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An Analysis of Health Situation of Women and Children at the Char of Gangachara Upazilla: A GIS based Case Study

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Abstract- Every year in Bangladesh substantial life of women and children are lost through various diseases. The study area of Gangachara is one of the monga-prone areas in Bangladesh. The river, Tista has a big influence on the livelihoods of the people of Gangachara. Healthcare situation in the chars is poor. But health is a basic requirement to improve the quality of life. Floods and erosion disrupted the lives of char dwellers. The victims of erosion lose their settlements, agricultural lands and employment and are forced to move elsewhere sometimes on a yearly basis. Bangladesh is still lagging behind in the field of environmental health. The Level of morbidity remains very high in Bangladesh. Much of the sickness, ill health and resultant deaths in this country are due the overall degradation of the environment. More than 80% population in Bangladesh live in rural areas and environmental problems are more acute in the rural areas of the country.

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I. Introduction

The riverine sand and silt landmasses known as char in Bengali are home to over 5 million people in Bangladesh. These areas are highly vulnerable to sudden and forceful flooding as well as erosion and loss of land, which makes living in the chars both hazardous and insecure. Many char dwellers struggle to produce or buy enough food to eat and malnutrition and micronutrient deficiencies are more common than elsewhere in the country. The chars- some midstream islands and others attached to the mainland–are created from river sediment and are in a constant state of formation and erosion. Emerging chars create new areas for settlement and cultivation, an important resource in a land scarce country such as Bangladesh. However, a constant threat of riverbank erosion and flooding, combined with a lack of physical infrastructure, government services and employment opportunities in the chars, makes for a vulnerable, difficult and fragile way of life. Char dwellers are considered poorer than the mainland population and are increasingly becoming the targets of efforts to reduce property. Nevertheless, there is still very little quantitative information on the health, nutrition, and food security of these vulnerable people, partly because they are highly mobile and access to the chars is physically difficult. Floods damage or destroy crops, homes, water and sanitation facilities and other assets and hinder access to food, medical care, schools and work. The victims of erosion lose their settlements, agricultural land and employment and are forced to move elsewhere, sometimes on a yearly basis. The main concern of this study is to assess the health situation of women and children at the chars of Gangachara Upazilla. It will also focus on the present problems of healthcare system to provide the char dwellers a better health care system.

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II. Statement of the Problem

Every year in Bangladesh substantial life of women and children are lost through various diseases. Gangachara, the study area, is one of the monga-prone areas in Bangladesh. The river Teesta has a big influence on the livelihoods of the people of Gangachara. Name of the major chars of Gangachara are Binbinia char, Motukpur char, Kolkond char, kholair char, Nohalir char and Malai char. Healthcare situation in all the above mentioned chars is poor. But healthy is a basic requirement to improve the quality of life. A national economic and social development depends on the state of health. A large number of Bangladesh's people, particularly in char areas, remained with no or little access to healthcare facilities. Gangachara Upazilla has an area of 9.86 sq. km. The town has a population of 12,600 out of which 52.02% is male and 47.98% is female. Only 15.1% female are literate. There are ten family planning centre, two satellite clinics and a health complex. This study will determine the health situation of women and children at the major char areas of Gangachara Upazilla.

a) *Aim of the Study*

- To demonstrate the present health situation of women and children at the char areas of Gangachara Upazilla.

b) *Objectives of the Study*

The objectives of the study are:

- To know about the health problems and facilities of study area.

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- To know about the consciousness level of women and children health of study area.
- To know about the environmental effect on women and children health of study area.
- To analyze related aspects of concern areas from maps and satellite images by using GPS.

c) Study Area

Study area is uttar kolkanda mouza located in Gangachara upazila of Rangpur district, Bangladesh. Gangachara upazila was established in 1917 and consists of 9 union parishads, 93 mouzas and 149 villages. Total area of Gangachara Upazila is 209.61 sq km. Gangachara (Town) consists of two mouzas. It has an area of 9.86 sq km. The town has a population of 12600; male 52.02%, female 47.98%. The density of population is 1278 per sq km. Literacy rate among the town people is 28.6%. Gangachara is noted for tobacco production.

Table 1 : Unions of Gangachara Upazila

Union Name	Number of Mouza	Number of Villages	Area (Acres)	Number of Household	Population	Literacy (%)
Betgari	10	14	6029	5309	23065	31.11
Kholeya	6	12	5936	5430	23749	34.89
Borobil	8	10	8543	7758	32446	35.65
Kolkanda	10	9	8558	5428	24415	32.61
Laxmichari	8	11	6703	4095	17379	30.66
Gojghota	9	9	4761	4244	28018	45.99
Mornea	13	26	5106	5869	25176	37.07
Nohali	7	7	7667	5276	21428	20.78
Alsabadchar	13	13	7175	7820	30983	28.19
Gangachara	93	149	66638	60674	259856	32.95

Source: Upazila Statistical Office

Table 2 : Various mouza of Kolkanda Union

Mouza Name	JL No	House Hold	Total Population
Chilakhal	1	453	2075
Matukpur	2	659	3397
Kismat Matukpur	3	469	1804
Jitpur Sreeram	4	1722	7719
Binbina Char	5	16	63
Kuribisha	9	109	460
Uttar Kolkanda	7	1188	5383
Arazi Sreeram	6	360	1582
Ale Kismat	8	452	1932
Kolkanda Union	8	5428	24415

Source: Upazila Statistical Office

d) Binbinia Char and Motukpur Char

These two char is located in kolkanda union. These are one of the most deprived areas in the northern Bangladesh. Most of the people of these areas are landless and marginal farmer. In different times their land property was taken away by river bank erosion and river channel shifting. Binbinia char and Avazi Sreeram are situated to the east of this mouza and Ale kismet Mouza is situated to the west, top part of this mouza touched with Motukpur mouza. Location of study area-

