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Does Farmers' Yard Waterlogging or Displacement from Houses Affect Social Health? Insights from Social Participation and Support Perspectives of Waterlogged Farmers in Bangladesh

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Abstract Waterlogged farmers struggle with multiple issues, including unstable income sources, difficulty fulfilling family needs, and social insecurity. These Pressures can erode social ties and reduce participation in community life, with implications for social health. This study explores the influence of farmers' yard waterlogging and displacement from their houses on their social health, operationalized through social participation and social support. A quantitative cross-sectional survey was conducted with 480 randomly selected waterlogged farmers between February and May 2023. Social participation and social support were measured using 4-point scales, non-parametric and regression techniques. Most respondents reported waterlogging, while a smaller proportion had been displaced from their houses. Overall, social participation during waterlogging was low, especially for activities such as volunteering and solving social problems, whereas perceived social support from family members was consistently high. Yard waterlogging was associated with slightly higher support but only modest differences in participation, while displacement from houses was associated with lower levels of social participation and no corresponding gains in support, highlighting contrasting effects on farmers' social health. Local, community, and national disaster management committees can strengthen farmers' social health by supporting opportunities for meaningful social participation, ensuring targeted assistance for displaced households, and enhancing early warning and waterlogging mitigation measures.

Keywords: yard waterlogging, displacement, farmer, houses, social health, participation, support

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1. INTRODUCTION

Bangladesh is a naturally disaster-prone country. The southwest region of the country is particularly vulnerable to various types of disasters, including flooding, salinity, storms, and water surges. Climatic conditions degrade the water flow in numerous rivers, primarily due to over-siltation, leading to frequent inundation. During the rainy season, heavy rainfall further impedes the smooth flow of river water. Farmers' yards often become inundated, and the stagnant water can remain for up to eight months a year. These long-term impacts gradually shrink livelihoods and the local economy, and unwanted changes in the environmental and social conditions make people vulnerable (Rakib et al., 2019a). Many farmers are displaced from their houses and compelled to stay either along the roadside or on higher ground within the villages. In some cases, they leave their houses for an indefinite time and stay with relatives or in educational institutions until the water recedes. Consequently, farmers in those areas cannot cultivate their land and often experience food insecurity. Because crops cannot be cultivated, acute socioeconomic crisis make farmers vulnerable to mental, physical, and social health problems, that are closely related to their socioeconomic status, family instability, and social support (Hayes et al., 2018). Farmers' social health and well-being are associated with protracted stress (O'Brien et al., 2014).

Social health refers to how well an individual interacts and forms relationships with others. It involves the ability to build and maintain healthy, meaningful connections with family, friends, coworkers, and the wider community (WHO, 2001). Good social health means having supportive relationships, effective communication skills, and the ability to adapt to social situations, all of which contribute to overall well-being (Jw et al., 2011). It encompasses not only the ability to interact and form meaningful relationships with others but also the ability to comfortably adapt to various social situations (Tammy, 2024). In this sense, social health represents the direct impact of social interaction and relationships on an individual's well-being, whereas social capital is a broader concept describing the networks and norms that contribute to health but can also be context-dependent and, in some cases, detrimental.

During waterlogging, farmers often feel hopeless and are under economic pressure, which can make it difficult for them to maintain positive social relationships with others. The quality and quantity of social relationships have short- and long-term effects on health.

In this study, social health is operationalized through two key dimensions: social participation and social support. Social participation refers to engagement in social activities (through social interaction), such as voluntary work or watching television in a club. Social support refers to help and encouragement received from family members or the wider community. Involvement in these activities keeps people socially stable. Potential disasters can cause long-term health problems by disrupting social interaction and human mobility, which are integral parts of social health, and adverse consequences can vary from place to place. Socioeconomic status, family relations, and social support all influence social health, and their deterioration can contribute to poor social health.

There are several theoretical bases for social participation, including social capital theory (Claridge, 2018), which links participation to trust and cooperation, and social role theory (Eagly & Wood, 2012), which connects self-perception and social identity to participation. These theories posit that social relationships can directly and indirectly influence physical health by providing emotional, tangible, and informational support. Perceived support, or the belief that help is available, is consistently linked to better mental health outcomes. Social health has a strong theoretical basis rooted in several academic disciplines, including sociology, public health, and social epidemiology. It is not merely a descriptive term; it is grounded in a substantial body of theory and empirical showing how social conditions shape health outcomes at both individual and population levels. The social-ecological model (Bronfenbrenner, 1977) for example, conceptualizes social health across multiple levels of influence -from individual (knowledge, attitudes) to interpersonal (family, friends) to the broader community. Complementing this perspective, the social determinants of health emphasize that social health is strongly affected by non-medical factors, such as socioeconomic status, education, housing, social inclusion, and related health inequities (Aidoo, 2023).

In this study, social participation is categorized into six types: attending agricultural training, participating in political meetings, joining religious assemblies, watching television, volunteering, and solving social problems. Numerous factors are believed to influence people's health through social participation. Watching television in a club can be understood as a form of social participation through several sociological and media studies theories.

Social participation can contribute to health and well-being, and it is considered a key component of a successful and healthy life (Amagasa et al., 2017). It also generates societal benefits by increasing community contributions (Douglas et al., 2017). Social support can be emotional (empathy and understanding), informational (advice or guidance), or practical (help with tasks or resources). It helps people cope with stress, improves their well-being, and allows them to feel connected. In this study, social support includes mutual understanding among family members, reciprocal reliance, sharing worries, and facing criticism. These forms of support can be particularly important during times of crisis. Social contact and support may also help manage or stave off chronic conditions through their links with social participation.

