

Livelihoods of Char and River Basin Communities

Baseline Study using Household Economy Analysis

Northwest Bangladesh

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Md. Emdadul Haque
Manas Rudra
Md. Nazrul Islam
Md. Ohidul Islam
A.K.M. Rokonuddaula
Md. Abdur Rouf
Shamima Akter
Md. Shohiduzzaman
Md. Arsadul Islam (part time)
Most. Asmani Afrin (part time)
Susanta Chandra Dey Roy (part time)

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The research and analysis was coordinated by Gavriel Langford, also the author of this report.

Gavriel Langford
FEG Consulting
glangford@foodeconomy.com
gavford.mail@gmail.com

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INTRODUCTION

This report presents the findings of research done in the island *chars* and mainland river basin areas of the Teesta River and upper region of the Brahmaputra-Jamuna river, located in northwest Bangladesh. Comprehensive details of annual food consumption, cash income and expenditure patterns are presented, disaggregated by wealth group and location, for the baseline period 15 April 2015 to 14 April 2016.

The area of northwest Bangladesh of interest to this research is part of a highly active flood plain which experiences flooding every year, sometimes multiple times. Secondary data indicates problems of under-nutrition, residual poverty, and annual livelihood shocks. The research found a complex livelihood system in which the intrinsic knowledge of river flooding plays a foremost part in the decision making processes regarding cropping, livestock rearing and the search for labour.

This research was commissioned by WFP Bangladesh as part of a project which has the aim of strengthening the Food Security Cluster through capacity building and institutionalizing best practices in humanitarian responses with a view to fostering future sustainability. The research was funded by ECHO whose objective is to produce robust evidence using the Household Economy Analysis methodology in order to support the analysis and assessments immediately after disasters in northwest Bangladesh.

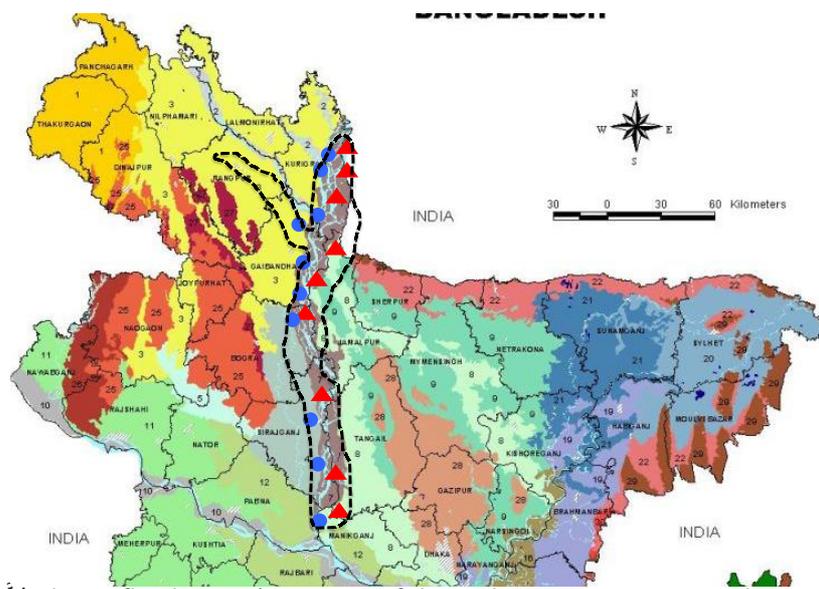
The methodology used for this research and analysis was Household Economic Analysis (HEA). The methodology focuses on quantification of the food and cash economy at the household level, including a detailed analysis of all food and cash incomes as well as expenditures for a one-year period. All data is disaggregated by socioeconomic level (wealth group) and agro-ecological zone (livelihood zone). Qualitative methods are used to not only descriptively complement the quantified data, but also to improve the accuracy and depth of information. See Annex A for a detailed description of the methodology.

This report is divided into four main sections. Section One describes the general aspects of the livelihood system of the area including geophysical aspects, seasons, and agricultural production. Section Two describes socioeconomic characteristics including wealth breakdown and markets. Section Three describes the specific findings of food, cash income and expenditure for each specific wealth group, with information related specifically to the baseline period mid April 2015 to mid April 2016. Section Four presents findings on coping mechanisms and the outcomes of various modeled scenarios.

