.25	00	18
	Sign	0.50	31	22.1				
	Primary	1-5	26	18.6				
	Secondary	6-10	66	47.1				
	HSC	11-12	8	5.7				
	BSc	13-16	2	1.4				
	MSc	>16	2	1.4				
Family size (No. of members)	Small	≤4	73	52.1	5.01	2.22	2	16
	Medium	5-7	51	36.4				
	Large	>7	16	11.4				
Farming experience (Years)	Low	≤10	82	58.6	10.23	7.56	1	35
	Medium	10-20	45	32.1				
	High	>20	13	9.3				
Organic farming experience (Years)	Low	≤10	83	59.3	9.6	6.74	1	32
	Medium	10-20	46	32.9				
	High	>20	11	7.9				
Annual income (BDT)	Low	≤120000	35	25.0	233828 .89	153135 .00	50600	750000
	Medium	120001- 180000	31	22.1				
	High	>180000	74	52.9				

Farm size (ha)	Landless	<0.02	4	2.9				
	Marginal	0.02-0.20	39	27.9				
	Small	0.21-1.0	81	57.9	0.60	1.08	0.01	11.55
	Medium	1.01-3.0	16	11.4				
	Large	>3	0	0				
Organizational Participation (Score)	Low	≤6	81	57.9				
	Medium	7-12	0	0	1.74	0.80	1	4
	High	>12	0	0				
Agricultural training (No. of training)	No	0	82	58.6				
	Low	≤3	46	32.9	1.04	1.42	0	5
	Medium	4-5	12	8.6				
Cosmopolitanism (Score)	Low	≤8	77	55.0				
	Medium	9-16	61	43.6	8.15	3.05	2	17
	High	>16	2	1.4				
Extension contact (Score)	Low	≤11	67	47.9				
	Medium	12-22	36	25.7	9.02	5.31	1	21
	High	>22	0	0				
Knowledge (Score)	Low	<6.5	35	25.0				
	Medium	6.51-13	91	65.0	8.96	3.29	2	17
	High	>13	14	10.0				

174

175 Table 2. *Continued...*

Parameter	Category	Score	Respondents (N=140)		Mean	SD	Min	Max
			Number	Percentage				
Attitude (Score)	Low	≤28	0	0				
	Medium	29-44	41	29.3	47.26	5.51	29	62
	High	>44	99	70.7				
Practice (Score)	Low	≤10	21	15				
	Medium	11-20	113	80.7	14.44	3.62	4	22
	High	>20	6	4.3				
Problem (Score)	Low	≤20	12	8.6				
	Medium	21-40	120	85.7	30.84	7.04	11	47
	High	>40	8	5.7				

176 *SD- Standard deviation, Min.- Minimum, Max.- Maximum

Source: Field survey, 2019

177 Table 3. Participation distribution of rural women based on participation score

Categories	Score	Respondents (N=140)		Mean	SD	Min.	Max.
		Number	Percentage				
Low participation	Up to 24	5	3.6				
Medium participation	25-48	73	52.1	45.36	10.15	18	69
High participation	Above 48	62	44.3				
Total		140	100				

178

Source: Field survey, 2019

179 **3.2 Extent of participation of rural women in selected 7-aspects along with 24-issues**
 180 **under 7-aspects in organic farming**

181 To measure the participation of women in organic farming the activities were arranged in twenty four
 182 issues under seven aspects where participation Score (PS) and Participation Index (PI) were
 183 calculated (Table 4). PI was ranged from 0 to 97.62. According to PI, collection of organic product
 184 from own residence (PI= 97.62), collection of material (Animal manure, agricultural residue,
 185 household garbage) (PI= 97.38) and decomposing of compost (PI= 91.43) were ranked as 1st, 2nd and
 186 3rd respectively and so on.