Sufficient evidence is not yet available to compare the effects of different types of disasters on social health. Poor social health can significantly affect the psychosocial well-being of farmers and may jeopardize their contribution to society and the state, with potential implications for national crop production. Repeated conflict or violence within the family may also result, suggesting that the farmer's household is fragile and vulnerable, and a lack of trust within families can signal broader community’s social instability.

The primary goal of this study was to evaluate the impact of yard waterlogging and house displacement from houses on the social health of farmers. To this end, we formulated the following research questions: 1) How is the social health of the waterlogged farmers affected by yard waterlogging and displacement from houses? and 2) Between yard waterlogging and displacement from houses, which has a greater influence on farmers' social health?

2. LITERATURE REVIEW

2.1 Yard Waterlogging and its Impact on Social Health

2.1.1 Immobility

Social health is influenced by social support for individuals affected by disasters (Kwon & Park, 2019). Ayeb-Karlsson (2020) demonstrated, in a study conducted in three coastal locations of Bangladesh, that during cyclones, people reported being unable to move away from environmentally high-risk locations and situations. Social roles strongly influenced evacuation decisions, either facilitating or constraining mobility. However, when a disaster strikes, not everyone has the same ability to move, particularly members of vulnerable communities. In addition, some populations lack the agency to move out of harm's way, leading to involuntary immobility, which is harmful to social health (Thalheimer et al., 2025). Malak et al. (2024) also found that some disaster-affected people chose to remain immobile as a coping strategy; their decision to stay in familiar surroundings was strongly linked to economic and health-related barriers. They reported feeling Constrained and highly anxious during such periods. Even after making the initial moves to seek safety, many later returned home because they found it difficult to leave their comfortable surroundings, as well as the social support provided by their families and the community. This reluctance is sometimes worsened by health issues and financial strains brought on by past disasters. These results point toward an alternative paradigm of disaster-induced immobility that recognizes the significant barriers to migration for vulnerable households, as well as their substantial local adaptive capacity (Gray & Mueller, 2012).

2.1.2 Household Isolation

Coastal areas in Bangladesh are characterized by natural hazards, particularly in waterlogged areas. Waterlogging often forces people to leave their homes (Raju, 2017), live in temporary shelters, and change their livelihood (B. Hossain et al., 2020). These conditions create adverse effects on society, infrastructure, the economy and the environment through disruption of normal life and substantial suffering (N. Hossain et al., 2020).

2.1.3 Local Environmental Stressor

Environmental stressors like waterlogging and flooding severely impact farmers' social health, manifesting as psychological distress, food poverty, social disintegration, and health barriers. Both agricultural production and labor significantly decreased due to waterlogging, while the migration of farmers was widespread (Mizanuzzaman, 2017; Hossain et al., 2016). Older farmers and those who lived in kaccha (temporary) houses experienced significantly more negative mental states (Kabir & Islam, 2024). Under such conditions, farmers may report feeling increasingly unable to carry out their daily activities. They participated less in social services, and their family relationships became strained. Many describe feeling socially isolated, placing their social health at risk (Klinenberg, 2016). Waterlogging further devastates livelihoods by damaging cropland, homes, transport, and institutions and heightens risks of

mental distress (Islam & Raja, 2021; Kabir & Islam, 2024; Pervez et al., 2021; Drammeh et al., 2019). Economic aspects, income, and employment opportunities, particularly in agriculture and fisheries (Vins et al., 2015; Burke et al., 2015), and loss of attachment to the natural environment (Cunsolo & Ellis, 2018; Levy et al., 2017) significantly influence farmers' social, physical, and mental well-being. Economic resource destruction and potential dislocation due to natural disasters inhibit victims from staying socially fit (Rudolph & Kuhn, 2018; Hayes et al., 2018).

2.2 Displacement-Related Effects

2.2.1 Breakdowns in Social Support

Displacement from one's home results not only in physical separation from significant others but also in profound disruptions of psychological and social resources, such as social support (Arnberg et al., 2015). Displacement is often associated with abject poverty, particularly among lower-income families (Labarda et al., 2020) because of food shortages and poor housing conditions. However, community ties breaks down due to waterlogging-induced displacement (Mizanuzzaman, 2017; Shultz et al., 2016). Quality of life is also influenced by involvement in local associations (Kiboro, 2017). Ferdous & Chowdhury (2016) found waterlogging responsible for an increased degree of long-term health issues by interfering with social contact and human mobility, which are essential components of social health. Even its unfavourable long-term effects differ depending on the location (Bathrellos et al., 2017). However, Méon & Verwimp (2022) observed that natural disasters can also prompt pro-social conduct, enhancing the social well-being of affected populations.

2.2.2 Identity Loss

Flooded environments and waterlogging often uproot farmers, disrupting social networks. Rahman et al. (2025) report that displacement leads to loss of identity and community—they noted, "When people have to move, they lose their sense of identity along with their material assets." Women especially suffered lasting trauma, including haunting memories and foot wounds from prolonged water exposure (Rahman et al., 2025). People living in disaster-affected communities lost not only their homes but also their everyday cultural practices and routines. One's culture and identity are developed and learned over time and cannot be easily replaced (Dugan, 2007). Identity distress was positively associated with socioeconomic and surrounding situations (Scott et al., 2014). For many, identity threat is closely linked to well-being and mental health; the poorer the outcomes, the stronger the threats. Even partial support was found for the moderating function of social capital (Jones & Walker, 2023).