SECTION ONE – LIVELIHOOD ZONES DESCRIPTION

GEOPHYSICAL ELEMENTS

The northwest area of Bangladesh is the entry point of many rivers coming from the Himalayan ranges. The area covered in this research is zoned by the Bangladesh Agricultural Research Council as the Active Teest¹ Floodplain and Active Brahmaputra-Jamuna Floodplain. The Brahmaputra has an average discharge of 19,800 m³/s² (peaking at around 100,000 m³/s during flood events). It is part of the Brahmaputra-Ganges-Meghna river system, which is the third largest in the world by discharge (after the Amazon and Congo rivers), of which more than half of this discharge is from the Brahmaputra. This three-river system has the highest level of sediment load in the world. The width of the Brahmaputra River varies by location but is around 5kms across in the dry season, increasing to widths of 15-20kms during floods. The Teesta river is significantly smaller in terms of width and discharge.



There are two main *livelihood zones* of interest for this research (as described in the methodology description in Annex A); the river basin zone and the *char* zone. The *char* zone refers to the collection of riverine islands that are present in both the Brahmaputra and Teesta rivers, many of which have semi-permanent settlements, all of which require boat transport. The river basin zone refers to the adjacent villages which are located on the banks of the two rivers and which are logistically connected by normal road networks to other parts of Bangladesh. The dashed black line on the map above indicates the area for which these baseline findings can be considered representative. The blue circles represent the approximate locations of the ten river basin villages visited for this research, the red triangles the nine char villages. Villages in the river bank zone are differentiated from villages further inland by the fact that they are lower and therefore subject to annual inundation by the two rivers, whilst villages further inland are only affected by occasional, larger floods. In the schematic cross section below, village C is on an island *char* and is part of the char livelihood zone, while village B is in the river basin, subject to annual inundation, and is part of the river basin livelihood zone. Villages A and D are outside both zones of interest and were not part of the research area. There is significant economic and social interaction between the *char* and river basin zones, as they are immediately adjacent to each other along the length of the rivers, and interaction between these two zones and other areas located further inland is also strong. Occasional mention in this report of inland areas refers to those locations relatively near the river basin zone (for example villages A and D in the schematic below), as well as those locations which are more distant and important as destinations for migration labour.



¹ Teesta is spelt as Tista in some of the secondary literature.

² <https://www.britannica.com/place/Brahmaputra-River>

The *chars* (Bengali term for the riverine islands) are islands formed either by sediment transport and deposition, or by a shift in a sub-channel of one of these two rivers which erodes an area of land, both normal aspects of the hydrological system. There are hundreds of chars in the two rivers, some of which were created several decades ago, some as recently as last year³. There is no specific geographical factor that determines the age, height and location of a char, other than random sediment movement and deposition with annual inundations and bigger floods. Typically, outer edges of chars are eroded each year, in some cases an entire char can disappear. Some of the chars are only slightly above the average water level (usually not inhabited), while others are several meters above the average water level. Dimensions of chars vary significantly with some only being up to 50 or so hectares in area, while others can be measured in square kilometers (with wheeled vehicle transport present). Soils vary from highly sandy to high clay, the most common soil type being mixed sandy clay. River basin villages typically have mixed sandy clay to high clay soil types. Land size (per village) on the chars is usually larger than in the river basin, with population density being lower also.



Char with agricultural production and human settlement



Harvesting Boro rice in river basin village



Low lying char suitable only for collection of fodder grass (no human settlement possible)

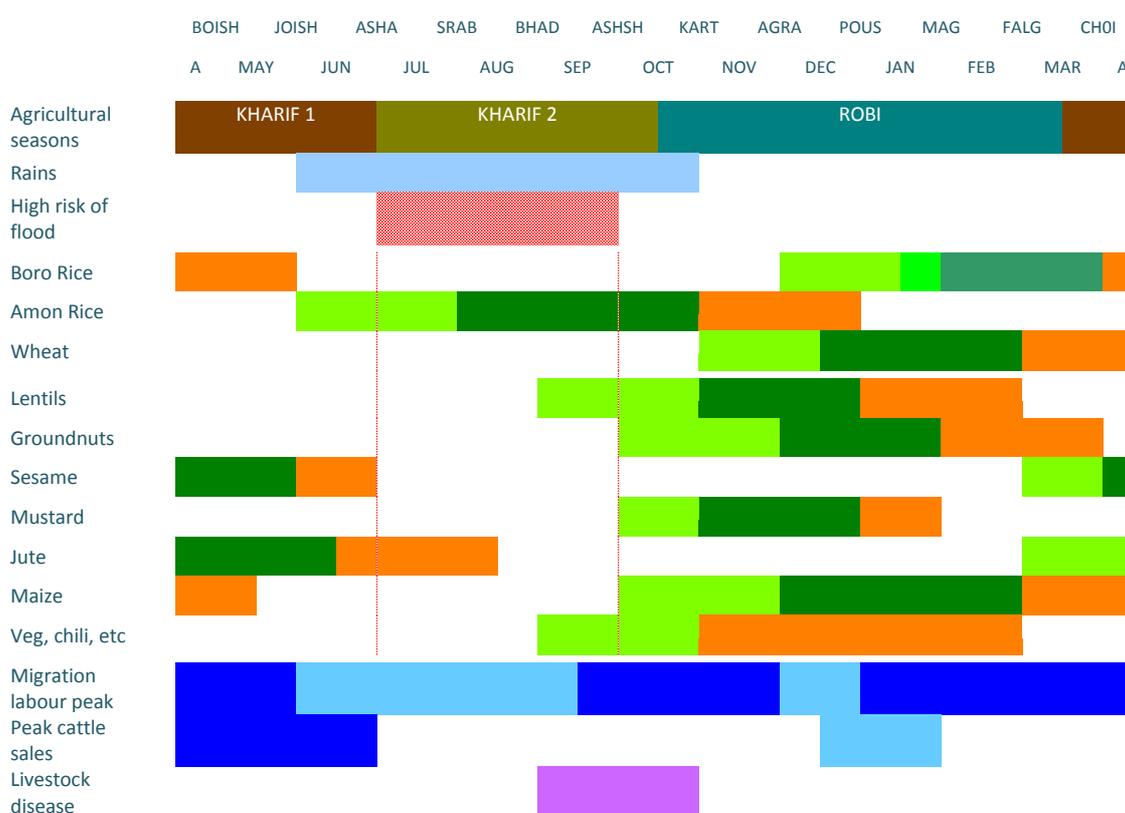
³ Two of the nine chars visited for this research were 5 or so years old, four were 10-15 years, two were around 20 years old, one was more than 30 years old.

