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Original article

Underlying causes and the impacts of disaster events (floods) on fertility decision in rural Bangladesh

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ABSTRACT

The study attempts to uncover how people living in vulnerable areas address the relationship between the impacts of extreme weather events (floods) and fertility preference. The study selected a village, Sharat Pur from Sunamganj District, which is highly vulnerable to the adverse impacts of flooding. The study gathered information from 158 respondents by using a semi-structured questionnaire and in-depth interviews. With the small sample size the study used descriptive statistics and qualitative analysis. Findings show that there is still a preference for more sons to recover the damage caused from the impacts of floods. However, people think having a large family is a burden. They emphasize controlling family size through family planning programs and do not take into account the risk of children dying affecting their desire to have additional children. Therefore they consider having more children especially sons as a gift from God and the occurrence of flood events as the wish of God. The intention of the study is not to generalize findings but to comprehend the underlying mechanism between disaster events and fertility behavior. The study collected information from a very small sample size. Future studies might consider a large sample size and explore more deeply the mechanism between the different disaster events and fertility decisions by using a comparative analysis between regions vulnerable to different extreme weather events and not vulnerable to extreme weather events within Bangladesh, and comparing Bangladesh with other South Asian countries.

KEY WORDS: Bangladesh, extreme weather events, fertility preference, perception, son preference

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1. Introduction

Studying human vulnerability to climate change is difficult and complex. Different groups of people experience different levels of vulnerability. Climate change affects human beings in different ways and to different degrees (SMIT & WANDEL, 2006) and it will increase human vulnerability, with the frequency and magnitude of extreme weather events (KLEIN ET AL., 2007). Understanding perceptions concerning climate change issues, extreme weather events and fertility decisions is very important in the advancement of the area of population dynamics and climate change (ANDERSON ET AL., 2007; XIAO & HONG, 2010; MUSTELIN et al., 2010). Studying individual views about the complex relationship between climate change and the impacts of extreme weather events and fertility preference can contribute to population size and environmental policy (AN & LIU, 2010; JIANG & HARDEE, 2011). Climate-related disasters (floods, cyclones, droughts etc) largely affect poor people. These people have fewer resources to tackle the effects of climate change (JIANG & HARDEE, 2011; BROUWER ET AL., 2007). The effects of climate change on society depend on the extent to which a country is able to manage demographic, socio-economic and cultural, and technological issues (DANIERE & TAKAHASHI, 1999). For instance, different studies have found that a continuation of high fertility is a vicious cycle and it is due to the scarcity of natural resources in developing countries (O'NEILL ET AL., 2001; LUTZ & SCHERBOV, 1999). Scarcity of natural resources contributes to the

desire for additional children, especially for sons, so that they can contribute to the family through their labours (DASGUPTA, 2000; BIDDLECOM ET AL., 2005; FILMER & PRITCHETT, 2002; STREATFIELD ET AL., 2015). People also perceive that having children, especially sons, is security for the future and a symbol of social status, and extra helping hands during a crisis. They are an alternative means of insurance for parents to recover damages from the impacts of extreme weather events. This perception in vulnerable areas may lead to increased fecundity and population size (PRITCHETT, 1994; CLELAND ET AL., 1994; BARKAT-E-KHUDA & HOSSAIN, 1996; LOUGHRAN & PRITCHETT, 1997; BONGAARTS, 1994). Socio-economic and cultural settings of a community play influential roles in shaping their perception and their link with fertility decisions (MUSTELIN ET AL., 2010). High population densities, population growth, and the adverse impacts of climate change affect the environment and increase the danger for people who live in vulnerable areas (CURTIS & SCHNEIDER, 2011; NICHOLLAS ET AL., 2007). In Bangladesh, most areas are vulnerable to, and at risk of, climate change. The impacts of extreme weather events have already caused considerable damage which has affected the livelihoods of people living in low lying and flood prone areas (HUQ ET AL., 1995; AGRAWALA ET AL., 2003; PDO-ICZMP, 2003).

Many studies focus on macro level study and macro level data and use broader perspective to address the mechanism between climate change and population dynamics. A few studies account for local level data and individual views and conduct a context-based study to analyze the relationship between the environment and fertility decisions (PEBLEY, 1998; SCHULTZ & ELLIOTT, 2013). The present study outlines how people living in vulnerable areas link fertility decisions in terms of their experiences with the adverse impacts of extreme weather events (floods). The study hypothesized that if people perceive an increase in the effects of extreme weather events on society, they may consider to alter their desire to have more children. People who face frequent extreme weather events and maintain their subsistence with security and support during crisis periods may require an extra-labour force from their children, particularly male children, to help to rebuild their homes, to recover damages and to earn money for use during crisis periods (GHIMIRE & MOHAI, 2005; AXINN & GHIMIRE, 2002; FOSTER & ROSENZWEIG, 2003).