2.2.3 Psychological Disruption

Kabir and Islam (2024) and Rahman et al. (2025) found that disaster victims were in extremely high levels of psychological distress, including feeling worried, anxious, and fatigued, which would lead to sleep at work. In addition, riverbank erosion and flooding have also led to displacement in rural Bangladesh, which is strongly associated with depression,

anxiety, and stress, and homeless individuals are particularly at risk (Hossain et al., 2020). Displacement alters survivors' attitudes and is associated with increased irritability (Collado, 2019), which is related to the victims' social health.

2.3 Research Gap

The physical and economic effects of waterlogging on Bangladeshi farmers have been widely documented (Hossain et al., 2016; Urbee et al., 2025), but the social health aspects of the problem—particularly as they relate to social support and participation—have received relatively little attention. The psychosocial and relational effects of extended waterlogging or displacement are still little understood, with the majority of existing research concentrating on migration, declining agricultural productivity, or livelihood loss (Ahsan & Warner, 2014; Hossain et al., 2020). Furthermore, prior studies have tended to treat social health as a secondary result, frequently taking a backseat to infrastructure or economic factors (Rahaman et al., 2020; Piggott-McKellar & McMichael, 2021). Furthermore, the majority of existing research has not distinguished between farmers who stay in waterlogged yards and those who are forced to leave their homesteads, which is a significant social determinant that could influence community relationships, involvement in group activities, and access to instrumental or emotional support. As a result, the relationship between social health and environmental displacement in Bangladesh is still not well understood or investigated empirically.

By investigating the effects of yard waterlogging and displacement on farmers' social health—with a particular emphasis on their social support systems and social participation—this study seeks to close these gaps. This would help develop more inclusive adaptation and community resilience policies in Bangladesh's waterlogged areas and offer a more comprehensive understanding of the social aspects of stresses brought on by climate change. This study aims to explore the impact of yard waterlogging and displacement on farmers' social health. In this context, understanding farmers' social participation and support provides a practical way to assess their social health.

2.4 Coping Strategies & Social Resilience

Natural disasters stimulate pro-social behaviour and involve people with self-help organizations. During a disaster, people work together to solve problems and manage recovery or clean-up (Ludwig et al., 2017). In addition, psychosocial distress, anxiety, depression, and the incidence of suicide are high in disaster areas (O'Brien et al., 2014). Social support for disaster-exposed people is a factor in psychosocial health (Keng & Hwang, 2022). Despite challenges, farmers demonstrate social resilience through community-based adaptive strategies. For example, integrated homestead farming—including raised beds, aquaculture, and livestock—has improved income and empowered women, enhancing intra-household social support (Rakib et al., 2019b). Floating gardening (*baira/dhap*) is a culturally embedded adaptation: hyacinth-raised platforms allow cultivation despite waterlogging, providing food

security, income, and a sense of continuity—recognized by FAO as a practice of global agricultural heritage (Berry et al., 2010).

2.5 Social Participation and Support

Recreation positively influences disaster recovery (Kono & Shinew, 2015). According to Klitzing (2004) and Dhar (2011), leisure activities (music listening, gossiping, window shopping, and playing with children) can help disaster-affected people distract themselves from stress and seek social support, particularly among people with lower socioeconomic status. Fair et al. (2017) find that less exposed people, compared to highly flood-affected ones, engage more in politics. Bryant et al. (2017) find that the risk is higher for participants who have fewer social connections or are strongly connected to people with severe depression. However, people are also observed to be depressed when they leave their community. Disasters impact not just relationships with family and friends but also people's social bonds. Historically and culturally, farmers of these areas had many social celebrations like *nabbano* (paddy harvesting), *khodar najar* (providing food to neighbors), *gajikalur gan* (songs offered to people free of cost to have babies). Irrespective of caste, creed and religion, they went to others' houses and were entertained with different delicious traditional foods. They used to lend money to their neighbours on different occasions. The severity of waterlogging damage has jeopardized these traditional forms of mutual aid and communal celebrations.

3. METHODOLOGY

3.1 Research Design and Study Setting

This research follows the survey design. The *Bhabadaha* point primarily triggers perennial waterlogging in three upazilas (larger administrative units): Abhayanagar, Manirampur, and Keshabpur. During periods of heavy rainfall in the late monsoon, large parts of these upazilas become inundated (Nesa, 2018). The first two upazilas were purposively selected as the study area (Figure 1). From these, six unions (small administrative units) were chosen, and two predominantly waterlogged villages were selected from each union, giving a total of 12 study villages.

These low-lying areas are typically inundated from the onset of the monsoon, for around eight months each year. Some emerging cultivable land. Over the last three decades, farmers in these villages have experienced high levels of psychosocial distress linked to recurrent waterlogging and unstable livelihoods (Kabir & Islam, 2024). Most households depend primarily on agriculture and experience prolonged inundation; these villages provide a suitable setting to examine how yard waterlogging and displacement affect farmers' social health.

