Research and Reviews: Journal of Agriculture and Allied Sciences

e-ISSN: 2347-226X
p-ISSN: 2319-9857

Women of Fishing Community: Unsung Women's Role in Foxnut Production

Khushboo Shimran*

Department of Sociology and Social Anthropology, A N Sinha Institute of Social Studies, Patna, Bihar, India

Research Article

Received: 11-Nov-2021, Manuscript No. JAAS-21-47188; **Editor assigned:** 15-Nov-2021, Pre QC No. JAAS-21-47188(PQ); **Reviewed:** 29-Nov-2021, QC No. JAAS-21-47188; **Revised:** 02-Mar-2022, Manuscript No. JAAS-21-47188(R); **Published:** 09-Mar-2022, DOI: 10.4172/2347-226X Stud.10.3.001.

***For Correspondence :** Khushboo Shimran, Department of Sociology and Social Anthropology, A N Sinha Institue of Social Studies, Patna, Bihar, India

E-mail: khushirkv001@gmail.com

Keywords: Fishing community; Women; Foxnuts

ABSTRACT

Foxnut or Makhana (*Euryale ferox*) is one of the important aquatic plants in the northern part of Bihar, and it is grown annually by the traditionally skilled mallah community. Women of this community perform numerous labor-intensive activities such as weeding, collections, cleaning, drying, gradation, roasting, frying, popping, rubbing, storage, transportation during foxnut cultivation and production. They execute continuous work of first frying to second frying of foxnut seeds to pop and thrash to grading with their family members at home. Thus the study was carried out to explore women's involvement in foxnut production and their challenges. The study has been conducted in the north-eastern region and north-western region of the Kosi basin. Two hundred households of fishing communities were selected based on involvement in foxnut production activities. Data were collected from selected households by interviewing women and men at their premises with the help of an interview schedule. Most of the respondents were illiterate. 55.5 percent of women took decisions related to family planning, and 65.5 percent of women decided to give debt to others. 60.5 percent of women were selling fish, and 32 percent of women were working as labor. They had less than five thousand rupees of earnings. Few women were engaged in farming. Above 66 percent of women were engaged in post-harvesting activities. 67.5 percent of women did not know the seed collection process, and 79.5 percent had no awareness of the value addition of foxnut pop into different products.

INTRODUCTION

More than one million fisherfolk belong to the major religious groups of Hindus, Muslims, and Christians. However, cutting across these three major religious groups is a complex social phenomenon known as the caste system. It is, by and large, a source of social identity, particularly in rural India. Coastal communities in India, particularly fishing communities, have

e-ISSN: 2347-226X
p-ISSN: 2319-9857

very low social status as they are considered at the lower echelons of the caste system. Lower castes were untouchables before India's independence in 1947.

According to Mukherjee the jati division of society was viewed in the realm of 'cultural' relations, *viz*. inter-dining, intermarriage, purity-pollution, and such other customary behavior and perception. In British India, the landlords, big landowners, wholesale traders, and moneylenders, who belonged to the higher castes, were overlooked, as was the fact that the bulk of self-sufficient peasants, small-scale artisans, and petty traders belonged to the middle castes in general. Moreover, those at the lowest echelon of the growing colonial-capitalist class structure (such as the marginal peasants, landless workers) belonged overwhelmingly to the lowest castes and the 'Tribes.' This is how the caste structure had invaginated (infiltrated) itself into the class structure that evolved in colonial India"[1].

The Manusmriti assigns the task of killing fish to a particular mixed caste, the Nisada. The caste system plays a important role in determining the livelihood options of the poor, and the way it operates varies throughout the country. In India, there are certain specialized fishing castes. Furthermore, this caste system has strictly confined fishing as a profession to a particular community that is considered very low on the social scale. Bihar mainly has only one fisher community, 'Mallah,' and includes Nishad, which refers to communities whose traditional occupation is near rivers. However, numerous sub-castes within the caste are Kewat, Bind, Nishad, Dhimak, Karabak, Sahan, Beldar, Chai, Tiyar, Khulwat, Godhi, Banpar, Kol. The way fishers are organized also defines women's role in their livelihoods. Women in rural areas across the globe engage in diverse economic approaches to sustain a livelihood for their families.

Foxnut or gorgon nut (*Euryale ferox*) is one of the important aquatic plants of northern Bihar, and it is grown annually. Foxnut is one of the premium dry fruit, and its seed is edible, which look like popcorn. It is mostly grown in a perennial stretch like streams, water holes, lakes, land dispersions, trenches, and marshlands. Most of the artificial and natural-born reservoir of this region is suitable reservoirs for the cultivation of foxnut and fish; it is an important source of employment for fishers. Foxnut has a heavy water requirement being a popular freshwater crop, ponds having at least 2 to 5 feet. Locally it is known as 'Foxnut.' It is mostly grown in stagnant stretches like wetlands, waterholes, ox-bow lake, land dispersion swamps, marshlands, and ditches. However, being an important aquatic plant, it is still neglected, supporting livelihood to the 'mallah' community. It is a highly endangered species as no other genus is available around the world. However, it is a great support to the people who have been doing it for generations for their livelihood, as they master the knowledge of cultivation and processing. Foxnut is an important fruit used in Hindus rituals, and besides these facts, it has not been mentioned in scripture.

