E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 76.37
(GIF) Impact Factor: 0.549
IJFAS 2022; 10(4): 228-233

www.fisheriesjournal.com
Received: 13-05-2022
Accepted: 03-07-2022

Tanwi Dey
Assistant professor, Department of Aquaculture, Faculty of Fisheries, Sylhet Agricultural University, Sylhet, Bangladesh

Piash Kumar Ghosh
Ph.D. Fellow, Department of Medicine, Faculty of Veterinary, Animal and Biomedical science Sylhet Agricultural University, Sylhet, Bangladesh

Corresponding Author:
Tanwi Dey
Assistant Professor, Department of Aquaculture, Faculty of Fisheries, Sylhet Agricultural University, Sylhet, Bangladesh

Gender participation and socio-economic evaluation of on-farm and cottage fish feed industries in Mymensingh district

Tanwi Dey and Piash Kumar Ghosh

DOI: https://doi.org/10.22271/fish.2022.v10.i4c.2717

Abstract
On-farm and cottage fish feed industries of three upazilas- Mymensingh Sadar, Trishal and Muktagacha in Mymensingh district were investigated to understand gender participation ratio, and to evaluate their socio-economic status and working environment. A total of 150 respondents were randomly interviewed where 60% of feed mill owners and workers were middle aged group. Relatively high average wage (9000-10,000 tk/month) found in Mymensingh sadar. However, others factors such as family size, income, socio-economic status etc. found similar among three studied areas. Among the surveyed fish feed industries, 53.33% industries produced feed for their own fish farm and 10% produced feed commercially. Locally available ingredients were used to prepare feed without scientific knowledge. Hundred percent workers claimed unhealthy working environment. A lower number of women participation observed in fish feed industries of studied areas. Therefore, government and non-govt. interference is necessary to encourage and motivate more women participation in aquaculture industries for sustainable economic development.

Keywords: Fish feed industries, gender participation, socio-economic status, working environment

1. Introduction
Asian region contributing 88% to global aquaculture production (FAO, 2022) [11]. Bangladesh endowed with vast inland water bodies and numerous fish species are the main advantages for rapid development of freshwater aquaculture (Ahmed MNU, 2003, DoF, 2017) [1, 7]. A large number of fish could be capture by men, women and children at their doorsteps during the monsoon season. Naturally, men's participation is dominant in almost all the sectors. The share of women in the total economically active population is relatively lower. According BBS report (2022) [4] women participation rate as labour force in Bangladesh is 36.3% whereas 80.5% for men. Although, rural women employment rate is higher than urban areas in Bangladesh (Islam *et al*., 2017, BBS, 2022) [15, 4]. However, there are still a great proportion of women beyond from real economic activities. Besides performing their household responsibilities rural women are contributing 28% of primary aquaculture workforce, 50% accounted in pre and post-harvest value chain activities and 18% in fisheries sector (FAO, 2022) [11, 12]. Rural women are also singularly contributing to seasonal fish drying, processing and many other assorted types of work associated with fisheries. After fulfilling their traditional responsibilities in the household, women can simultaneously be involved in pond fisheries activities. This enables their male counterpart to work elsewhere, and women to supplement the family income.
Due to expansion of aquaculture the dependence of commercial feed is increasing. High price of commercial feed and limited supply during the culture period according to farmers demand, many on-farmed and cottage fish feed mill has been developed in most of the fish culture area all over the country. Some big fish farm owner produce fish feed in their farm according to their demand rather than dependence of commercial diet. Some commercial cottage fish feed industry owner also produce formulated diets for medium or small scale fish farmers according to their requirement by charging a certain amount of milling charge.

Many aquaculture farms with on-farm or cottage feed mill and feed industries were developed in the greater Mymensingh area, with a significant number in Trishal, Mymensing sadar and Muktagacha upazillas. Availability of hatchery-produced fry, favorable recourses and climatic conditions, abundant labor that supports to establish large number of fish farms and different on-farm and cottage feed industries. Both male and female workers are working in theses feed mills. But limited information available on participation rate/ratio of male and female worker in feed mill of these areas, their working environments, their livelihood status and the present status of on-farm and cottage feed industries and major ingredients used to prepare those feeds. Therefore, the present study was conducted to understand the gender participation and socio-economic evaluation of the On-farm and Cottage fish feed Industries in these study area.