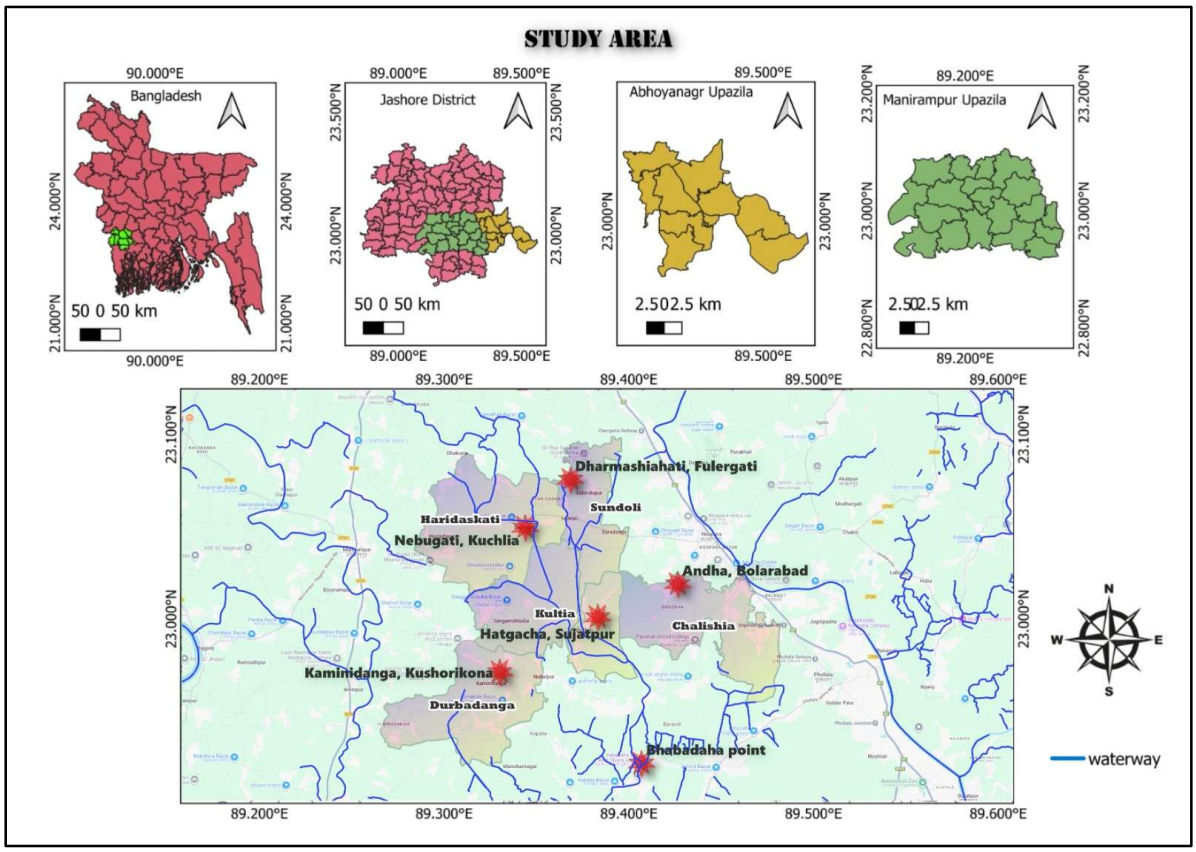

Figure 1. Study areas by Upazila and Union

3.2 Sampling Procedure: Sampling and Sample Size Determination

Farmers were selected based on the following criteria: i) they possessed at least 20 decimals of arable land. ii) their cultivable land was affected by waterlogging; and iii) cropping was their sole source of income, with no salaried service members in the household. We conducted a household survey from December 15 to 28, 2022, to accurately determine the population size in the study area. To conduct this survey, the researcher, accompanied by a research assistant, went door-to-door to identify the population based on the attributes above. The Union Parishad (UP) and Agriculture Extension Office (AEO) did not maintain any lists of waterlogged farmers, so there were no alternative methods to determine the unit of analysis for this study. In certain cases, the researcher received assistance from elderly farmers and local leaders in the relevant areas. The study employed a simple random sampling method. Finally, 480 farmers were taken as the sample after conducting the household survey based on their attributes.

3.3 Scale Formation: Social Health

Likert scales were used to measure social health. Although social participation and social support cannot be quantified, farmers' behaviours related to these constructs were assessed using 4-point scales. Social participation and social support comprise social health. This social health scale is based on a 4-point Likert scale (not at all = 1, sometimes = 2, often = 3, all the time = 4). Both scales (social participation and social support) were translated into Bengali to facilitate participants' understanding.

3.3.1 Social Participation Scale

Tan et al. (2009) and Levasseur et al. (2010) developed the six items used in this study. Although studies employed a 7-point Likert scale, here a 4-point Likert scale was adopted to evaluate the social activities of farmers in the community during waterlogging. Social participation includes six items (i.e., attending training, participating in political meetings, joining a religious congregation, watching TV, volunteering for social work, and solving social problems). Total score ranges from 6 to 24, with higher scores indicating more frequent social participation.

3.3.2 Social Support Scale

The social support scale consists of several indicators of social integration (number of social ties and the contact and quality of interaction with those social ties). Building on Cohen (2004) and Uchino (2009), the social support scale in this study includes four items: understanding how the farmers feel; reliance when having a serious problem; opening up about worries; and facing family criticism. Questions were asked about support from family members. Here, reliance refers to trusting family members with serious problems and avoiding family conflict. Both positive and negative aspects of social support are captured in this section. This scale is based on a 4-point Likert Scale (not at all = 1, little = 2, some = 3, a lot = 4), and the total scores range from 4 to 16, with higher scores indicating greater perceived social support.

3.4 Data Collection

During the field survey, farmers in the study area who met the criteria described above were interviewed. The schedule contained both closed and open-ended questions. We prepared an interview schedule based on the study's objectives. Some of the faculty members of Khulna University and Rajshahi University (psychologists and sociologists) approved the face and content validity of the questionnaire. From February 24 to 28, 2023, a pilot study was conducted with 29 farmers, representing more than 6% of the total sample, to test the validity and reliability of the scales for measuring psychological state, anxiety, and depression. Nine (9) farmers from the first two villages of the 12 villages were randomly selected, and two (2) farmers from each of the last 10 villages were selected. Subsequently, a final interview schedule based on the information from the pre-testing phase was developed. We made the necessary modifications to finalize the schedule. Between March and May 2023, the researcher and five experienced data collectors collected primary data from the field. At this time, some of the study areas were inundated.