187 On the other hand, participation Score (PS) of respondents was ranged from 79 to 347. On the basis
 188 of participation score land management (\bar{x} = 347) followed by harvesting the product (\bar{x} = 325),
 189 fertilizer management (\bar{x} = 313.71), intercultural operation (\bar{x} = 259.5), seed management (\bar{x} =
 190 232.75), collecting the product (\bar{x} = 105.25) and marketing the product (\bar{x} = 79) were ranked gradually
 191 from 1st to 7th.

192 Desai (2013) found that women of North Dry Zone of Northern Karnataka preferred to involve in
 193 different part of organic farming activities like seed preservation, transplanting, weeding,
 194 vermicompost preparation, storage etc.

195

196 **Table 4. Relative position (Rank order) of the selected 7-aspects along with 24-issues of rural**
 197 **women in case of participation in organic farming based on participation score (PS) and**
 198 **participation index (PI) (N=140)**

Activities	Degree of participation				PS	PI	Rank (24- issues)	Rank (7- aspects)
	Regularly (3)	Occasionally (2)	Rarely (1)	Not at all (0)				
A. Land Management								
1. Land selection	95×(3)	30×(2)	7×(1)	8×(0)	352	83.81	6 th	
2. Land preparation	87×(3)	37×(2)	7×(1)	9×(0)	342	81.43	9 th	
\bar{X} of A					347			1 st
B. Seed Management								
3. Seed collection	106×(3)	17×(2)	8×(1)	9×(0)	360	85.71	5 th	
4. Seed treatment	2×(3)	1×(2)	4×(1)	133×(0)	12	2.86	21 st	
5. Seed sowing	103×(3)	15×(2)	6×(1)	16×(0)	345	82.14	8 th	
6. Seed preservation	58×(3)	17×(2)	6×(1)	59×(0)	214	50.95	15 th	
\bar{X} of B					232.75			5 th
C. Fertilizer Management								
a. Preparation of fertilizer at home								
7. Collection of material (Animal manure, Agricultural	132×(3)	6×(2)	1×(1)	1×(0)	409	97.38	2 nd	

residue, kitchen garbage)								
8. Decomposing	122×(3)	7×(2)	4×(1)	7×(0)	384	91.43	3 rd	
9. Moistening and turning the compost	107×(3)	11×(2)	8×(1)	14×(0)	351	83.57	7 th	
10. Maintaining the compost	102×(3)	13×(2)	9×(1)	16×(0)	341	81.19	10 th	
11. Harvesting the compost	101×(3)	14×(2)	8×(1)	17×(0)	339	80.71	11 th	
12. Applying the Compost	97×(3)	16×(2)	7×(1)	20×(0)	330	78.57	12 th	
b. Directly purchase the compost	7×(3)	9×(2)	3×(1)	121×(0)	42	10	20 th	
\bar{X} of C					313.71		3 rd	

199

200 Table 4. *Continued...*

Activities	Degree of participation				PS	PI	Rank (24- issues)	Rank (7- aspects)
	Regularly (3)	Occasionally (2)	Rarely (1)	Not at all (0)				
D. Intercultural Operation								
13. Irrigation	120×(3)	9×(2)	4×(1)	7×(0)	382	90.95	4 th	
14. Weeding	91×(3)	20×(2)	9×(1)	20×(0)	322	76.67	13 th	
15. Thinning	59×(3)	24×(2)	9×(1)	48×(0)	234	55.71	14 th	
16. Pest control	16×(3)	18×(2)	16×(1)	90×(0)	100	23.81	17 th	
\bar{X} of D					259.5		4 th	
E. Harvesting the Product								
F. Collecting organic product								
17. Directly from farm	2×(3)	2×(2)	1×(1)	135×(0)	11	2.62	22 th	
18. From own residence	135×(3)	2×(2)	1×(1)	2×(0)	410	97.62	1 st	
19. From other's residence	0×(3)	0×(2)	0×(1)	140×(0)	0	0		
20. From local businessman	0×(3)	0×(2)	0×(1)	140×(0)	0	0		
\bar{X} of F					105.25		6 th	
G. Marketing the Product								
21. Packaging	11×(3)	10×(2)	2×(1)	117×(0)	55	13.09	18 th	
22. Transporting	8×(3)	11×(2)	4×(1)	117×(0)	50	11.90	19 th	
23. Selling the product	14×(3)	42×(2)	6×(1)	78×(0)	132	31.43	16 th	
\bar{X} of G					79		7 th	