2. Materials and Methods

A total of 150 respondents (50 in each upazila) were randomly selected from Mymenshing Sadar (area1), Trishal (area 2) and Muktagacha (area 3) of Mymensingh district. The primary and secondary data were collected. Primary data was collected using a technique of direct interviews in duration of 8 month with feed mill owner, male and female workers. A well-structured and pre-tested questionnaire were used during interview which includes information on the involvement of men and women workers in this field, their socio-economic condition, present status of on farm and cottage fish feed industries, their production procedure and sources of ingredients and its quality etc. Then, collected information were further justified using Paticipatory Rural Appraisal (PRA) techniques (Chambers R, 1992) [6]. The information collected through wider participation of the community is likely to be more accurate and it is the advantage of PRA over other methods (Chamber R, 1992) [6]. Therefore, participation of women and man workers provides an opportunity for cross checking individual opinions as well as allowing the community to discuss the issues that they feel important rather than responding to a questionnaire. Moreover, Focus Group Discussion (FGD) was used to get an overview of existing on-farm and cottage feed mills problems, its social and economic importance etc. FGD were held in front of feed industries or their office room or village shops or under the big trees or workers houses and school premises wherever there was spontaneous gathering. Cross-check interviews were conducted with key informants such as Upazila Fisheries Officers, school teachers, local leaders, experienced fish farmers and NGO workers where information was contradictory. The interviews of respondents were conducted in their offices and/or houses. These data were verified to eliminate all possible errors and inconsistencies. Finally, the data were coded, converted into international units, tabulated and processed for analysis using MS excel Software.

3. Result and Discussion

3.1 Family size, education and social status of gender participated in on-farm and cottage fish feed industries

The family size and age groups of feed mill owners and workers did not differ among the three surveyed upazillas. Feed mill owners were in 20-70 years age group and workers were 15-60 years age group. Based on age, the respondents were classified into three categories. Therefore, 3.33% of feed mill owner were young aged, 60% were middle aged and 36.66% were old aged. Most of the worker in feed mill belongs to young aged group 43.33% followed by 36.66% were middle aged and 20% were old aged (Figure 1). Working in the feed mill is a laborious job therefore the maximum number of workers included in young and in middle aged grouped.

The family size of most of the mill owner and worker was 4 to 10 and 5 to 11 members respectively. The average family size of the mill owner and worker was found to be bigger (5.46 and 6.23 respectively) than the national average of 5.1 members (BBS, 2022) [4] with 52% male and 48% female.

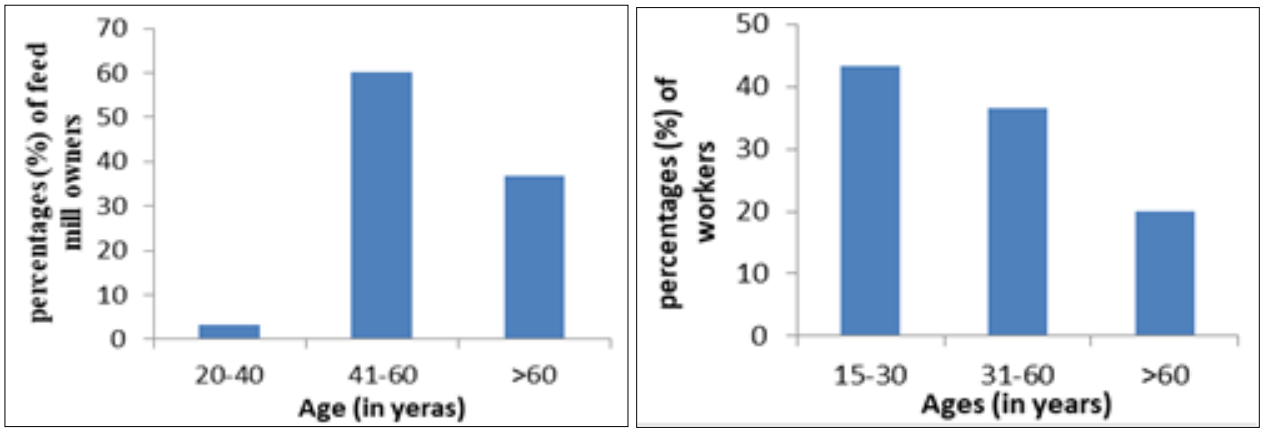

Fig 1: age structure of feed mill owners (left) and workers (right) in surveyed areas

3.2 Income of feed mill owners and workers

The feed mills income mainly depends on fish culture period. Most of the feed mill owner in surveyed areas prepared feed for their own fish farm. Some feed mill owner prepared feed for other farmers taking milling charge (commercial cottage). Milling charge of the surveyed area varied from 2500-3000 taka/ton. Normally each feed mill produced 1.5-2.0 ton feed/day. Scarcity of commercial feed in pick culture period generated urges on farm feed production. However, total annual income of the mill owner depends on the salary of staffs and wage for labour, repair and maintenance cost of the mill etc. Better management with minimum of labour would give maximum net income.