It is also distributed in tropical and subtropical regions of South-East Asia and is also known to exist in Japan, Korea, Russia, North America, Nepal, Bangladesh, and some parts of India. In India, the foxnut grower states are Bihar, West Bengal, Manipur Assam, and Jammu and Kashmir. However, for commercialization purposes, it is mainly grown in Bihar. In Bihar, the cultivators grow this cash crop to gain income for poverty alleviation, livelihood security to the economically backward rural areas, and earning foreign exchange. Bihar produces about 90 percent of the foxnut of the country, and according to an official figure, around 25,000 MT of foxnuts are produced every year in Bihar, with an annual turnover of Rs. 300 crores (The New Times Express). Around 85 percent of foxnut cultivation in Bihar is done in Saharsa, Supaul, Kisanganj, Araria, Darbhanga, Madhubani, Purnia and Katihar. Bihar is a state surrounded by the land of the Indian

e-ISSN: 2347-226X
p-ISSN: 2319-9857

subcontinent and has less forest cover, and has various rivers as resources changing their course every year because of Natural Disasters.

Being an important aquatic plant, traditional methods are being used to cultivate foxnut by the mallah community and grown in the pond and other water bodies. In the traditional system of cultivation, it is grown annually. Considering its profitability, the cultivation of foxnut is now being shifted from the pond system to field conditions in these districts. At present, 40-50 percent of the foxnut crop is cultivated in low land rice field conditions, and the rest are traditionally grown in the pond systems. Katihar and adjacent districts are fast emerging as important cropping systems can be a boon for farmers engaged in foxnut cultivating by traditional methods. In the traditional method, it is more labor-intensive, and the health of farmers is also at risk; on the other hand, cultivating it in the paddy field would increase crop intensity and fewer health hazards for farmers. However, this system of foxnut cultivation is not popular among foxnut cultivators as they do not know much about the field cropping system. Furthermore, as foxnut growers are poor farmers, they do not have access to fields or ponds that they can use for cultivation. North Bihar, known for its wetlands and other water bodies where foxnut is cultivated, helps sustain wetlands' sustainable management [2].

The mallah community has acquired proficiency in the techniques of the cultivation and harvesting of foxnuts. People involved in the cultivation of foxnuts are mostly uneducated and migrate to other places after cultivating foxnuts. Usually, male folks are involved in cultivation, harvesting, and women and children are primarily involved in processing. However, nowadays, women started participating in production techniques, *viz*. spraying fertilizers, insecticides, and pesticides and weeding operations in foxnut cultivation (Sodi and Kumar). Women perform numerous labor-intensive activities such as weeding, collections, cleaning, drying, gradation, roasting, frying, popping, rubbing, storage, transportation.

They execute continuous work of first frying to second frying of foxnut seeds to pop and thrash to grading with their family members at home. Children also help in removing the kernels from Foxnut pop. Men collect seeds lying on the ground, washed, and clean. Together with their children, men pick up collected seeds heaped in the bottom, put them in a container, clean seeds, pack, and transport them to the embankment. Then they poured seeds to rub the seed coat. After that, they bring the processed seeds to their hut and keep them overnight. Women with their children spread nuts over the mat for drying. Then, they engage in sieving all the processed seeds for gradation. Women with their family members mostly engaged in frying nuts, thrashing, rubbing, grading, packing, and storage. Men sell foxnut pop to the wholesalers as there is no local trade or market availability. Women of the fishing community enjoy their economic contribution at the household level as they are fetched with additional earnings.

Women also started participating during seed sowing, thinning, gap filling, and pest management. In contrast, women were involved in works like drying foxnut seeds within the household. They were not involved in cultivation as ponds located on the outskirts of the village or some ponds taken on lease are in other villages. The popping of foxnuts is more labor-intensive, and more capital is required. Men and women do this work. It is dried up in the sun, and then it is fried on 'Bhatti or Chulha' (fireplace) where women have to sit for hours to fry it and then from 'Pitna' (wooden hammer), the seed is crushed, and then foxnut pop is processed. Most women have participated during the first frying of nuts, rubbing, and storage.

e-ISSN: 2347-226X
p-ISSN: 2319-9857

Studies on fishing women in foxnut production conducted in India and other countries concluded that women contribute far more to the production than they were generally acknowledged. These women's role in foxnut cultivation gives them a special status shaping their culture and socio-economic development in society. The whole family members are occupied for generations and have acquired unique processing skills, which determine the quality of Foxnut pop. According to Mandal, males, females, and children spent 50 percent, 40 percent, 10 percent of labor respectively in foxnut production. Division of labor is categorized as men occupied cultivating the foxnut crop, including sowing, transplanting, and harvesting guris and processing foxnut, while women are mostly involved in processing.

They were engaged in foxnut seeds (guris) and pop production and trading and as wages laborers. Women play a significant role in foxnut processing and allied field activities, including the main fisheries, crop production, and post-harvest operations. Women's participation in foxnut production varies significantly from region to region. However, regardless of these activities, there is hardly any activity in foxnut production, except planting and seed collection in which fewer women are actively involved. Kumari observed that women have started participating in spraying fertilizers and weeding operations in foxnut cultivation. The study also revealed that the selection and cleaning of ponds or land are carried out by males only, whereas seed sowing, thinning, women and men operate gap filling and pest management. Women cultivate the low land ponds or fields taken on batai and work as wage laborers and also vend fish. The women are pioneers in converting seeds into pop. In general, women and their children are involved in sun drying, size grading, pre-heating and popping, polishing and grading, and packaging [3].