3.5 Statistical Analysis

Collected data were processed, analyzed and interpreted using descriptive as well as inferential statistics. They were analyzed by SPSS 25.0 (IBM Corp.). Percentages and mean ranks were used to describe the aspects of waterlogged farmers' social participation and social support. As the data of this study were not normally distributed (according to the Kolmogorov-

Smirnov and Shapiro-Wilk tests of normality, p = 0.000), a non-parametric test, i.e., the Mann-Whitney U test (for two groups), was used to determine significant differences in yard waterlogging and displacement from houses. All relevant statistical tests were performed at both significant levels ($p < 0.05$ and $p < 0.001$) with a 95% confidence interval.

4. RESULTS

4.1 Demographics and Socio-Economic Status

Table 1 represents the sociodemographic and economic scenarios of waterlogged farmers. Their average age was 50.54±12.68. The vast majority of respondents identified as Sanatan (90.2%) and had at least some formal education (87.9%). Most households lived in *semi-pacca* or *pacca* dwellings and followed a nuclear family structure with single-earning members. Their average monthly income and expenditure were 9162.7±4582.5 and 8910.4±4234.3, respectively.

Table 1. Demographics and socioeconomic status of the farmers

Variables	N (%)	M±SD	Variables	N (%)	M±SD
Age (year)			Family type		
≤55	313(65.2)	50.54±12.68	Nuclear	388(80.8)	
>56	167(34.8)		Joint	92(19.2)	
Religion			Family member		
Islam	47(9.8)		≤4	271(56.5)	4.50±1.72
Sanatan*	433(90.2)		>5	209(43.5)	
Education			Child		
Illiterate	58(12.1)		Yes	464(96.7)	
Educated	422(87.9)		No	16(3.3)	
House type *			Number of family earners		
Kaccha	128(26.7)		1	375(78.1)	1.24±.49
Semi-pacca	196(40.8)		≥2	105(21.9)	
Pacca	156(32.5)		Monthly income (BDT)		
Marital status			≤1000	377(78.5)	9192.7±4582.5
Unmarried	14(2.9)		>1000	103(21.5)	
Married	466(97.1)		Monthly expenditure (BDT)		
			≤1000	393(81.9)	8910.4±4234.3
			>1000	87(18.1)	

Source: Field survey-2023. *Sanatan religion of the Hindu community. * *Kaccha* means mud-made house; *Semi-pacca* means brick-built with tin shed, and *Pacca* means brick-built. BDT-Bangladesh Taka

4.2 Yard Waterlogging and Displacement from Houses

Yard waterlogging and displacement from homes are caused by perineal waterlogging (Figure 2 and Figure 3). This is a common scenario in the study areas. However, it varies from region to region.

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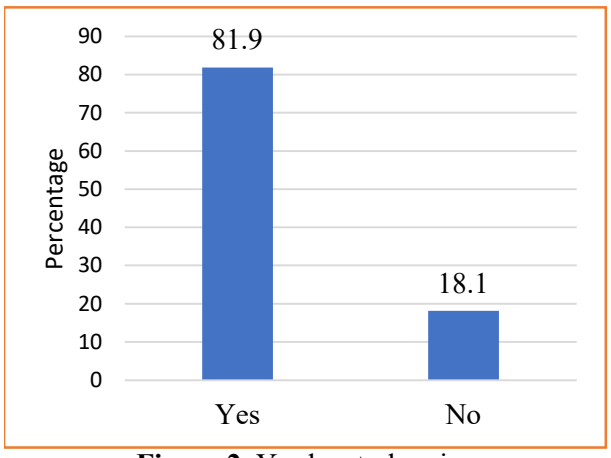

Figure 2. Yard waterlogging
(Source: Field survey-2023)

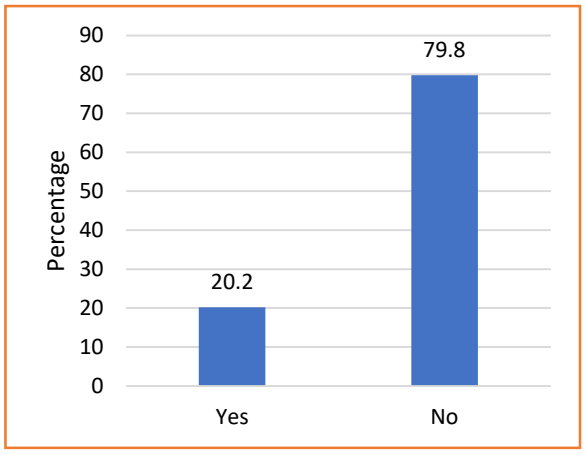

Figure 3. Displaced from houses
(Source: Field survey-2023)

4.3 Social Participation and Social Support

Participation in social activities is considered a significant determinant of social health. Participation in social activities can take various forms.

However, this study justifies six types of participation in social activities to explain social health outcomes. Most of them participated in religious talks and watched television. Most of the farmers did not participate at all in social activities during waterlogging (Table 2). Despite low levels of participation in many activities, most respondents reported high levels of social support from family members, particularly in terms of feeling understood and being able to rely on others during serious problems.