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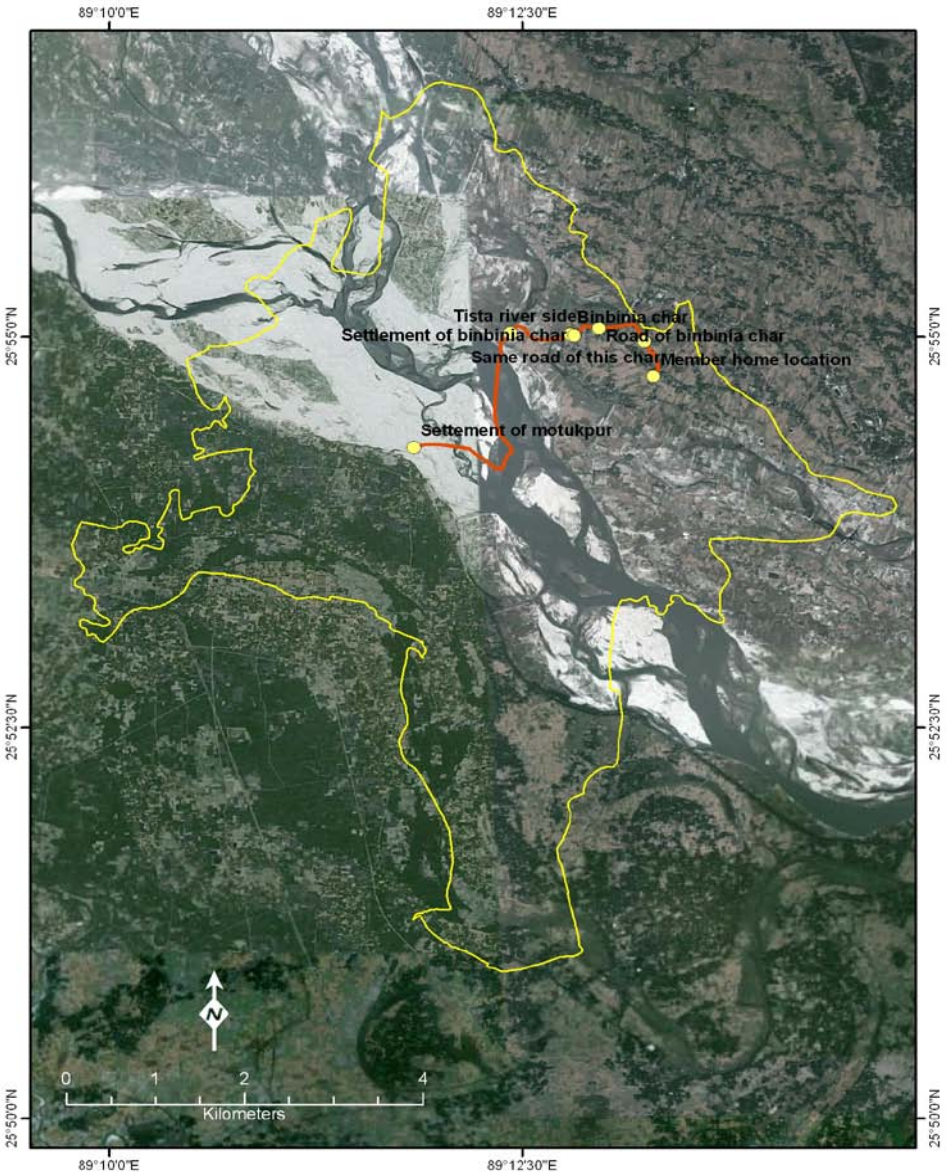

Figure 1 : Location of study area

III. Research Methodology

Systematically sampling has taken to collect social data or information. To have performed the analysis on the data sets and derived the findings, GIS, as usual descriptive statistical tools and techniques have been applied in the study. Here, two types of primary data (socio-economic and geographical) are collected from the field by conducting questionnaire survey, FGD and GPS device etc. Major primary sources which will be conducted in four ways-

(i)In-situ Observation, (ii) Formal Questionnaire Survey, (iii) FGD, (iv) GPS Survey.

Here, noted, The GPS technology has tremendous amount of applications in GIS data collection, surveying, and mapping.

The source of secondary data is publication of Government Agencies, Publication of Related NGOs and Satellite Images. Satellite image is collected from Google Earth.