MATERIALS AND METHODS

The study was conducted in two zones of the Kosi river basin in Bihar. The first sub-zone of the Kosi river basin is the north-eastern region, and the second sub-zone is the north-western region of the Kosi basin. For the sample selection, Saharsa and Darbhanga districts from each of the zone were selected. Two blocks were selected based on larger fishing members in Matsya Jivi Sahyog Samiti (Fishermen Co-operative Societies) from each of the selected districts engaged in foxnut cultivation. Hence, four blocks, namely Simri Bakhtiyarpur and Mahisi from Saharsa, Biraul and Alinagar from Darbhanga. Two villages from each block were randomly selected.

The villages selected were Khajuri and Andhari from Simri Bakhtiyarpur, Naharvar and Jhitki from Mahisi, Supaul and Ramnagar village from Biraul, Harsingpur, and Jayantipur from Alinagar block. Twenty-five households of fishing communities from each village were selected based on involvement in foxnut production. Thus, the total sample size is 200 households. Data were collected from selected households by interviewing women and men at their premises with the help of an interview schedule, and then collected data were tabulated and analyzed to draw an inference.

Study area

Saharsa is located in the Kosi region of Bihar. It is situated at 25037'0" to 26032'0" North Latitude and 8600'0" to 86009'0" East Longitude on the alluvial plains of Kosi River. It has a major connection with rail and road links.

e-ISSN: 2347-226X
p-ISSN: 2319-9857

At present it has 10 blocks namely Mahishi, Simri Bakhtiarpur, Salkhua, Nauhatta, Kahara, Satar Kataiya, Patarghat, Saur Bazar, Sonbarsa, Banma Itahri. The rivers flowing through this district are Kosi and Bagmati. Flat alluvial plains surround it with coarse gravels and kankar, silts, clays, and sand due to the Kosi river and its tributary. Medium and fine silts are also carried up to the Salkhua block. Thus, this region is enriched with foxnut production, which is mainly occupied by the fishing community. Their livelihood depends on foxnut cultivation. Simri Bakhtiyar and Mahisi block foxnut-based occupation carried out by the fishing community is higher. Some villages Khajuri, Balhi, Barsam, Andhari, Naharwar, and Jhitki, constitute highly skilled fishing farmers engaged in foxnut cultivation and processing.

Darbhanga is located at the center of 25.53' to 26.27' North Latitude and 85.45' to 86.25' East Longitude. Kosi, Kamla, and Kamla Balan are the main rivers of the district. It has vibrant and fertile soil that supports a variety of vegetation. The district is well connected with roads and rail. Darbhanga is the ancient city of Mithila with North India's cultural region and famous for fish, foxnut, and Betel. It has three sub-divisions namely Darbhanga Sadar, Benipur, and Biraul. There are 18 blocks: Bahadurpur, Jale, Hayaghat, Singhbara, Benipur, Ghanshyampur, Baheri, Kewati, Manigachhi, Darbhanga, Alingar, Biraul, Kushwarasthan, Kushwarasthan East, Gauravauram, Kiratpur, Hanuman Nagar, and Tardih.

The district has four natural divisions in which Biraul lies under the eastern portion that contains fresh silt, large tracts of sandy land covered with wild marsh deposited by the Kosi River due to floods till the construction of the Kosi embankment. This region has much potential for foxnut farming which supports livelihood. Hence, this unique freshwater system seems to be a highly productive area for the livelihood of the fishing community. Biraul and Alinagar are famous for foxnut workers. In this block, some caste of mallah community occupied in foxnut based occupation mainly resides in villages namely Supaul, Ramnagar, Afzalla and Neuri; Harsinghpur, Jaitipur, Jauhatta, Hariyat. They were mainly occupied in foxnut production and migrated for more than six months in another district for foxnut farming and processing [4].

RESULTS AND DISCUSSION

Social characteristics of foxnut farm worker

Age is an important factor which affects needs and priorities of this community. The Figure 1 shows that most women's age group was 31-40 years (57.5%) while the age group of men was 41-50 years (45%) followed by 22 percent women in age group of 20-30 years and 40 percent men in the age group of 31-40 years. Education is an important factor for learning, but the fishing community often faces educational disadvantages because of social and geographical marginalization. This may also be because of mobile and migratory community and engagement in economic activities.

Among total respondents, the greater percentage of women (82%) were illiterate than men (59.5%). 17.5 percent women and 13 percent men were literate. Only men were expressed to have primary education (9.5%). Only 0.5 percent of women had secondary education, while 18 percent of men were secondary educated (Figures 2-5). They were not sufficiently literate to access the government resources and documents and others (Figures 2-5) [5].

e-ISSN: 2347-226X
p-ISSN: 2319-9857

Figure 1. Demographical zone of kosi region, map of bihar showing kosi river (blue) and two districts darbhanga (green) and saharsa (orange).