The study conducted a field study in the village of Sharat Pur which is vulnerable to floods and people regularly live in the face of flood events. Key findings of the study show that most people in Sharat Pur do not consider a large family size as being advantageous during flood events. However, people think that to have more sons is an advantage when dealing with the after effects offlood events. People perceive that sons can help to repair their houses, earn money, and help to repay loans borrowed during flood periods. The perception may further lead to increased fecundity fertility and population growth in vulnerable areas in Bangladesh.

2. Literature review

2.1. Population dynamics and climate change (Bangladesh)

The Bangladesh Demographic and Health Surveys (BDHS, 2014) reported that Bangladesh's population in 2014 was around 158 million compared with 80 million in 1981, thus doubling in nearly 30 years. United Nations has estimated that the population of Bangladesh would be about 202 million in 2050 (UN, 2015). Median age at first marriage for those women who are in their mid to late forties is 15 years and those women who are in their early twenties is 17.2 years (BDHS, 2014). Socio-economic factors such as poverty, social insecurity, unemployment and social pressure influence early marriages and/or age at first marriage (ISLAM ET AL., 2016; HOSSAIN ET AL., 2015). Early marriage is more common among the poorest families (HOSSAIN & ISLAM, 2013; ATIQUL HAQ, 2013; PARSONS ET AL., (2015). The fertility rate in Bangladesh has declined dramatically from 6.3 children in 1975 to 2.3 children in 2014 (BDHS, 2014). BDHS (2014) shows that total fertility and the age specific fertility rate (ASFR) are higher in rural areas than in urban areas. ASFR is higher for the group 15-19 years of age in rural areas than in urban areas. This strongly suggests that women in rural areas are married and give birth at an early age. Fig. 1 shows the regional variation of the fertility rate between 2007, 2011 and 2014 in Bangladesh. This study found that fertility is comparatively higher in the Chittagong and Sylhet divisions than in other divisions in the country.

Due to exposure to extreme weather events such as flood, cyclones etc, most of Bangladesh's population are vulnerable and more people will be exposed to climate change risks (AGRAWALA ET AL., 2003). According to the CLIMATE RISK INDEX (2015), Bangladesh is in sixth position for experiencing more extreme weather events (KREFT ET AL., 2014). Particularly, the economically poor,

natural resource dependent rural households are likely to experience a disproportionate burden of these adverse impacts of climate change (OLSSON ET AL., 2014). From 1951 to 2010, Bangladesh experienced 51 flood events and these were more frequent in the last decade. After the independence of the country in 1971, the country faced 9 flood events in 1970s, 1980s and 1990s and 10 flood events occurred in the last decade (FFWC, 2012). In the 1980s and 1990s the country faced drought events that happened only once in the last two decades while the number of tornadoes has increased and the number of cyclones has fluctuated (PLANNING COMMISSION BANGLADESH, 2009). SHAHID ET AL., (2012) collected data on daily temperatures changes from 1961 to 2008 and found an increase in the minimum and maximum temperatures of 0.15°C and 0.11°C respectfully per decade for Bangladesh. There is also evidence of an increase in the minimum temperature worldwide (ADGER ET AL., 2005). SHAHID & KHAIRULMAINI (2009) collected data from 1969 to 2003 of the average annual rainfall and found fluctuations from year to year and an increase in the recent years in Bangladesh. It is evident that extreme events such as floods and cyclones have increased with the increase in rainfall and temperature over the last decade in the country (SHAHID, 2012).