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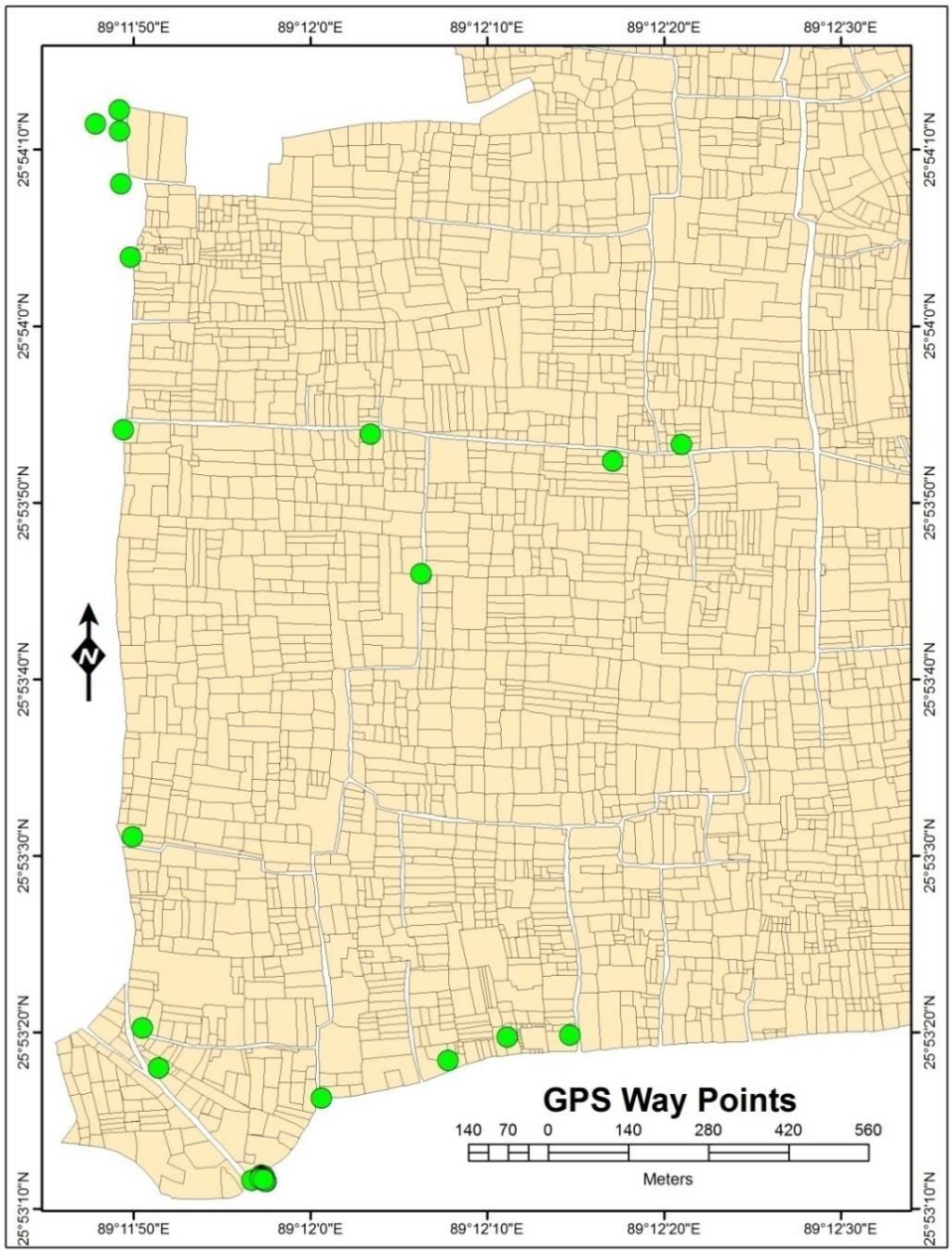

Figure 2 : GPS Data (way pints) of the study area

GPS survey was conducted to get some points for geo-referencing maps and images. I have collected 15 reference points including my study area.

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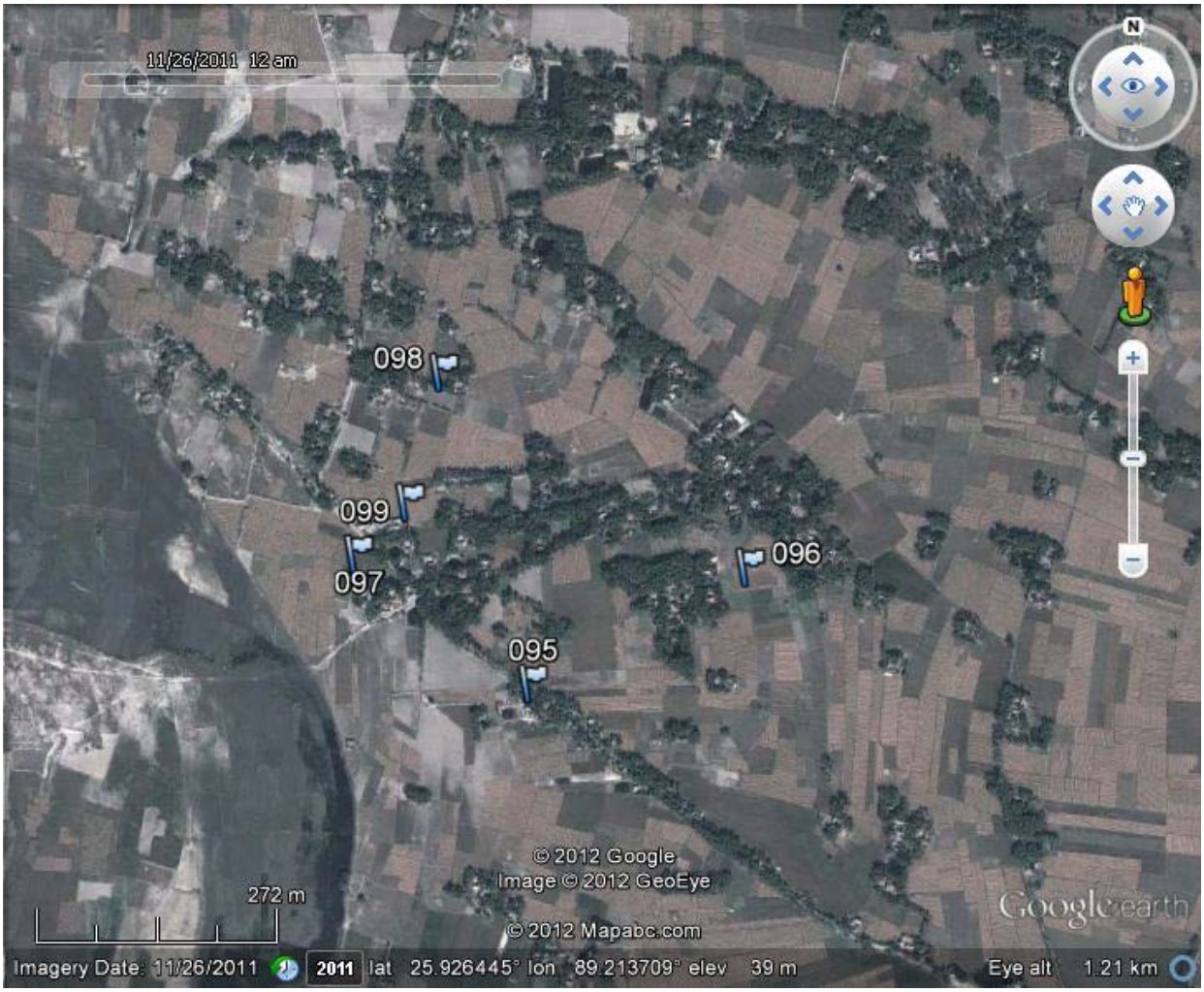