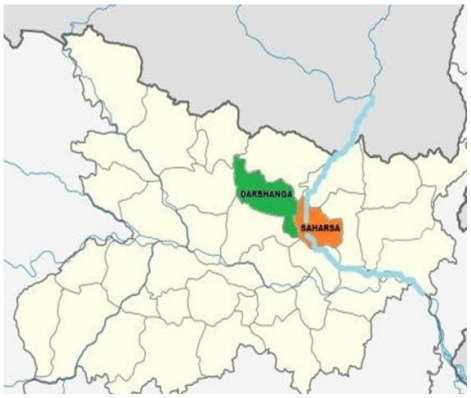
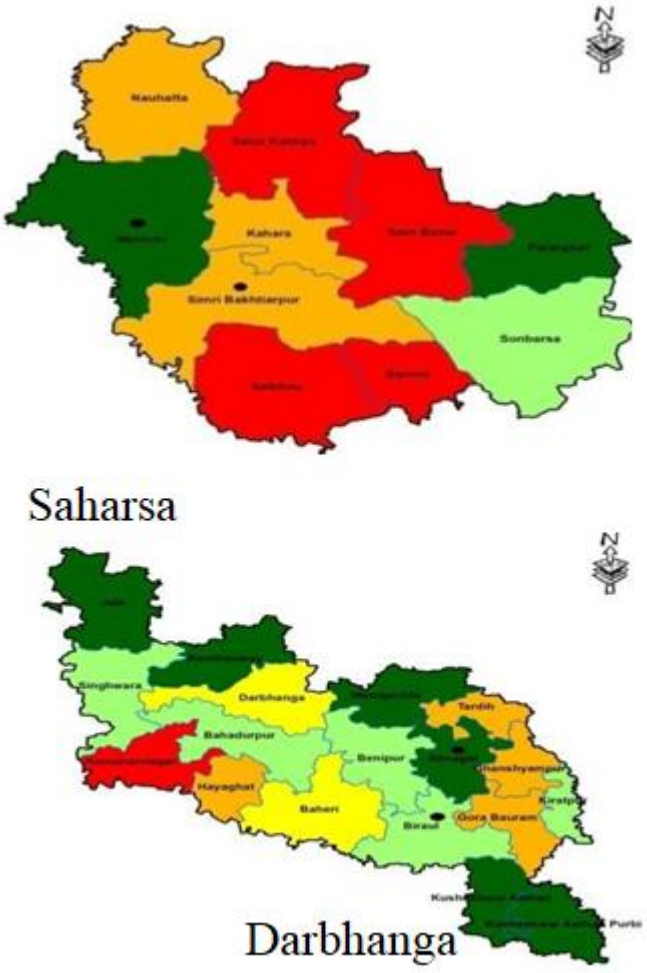


Figure 2. Demographical zone of kosi region map of saharsa (upper panel) and darbhanga (lower panel) districts showing different blocks.



e-ISSN: 2347-226X
p-ISSN: 2319-9857

Figure 3. Demographical zone of kosi region study plan for household selection.

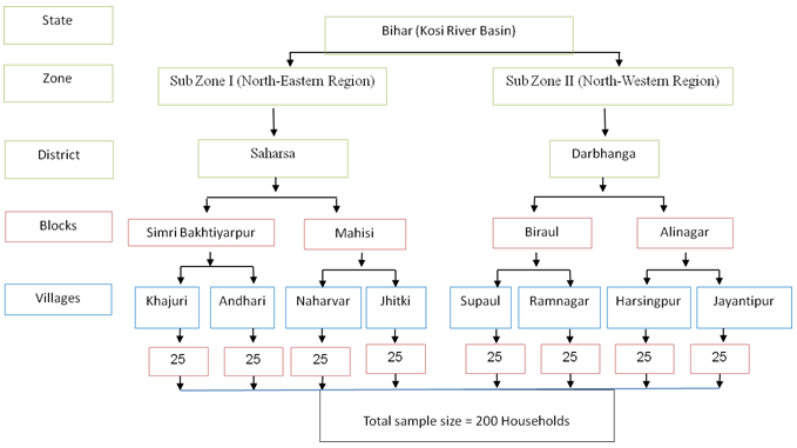
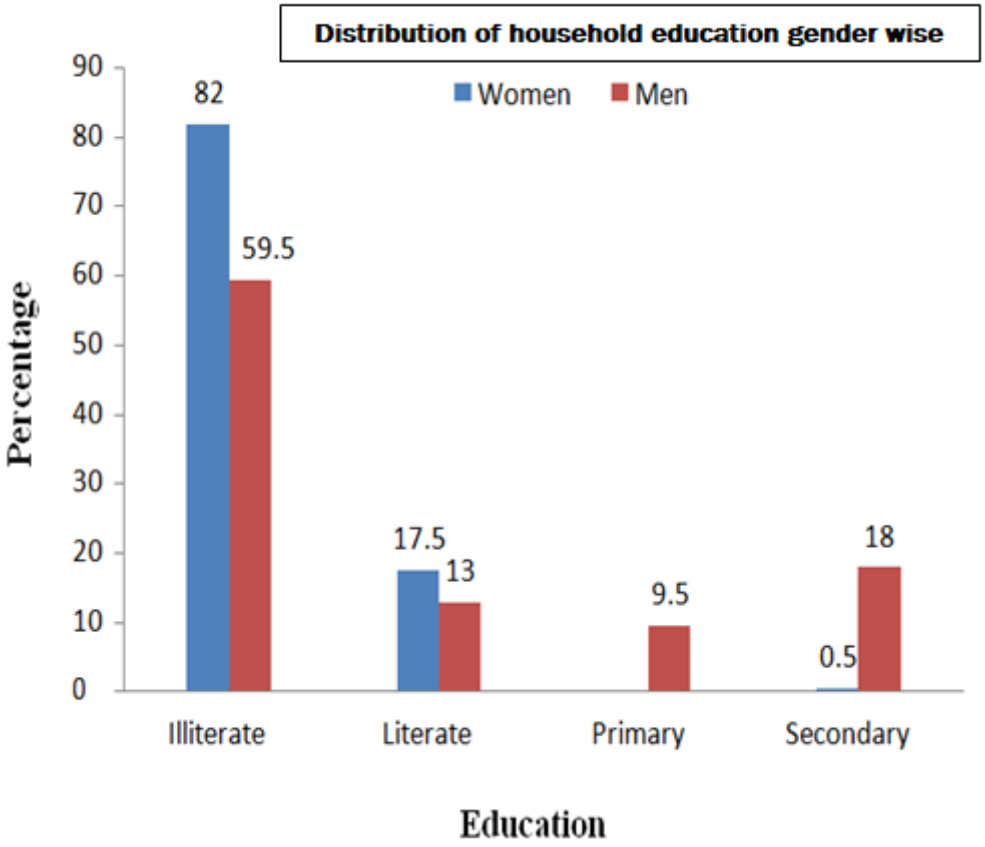