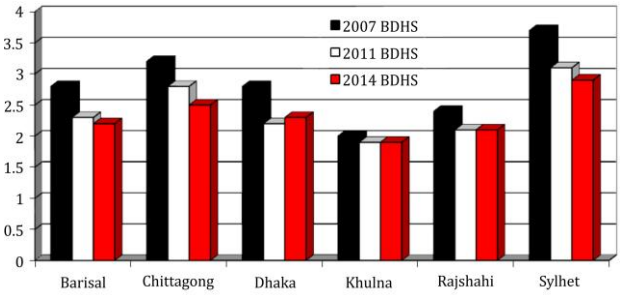

Fig. 1. Total fertility rate (TFR) by divisions in Bangladesh

2.2. Socio-economic and cultural factors affecting fertility behaviour in Bangladesh

Most of the country's people live in rural areas with limited means and have little access to social opportunities like education, health care, or have alternative sources of income. Almost a doubling population size by the year 2050 (GAYEN, 2002) will consequently cause difficulties in upgrading the countries Human Development Index (HDI). CLELAND ET AL. (1994) argued that social forces highly influence reproductive choices worldwide. Economic and social institutions, such as demand for extra-labour, religion etc support a preference for high fertility. The economic and social value of children, especially sons, strongly influences fertility. A study by RAHMAN & JULIE (1993) in Matlab, Bangladesh, found that if a woman has at least one daughter, the chance of a subsequent birth is negatively related to the number of sons. They also found that women with no daughters also prefer to have a subsequent birth. Since parents perceive that their children, especially sons, will provide a dependable form of assistance (CAIN, 1978, 1983; CLELAND ET AL., 1994).

Education can play an important role in reducing fertility and gender preference. BECKER (1981) mentioned that the rural poor people face a dilemma between giving their children good educational opportunities and putting them into traditional work. Instead of sending children into education, the rural poor prefer sons who can be part of the labour force (CLELAND ET AL., 1994; AHMED & QUASEM, 1991). GORNEY (2011) discussed that a girl's education becomes shortened by not only early marriage but also the practical considerations of their parents who want to spend their money on their sons. HOSSAIN ET AL., (2007) found an association between men's reproductive health knowledge, and their attitudes and behavior with their wives' subsequent reproductive behavior. BELT (2011) reported that one government health worker in Satkhira (coastal area and vulnerable to extreme weather events) in Bangladesh visited thousands of homes and persuaded newly married couples to plan their family's size and to use contraception. But the health worker said that men put pressure on women to have lots of children. Education is positively associated with the age at which women marry (KABIR ET AL., 2001), their access to contraception (ERICA & ATTILA, 2005) and these are inversely related to the level of fertility (KHUDA & HOSSAIN, 1996). SAHU ET AL., (2012) in a study in India and Bangladesh mentioned that high fertility in religious minority groups is due to a socio-economic disadvantageous position and gender preference (RAD ET AL., 2012).

2.3. Perception, extreme weather events and fertility preference

The adverse impacts of climate change on human vulnerability are extensively influenced by different factors such as demographic changes, geography and social and cultural factors (JIANG & HARDEE, 2011). Regarding environmental shocks (e.g. earthquakes, tsunami etc) and fertility behavior in Italy and Japan, LIN (2010) attempted to understand how uncertainty (e.g. natural disasters like earthquake and tsunami) influenced people's fertility behavior and found a strong negative association between disaster and fertility, especially marital fertility.

In these countries, natural disasters cause a decrease in fertility and people are reluctant to have children. On the contrary, people living in developing countries like Bangladesh usually face uncertainty about the adverse impacts of floods and the uncertainty influences them to prefer more sons (Sasson & Weinreb, 2017). Biddlecom et al., (2005) claimed that people's perception towards resource scarcity has a positive effect on their fertility preference and preference for a son. Dasgupta (1998) argued that families in developing countries depend on child labour for extracting natural resources and consider different uses of child labour (e.g. carrying fresh food/water, collecting fuel wood (Cain, 1978; Loughran & Pritchett, 1997; Dasgupta & Maler, 1995; Haq, 2011). A study in Nepal argued that awareness of poor environmental conditions lowers the demand for additional children since people see the damaging effects of overpopulation on the environment (Axinn & Barber, 2005; Ghimire & Mohai, 2005). On the other hand, some studies claim that a high preference for a large family is due to poor environmental conditions (Axinn & Ghimire, 2002; Foster & Rosenzweig, 2003). Several post-hurricane fertility studies in the United States reveal that fertility both increases and decreases after strong storm events (Davis, 2017; Cohan & Cole, 2002; Evans et al., 2010; Hamilton et al., 2009). Another earthquake study on the 2003 earthquake in Bam in south-central Iran found a decrease in the local fertility rate in 2004, followed by a rise in the fertility rate in 2006–2007 (Hosseini Chavoshi & Abbasi-Shavazi, 2015). The study investigated people living in vulnerable areas to see how extreme weather events (floods) influence their fertility preference. Biddlecom et al., (2005) claim that declining environmental conditions may influence people to prefer more additional sons. Presence of this perception in vulnerable areas may increase fertility preference and add to the population which brings impacts on environmental sustainability and sustainable development (Rosero-Bixby & Palloni, 1998).