Figure 3 : Way points of study area

So, I made a questionnaire field survey in this char on selected women and children and collected primary data. There have 148 household in this mouza. The sample was selected randomly from this and the sample size was 148. The personal interview of members of union, Upazilla and others was also conducted during field investigation.

The collected satellite image 'Spot Image' and the spatial resolution of this image is 5m×5m.

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Figure 4 : Satellite Image of the Study Area

Through questionnaire survey: The questionnaire was designed considering following four variables, this are-independent, dependent variable, controlled variable, uncontrolled variable. The questionnaire tried to collect five different types of information from the study area. Such as-General Information, Social/Economic Information, Land Related Information, Physical and Environmental Information, Land Management and Legal Information.

IV. Data Analysis Tools

a) Major data analysis tools were-

- Microsoft Excel and SPSS for numerical data analysis;
- Arc GIS, Arc View and Erdas Imagine for Raster Data analysis.

b) Image Analysis Software

Various software is used for image analysis. Some are used for collecting image and joining and others for creating shape file and calculating geometry of various features. The software are used for image analysis is mentioned below with their function.

Table 3 : List of used software for image analysis

S.N	Software	Functions
1	Google Earth	Image Collection
2	Adobe Photoshop	Image Joining (Manual)
3	Auto Stitch	Image Joining (Automatic)
4	Arc View 3.3	Database management
5	Arc GIS 9.2	Georeferencing, DBM, Projection, Creating features, calculation of geometry etc.

c) Image Processing

Image processing means set of techniques such as- image collection, geo-referencing and geo-correction of image, defining projection, digitization etc. Image processing techniques used in this research is briefly mentioned below:

i. *Geo-referencing*

GIS users analyze relationships among real-world objects. Features in a GIS must be georeferenced so data can be correctly related to locations on the earth's surface. Georeferencing data is accomplished by assigning a coordinate system—a reference system used to locate geographic features on a two- or three-dimensional surface. *(Canserina Kurnia, ESRI).*

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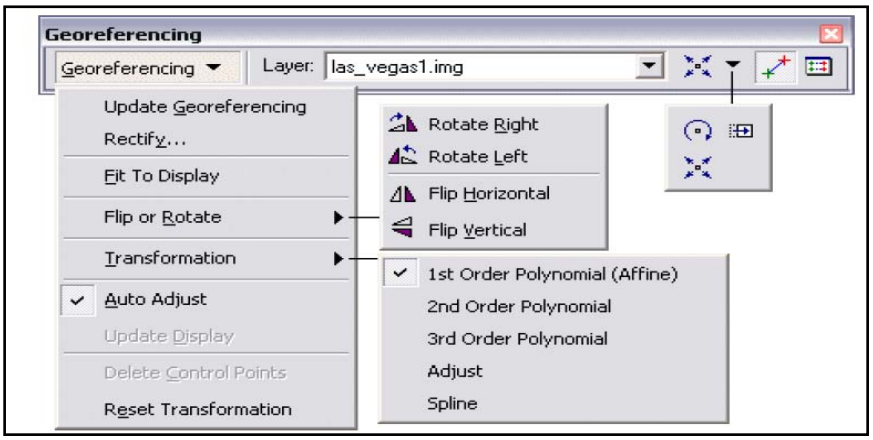

Figure 5 : Geo referencing Tool in Arc GIS 9.2

Geo referencing is a very important part of image analysis. Without spatial reference any kind of image analysis is impossible.

V. Literature Review

Review of previous studies is one of the important parts of any scientific research and serves a number of academic purposes. It is a task, which deal with previous research to find more information gaps for the designed research. By examining published documents, professional journals data achieves and library sources. The researcher may find the desired portion of the data needed in a particular study. Many literature reviews are available on this issue. Some of these have been studied for this research and important aspects are discussed here.

Akhter and Hunter (1991) defined the term medical geography as well as health. They indicated that the basic differences between medical geography and epidemiology. An in depth discussion was also made on disease ecology and health cure in the developed and under developed countries. *Learmonth (1991)* explained the term disease ecology and focused on the ecology of yellew fever. An attempt was also made to discuss the diffusion of this disease.

Khan (1995) observed that besides non availability of medical services, many other factors such as precarious nutritional status, lifelong inadequate food intake, poor sanitation and lower health status of women had affected the overall health status. It was observed that, women faced poorer environmental sanitation that gave them lower resistance capacities.

Hoque and Hoque (1994) indicated that environment and health together are such a vast and complex topic that any effort to describe them is bound to be incomplete.

Sarwar(1992) focused on malnutrition which affects the mental and physical development of children and reduces their ability to resist the disease. *Jahan and Saadia (1989)* traced that nutritional blindness among preschool age children in Bangladesh is near highest levels in the world.