Relatively high average wage rates 9000-10000 taka per month found in Mymensingh sadar upazilla followed by 7000 to 8000 tk in Trishal and Muktagacha upazilla. Average work duration 8-12 hrs per day in the surveyed area. Extra working hours with extra wage observed in the pick culture period of fish.

3.3 Gender participation in on farm and cottage feed industries

3.3.1 Women's participation

Changing conditions of rural livelihood lead to changes in the gender based responsibilities (Bose *et al*., 2009) [5]. The findings of the present study support this statement. Both male and female worker were working together in fish feed industries. Once fish farming was considered as male activities but presently the females also take responsibilities to perform fisheries activities. Normally male do heavier works and female do relatively less laborious work. It was observed that among of heavy works, male perform lifting and carrying of feed ingredient sacks and pouring of ingredients in hollar/pelletizer machine, purchasing of ingredients from the market, mixing of ingredients, operation of pelleting machine, packaging of ingredients during storage etc. Female performs different works as a helping hand along with male such as carrying feed ingredients and feed, sieving of ingredients prior to mixing, mixing of ingredients, drying of ingredients in sun or in electric fan, packaging of prepared feed etc.

Moreover, women's participation in fisheries and aquaculture activities has been increased in last 25 years but still lower compared to male counterpart (Rahman and Naoroze, 2007, Mettei *et al*., 2016, Qudus *et al*., 2018, Rahman *et al*., 2019, FAO, 2021 & 22) [22, 21, 9, 12]. Unlike other fisheries activities in Bangladesh, participation of female worker found lower in surveyed fish feed industries under three upazilas and owner of fish feed mills were all male. This could be explained by women's allocation of time for the labor market, unpaid domestic work and leisure, in terms of their marginal returns from these activities when compared to men. In the context of Bangladesh, the institution of *purdah* and the ''patriarchal contract'' have received particular attention (Amin, 1997, Kabeer N, 1997) [3, 16]. *Purdah*, which in its narrow interpretation concerns the seclusion and veiling of women from the gaze of unrelated males, is better understood as ''the broader set of norms and strictures that set standards of female morality: a definition that goes beyond restrictions on mobility to include codes of conduct for womens economic activities and interactions with men within and outside the household (Amin, 1997) [3].

It has been argued that womens expertise in household activities freeing men in labor market work and hence be the primary breadwinners for the family (Kabeer N, 1997; Malhotra and DeGraff, 1997, Elson, 1999) [16, 17, 8]. Bangladesh society has included a high degree of gender segregation and role differentiation (BBS, 2022) [4]. Despite important contributions of women to agricultural production and expenditure-saving activities, their family maintenance roles are emphasized (Bose *et al*., 2009) [5]. In contrast, men are depicted as providers, protectors and authority holders of the family. Women are dependent on men not only for economic security but also for social status and recognition.

3.3.2 Constrain perceived by women through employment

Very few numbers of women were working as day labour in fish feed industries and no female ownership for on farm and cottage fish feed industries found under the studied areas. During interview respondent mentioned some major problems (Table 1) where family bindings, time limitation due to load of household activities, no source of credits and no land ownership were most common (Gary SB, 1981,1991, Meetei *et al*., 2016, Quddus *et al*., 2018, Rahman *et al*., 2019) [14, 18, 19, 21]. Another common problem was low confidence level on their ability observed among the women in studied areas. However, respondents were more concerned about household works and family bindings but less concerned in finding job. Similar statistical report found by BBS (2022) [4] that women prioritize housekeeping activities rather than economic involvement in Bangladesh. Now a days, cultural and religious taboos are fading from societies due to proper motivation by govt. and non-governmental organization, access to mass education facilities and access to information through social media, television etc. Most of fish feed industries in studied areas were operated traditionally with less technological support that making exhaustive working environment discouraging women participation (Rahman *et al*., 2018, FAO, 2018 & 2021) [20, 10, 9].