3. Methodology

3.1. Location of the study

Bangladesh is located in South Asia with 88% Muslim population, 88.7% men headed households and only 11.3% women headed households (Bangladesh Bureau of Statistics, 2007). The country has eight divisions, and is further divided into 64 districts and 496 upazilas (sub-districts) (Bangladesh Bureau of Statistics (BBS), 2001). The study village, Sharat pur, is located in Jamalganj Upazila in Sunamganj District. The Upazila has three main rivers named Nawa Gang, Baulai and Dhanu, and floodplains named Pakna Haor and Hail Haor. The total population in Jamalganj Upazila is 107,771 with 55,769 males (51.75%) and 52,002 females (48.25%). The literacy rate (7+ years) is 20.1% whereas the national average is 32.4% and the population (18+ years) is 53,158 in Jamalganj (Bangladesh Bureau of Statistics, 2001). Fig. 1 shows the Jamalganj Upazila in Sunamganj District where the study village Sharat Pur is situated. The present study village was selected due to the fact that it regularly faces the adverse impacts of flooding. NGOs like Association for Social Advancement (ASA), Bangladesh Rural Advancement Committee (BRAC) and GRAMEEN Bank have projects dealing with disaster management and vulnerability in the village. The European Union (EU) also has a project on vulnerability and disaster management in Sharat Pur. One of the employees working for ASA NGOs suggested the village as a study location and source of primary information. The employee was experienced and had connections with other employees working on disaster management in Sunamganj including this study village. The employee provided important information on how to access the location and about the study population.

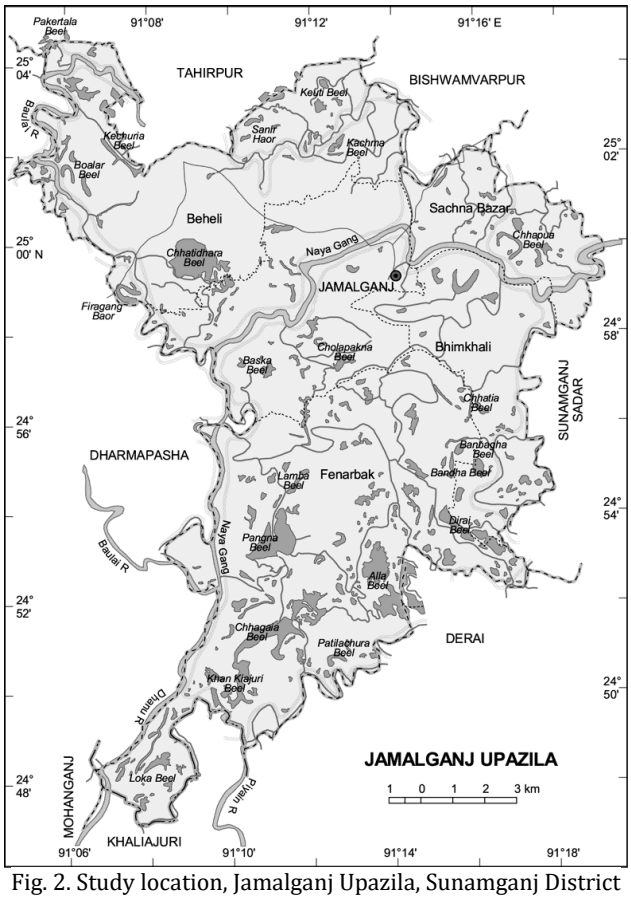

Fig. 2. Study location, Jamalganj Upazila, Sunamganj District (Source: SonaliSylhet, Retrieved at http://www.sonalisylhet.com/jamalganj.php)

3.2. Target population and sampling

The study selected Sunamganj district from 4 districts in the Sylhet Division and Jamalganj Upazila from 10 Upazilas in Sunamganj district with 165 villages. Sharat pur village is the most vulnerable village in the area with frequent floods. The study followed a multistage sampling process for selecting the district, Upazila and the study village and it was purposive. The study included married and unmarried people (men and women) through a field study. The study included unmarried women to know how they perceive the impacts of extreme weather events and fertility preference and compared these with married women. A family planning worker working in the village reported that the population of Sharat Pur is 808 with 403 males and 405 females (including children).

Table 1. Socio-demographic characteristics of respondents

Socio-demographic characteristics		Number of respondents	Percent
Gender	Male	60	38.0
	Female	98	62.0
	Total	158	100.0
Religion	Muslim	122	22.8
	Hindu	36	77.2
	Total	158	100.0
Marital status	Unmarried	24	15.2
	Married	134	84.8
	Total	158	100.0
Age (years)	16–25	46	29.1
	26–35	32	20.3
	36–45	37	23.4
	46–55	21	13.3
	56–65	11	7.0
	65+	11	7.0
	Total	158	100.0
Years of schooling	1–2	5	3.2
	3–5	23	14.6
	6–8	16	10.1
	9–11	18	11.4
	12–14	2	1.3
	Nil	94	59.5
	Total	158	100.0

The study used 'convenience sampling' (HAQ & AHMED, 2017) and collected relevant information from 158 responders (60 males and 98 females). The study interviewed responders - those in the house and willing to be interviewed. The study aimed to include at least 20 responders from each age group (10 males and 10 females). However, in practice, this was not possible and the number of respondents from each age group varied. The study interviewed more respondents of middle age compared with other age groups (Table 1). The number for those aged 16-45 was proportionally higher compared with other age groups. The study counted respondents in each age category and then interviewed those from an age group with few respondents. In this case, the study followed 'quota sampling' (HAQ & AHMED, 2017).