Samir (2010) pointed – the world is facing increasingly frequently and intense disasters, both natural and man-made, with devastating impacts. Women play a vital role in providing economic and mental assistance to the family and community in past disaster rebuilding activities and at the same time actively participate in disaster deterrence programmes. Post disaster recovery projects often fail to understand the significant of gender relations in people's lives in a society and formulate policies without appreciating local, cultural practices and institutions, resulting in loss of traditional sources of status power of women.

Skoda et al. (1979) traced out the effects of various natural and socio economic factors like sanitation, water usage etc. in Bangladesh.

Skin diseases are common in Bangladesh. *Ahmed et al. (1977)* observed that skin diseases were related to location of residence, seasonal variations, age and site involved with skin diseases. Acute respirations Infection (ARI) is one of the major causes of morbidity and mortality among children in Bangladesh.

Parvez (2009) pointed- In fact women and children are worst sufferers during flood and any natural calamity. They face countless difficulties, live inhumanly and struggle to survive even at the cost of one's lives. The bitter truth is that in such distressing situation some of the poor girl/women are enticed by pimp. Traditional gender specific work naturally becomes too difficult for them. For lack of resources poor women face more problems than women belonging to middle class and rich household. For those types of important reasons relief and rehabilitation facilities should be promised for women and children, especially those who are so helpless and distressed.

Khanom (1995) in a study observed that the government supplying the services is inadequate. Besides, all the places of rural area do not get equal services. NGO's also are not serving equally all over the country. Different

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NGO's working in different areas. Some areas are having services from more than one NGO on the country; some areas do not have any access to any kind of services. This study also indicated that insufficiency of doctor's, especially female doctor is a major problem in rural area. As a result, different maternal complicacies do not get treatment. Besides for 'Pardah' tradition, women do not want to see a male doctor in some casas any doctor at all. This study further noticed that the services of the government health workers are not regular in some places.

The above studies have addressed health-related issues of Bangladesh from the perspective of health practitioners. Very few studies in that past have focused on the spatial variation of mortality and morbidity in Bangladesh (Huq, 1996). He focused on the spatial epidemiological aspect of child health in a small area (Savar thana, Dhaka) of Bangladesh using GIS tools. He observed that both social and physical environments played significant roles on the morbidity and mortality of the children aged (0-5) years.

Kingham et al. (1995) outlined spatial clustering of health events using environmental epidemiological data in a study on the child health situation in Lancashire in England. This study examined spatial clustering problems of disease with the aid of GIS (quoted in Huq, 1996).

Twigg (1990) in a study on health care indicated that GIS has much potential in hhealth care planning and further argued that although Gis offers much potential, its use in the health service is crucially dependent upon the availability of geo referenced, accurate and up to date data.

VI. Results and Discussions

a) Women and Children Health Condition of Char Area

Binbinia and Motukpur char of Gangachara Upazilla is one of the most flood vulnerable areas which are affected by flood and riverbank erosion almost every year. To assess the health situation of women and children of this area, field survey is needed to acquire the real picture. So, I made a questionnaire field survey in this char on selected women and children and collected primary data. There have 148 household in this mouza. The sample was selected randomly from this and the sample size was 148. The personal interview of members of union, Upazilla and others was also conducted during field investigation. Those collected data are needed to analyze and arrange to find out the problem and there coping and adapting strategies. The analyzed data are given below:

Table 4 : Women and children health condition (Food, Water, and Sanitation)

Questions	Total Respondents	Number of Respondents	
		Yes	No
Can you manage the right proportion of food materials for your family members	148	49	99
Do you face scarcity of water	148	69	79
Do you face any sanitation problem	148	32	116
Do you think your sanitary system is hygienic?	148	31	117
Do you think women and children need extra privacy and protection in any form like time of bathing, using latrine, collecting water and others	148	148	0

Source: Field Survey, 2012

i. *Comments*

Those women and children stay in char area; they also have to face different kind of difficulties than the male person. Women cook their food in their house but for this they have to face various kinds of problems such as deficiency of food materials, scarcity of drinking water and sufficient fuel. Moreover maximum women families sanitary system are non hygienic.

Table 5 : Women and children health condition of char area

Questions	Total Respondents	Number of Respondents	
		Yes	No
For pregnant women has there any special facilities in your area	148	0	148
Ever you and your children attacked by water born diseases	148	72	76
Do you get any doctors facility in your area	148	25	123
Do you get any private organization or govt. free medical facilities	148	37	111

Source: Field Survey, 2012

ii. *Comments*

Women and children face different kinds of health problems. Specially, pregnant women do not get any kinds of facilities in the study area. They are also affected with several kinds of water born diseases and they do not get any doctoral facility.

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Table 6 : Women and children health condition (Harassment in different sectors)

Questions	Total Respondents	Number of respondents	
		Yes	No
Do your children go to school?	148	107	41
If yes, are they facing problems or obstacles to go school?	148	80	27
Did your girls face any harassment at this time?	148	79	69
Do you face any types of violence from your husband	148	36	112
Do you face any transportation/ communication problem?	148	122	26
Do you get any extra facilities in the transport vehicle as women?	148	19	129
Is there any awareness programmed arranged?	148	43	105