Table 1: Major constrains perceived by women and percentages of respondent under the studied areas

Constrains	Respondent percentages (n=40)
Family bindings	90
No source of credits	90
No land ownership	89
Time limitation due to load of household activities	87
Less confident	86
Heavy work in feed industries	84
Lack of women friendly working environment	83
Cultural and religious taboos	70
Limited access to information and technology	71
Limited access to training facilities	68

3.4 History and types of fish feed industries in the surveyed area

With the expansion of aquaculture activities in Bangladesh demand of commercial feed increased. Due to high price and unavailable supply of commercial feeds the demand of on farm and cottage fish feeds industries has developed and some are still developing in surveyed areas. During the PRA study, respo ndents revealed that an innovative, large pangus farm owner initially established this cottage fish feed industries for preparing fish feed for their own farm. Gradually, this type of industries spreaded to medium scale farmer also. After that many pre-established rice millars generally established cottage feed mills by adding pelletizer to their rice mill. Fish farmers use this cottage feed mills to make farm made feed pellet by paying milling charge.

Among the surveyed fish feed industries 53.33% produced feed for their own farm only, 36.66% industries produced feed for their own farm and for others farmer with milling charge and 10% commercially produced fish feed for fish farmers where farmers bought their feed ingredients and the inclusion level of different ingredients varies with farmers choice without scientific knowledge.

3.5 Types and sources of feed ingredients used in surveyed area

In Bangladesh, different types of raw materials are locally available which are used for aquafeed production. Rice bran, Wheat bran, Maize, Mustard oil cake, sesame oil cake and Soybean meal are also sufficiently used in feed formulation in on farm and cottage fish feed industries of the surveyed area. Molasses and flour are used as binders. Feed ingredients of animal origin, like fish meal, dried trash fish and fish processing wastes, Meat and bone meal, Protein concentrate etc. are the commonest (Ganguly *et al*., 2022) [13].

It was observed that the availability and price of agricultural by-products suitable for fish feeds is largely seasonal. Although most are available throughout the year and all over the country, some are much localized. Fish meal, protein concentrate, meat and bone meal and soybean meal are commonly imported from foreign countries. Though the price of those ingredients is relatively higher compared to locally available ingredients but the use of these ingredients even in small amount may improve the nutritional value of the entire feed.

3.6 Types of feeds produced and their cost of production

Generally feed mill owner produced feed according to the cultural species and desire of the fish farmer. Monoculture of Pangas, tilapia and Thai koi were mostly observed in the surveyed area. These feed mills produce feeds of different particle size (1.8 to 5.0 mm diameter) for different age group of fish. Farmers were trying use low cost feed ingredients to reduce the feed cost rather than considering the nutritional quality of prepared feed (Ali *et al*., 2010, Gangualy *et al*., 2022) [2, 13]. The feed which is produced by using locally available & relatively cheap ingredients in these cottages feed mill locally named as '*Luse feed'*. The fish farmer of the surveyed areas uses rice bran, mustard oil cake, maize, meat and bone meal and chewa dryed fish etc. as low cost feed ingredients. The milling charge of most of the cottage fish feed mill were more of less same in the surveyed areas and it ranges between 2500 to 3000 Tk./ton. The average production of these cottage fish feed mill in the surveyed area varies between 1.0 to 3.0 ton/day during the peak period of the culture season.

3.7 Mill type and sources of mill establishment cost

Most of the feed mill owners have their own large to medium size fish farm. So many of the feed mill owners established this type of feed mill for producing the feed for own farm. It was found that in the surveyed area about 28% feed mill owner produced feed for their own farm only, 27% produced feed only for others and 45% produced for their own farm and for others farmers. The establishment cost of this cottage feed mill is about 5 lac taka. The sources of establishing cost were self- finance or loan. About 34% mills were established from self- finance capital, 23% mills established from Loan and 43% mills established from both self-finance and loan was observed (Figure 2).