3.3. Techniques of data collection

This study used a questionnaire survey about socio-demographic characteristics and the impacts of flooding and fertility preference. The study also conducted in-depth interviews especially about the impacts of flooding and fertility preference and gender preference. The study recruited seven assistants, particularly Sociology students, from Shahjalal University of Science and Technology, Bangladesh to collect data and complete the field study. The study formed four groups (each group with two persons) and divided the village into four parts to include respondents from each corner of the village. Female assistants interviewed female respondents who felt shy and were not willing to be interviewed by male assistants. Every interview took about 45 minutes to one hour. The study interviewed married men when they were back home after work in the evening and gathered information in the respondent's local language on their experiences of extreme floods in relation to fertility preference. The study interviewed respondents whether they prefer to have a large family, and more sons, or not during flood periods; whether the risk of their children dying influenced them to prefer additional children or not; and whether they believed that the occurrence of extreme floods and having more children are acts of God. The study conducted fifteen in-depth interviews (seven from male respondents and eight from female respondents) and requested respondents to provide their thought in details on the impacts of extreme weather events, especially floods, and for preferring more sons than daughters. Respondents who were considered as informative, having detailed understanding and more experience with the impacts of flooding, were selected for in-depth interviews during the questionnaire survey. The majority of the respondents (62%) were female and stayed at home doing domestic work (Table 1). However, it was difficult to reach male inhabitants since they go out to work early in the morning and come home late in the evening.

3.4. Techniques of data analysis

The study used both qualitative and quantitative methods in studying population dynamics and climate change. Using both methods can provide findings that are more comprehensible and provide policy suggestions for effective interventions to overcome the challenges of population and climate change issues at local and regional levels (HUMMEL ET AL., 2013; SCHULTZ & ELLIOTT, 2013). The study summarized the collected information and used descriptive statistics such as frequency distribution, crosstab and central tendency (mean and median for interval/ratio level data and mode for nominal/ordinal level data). The study also used ANOVA tests to check whether the tests were statistically significant or not. Calculated value of Cronbach's Alpha is 0.651 and Guttman Split-Half Coefficient is 0.631 which shows the reliability and consistency of the information collected from the village of Sharat Pur. WEI ET AL., (2009) in China, TATLIDIL ET AL., (2009) in Turkey and RAHMAN (2003) in Bangladesh used the five-point Likert scale and used different items on environmental perception. The present study also adapted the five-point Likert scale and used items on the impacts of extreme events and fertility preference and scored responses (5 for strongly agree, 4 for agree, 3 for unsure, 2 for disagree and 1 for strongly disagree). The above mentioned studies calculated perceptions by taking the arithmetic mean of all the item scores where a higher arithmetic mean reflects a higher level of perception and a low mean reflects a low level of perception (WEI ET AL., 2009; TATLIDIL ET AL., 2009; RAHMAN, 2003). The present research included seven items about extreme weather events (floods) and its connection with fertility preference and son preference. The study included all respondents who provided their opinion on: (1) managing a large family is a burden during extreme floods, (2) a large family size puts pressure on natural resources especially during extreme floods, (3) family planning programs can lower family size and put pressure on families during flood periods, (4) insurance and support from the government can help recovery after extreme flood events and lower high fertility preference, (5) a large family size is not an advantage during extreme floods, (6) sons are not future security against extreme floods and (7) extreme flood events and having more children do not occur, by the wish of God.

4. Results

4.1. Perception, family size preference and extreme weather events (floods)

In the study in Sharat Pur, the adverse impacts of flooding influenced people's perception about fertility preference and son preference. Results of this study show that 84% of respondents do not think that a large family size is advantageous during a flood (Table 2). However, 16% thought a large family size was advantageous in tackling the adverse impacts of flooding through providing lots of helping hands to transfer things to a safe place and in sharing work. Considering all age categories, this study also shows that young people (16-25 years and 26-35 years) did not think that a large family size is advantageous whereas a higher proportion of the older population did (56-65 years and 65+ years) (Table 2).