Source: Field Survey, 2012

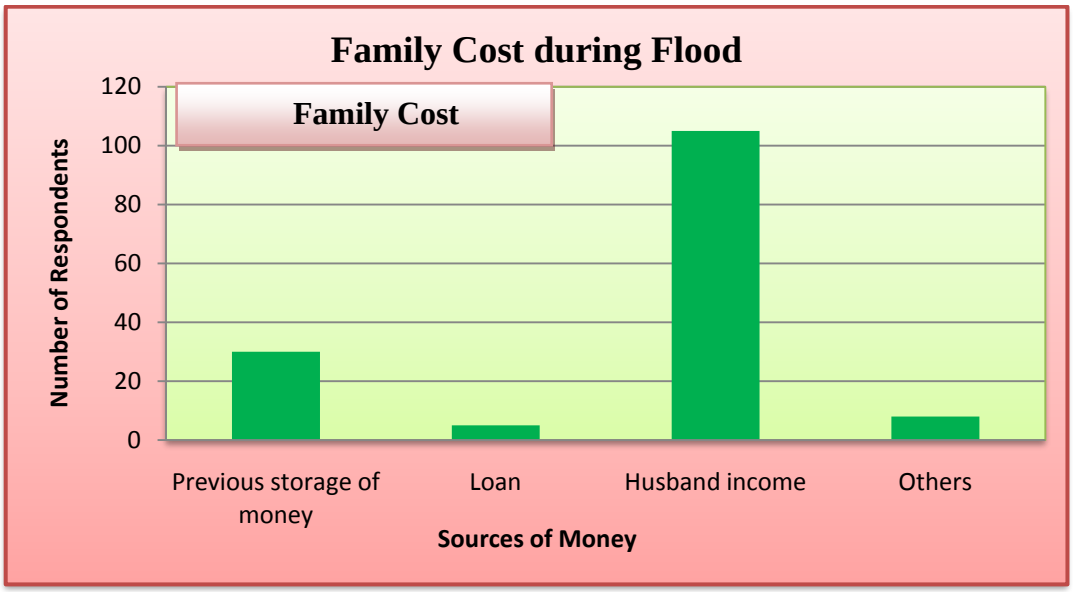
iii. *Comments*

Women and children also face transport problems and harassment in the study area. Their children go to school though they face obstacle in the prior of going school. There are no extra facilities of women in the vehicle in the study area.

b) Some Others Problems Women Face in Char Area

i. *Family Cost*

Women have to maintain families internal some work and for this money are needed. In this case, maximum women take the necessary money from their husband to maintain the family works which number is 105 out of 148 respondents in the study area. Some women also use previous storage money or take loan from others and which number is low. (Figure 5)



Source: Field Survey, 2012

Figure 6 : Family Cost

ii. *Women and children Sanitary System*

Women and children are great sufferer in the char area in the case of sanitary system than male person. From above chart and table it can be said that 52 respondent of the study area complete sanitary work in the flood water, 33 respondents beside the tree, 29 respondents in boat and very low number respondent use the sanitary latrine out of 148 respondents. (Figure 6)

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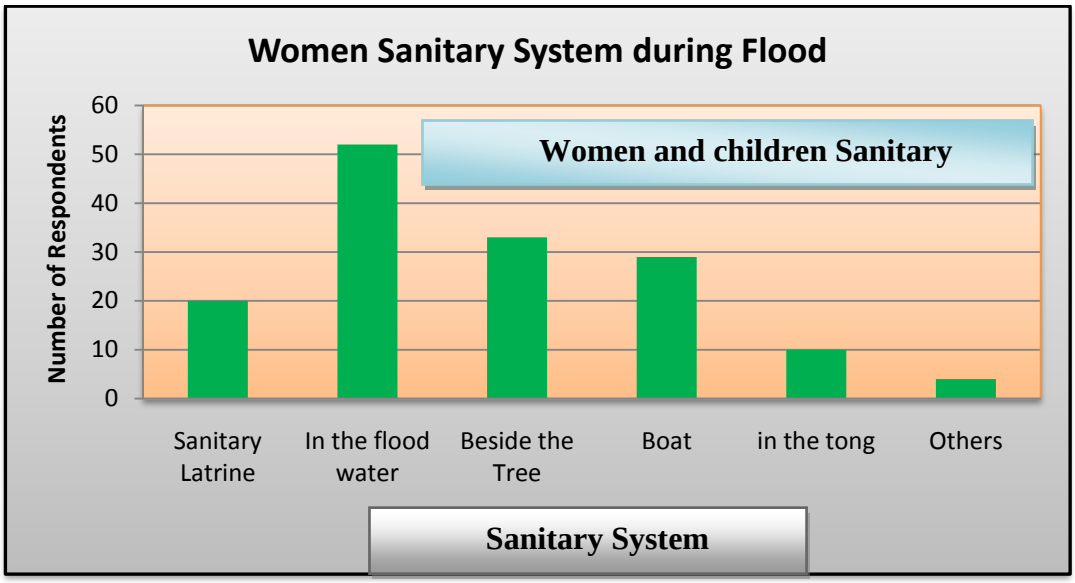
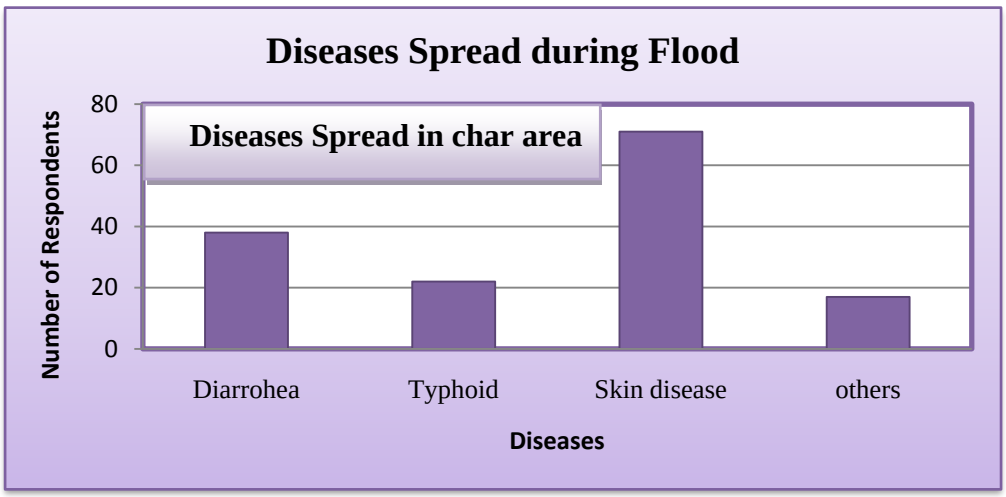