Figure 4. Social characteristics of respondent's household age and gender wise distribution. Note: (■) women and (■) men

e-ISSN: 2347-226X
p-ISSN: 2319-9857

Figure 5. Social characteristics of respondent's household education and gender wise distribution. Note: (■) women and (■) men



Women participate in raising the economic status

Women along with men involvement in economic activities, improve the livelihood status of family. Women have earned income and their sharing of household income improves household nutrition, education and occupation. Women of this community mostly participate in on-farm and off-farm work. Most respondents were engaged in fish business, farming and aquaculture or agricultural labour. Data confirmed that fewer women (60.5%) had fish occupation than men (83.5%). Only 4 percent of respondents were farming fish.

About 32 percent women and 96 percent men reported working as aquaculture or agriculture labourer (Figure 6). Data related to income status indicates that only 7 percent of women were not earning. 93 percent of women respondents had earnings of less than 5000 rupees monthly, whereas only 25 percent of male respondents had less than 5000 rupees. Percentage of men having an income of rupees 5001-10000 and 10001-15000, and above 15000 was 53 percent, 17 percent, and 4.5 percent, respectively (Figure 7). Foxnut farmworker depend on nongovernmental debt or loan pattern.

e-ISSN: 2347-226X
p-ISSN: 2319-9857

Figure 6. Economic status of respondent's household occupation and gender wise distribution. Note: ( ) women and ( ) men

Figure 7. Economic status of respondent's household Income and gender wise distribution. Note: ( ) women and ( ) men

e-ISSN: 2347-226X
p-ISSN: 2319-9857

The fishing community was an ethnically deprived and untouchable community that mainly depended on the aqua farm sector where they faced a financial crisis. They do not have permanent employment opportunities. So they have to depend on debt for their livelihood support. The respondent's household debt pattern shows that only 4 percent of respondents took loans through the government institute. Most respondents took debt from moneylenders, i.e., Mahajan (73.5%), non-government organisations (22.5%) also (Figure 8). All of them reported having debt presently, and some of them took debt for farming (57%), business (31.5%), and health checkups (11.5%) (Figure 9) [6].

Figure 8. Debt or loan pattern of respondent's household debtor.

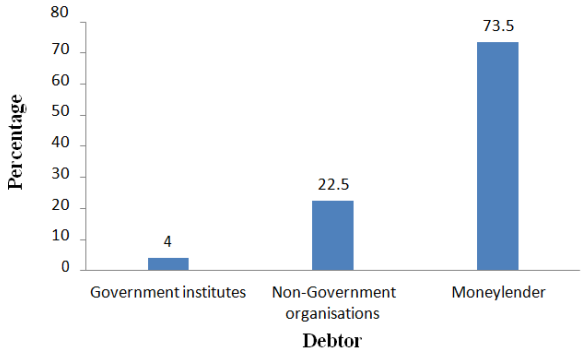
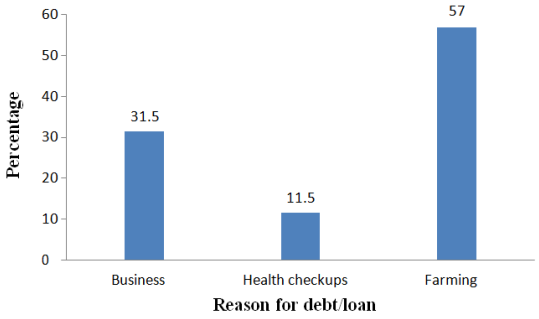


Figure 9. Debt or loan pattern of respondent's household Reason for debt or loan.



Women migrate along with their families during foxnut processing

In this area, fisher community is a migrant farm worker who was absent from their residence to seek employment opportunities in foxnut production and other aquaculture or agriculture work as well as other industries. They were temporarily or seasonally working in farm fields, foxnut processing, and more. Data related to migration indicated that 42 percent of women and 36.5 percent of men migrated to other districts within Bihar, whereas 18 percent of men migrate to other states for income generation (Figure 10).