Table 2. Perception about large family size and floods

Large family size is advantageous during extreme floods	Reasons	16–25 % [N]	26–35 % [N]	36–45 % [N]	46–55 % [N]	56–65 % [N]	65+ % [N]	Total: % [N]
No	Difficult to manage food and accommodation	15 (22)	11(17)	8(12)	6 (9)	3 (5)	3 (5)	84 (125)
	Difficult to work and earn money for subsistence	3 (4)	1 (2)	3 (4)	0 (0)	1 (1)	0 (0)	
	Difficult to move to a safe place	3(4)	5 (8)	4 (6)	1 (1)	1 (2)	0 (0)	
	All the above	4 (6)	0	5 (7)	4 (6)	1 (2)	1 (2)	
	Total	24 (36)	18 (27)	19 (29)	11 (16)	7 (10)	5 (7)	
Yes	A large family can help to carry things in a safe place during flood periods	5(7)	2 (3)	3 (4)	3 (5)	1 (2)	2 (3)	16 (24)
	Total	5 (7)	2 (3)	3 (4)	3 (5)	1 (2)	2 (3)	
Total: Percent (N)		29 (43)	20 (30)	22(33)	14(21)	8 (12)	7 (10)	100 (149)

This study conducted in-depth interviews and summarized respondent's opinions and 'paraphrased' translations of key information. An unmarried male respondent (22 years, Muslim) said that a large family is problematic during flood periods because it is difficult to find new accommodation and to move to a safe place. A married male respondent (24 years, Muslim) said that a large family requires more space and more food and it is harder to move to a safe place. A married female respondent (27 years, Hindu) said that for large families it is difficult to stay alive and keep her children from perishing. Another married female respondent (35 years, Muslim) said that during flood periods she faces difficulties with her large family because they cannot find a new large enough accommodation and cannot take proper care of all the children.

In general, people with more children who experienced difficulties during flood periods mentioned that a large family is disadvantageous since they have to manage food, accommodation and their children as well. Regarding marital status, married people in Sharat Pur are relatively more concerned than unmarried people about the impacts of a large family size during extreme floods. They face real difficulties in having more children and closely observe the impacts of having a large family. As a result, they perceive having a large family size as disadvantageous during flood periods. Married women particularly said that it is very difficult to find food and accommodation for a large family and usually face the majority of the difficulties.

Table 3. Items and opinions on large family size and extreme flood events

Items	Large family size is advantageous during floods	Mean of scores
1. Large family size is a burden during floods	Yes (N=24)	3.3
	No (N=132)	4.0
2. Large family size puts pressure on natural resources	Yes (N=24)	3.2
	No (N=132)	4.2
3. Family planning programs can reduce fertility preference	Yes (N=24)	3.8
	No (N=132)	4.3
4. Insurance and support from the Government can reduce fertility preference	Yes (N=24)	3.9
	No (N=132)	3.8
5. A large family size is not important during flood periods	Yes (N=24)	3.3
	No (N=132)	3.0
6. Sons are not future security against extreme floods	Yes (N=24)	3.0
	No (N=132)	3.7
7. Extreme floods and having more children does not occur as an act of God	Yes (N=24)	2.3
	No (N=132)	2.3

The study included respondent's opinions on different items and their reactions reveal their understanding and perception about the relation between the effects of flooding, family size preference and son preference. ANOVA tests considered respondent's opinions on large family size (advantageous or disadvantageous) as a dependent variable. The tests considered scores from their responses on different items as independent variables. Results show that there is a statistically significant difference between people who think that a large family size is advantageous and those who do not, regarding the burden of a large family, pressure on natural resources, family planning programs, and a large family not an advantage during extreme floods. ANOVA tests show $P<.01$ for the variables. People do not consider a large family size as being advantageous during floods. ANOVA tests also show a statistically significant difference between considering a large family size advantageous or disadvantageous and sons are not a support and future security against extreme floods ($p< .01$). This indicates that some people who consider a large family size as advantageous also thought of sons as helping hands, insurance and future security. However, people who consider a large family size as disadvantageous had different opinions, for example, considering them to be a burden during times of crisis. Results also show whether people perceive a large family size as advantageous or not, most of them consider that extreme weather events (floods) and having more children are the wish of Allah or Bagman. Table 3 shows the mean for the respondents who think that