Source: Field Survey, 2012

Figure 7 : Women and children Sanitary System

iii. *Diseases Spread in char area*

Different kinds of disease are spread in the char area. From above chart and table it can be said that among them most of the women and children are affected by skin disease which number is 71 out of 148 respondents. Some are also affected by typhoid, Diarrhea etc related diseases in the prior of flood. (Figure 7)



Source: Field Survey, 2012

Figure 8 : Diseases Spread in char area

iv. *Transport system in char area*

From below data chart (Figure 8) it is found that maximum women use boat as a mode of transportation in the study area which number is 76 out of 148 respondents where as 31 respondents go to their destination on foot.

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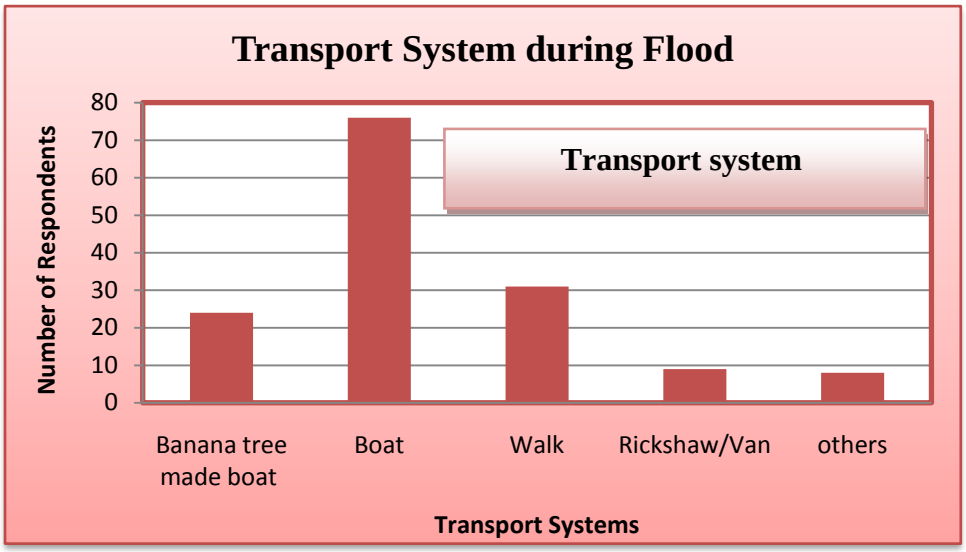

Source : Field Survey, 2012

Figure 9 : Transport systems in char area

v. *Position of Women and Children in Bangladesh*

Specific social features in Bangladesh include seclusion and limited mobility of women & children, and the exclusive nurturing role assigned to them in the gender division of labor. Cultural values, religious norms, and social structures force women and children to be dependent on men. Most of the value systems in almost all Bangladesh societies believe in the need for protection of a male for women to carry on with life. At the same time, the social pressures arising out of the same value systems force the poor towards action such as female infanticide.

According to the socio-economic indicators, the illiteracy of the overall population is considerably high and the gender disaggregated data points out that female illiteracy is always higher than male. The ownership of assets shows a similar pattern where women own fewer assets, since most societies follow a patriarchal system of ownership of property.

Some of the key factors contributing to women's 'double edged' vulnerability owing to poverty and other social disadvantages in the Bangladesh context can be stated as follows:

- Very high illiteracy levels
- Low ownership of assets such as land, and other property (often inheritance laws are male oriented)
- Minimum work opportunities outside home
- Limited mobility out of home and out of their own locality
- Low social status
- Socially constructed dependency on male relatives

All these factors, the dynamics between them and the processes arising from the inter-relationships between them has resulted in women becoming an extremely vulnerable group in Bangladesh.

vi. *Women and Children: Disaster*

As mentioned the socio economic, cultural and religious values in Bangladesh have resulted in its women and female children in particular to be more vulnerable to adverse situations in comparison to men. These dynamics form into vicious cycles, where women and their children get trapped. Therefore, it is nearly impossible for women belonging to already poor and vulnerable groups to bounce back once hit by extreme events. The result in the worst scenario is often women becoming destitute with their children. In many societies, vulnerability to (natural) disasters differs for women and men. Women are often more vulnerable to disasters than men through their socially constructed roles and responsibilities, and because they are more poor. Disasters do not just happen. The social structure of most societies formally relegates women to inferiority and dependency, increasing their vulnerability through their disempowerment .Women is integral parts of functioning societies, with established roles and rule Adolescents, pregnant women, lactating mothers, the disabled, and the aged make up particularly vulnerable groups in emergencies. In the course of determining the impact of both natural and conflict induced disasters.

vii. *Problem of Food, Clothing and Shelter*

Poor people suffer from lack of food, clothing and shelter. At the time of flood many families/women become homeless. It is sometimes impossible or not acceptable for a girl of marriageable girl to seek shelter in somebody's house. Unemployed men often sit idle or move elsewhere leaving their households members behind. Poor women and children have to wait all through the day and night for some food. Poor women with only one "shari" are often oblige to remain in wet clothe for most of the day for lack of the private place to dry off. Women's life also falls at risk, especially while

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travelling during floods the shari become a death trap for women. An increase in the number of female-headed households (because of male out-migration) also amplifies women's responsibilities and vulnerabilities during natural disasters. After a disaster hits there are often inadequate facilities available for women to cope with their household tasks or to get shelter.

viii. *Problem of Sanitation*

Women and children face countless difficulties using latrines than men during flood. It is impossible for women and children to disagreed their inhibitions and go to latrines, which are open to all. Women sometimes have to wait till dark/night to ensure privacy to respond to calls by nature, even changing clothes/sanitary pad which are really discomfortable to sufferer women. In the flood shelter they have also problem to share toilet with others.