Table 2. Percentage distribution of waterlogged farmers by social participation

Social participation	**Not at all**	**Sometimes**	**Often**	**All the time**
Attended training	290(60.4)	165(34.4)	17(3.5)	8(1.7)
Participation in political meetings	300(62.5)	166(34.6)	2(.4)	12(2.5)
Participation in religious talks	22(4.6)	188(39.2)	155(32.3)	115(24.0)
Watch television	45(9.4)	194(40.4)	133(27.7)	108(22.5)
Volunteering work	288(60.0)	161(33.5)	22(4.6)	9(1.9)
Participation in solving social problems	243(50.6)	181(37.7)	39(8.1)	17(3.5)
Social support	**Not at all**	**Some**	**Little**	**A lot**
Understand the way you feel about things	-	8(1.7)	108(22.5)	364(75.8)
Reliance when having a serious problem	3 (.6)	18(3.8)	154(32.1)	305(63.5)
Open up about worries	1(.2)	46(9.6)	166(34.6)	267(55.6)
Face criticism	267(55.6)	113(23.5)	83(17.3)	17(3.5)

Source: Field survey-2023.

4.4 Social Participation and Social Support Scale and Their Scoring

Among social participation items, participation in religious talks had the highest mean score (2.75 ± 0.86), followed by watching television (2.63 ± 0.93). For social support, 'understanding the way farmers feel' recorded the highest mean score (3.73 ± 0.47), indicating consistently high perceived support in this domain (Table 3).

Table 3. Descriptive statistics of social participation and social support scale

Scale	Mean ± SD	Scoring	N (%)
Social participation			
Attended training	1.46±.64		
Participation in political meetings	1.42±.63	Low (10≤)	203(42.3)
Participation in religious talks	2.75±.86	Medium (11-15)	242(40.4)
Watch television	2.63±.93	High (16≥)	35(7.3)
Do any volunteer work	1.48±.67		
Participation in solving social problems	1.64±.77		
Social support			
Understand the way farmers feel	3.73±.47	Low (8≤)	11(2.3)
Reliance when having a serious problem	3.57±.60	Medium (9-12)	200(41.7)
Open up about worries	3.43±.67	High (13≥)	269(56)
Face criticism	1.60±.77		

Source: Field survey-2023. SD-Standard Deviation.

Table 3 indicates the waterlogged farmers' level of social health based on social participation and social support scoring. It reveals that most of the farmers' social participation was low, and most of the farmers got high social support from their family members during waterlogging.

4.5 Social Participation vs. Yard Waterlogging and Displacement from Houses

Table 4 summarises differences in social participation between farmers with yard waterlogging and those displaced from their houses. Yard waterlogging was significantly associated with participation in political meetings and watching television in clubs ($p < 0.001$), whereas displacement was significantly associated with watching television, volunteering, and solving social problems ($p < 0.05$). However, the effect sizes for all comparisons were small (Cohen's $d = 0.11–0.16$), indicating modest differences in participation across groups.

Table 4. Differences of SP between yard waterlogging and displacement from houses

SP	YW	MR	U-test	Z	d	DH	MR	U-test	Z	d
Training	Yes	244.0	15693	-1.39		Yes	234.1	17960	-.587	
	No	224.38				No	242.11			
Political meetings	Yes	249.8	13441.5	-3.69**	.16	Yes	255.6	17104.5	-1.42	
	No	198.50				No	236.66			
Religious talks	Yes	242.2	16410	-.620		Yes	229.4	17505.5	-.928	
	No	232.62				No	243.29			
Watch television	Yes	250.63	13114.5	-3.58**	.16	Yes	270.56	15659.5	-2.51*	.11
	No	194.74				No	232.89			
Volunteering	Yes	242.2	16414	-.674		Yes	206.9	15325	-3.08*	.14
	No	232.67				No	248.99			
Solving social problems	Yes	239.9	16859	-.224		Yes	209.9	15613	-2.68*	.12
	No	243.22				No	248.23			

SP-Social participation, DH-Displacement from houses, MR-Mean rank, U test-Mann-Whitney test *p<0.05** p<0.001

Note- Effect size is calculated with Cohen's $d=|\frac{z}{\sqrt{N}}|$, effect d=≤.10(small), d=≥.20 (medium)and d=≥.50 (large)

4.6 Social Support vs. Yard Waterlogging and Displacement from Houses

Yard waterlogging was significantly associated with higher scores for reliance, opening up about worries, and facing criticism, with a medium effect size for reliance (d = 0.20) and small effects for the other items (Table 5). In contrast, displacement from houses showed only a small effect on reliance (d = 0.10) and no significant differences for the other social support items.

Table 5. Differences of SS with yard waterlogging and displacement from houses

Social support	YW	MR	U-test	Z	d	DH	MR	U-test	Z	d
Understand the way you feel about	Yes	244.62	15475.5	-1.86		Yes	241.35	18493.5	-.090	
	No	221.88				No	240.29			
Reliance when having a serious problem	Yes	251.77	12667.5	-4.48**	.20	Yes	265.60	16141	-2.36*	.10
	No	189.60				No	234.14			
Open up about worries	Yes	248.02	14139	-2.84*	.12	Yes	249.03	17748.5	-.765	
	No	206.52				No	238.34			
Criticize you	Yes	246.31	14812	-2.16*	.09	Yes	240.93	18534	-.038	
	No	214.25				No	240.39			

YW-Yard waterlogging, SS-social support, DH-Displacement from houses, MR-Mean rank, U test-Mann-Whitney test, *p<0.05** p<0.001

Note- Effect size is calculated with Cohen's d=$|\frac{z}{\sqrt{N}}|$, effect d=≤.10(small), d=≥.20 (medium)and d=≥.50 (large)

4.7 Social Participation and Social Support with Yard Waterlogging and Displacement

Figure 4 illustrates the impact of yard waterlogging and displacement on the social health of farmers. Yard waterlogging had a stronger association with social support than with social participation, whereas displacement from the house was more strongly associated with social participation than with social support.