a large family size is advantageous and those who do not think so. The results show that people who perceive a large family size as being disadvantageous also perceive that the management of a large family size is a burden, a large family puts pressure on natural resources and family planning programs can reduce fertility preference (above 4.0). The people who did not think that a large family is advantageous during extreme floods had a high level of perception of the above-mentioned items than those who consider a large family to be beneficial during extreme floods. A mean between 3.5 and 4.0 regarding family planning programs implied that some people are concerned about this issue. This might be due to the family planning worker working in Sharat Pur. The family planning worker said that she visits this study village at least once every two-four weeks. She tries to inform the villagers about the benefits of family planning programs and a small family. Regarding insurance and support during extreme events, the same means (between 3.5 and 4.0) for both groups (who considered a large family size to be advantageous or who don't) implies that many people from both groups agree that insurance and support from the government or NGOs during extreme flood events can reduce the high fertility preference. Whether people believe that having a large family is beneficial, or not, most people think that having more children and the occurrence of extreme weather events are especially acts of God.

4.2. Perception, gender preference and extreme weather events (floods)

The study investigated opinions about gender preference during flood periods. Results show that 35% of males and 44% of females prefer to have more sons than daughters. Most males mentioned that sons could do more hard physical work during flood periods. Many females said that sons can work outside and can move freely without restrictions. This is due to the patriarchal nature of their society. Most females perceive that their daughters cannot go out and move about easily. Women always depend on men for moving to a safe place and managing food. As a result, they believe that sons can contribute a lot to their family. Descriptive statistics show that in general, 78% of total respondents mentioned that sons are important and advantageous and prefer to have more sons. Only 22% of respondents consider sons and daughters to be of equal value and help during a crisis (Table 4).

Table 4. Gender and opinions about son preference over daughters during extreme floods

Preference to sons	Reasons	Male % [N]	Female % [N]	Total: % [N]
Yes	Sons can do hard physical labour	20 (29)	18 (25)	78 (111)
	Sons can work outside and move easily	14 (20)	26 (37)	
	Total	35 (49)	44 (62)	
No	Both are equal and have no gender preference	6 (9)	15 (21)	22 (31)
	Daughters will stay with parents, but a son may leave with his wife after marriage	0	1 (1)	
	Total	6 (9)	15 (22)	
Total: Percent (N)		41 (58)	59 (84)	100 (142)

During the field study in Sharat Pur, different opinions from respondents were recorded. A few of the opinions from respondents are mentioned below. These opinions are not an exact literal translation but a summary of what the person said. An unmarried man (16 years, Muslim) said that boys can move possessions to a safe place, can save others and can swim, but most girls cannot swim. A married woman (22 years, Hindu) mentioned that boys can easily help save important belongings from extreme floods but girls cannot go out, or Hinduism forbids work with boys. A married male respondent (23 years, Muslim) said that boys can handle any difficult situation since they are physically able to work hard and are able to tackle crises. A married woman (38 years, Muslim) said that if we have more boys, we do not need to borrow money with high interest from business men or NGOs and we would not face so many repayment problems. She added that if we have more sons, they can do hard work and earn money. A married man (42 years, Muslim) mentioned that only boys are permitted by religion to go out and girls are not able to do the same work as boys can do. A married female respondent (50 years, Hindu) said that boys can help to rebuild houses destroyed by extreme floods and they can go out to collect resources, but girls cannot go out and

it's not good for girls to go out for work or to collect resources.

Opinions mentioned above indicate that people living in the vulnerable area desire to have more sons than daughters because sons can handle difficulties, earn more money, help to rebuild houses, repay loans and go out and move easily. People mentioned that having sons depends on the wish of God. That indicates the influence of religion on fertility preference. The patriarchal system also supports specific gender preference. In this sense, even their consideration of a large family size being either advantageous or disadvantageous, during flood periods, is less influential in their thinking than the local patriarchal culture. People who preferred sons mentioned the need to have more sons to tackle the adverse impacts of extreme floods. Their argument is that they are usually affected by floods every year. In the case of insurance and support during extreme weather events, field level observation shows that people living in vulnerable areas believe that they do not receive enough support from the Bangladeshi Government during a crisis. People living in these areas find that initiatives for extreme floods and related insurance and support from governmental or non-governmental organizations are not adequate for tackling the adverse impacts of floods. As a result, they consider having large families, particularly many sons, as advantageous.

4.3. Perception, risk of dying during floods and fertility preference

In the case of Sharat Pur, some people mentioned that they already have a few examples of their children dying. A few people said that their children had died due to the adverse impacts of floods. Extreme floods sometimes took their small children away and they were not able to save them. During the field survey, a few people said that if they have more children, especially sons and one of them dies during a crisis, then others will survive and help them. They also said that whether children survived, or died, totally depends on the wish of God.