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202 **3.3 Relationship between the selected characteristics of rural women and extent of**
 203 **women participation in organic farming**

204 **3.3.1. Correlation coefficient**

205 Coefficient of correlation was computed in order to explore the relationship between the fifteen
 206 selected characteristics of the rural women and their participation in organic agricultural activities. This
 207 correlation has been done by using Spearman's Rank Order Correlation Coefficient (ρ) (for ordinal
 208 type of data) as well as Pearson's Product Moment Correlation Coefficient (r) (for ratio type of data).

209 Among the 15 selected characteristics agricultural training, knowledge, attitude, practice showed a
 210 positive and significant relationship between those variables and participation of rural women in
 211 organic farming. Rana et al. (2017) found significant relationship between agricultural training of
 212 organic farmers and their attitude at 5% level of probability.

213 Only the value of coefficient of correlation ρ (-0.268**) represented a negative and significant
 214 relationship between problem faced by women in organic farming and women participation in organic
 215 farming. This analyzed that participation of women might be declined in organic farming with the
 216 increase of problem.

217 **3.3.2. Regression coefficient**

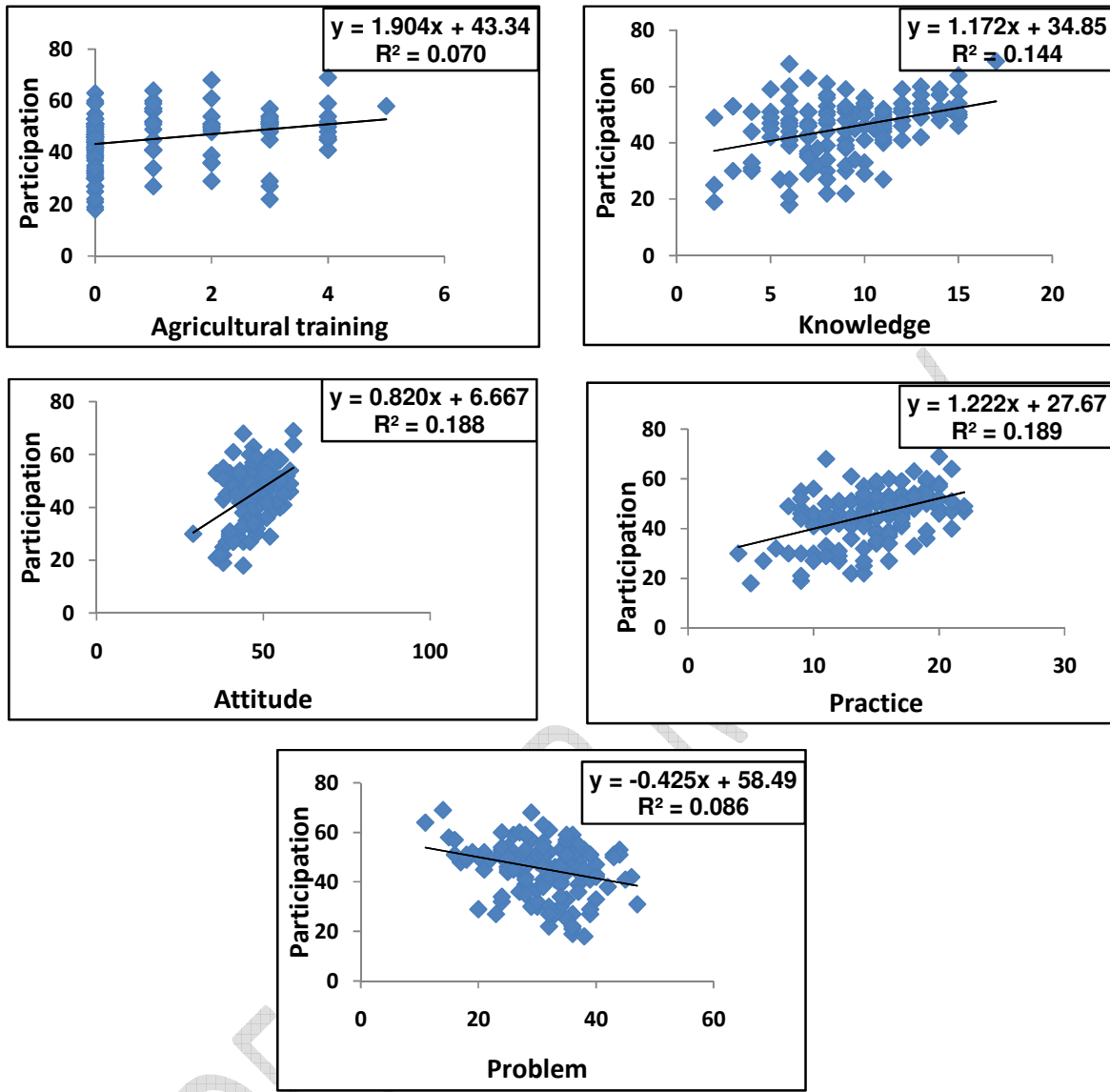
218 Coefficient of **simple linear** regression was computed to predict the contribution **effect** of independent
 219 variables (agricultural training, knowledge, attitude, practice, and problem; **the variables which were**
 220 **significantly correlated with the dependent variable**) on the participation of rural women in organic
 221 farming practices. This result will give an understanding about how the value of dependent variable
 222 changes with the changes of any one in the independent variables when the others are held fixed.