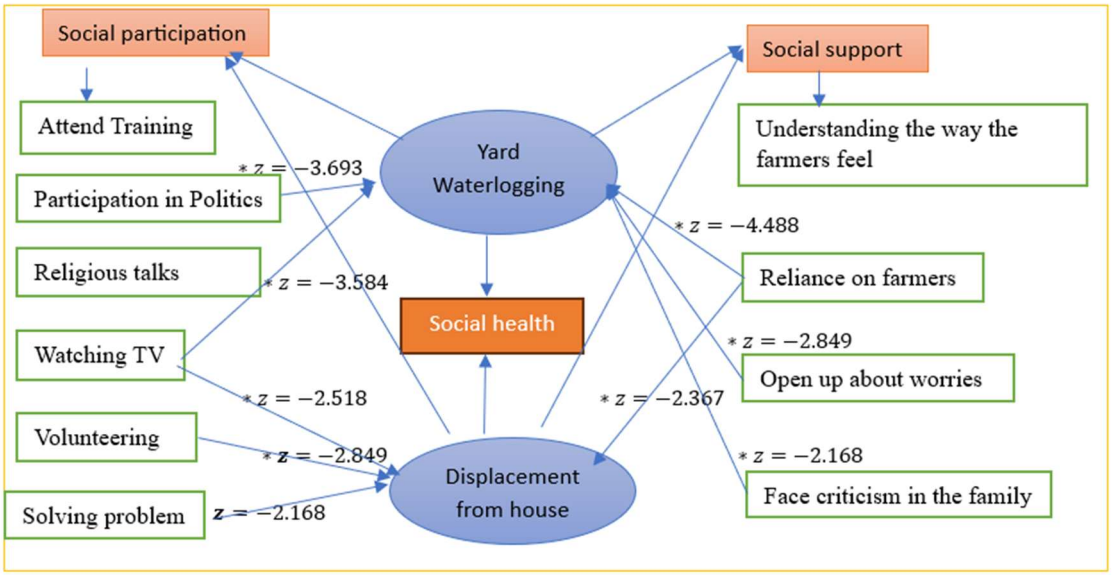

Figure 4. Effect of yard waterlogging and displacement on farmers' social health

4.8 Multiple Logistic Regression

Table 6 explains the parameter estimates for the waterlogged farmers' social participation and social support. In the multivariable model, social participation scores were significantly lower among farmers displaced from their houses (β = –0.196, 95% CI –0.380 to –0.011, p < 0.05). By contrast, social support scores were significantly higher among farmers whose yards were waterlogged (β = 0.200, 95% CI 0.074 to 0.327, p < 0.01), while displacement from houses was not significantly associated with social support.

Table 6. Parameter estimates of social participation and social support

Parameter	Parameter Estimates[a]				
	B	SE	95% Confidence Interval		p
			Lower	Upper	
Social Participation					
Yard waterlogging					
Yes	.171	.098	-.021	.364	.082
No [ref]	1				
Displacement from houses					
Yes	-.196	.094	-.380	-.011	.038*
No [ref]	1				
Social Support					
Yard waterlogging					
Yes	.200	.064	.074	.327	.002*
No [ref]	1				
Displacement from houses					
Yes	.001	.062	-.121	.122	.989
No [ref]	1				

[a] For logistic regression, 2 items from social participation (religious talks and watching television) and 1 item from social support (facing criticism) have been deleted to make the data more reliable. SE-Standard error *p<0.05** p<0.001

5. DISCUSSION

Both the yard waterlogging and displacement from houses affected social participation. Waterlogged farmers were less involved in social participation. On the contrary, they got the highest support from their family members during waterlogging. Regarding social participation, the farmers engaged more in religious discussions. For social support, mutual understanding was frequent among the farmers' families.

5.1 Impact of Yard Waterlogging on Social Health

Farmers whose yards were waterlogged were somewhat more likely to participate in political meetings and watch television in a club than those without yard waterlogging. From the perspective of social support, they reported relying on their family members, trusting and sharing worries and memories with them and rarely experiencing criticism within the household. Despite the strong family-based support, overall social participation during waterlogging remained low. As indicated by Kwon and Park (2019), both participation in social events and support from family are important for social health because social support and

family relationships influence key factors that can lead to poor social health (Hayes et al., 2018; Trombley et al., 2017). Our results are broadly consistent with those of Hayes et al. (2018) and Trombley et al. (2017) Who showed that socioeconomic crises during catastrophes make victims vulnerable to social health problems, mainly through family instability and disrupted social support. In addition, Islam and Walkerden (2015) emphasize that weakened relationships arising from financial crisis contribute to poor social health during disasters.

The findings of Fair et al. (2017) differ from those of this study. They report a positive association between disaster experience and political activity, with people who are less vulnerable to flooding participating more in politics than those who are severely affected. A similar conclusion was reached by Cassar et al. (2017) and Fair et al. (2017), who argue that more affected people tend to be more politically engaged, whereas in our study area prolonged waterlogging appears to limit broader social participation despite strong family-based support.. Besides this notion, there have been cases of victims interacting with self-help groups after natural disasters (Markowitz, 2015). Disasters produce stress that exacerbates various types of ailments and infirmities. Over time, individuals, groups, communities, organizations, and social ties can become increasingly vulnerable to this accumulated stress (Sandifer & Walker, 2018). Waterlogging induces multiple disasters, which affect mental health, physical health, and well-being (Saha, 2015; Leppold et al., 2022).