Table 5. Opinions on the risk of dying during extreme floods

Items	Risk of children dying creates a preference towards additional children	Mean of scores
1. Large family size is a burden during flood	Yes (N=28)	3.8
	No (N=123)	3.9
2. Large family size puts pressure on natural resources	Yes (N=28)	3.8
	No (N=123)	4.1
3. Family planning programs can reduce fertility preference	Yes (N=28)	4.2
	No (N=123)	4.2
4. Insurance and support from government can reduce fertility preference	Yes (N=28)	4.1
	No (N=123)	3.8
5. A large family size is not important during flood periods	Yes (N=28)	2.9
	No (N=123)	3.1
6. Sons are not future security against extreme floods	Yes (N=28)	3.3
	No (N=123)	3.1
7. Extreme floods and having more children does not occur as an act of God	Yes (N=28)	2.4
	No (N=123)	2.3

ANOVA tests considered opinions on the risk of dying as one of the factors for preferring additional children as the dependent variable and the scores for a large family as a burden, pressure on natural resources, family planning program, insurance and support, large family not an advantage, sons as security against extreme floods and extreme floods and having more children as an act of God as the independent variable. ANOVA tests did not show any statistical significance for people's opinions regarding the risk of their children dying and their responses on different Items ($p>.05$). Table 5 shows a high-level perception (above 4.0) for people who did not consider that the risk of their children dying during extreme floods as regarding pressure on natural resources and family planning programs. People who prefer additional children as a response to the risk of their children dying agree to receive support and insurance from the government or NGOs during extreme floods. They believe that

support from the government or NGOs can reduce the risk of extreme floods and fertility preference.

The research also included the key opinions of respondents about the risk of dying during extreme floods and fertility preference. Respondent's opinions were summarized andthese opinions are 'paraphrased' translations. An unmarried female respondent (18 years, Hindu) said that it is uncertain whether her children will die during flood periods or not. A married female respondent (41 years, Muslim) said that it doesn't matter how many children I have, but I should keep them in a safe place. If Allah wants to take one of them away from me, then what can I do. But I do not have any preference for further reproduction. A married female respondent (42 years, Muslim) said that everything depends on Allah's wish whether I will have any additional children or not and whether they all survive or die depends on the wish of God. Religious values strongly influence people's preference for more sons. They even think the happening of extreme flood events and children surviving during extreme floods with their religious values as well.

5. Discussion and conclusions

The study considered that people who are more concerned about the impacts of extreme weather events (floods) are more likely to reduce their preference for having many children. People consider having a large family creates more difficulties during flood events such as managing food, moving children and their belonging to a safe place. However, they only consider a large family as a burden when they face extreme flood events. Respondents expressed their desire to have more sons or at least as many children as they have. These findings differ from the studies conducted in Chitwan Valley, Nepal by AXINN & BARBER (2005) and GHIMIRE & MOHAI (2005). They concluded that people living in the Valley revised their fertility preference as they observed environmental degradation induced by humans. People generally prefer having more sons than daughters. People generally want to have more sons to help and contribute to tackling the damage caused by extreme flood events. Other studies in Bangladesh conducted by CHOWDHURY & HARVEY (1994), CLELAND ET AL., (1994), CAIN (1983), CARR & KHAN (2004) found that having more sons is perceived as future security. The support they are getting from NGOs and/or their Government is not enough for them during extreme floods. It leads them to borrow money during the extreme flood period from local business persons with high interest who pressure them to repay the loans. As a result, they prefer to have more sons as a social insurance and future security during extreme weather events (floods). This differs from the arguments of BORD ET AL., (1998) who mentioned that people who are concerned about the adverse impacts of climate change would be more likely to take initiatives themselves and support governmental and non-governmental initiatives. There is a lack of support from the government and NGOs, and high pressure to repay loans with interest. As a result, people's reproductive decisions to have more children especially sons is high in the study village of Sharat Pur. People living in Sharat Pur believe that whether their children live or die depends on the will of God though they did not mention that risk of dying during floods influences their fertility or son preference. Since people living in the vulnerable areas are at risk of extreme weather events and have trouble during extreme events, they may consider having more sons in case one of them dies during the crisis periods. LUTZ ET AL., (2006) argued that a high risk of infant mortality might influence the parents to have more children. FINLAY (2009) in a study on fertility response to natural disasters (earthquakes) in India, Pakistan and Turkey found that people have a 'positive response' to child mortality and want to have a one-for-one replacement. A study by AHMED ET AL., (2001) found that women who have experienced child deaths had a higher mean number of childbirths. Death of a child motivates people to replace the dead child in Bangladesh. However, Sharat Pur is highly vulnerable and at risk of extreme floods, and people living in the village do not perceive the risk of their children dying to influence them having more children.

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