Migrant farmworkers had their permanent residence in their respective villages. They were moving from one place to another during foxnut farming (February to April) and processing season (August to December) and returning to their home after

e-ISSN: 2347-226X
p-ISSN: 2319-9857

completing their work. The respondents' migration for less than five months was 11 percent and 14.5 percent for women and men, respectively. At the same time, more males migrate for 6-10 months (40%) compared to women (31%) (Figure 11). This was because male migrated for foxnut farming as well as processing while female migrates only during foxnut processing [7].

Figure 10. Migration of respondent's household place of migration and gender wise distribution. Note: (■) women and (■) men

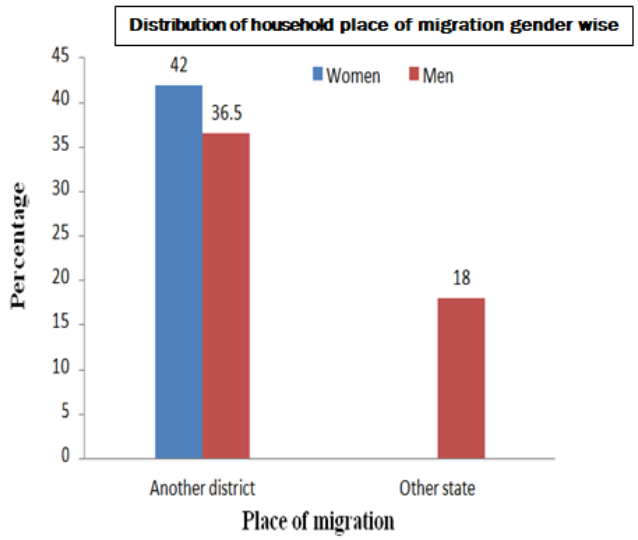
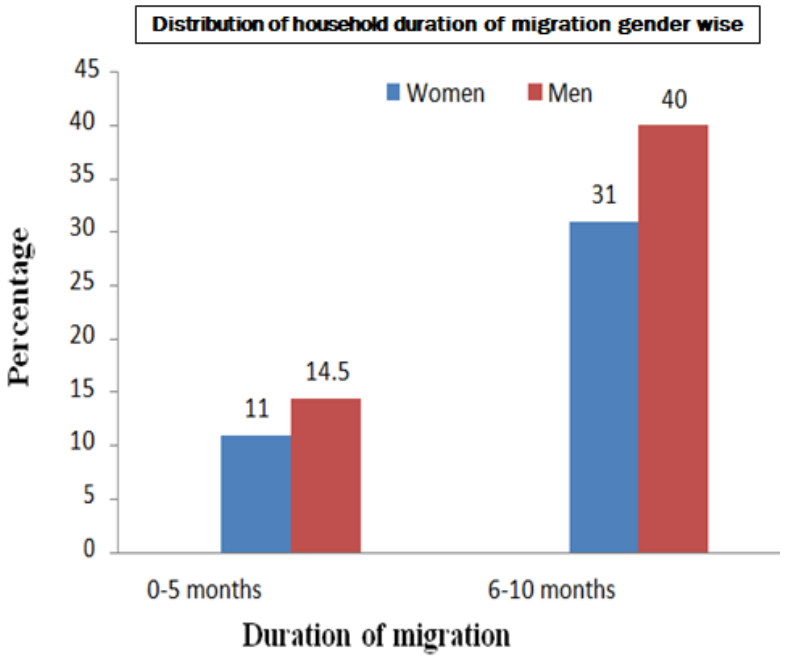


Figure 11. Migration of respondent's household duration of migration and gender wise distribution. Note: (■) women and (■) men



e-ISSN: 2347-226X
p-ISSN: 2319-9857

Participation of women increases in decision making

Women and men living as couples in the family were asked about the decisions makers of the family in their domestic life, economic opportunities, health, and other social activities. They were asked whether the women or men took decision solely or shared by a couple or other family members. Data represents the decision-makers of household in their various social and household activities. Results evidenced that most wives make decisions related to family planning (55.5%) and debt to others (65.5%), followed by all members. The decision of girls marriage (71%), education of children (44.5%), selection of recreation and guest in function (65.5%), investment on relatives (68.5%) and business (71.5%) were taken by majority of both husband and wife jointly, followed by all members. All members took family health (73.5%) and planning of religious activities (63.5%) in most families, followed by both husband and wife. While most husband took the decision for the gift (43.5%), buying household resources (69%) and property (70.5%). However, the decision for girls' marriage and buying property were solely taken by husband while decisions related to children's education were taken by both wife and husband collectively. This shows that changes were taking place and women participation in decision making has increased (Table 1).

Table 1. Decision-makers in respondents' household (in percentage).