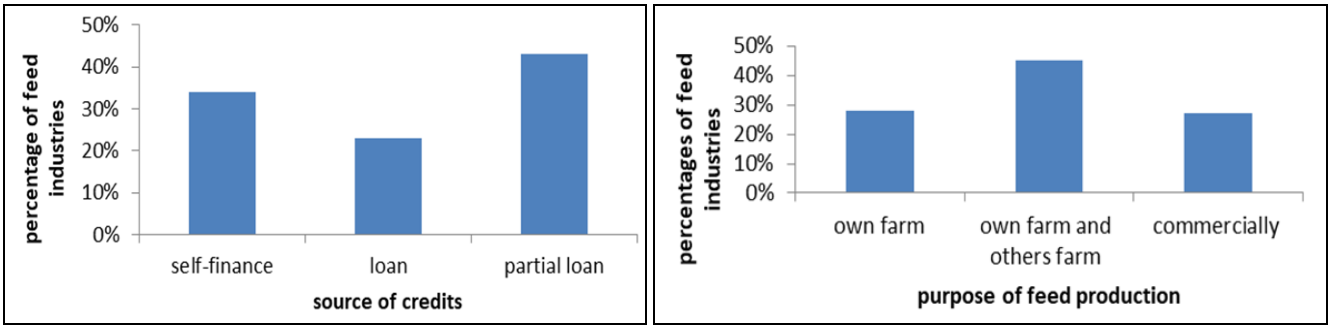

Fig 2: Source of credits for feed mill establishment (left) and purpose of feed production (right) by feed industries under the studied areas

3.8 Working environment in cottage fish feed mills

The environment in feed industry area was polluted mostly by dust and bad smell of dried fish/fish meal, meat and bone meal. Sound pollution due to belt movement was also identified. Due to inadequate aeration and lighting facilities in the mill house also causes poor environmental condition of the feed mills in the surveyed area. Hundred percent workers claimed their working environment as unhealthy environment. In most of the feed mill there were no temporary shed for resting of the worker (Table 2). Workers in feed industries found less privileged, even though their basic safety and health security were not ensured.

Table 2: Environment in feed mill (N = 150). (Total no. of respondents, N = 150)

	Physical environment	Person responded	Percent
1	Unhealthy environment	150	100
2	Moving belt has no protective cover	128	85.33
3	Excessive dusts in the mill house	142	94.66
4	Frequent load shedding	106	70.66
5	Excessive light heats the room	87	58.00
6	Insufficient light	88	58.66
7	No plantation in the mill premise	94	62.66
8	Aeration facility in the mill house inadequate	76	50.66
9	Sound pollution due to belt movement	76	50.66
10	No sanitary latrine	62	41.33
11	No shed for temporary resting	61	40.66
12	Windows kept closed in the mill house	62	41.33
	Socio-economic environment		
1	No society of workers to protect their right	132	88.00

2	No allowances other than salary	85	56.67
3	No loan given workers	67	44.67
4	No salary / wage during leave	150	100
5	No security of job	150	100
6	No insurance for accidents/casualties during work	150	100
7	No financial help for sick worker	42	28.00
8	No bonus for festivals	40	26.67
9	Low salary and wage	140	93.33
10	No advance against salary / wage given to worker	138	92.00
11	No overtime	65	43.33
Health-related environmental			
1	No health checkup facility provided by feed mill	150	100
2	No physician appointed for medical advice to worker	150	100
3	Single driver for continuous driving of huller	124	82.67
4	No protective device for dusts (Use of musk)	137	91.33
5	No shifting duty	48	32..00
6	No sanitation	69	46.00
7	No recreation facilities	120	80.00
8	Excessive workload	142	94.67

4. Conclusion

Aquaculture production has globally increased. In Bangladesh, fish farmers are facing scarcity of commercial feed supply in the market especially in the peak culture period. In this circumstances many big fish farm owner even medium size farm owner are now producing on farm feeds according to their requirement. In past years, fisheries activities was considered masculine but recently capability of women in adopting and implementing aquaculture development technologies is well substantiated, although their full potential has yet to be explored. To ensure sustainability of aquaculture and social development it is imperative to understand women's role in different aspects of aquaculture and society. In the study areas, many women's are involved in on farm feed preparation along with man. But their facilities are not equal to man. This inequality should be overcome for the sustainable development of the country. Moreover, working environment in feed industries of studied three upazilas were not healthy and climate friendly. However, feed production technologies were not in compliance with scientific knowledge. Therefore, training on fish feed formulation could be arranged for fish farmers and feed mill owners to help them acquire scientific knowledge to formulate quality feed with available quality ingredients. Though government has the policy and regulation for women empowerment and labour safety but these are not properly implemented. So government should take proper steps for its effective implementation.