223 In case of simple linear regression the participation of women increased with the increase of
 224 agricultural training, knowledge, attitude, and practice where 7%, 14.44%, 18.85% and 18.96% of the
 225 participation can be explained by the above variables respectively. On the other side women
 226 participation decreased with the increase of problems where participation can be explained by 8.69%
 227 of the problem.

228 **Table 5. Correlation coefficient between the selected characteristics of rural women and extent**
 229 **of women participation in organic farming**

Independent variable (Personal socio-economic characteristics)	Focus variable (Dependent variable)	Computed value	Type of correlation
Age	Participation of rural women in organic farming	-0.068 ^{NS}	
Education		-0.038 ^{NS}	
Family size		-0.063 ^{NS}	
Farming experience		0.022 ^{NS}	
Organic farming experience		-0.011 ^{NS}	<i>r</i>
Annual income		0.053 ^{NS}	
Farm size		0.090 ^{NS}	
Agricultural training		0.264 ^{**}	
Organizational participation		0.084 ^{NS}	
Cosmopolitanism		0.020 ^{NS}	
Extension contact		0.168 ^{NS}	
Knowledge		0.343 ^{**}	ρ
Attitude		0.359 ^{**}	
Practice		0.381 ^{**}	
Problem		-0.268 ^{**}	

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248 **Figure 1 | Simple regression analysis of training, knowledge, attitude, practice and problem on**
249 **participation of rural women in organic farming**

250 **DISCUSSION**

251 The participation of rural women in organic and sustainable farming sector
252 must consider the interrelatedness between biodiversity, local and indigenous
253 knowledge. Women farmers appear to have had more success in becoming a part of and contributing
254 to the development of sustainable farming system. On the farm, women's participation are very
255 important for saving seeds, maintaining biodiversity, production of traditional crops and livestock,
256 which in turn provides healthy and safe food and good nutrition. Food security as a priority for
257 organics may also enabling women's participation since they hold, in most cultures, a central role in
258 providing nutrition for the household. In the site of agriculture their involvement is considerable. Thus,
259 the study was conducted mainly for the investigation towards sustainable agriculture through
260 participation of rural women in organic farming, to get a clear understanding about participation of
261 rural women in organic farming practices. With the rise of organic farming, women saw and embraced
262 an alternate way to participate in agriculture.