Indicators	Total (n=200)			
	Wife	Husband	Both	All members
Family planning	55.5		13	31.5
Marriage (girls)		8	71	21
Education of child	12	12	44.5	31.5
Family health	10	7.5	9	73.5
Gift for social work	6.5	43.5	33.5	16.5
Planning of religious activities	15	11	10.5	63.5
Selection of recreation and guest in function	6	5	65.5	23.5
Debt to others	65.5	11	14	19.5
Investment on relatives	14	7	68.5	10.5
Buying household resources	8	69	11.5	11.5
Buying property		70.5	13	16.5
Business		10.5	71.5	18

Women involvement in foxnut production activities

Foxnut is cultivated by fishing community. They were adopted pond-based and field-based foxnut cultivation technology which requires stagnant water. Foxnut cultivation elaborate specifically on the selection of land or pond, cleaning of land or pond, sowing seeds, thinning, transplanting, fertilizer use, irrigation, weed control, and pest control. The study finds out the participation of women and men in foxnut farming activities. Data in the Table 2 clarified that most women were never (86.5%), whereas men were always (44.5%) involved in selecting land or pond. In other operations majority of respondents never involved in cleaning of land or pond (Women-57.5%, Men-42%), sowing of seeds (Women-55%, Men-5%), thinning (Women-58.5%, Men-47%), transplanting (Women-70.5%, Men-47%), use of fertilizer (Women-73%, Men-59.5%), irrigation

e-ISSN: 2347-226X
p-ISSN: 2319-9857

(Women-84%, Men-63%), weed control (Women-81%, Men-64.5%), and pest control (Women-87%, Men-63.5%).

Further, some women were sometimes and always engaged in different farm operations of foxnut production. Data shows that the highest percentages of women were sometimes engaged in spraying fertilizers (23.5%), followed by sowing and thinning (22%). Women's always involvement was highest in the cleaning of land or pond (23.5%) followed by sowing (23%), thinning (19.5%), transplanting (17%). Further foxnut cultivation activities include harvesting and post-harvesting activities. Foxnut seeds are collected from bottom or floor of water body with necessary equipment through sweeping by skilled fishers. While in post-harvesting activities, both women and men were involved. It is clear from Table 3 that women were not involved in harvesting while 53 percent of men always occupied. They collected seeds from the bottom of water body and cultivated areas with their traditional equipments. Majorly 47.5 percent women and 44.5 percent men of total respondents sometimes participated in cleaning and storage, followed by always occupied 28.5 percent and 35.5 percent respectively. Women were always occupied in drying (54%) while comparatively less men (36.5%). The cleaned seeds were sun dried and stored. Most women always (53%) participated in grading seeds while men never (33%) [8].

Table 2. Aquafarm operation undertaken by women and men in foxnut cultivation (in percentage).

Indicators	Total (n=200)					
	Women			Men		
	Never	Sometimes	Always	Never	Sometimes	Always
Selection of land or pond	86.5	13.5		42	13.5	44.5
Cleaning of land or pond	57.5	19	23.5	42	19	39
Sowing	55	22	23	50	16	34
Thinning	58.5	22	19.5	47	23	30
Transplanting	70.5	12.5	17	47	13.5	39.5
Use of fertilizer	73	23.5	3.5	59.5	17.5	23
Irrigation	84	16		63	17	20
Weed control	81	14.5	4.5	64.5	17	18.5
Pest control	87	13		63.5	19.5	17

The sun dried seeds were graded into five to ten grades depending on their size before heating. Jointly women and men were occupied in these operations, namely first roasting (66.5%), tempering (66.5%), popping (66.5%), and polishing (66.5%). The seeds were roasted in an earthen or cast iron pan with constant stirring and heating; beaten with a wooden hammer to separate kernel from edible parts, rubbed to turn into pop, and then graded with sieve. In grading of pop majority of women always (66.5%) engaged while men sometimes (34.50%), followed by always (32%).

The graded seeds were packed in gunny bags for storage, transportation, and marketing. More women than men were always involved in packing (Women-66.5%, Men-52.5%) and storage (Women-66.5%, Men-57.5%) of foxnuts. Furthermore, equal percentage of women never and men were always involved in pricing (100%) and marketing (100%).

e-ISSN: 2347-226X
p-ISSN: 2319-9857

Table 3. Harvesting and post-harvesting operation undertaken by women and men in fox nut cultivation (in percentage).

Indicators	Total (n=200)					
	Women			Men		
	Never	Sometimes	Always	Never	Sometimes	Always
Harvesting	100			47		53
Cleaning and storage	24	47.5	28.5	20	44.5	35.5
Drying	33.5	12.5	54	33	30.5	36.5
Grading of seeds	33.5	13.5	53	33	32.5	19.5
First roasting	33.5		66.5	33.5		66.5
Tempering	33.5		66.5	33.5		66.5
Popping	33.5		66.5	33.5		66.5
Polishing	33.5		66.5	33.5		66.5
Grading of pop	33.5		66.5	33.5	34.5	32
Packaging	33.5		66.5	33.5	14	52.5
Storage	33.5		66.5	33.5	9	57.5
Pricing	100					100
Marketing	100					100

Challenges faced during foxnut cultivation

Fisher community engaged in foxnut cultivation faces lack of resources for cultivation and production. Data regarding challenges faced by respondents in fox nut cultivation furnished in the Table 4 pinpointed that majority of respondents perceived no knowledge of the seed collection process (Women-67.5%), the proper method of processing (Women-33.5%, Men-33.5%), disease and pest management (Women-27%), and value addition of different products from seeds (Women-79.5%, Men-89%). Forty-seven percent of total women and 22.5 percent of total men expressed problems in solving farming issues. All women and only 33.5 percent of men showed problems in selling foxnuts.

Table 4. Challenges reported by women and men in fox nut cultivation (in percentage).