5. References

1. Ahmed MNU. Fisheries sector in Bangladesh: Economy and Development of livelihood. Mothsho Pakkho (Shoronika); c2003, p86.
2. Ali H, Azad MAK, Anisuzzaman M, Chowdhury MMR, Hogue M, Shariful MI. Livelihood status of the fish farmers in some selected areas of Tarakanda upazila of Mymensingh district. Journal of Agroforestry and Environment. 2010;3(2):85-89.
3. Amin Sajeda. The poverty-purdah trap in rural Bangladesh: Implications for women's roles in the family. Development and Change. 1997;28(2):213-233.
4. BBS. Fact and Figures: Men and Women in Bangladesh. Government of the People's Republic of Bangladesh. Bangladesh Bureau of Statistics, Statistics and Informatics Divisin, Ministry of Planning; c2022.
5. Bose ML, Ahmad A, Hossain M. The Role of Gender in Economic Activities with Special Reference to Women's Participation and Empowerment in Rural Bangladesh. Gender, Technology and Development. 2009;13(1):69-102.
6. Chambers R. Rural appraisal: rapid, relaxed and participatory. IDS discussion paper, International Technology Publications, London, UK; c1992.
7. DoF. Yearbook of Fisheries Statistics of Bangladesh 2016-17. Fisheries Resources Survey System (FRSS), Department of Fisheries, Bangladesh; c2017, p 129.
8. Elson D. Labour markets as gendered institutions: equality, efficiency and empowerment issues. World Development. 1999;27(3):611-27.
9. FAO. Empowering women and girls is crucial to ensure sustainable food security in the aftermath of COVID-19, say UN food agency heads ahead of International Women's Day. In: FAO, Rome; c2021. www.fao.org/news/story/en/ item/1379059/icode
10. FAO. The State of World Fisheries and Aquacultur. Meeting the Sustainable Development Goals. FAO, Rome; c2018.
11. FAO. The State of World Fisheries and Aquaculture. Towards Blue Transformation. FAO, Rome; c2022. https://doi.org/10.4060/cc0461en
12. FAOSTAT. Statistical database. Food and Agriculture Organizations of the United Nations, Rome, Italia; c2022.
13. Ganguly S, Drucza K, Esayas B, Bikketi E, Yossa R, McDougall C. Affordable local ingredients for fish feeds in low-income contexts: A social and gender risk and opportunity analysis. Penang, Malaysia: CGIAR Research Program on Fish Agri-Food Systems; Working Paper: FISH-2021-22; c2021.
14. Gary SB. A Treatise on the Family, Harvard University Press; c1981, 1991. ISBN 0-674-90698-5.
15. Islam FMK, Asif AA, Ahmed M, Islam MS, Sarker B, Zafar MA. Performances of resource poor households in aquaculture practices in Sadar Upazila, Meherpur, Bangladesh. International Journal of Fisheries and Aquatic Studies. 2017;5(6):281-288.
16. Kabeer N. Subordination and struggle: Women in Bangladesh. New Left Review. 1988;168(1):95-121.
17. Malhotra A, DeGraff DS. Entry Versus Success in the Labor Force: Young Women's Employment in Sri Lanka. World Development. 1997;25(3):379-394.

18. Meetei WT, Saha B, Pal P. Participation of women in fisheries: a study on gender issues in Manipur, India. International Journal of Bio-resource and Stress Management. 2016;1:7(4):906-14.
19. Quddus A, Jui NZ, Rahman KM, Rahman M. Gender role in pond fish culture in terms of decision making and nutrition security. Bangladesh Journal of Agricultural Economics. 2018;8:(38):454-4211.
20. Rahman KM, Titumir RAM, Nasrin SO. Dimension of Women Labour Force in Bangladesh: Evidence from Nationally Representative Data. The Journal of Social Sciences Research, Academic Research Publishing Group. 2018;4(1):9-15.
21. Rahman MA, Ferdous J, Tasnim Z. Role of women in pond fish farming and fish consumption situation in a selected area of Bangladesh. Archives of Agriculture and Environmental Science. 2019;10;4(2):206-12.
22. Rahman MH, Naoroze K.Women empowerment through participation in aquaculture: experience of a large-scale technology demonstration project in Bangladesh, Journal of Social Science. 2007;3(4):164-171.