263 The environmental concern is identified as the most important factor for organic farmers. Ashari et al.
264 (2016) revealed that environmental concern has positive impact toward farmers' attitude on organic
265 farming. The better attitude; in turn, positively affect for farmers intention to adopt organic farming.
266 Herath and Wijekoon (2013) mentioned that conventional farmers were not motivated to practice
267 organic farming due to its productivity had been low. Conversely, organic growers performed the
268 organic farming mainly due to the marketing assistance and inputs and they also had favorable
269 attitudes towards the environment. Knowledge about organic farming and extension worker contacts
270 greatly influence towards adopting organic farming. Sudheer (2013) confirmed that organic farming is
271 generally more profitable in terms of financial costs and returns than chemical farming in India.
272 Analysis of the farmers perception of organic farming revealed that electronic media (television) is the
273 prime motivator for farmers to adopt organic practices. Farmers believed that organic farming
274 improves soil fertility and their profits in the long run.

275 Desai (2013) conducted a research to find out the role of women in organic farming, assessed and
276 compared the family quality index of organic and conventional farm families in the selected agro-
277 climatic zones of Northern Karnataka. Researchers identified the problems and suggested the
278 requirements of technical knowledge and skills for women involved in organic farming and lastly
279 focused on the need of training program based on felt needs of women in organic farming. The
280 sustainable agricultural sector has been quite successful in creating women-friendly spaces. Women
281 are primarily interested in running small farms and working with family labor. For women in particular,
282 the boundaries between economic and non-economic activities are often fluid, as women seek to
283 combine their roles as a mother and homemaker with community development and with income
284 generation stated by Farnworth and Hutchings (2009). Mazhar et al. (2001) stated that Gram-karmies
285 (women) were the backbone of Nayakrishi in Bangladesh. Nayakrishi has a special emphasis on
286 supporting women through giving incentives. They also suggest the women's to collect seed from
287 local varieties. They were involved in training and campaigning of the farmers about organic farming.

288 Our finding indicates that about two-third (65%) of the rural women had medium knowledge on
289 organic farm activities compared to 25% and 10% had low knowledge and high knowledge on organic
290 farming respectively. Farouque and Sarker (2018) showed in their study that organic farmers had low
291 to medium level of knowledge. But Shiduzzaman et al. (2018) found that farmers possessed medium
292 to high level of knowledge on organic farming. It was observed that rural women had much knowledge
293 about organic farming in spite of having low extension contact and training. It also revealed that the
294 rural women usually gained knowledge on organic farming mostly from their own experience as well
295 as from their husband or parental house. It was remarkable that the rural women of the study area
296 were very conscious about organic farming.

297 In our study, majority of women possessed positive attitude towards organic farming that was about
298 70.7% and 29.3% had medium attitude towards organic farming. In case of low attitude the
299 percentage was zero. Women's are now more concerned about the use of harmful fertilizers and
300 pesticides. But the organic product is still very small because farmers only adopt organic farming in
301 small scale crop production such as growing vegetables in homestead area. Sultana and Muhammad
302 (2018) and Mohan and Helen (2014) showed that majority of the organic farmers had a favorable and
303 highly favorable attitude towards organic farming practices. Organic farming as a sustainable source
304 of income, most of the rural women support this statement as women can able to support her family
305 through growing vegetable using organic compost in their homestead area. This helps to meet their
306 family needs as well as support them economically. Most of the women showed positive attitude in
307 case of organic crop cultivation as it provide human with a good health and nutrition.