5.2 Impact of Displacement from Houses on Social Health

Displacement has several adverse impacts on physical, financial, social, and human livelihood assets, and uncertainties during the pre-relocation phase are significant causes of impoverishment risks among the households likely to be displaced (Nikuze et al., 2019). In this study, displaced farmers showed significantly lower participation in watching television, volunteering, and solving social problems during waterlogging, although the effect sizes were small. Most other activities, both in terms of social participation and social support, showed little difference by displacement status. Taken together with the logistic regression results, this suggests that displacement primarily weakens everyday social participation, while perceived family support remains relatively stable. This pattern is consistent with Labarda et al. (2020) and Arnberg et al.(2015), who found that moving away from home results in physical separation from their significant other, which affects social health, and with Collado's (2019) observation that dislocation may heighten stress and irritability.

More broadly, our findings echo evidence that disaster-related displacement threatens social health by reducing opportunities for participation, even when some sources of support persist. Prior studies have shown that possible or actual displacement is linked with social health disruption and environmental stressors (Rudolph & Kuhn, 2018; Sanni et al., 2022) and that displacement can gradually weaken collective identity and access to livelihoods, thereby exacerbating social exclusion (Aslam, 2025; Zaman, 2024). Displaced individuals often struggle to adapt to new living conditions and face uncertainty, food insecurity, and inadequate services. However, active involvement in local associations and community groups can help rebuild social ties and support more sustainable living conditions (Kiboro, 2017). For

waterlogged farmers in coastal Bangladesh, temporary displacement therefore appears to erode social health mainly through reduced engagement in community and civic activities, rather than a collapse of family-based support.

5.3 Measuring the Influence of Yard Waterlogging or Displacement from Houses on Social Health

Overall, social participation during waterlogging was generally low, whereas perceived social support from family members was high. Both yard waterlogging and displacement from houses had only small effects on social participation, but displacement was associated with slightly lower participation scores than yard waterlogging. Yard waterlogging, in contrast, was positively associated with social support, while displacement showed no significant effect on support. Since social health in this study is operationalized through both social participation and social support, these findings indicate that yard waterlogging tends to lower participation but strengthen perceived support, leading to a mixed but partly favorable effect on social health, whereas displacement mainly reduces participation without corresponding gains in support, leading to a less favorable social health outcome.

5.4 Strengths and Limitations

This study was based on a door-to-door survey. The researcher, together with a field assistant, collected data from the field. When any complexities (not understanding any term) arose during data collection, the researcher addressed them immediately. There are some limitations, too. This is a quantitative study. Qualitative data will contribute to a deeper understanding of the social health of farmers affected by flooding. More samples will produce better results for the study. However, this study does not represent the whole of Bangladesh; it is focused on the southern part of the country. Additionally, there are some limitations related to scale construction for social participation and social support. The reliability of these scales could be improved in future studies by incorporating additional context-specific items. We can delve into additional issues to gain a deeper understanding of their health conditions. Time constraints are one of the study's biggest limitations.

6. POLICY FORMULATION

More farmers should be supported to participate in training programs on disaster preparedness and livelihood diversification. This will provide a platform for the displaced farmers to engage with their community. Farmers should be encouraged to participate in politics, especially during periods of waterlogging. Given the long-standing difficulty in resolving waterlogging, political collective action and advocacy might be a powerful tool to improve the situation. It is possible to adopt a three-stage approach. At the local government level, until a permanent solution to the problem is found, temporary housing on higher grounds

for the farmers of the respective areas can be built. They can receive special VGF (vulnerable group feeding) cards from the local government. At the community-level, households that are well-off and not waterlogged can play a role in promoting social participation (meaningful social gatherings) and providing mutual aid (family/community support). The National Disaster Management Committee can develop a long-term plan to mitigate the waterlogging problem and may add international expertise for further initiatives. Generally, more than 0.319 mm per hour indicates the onset of waterlogging conditions. Early warning systems can help farmers make preparations against the nuisance. In addition, regular excavation of the over-silted river is needed to maintain its flow. Resettlement in the highlands of the surrounding areas may be an option for those who are primarily at risk of waterlogging.

7. CONCLUSION

This study explores the social health of waterlogged farmers by enumerating their social participation and social support. Farmers' overall social participation during waterlogging was low, but their families' social support was high. Both yard waterlogging and displacement from houses had only small effects on the social health indicators; however, displacement was associated with slightly lower social participation, whereas yard waterlogging was positively associated with perceived social support. Taken together, farmers' social health appears fragile in terms of participation but comparatively resilient in terms of family-based support. Multifaceted interventions, i.e., initiatives taken by the local government, community, and disaster management committee, can be taken as an effective way out of the issue. Early warning systems for forecasting yearly rainfall, continuous river excavation, and rehabilitation in the highland during waterlogging can be pursued as risk reduction action plans. A smooth movement system (constructing a high path) can be developed for farmers with yard waterlogging, with community intervention. Rehabilitation in the higher grounds for a specific time can be managed for displaced farmers. Government and non-government organizations (NGOs) can play an effective role in rehabilitating them.

ETHICAL CONSIDERATION

I obtained the farmers' oral consent for the study before data collection, without offering any financial incentives. I ensured their anonymity to ensure data confidentiality and authenticity. I assured them that I would not use their data for purposes beyond the study and their psychosocial health information would be strictly protected. The Ethical Clearance Committee of the university (IBSERB, RU-12/01/2022) reviewed the questionnaire and approved the collection of data from the field.

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