Indicators	Total (n=200)			
	Women		Men	
	Yes	No	Yes	No
Knowledge of seed collection process	31.5	67.5	100	
Proper method of processing	66.5	33.5	66.5	33.5
Disease and pest management	73	27	100	
Problems in solving farming issues	47	53	22.5	77.5
Value addition	20.5	79.5	11	89
Problems in selling	100		35.5	64.5

e-ISSN: 2347-226X
p-ISSN: 2319-9857

NFoxnut farming and production are feminine activities. Women have been engaged in farming till production along with men. The traditional status and roles of the women have been transformed and emphasized in foxnut production through this study. Production of foxnuts tends to be concentrated among caste-based fishermen and with commercial linkages to traders and processors. Most of fishing community was illiterate due to their involvement in economic activities and household activities. More than fifty percent of women had fish occupation, and about 32 percent of women reported working as aquaculture or agriculture labourers. Most women had less than five thousand rupees of earnings. The earned value in the family within the traditional social structure is of the men. However, fishing community women have a direct income also. However, woman works for the traditional family businesses, which support in changing their livelihood status. These earnings have been reported as a kind of contribution to the familial budget. However, women work at a business with a specific income does not change their social status and roles [9]. Most households took debt from moneylenders for farming, business, and health checkup. They migrate along with their family to other districts for foxnut processing for 6-10 months. Most women took decisions related to family planning and debt to others. The decision of girl's marriage, education of children, selection of recreation and guest in function, investment on relatives and business were taken by majority of both husband and wife. These communities engaged in production and carried out fox nut cultivation and processing practices. People living near river basin areas like those in the interior locations derive their income from diverse sources other than fishing, such as foxnut trade-processing, storage, packaging, and transportation. In fox nut production, women are involved in farming to processing seeds, namely cleaning the pond, sowing, thinning, transplanting, fertilizing, weeding, cleaning, drying, grading, roasting, tempering, popping, polishing, grading of pop, packaging, and storage [10]. Women are also involved in spraying fertilizers and weeding operations.

CONCLUSION

In harvesting, women were not engaged, as foxnut seeds are collected from the bottom of the water body. Contrary to this study in Assam, the raw edible parts of the seeds are harvested by rural women. According to Jalaj, they also handpicked the snails and other debris from the seed, and after cleaning, they spread the seeds for sun-drying on a bamboo or plastic mat. Women's participation was significantly high in grading (62.36%), first roasting (74.45%), and second roasting (72.19%). Frying is generally carried out in late evening hours, and during frying, women take out 5-10 nuts and hand them over to the second person. Few women spent about four hours selecting land or pond, cleaning land or pond, thinning, weed control, fertilizer, irrigation, and pest control. In other operations, most women occupied 4 to 8 hours in sowing of seeds and transplanting. They engaged for about four hours in cleaning, drying, and grading of seeds. Women spread processed seeds over mat or cloth for drying for two to three hours under bright sunlight and seven-eight hours in cloudy weather. The involvement of women in foxnuts other than fisheries helps to increase their livelihood. In fox nut production, most women perceived no knowledge of the seed collection process, the proper processing method, disease and pest management, and value addition of different products from seeds. They expressed problems in solving farming issues. All women showed problems in selling foxnuts. Due to lack of knowledge about the improved grading, packaging, product details, and bar coding, which help in branding and marketing? Thus the most important factor for women's involvement in earning activities along with men is to pay their family debts and enhance their nutrition and health also. In conclusion, women's engagement in fox production activities changed their livelihood status and their roles in society.

e-ISSN: 2347-226X
p-ISSN: 2319-9857

ACKNOWLEDGEMENT

I thanks Binod Mukhiya for providing information related to household engaged in foxnut cultivation during survey. I also thanks Ravi for data analysis and paper compilation.

REFERENCES

1. Atal R, et al. Processing of makhana and value chain financing in Bihar. Int J Curr Microbiol App Sci. 2020; 9: 1322–1326.
2. Baruah D. Role of women fish workers for food security in Assam. J Krishi Vigyan. 2015; 3: 89.
3. Jalaj RK, et al. Traditional methods of harvesting and processing of makhana (*Euryale ferox* salisb.) adopted in araria district of Bihar. Int J Curr Microbiol Appl Sci. 2019;9:321–326.
4. Kumari N, et al. Accelerating socio-economic condition of women through makhana cultivation in Bihar. Ind Res J Ext Edu. 2014;14:102–104.
5. Mandal RN, et al. Harvest and processing of makhana (*Euryale ferox* Salisb.): An unique assemblage of traditional knowledge. Ind J Tradition Knowledg. 2010;9: 684–688.
6. Sodi M, et al. Association of makhana (*Euryale Ferox* Salisb) with macrophyte weeds in katihar district of Bihar, India. Schol J Agricult Veterinary Sci. 2020;7:231–239.
7. Nanren P. Rhapsody on a westward journey. Wen xuan or selections of refined literature, Volume II: rhapsodies on sacrifices, hunting, travel, sightseeing, palaces and halls. Princeton University Press, Rivers and Seas. 2014;118:181.
8. Kadfak A. More than just fishing: The formation of livelihood strategies in an urban fishing community in Mangaluru, India. J Develop Stud. 2020;56:2030-2044.
9. Busby C. Agency, power and personhood: Discourses of gender and violence in a fishing community in South India. Critique Anthropol. 1999;19:227-248.
10. Rubinoff JA. Fishing for status: Impact of development on Goa's fisherwomen. In Women's studies international forum. 1999; 22:631-644.