Figure 10 : Sanitary system

ix. *Impact on women's economic livelihoods*

When poor women lose their livelihoods, they slip deeper into poverty and the inequality and marginalization they suffer from because of their gender division increases. Therefore, flood presents a very specific threat to their security. Floods damage livestock -cows, goats, buffaloes, and poultry -chickens, ducks, fisheries, trees, crops-rice, wheat, nuts, chilies, lentils, seeds and animal fodder. Sand deposition as a result of flood and river erosion affects production of crops such as nuts. During and after flood, the lack of fodder for livestock and poultry results in reduced milk and meat production.

c) *The Impacts of Chars During Floods on the Livelihoods of Women Include*

i. *Crop production loss*

Women, who control homestead-based livelihoods, lose income when crops are blown or washed away.

ii. *Livestock death*

Cows and goats are the most valuable assets of poor people in flood-prone areas. During flooding, collection of fodder for livestock is a significant challenge, particularly for goats that need green grass (which often becomes flooded.)

iii. *Housing and homestead*

The destruction of houses by floods is a common impact in disaster prone areas. Homestead vegetation which is maintained by the female family member is damage by flood and decrease the earning source of women.

iv. *Loss in productivity*

Flood water and sand deposition decreases soil productivity. So, the food insecurity situation has been worsened by the floods.

v. *Supply shortage and price of inputs*

Shortages during flooding leads to increased prices for inputs such as seeds, fertilizers, oil for running irrigation pumps, fodder for animals, transport costs and veterinary fees.

vi. *Loss of income, savings and employment*

Loss in production, lack of storage and destruction of access roads result in assets (e.g. cattle) or products (e.g. milk) being sold at low prices. The selling price decreases while the shortage in supply induced by floods results in increased prices for essential goods. Moreover, flood reduces employment opportunities, especially for women working in agricultural fields. Less income of women means less food at home for children. As a result, there is a net loss in income which, in turn, leads to a loss in savings, thus making it even harder for households to cope with disasters.

vii. *Limited access to market*

With damages to infrastructure and communications systems, women and children cannot

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access the market to buy or sell food such as milk, eggs, vegetables or other products. Women are forced to trade within the village or accept lower prices offered by male buyers from other area. Also much another socio-economic impact of chars during flood on women and children are seen in the study area. Among them those mentioned are more common and miserable.

VII. Research Findings

Through this study, it becomes clear that chars environment create a great impact on women and children life. By studying this, there found some information which can be summarized that-

The negative impact of char's environment is widely seen on live, livelihood, agricultures and health.

- Most of the women lose their livelihoods; they sink deeper into poverty and the inequality and marginalization they suffer from because of their gender division.
- Women who had comparatively less knowledge about their child health and its impact and were dependent on male decision.
- Most of the women have no ability to take steps like, pregnancy time, medicine, child education etc.
- Most of the women and child suffer from physical injury, water born diseases, malnutrition and other health problems than man.
- Woman and children are not get proper health facilities in the health complex only Sunday health worker come and their health facilities are not good.

VIII. Recommendation

- Create an environment in which women's engagement in adaptation discussion and governance structures is fully supported in order to do so exiting coping strategies and constructing to adaption should be studied.
- Empower women and children as agents of adaptation, and provide women with opportunities to control greater percentages of resources (including land) and services and to make independent decisions.
- Prevent cultural practices from hindering women's capacity to adapt.
- Assist women and their coalitions and networks at community, national and international levels to ensure that recovery and adaptation measures respond to women's needs and concerns.
- Provide training to women's organizations, networks and support groups and opportunities to share experiences—women and their organizations should demonstrate exemplary leadership and serve as gender advocates and credible ambassadors on climate change.
- Acknowledge women's social, economic, physical and psychological vulnerabilities in community-based preparedness and response plans in order to reduce the impact of disasters on women.
- Recognize women's abilities and incorporate them into flood relief efforts with the goal of changing gendered roles and perception of rights.
- Endeavor to ensure that activities are appropriate for women, and that they receive positive encouragement and support for participation.
- Create adaptation finance mechanisms that support livelihood adaptation priorities of poor women, and include gender-disaggregated indicators in adaptation funds for targeting and monitoring the benefits to poor women.
- Safe water supply should be provided immediately in the char areas and public awareness should be increased about the contamination of the water.
- The households who have no toilet facilities should be motivated to dispose human excreta at the proper place and sanitary latrines should be constructed at a safe distance from their sources of drinking water.
- Medical facilities should be made available to the people in remote areas and service of Upazilla health complex and community health complexes should be developed.
- The existing road networks should be developed, so that the people living in the remote areas can easily reach to the health centres.
- Primary health education programmes are to be conducted so as to inform, motivate and help people to adopt and maintain health and hygiene practice and lifestyle.

IX. Limitation of the Study

This study did not incorporate qualitative data in its methodology. This incorporate of qualitative data in GIS could be more acceptable findings and results. Some of the respondents feel introverted to give answers of some questions related to their personal income, personal savings and security. Despite all the above limitations this study might be a model for further research on health aspects of Bangladesh.

a) Conflict f Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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