308 The present study reveals that 80.7% of the respondents had medium practice, where a quarter
309 (15%) had low practice. However, it is observed that still a small portion (4.3%) of the organic
310 vegetable growing women highly practiced organic farming technologies. This study explores that
311 organic farming has become popular among the rural women. They adopted organic farming as a low

312 cost crop production technique. Poddar et al. (2017) obtained the similar findings. Research
313 conducted by Farouque and Sarker (2018) showed the opposite result as organic farmers follow
314 different organic farming techniques in low to medium category.

315 Data of the present research indicates that above half of the respondents (52.1%) had medium level
316 of participation in organic farming followed by 44.3% had high level of participation and only 3.6% of
317 rural women practiced low. Organic farming is a traditional system of farming followed by women from
318 a long time back. They choose it as a sustainable source of income, easy method of farming, good
319 and healthy source of nutrient. Organic and sustainable farming has the potential to create new
320 structures that actively work towards achieving women's empowerment and protecting the use of
321 indigenous knowledge. The respondents of this study area participate in those organic farming
322 activities to different extent. Women mostly participated in activities like collection of composting
323 material, collection of organic product from own residence, decomposing of compost, irrigation etc.
324 Involvement of women in organic farming actually promotes interdependent and accountable
325 relationships that contribute to the pursuit of women's rights and needs.

326 As majority of rural women were found to practice organic farming in medium to low level so massive
327 arrangement of campaigns by the public extension organization (Department of Agricultural
328 Extension) and the local level NGO's can be helpful to enhance the rate of participation. Lack of credit
329 support and lack of education were the major problem. Concerned authority should ensure available
330 supply of credit to the rural women so that they can invest more money to participate in organic
331 farming programs. At the same time proper arrangement should be made for provide education to the
332 rural women that might be helpful for creating awareness regarding organic farming.

333 A small piece of research having conducted in some specific locations cannot provide all information
334 for proper understanding about actual participation rate of women in organic farming and other related
335 affairs. Following research study should be undertaken for covering more dimensions regarding
336 organic farming. The study was conducted to find out the extent of participation of rural women in
337 organic farming. Further research should be taken to find out the empowerment of rural women
338 through sustainable agricultural system and in other related topics.

339 Organic farming in Bangladesh is only practice by few commercial producers and farmers only
340 practice it for small scale crop cultivation. The findings may prove helpful for field level extension
341 workers and researchers to improve strategies of action to motivate the farmers to adopt organic
342 farming in large scale crop production in Bangladesh. Finally, it is assumed that the recommendation
343 of the study will be helpful to reduce hindrance of organic farming faced by women and to develop
344 policy and standards for organic food product supply throughout the country.

345 4. CONCLUSION

346 Based on the results and its logical interpretation it can be concluded that highest proportion of rural
347 women had low to medium (55.7%) followed by high (44.3%) participation in organic farming. Among
348 7-aspects of participation, the participation was highest in land management ($\bar{X} = 347$) followed by
349 harvesting ($\bar{X} = 325$), fertilizer management ($\bar{X} = 313.71$), intercultural operation ($\bar{X} = 259.5$), seed
350 management ($\bar{X} = 232.75$) and collection of product ($\bar{X} = 105.25$), while it was least in marketing ($\bar{X} =$
351 79). In case of 24-issues under 7-aspects of organic farming, the highest dominant area of
352 participation by the women was collection of product from own residence ($\bar{X} = 97.62$). Agricultural
353 training, knowledge, attitude, practice showed a significant positive relationship with their participation
354 in organic farming.

355 Thus, it might be concluded from the gist of findings mentioned above that, participation of women in
356 organic farming is still not satisfactory and necessary steps concerning extension approach as well as
357 adequate support should be provided to increase the participation by ensuring barrier free
358 participation of rural women in organic farming.

360 **COMPETING INTERESTS**

361 Authors have declared that no competing interests exist.

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