SEASONALITY AND THE REFERENCE YEAR

All data in Section Three of this report relate to the 365-day period 15th April 2015 to 14th April 2016. Mid April corresponds to the average start date of the primary rice harvest in both zones, some starting slightly later, some starting in May. The term “baseline reference year” will be used in the remainder of the report to refer to this 365 day period.

It is important to remember while reading this report that the baseline reference year was itself a moderately bad year in terms of production, slightly below what local farmers consider “normal”. This related to the nature of the flood events during the 365 day period, and its impact on jute production and local labour opportunities. Also, the baseline reference year immediately followed the large flood events of 2014. It should be kept in mind that other years may be easier, better and more productive than the baseline reference year, more like the “normal” or even above normal.

The following table summarises the main elements of the seasons related to production.



Additional Notes

Sales of fattened cattle take place throughout the year, however sales peak in May/June just prior to the inundation period. This comes at the end of an 8 month period of fattening (usually purchased in September/October). Some are fattened for a 3-4 month duration, sold in December/January, then new calves are bought immediately for sale in May/June. Other sale peaks occur at major festivals. Labour migration actually takes place throughout the year but the peak seasons are indicated in dark blue. The livestock disease peak relates to post rainy season illnesses affecting cattle and goats. Another period of increased disease takes place in the colder months of December/January.

The mean annual rainfall of the northern extent of the two zones is around 2,400mm (Rangpur, Kurigram), decreasing to around 1,500mm in the southern extent of the area (Sirajganj).

PRODUCTION METHODS – CROPS, LIVESTOCK

Soils in both zones support a wide range of crops. This includes boro rice, amon rice, wheat, foxtail millet, proso millet, maize (for livestock feed), lentils, sesame, chili, jute, mustard, groundnuts, vegetables and fruit trees, as well as uncultivated fodder for livestock. The variation in crop type, especially on the chars, is mostly determined by soil type, but also by height of the land. Pulses, sesame and groundnuts, for example, are more common on the chars than in the river basin zone due to higher levels of sand in the soil (i.e. better drainage). Mustard is more intensively cultivated in the southern end of the two zones (Sirajganj) due to soil suitability. It is also cultivated in the northern district of Kurigram, however better off households from the river basin zone tend to cultivate mustard on plots of land they have on the chars. There are large areas of many of the chars which are not suited to any crops, where only wild grasses grow, suitable for grazing and collection of fodder.

Irrigated Boro rice is the primary food crop produced. Other food crops grown on the chars, such as wheat, millet, and amon rice, are far more minor. Millet and wheat are cultivated at the same time as the more preferred Boro rice, meaning they are in direct competition. Transplanted amon rice is rainfed and therefore coincides with the time of the year of peak risk of flooding. Limited land sizes in the river basin zone mean that farmers default firstly to the production of Boro rice over other crops, except for better off farmers with larger plots of land that can afford the risk of diversification.

In the last ten years, amon rice has been successfully harvested only three times (on a mass scale). Most farmers did not successfully harvest amon during the baseline reference year. It is arguable that amon rice is not, and cannot be, a fundamental crop in the livelihood system of these two zones (3 in 10 year success rate) given the geophysical realities of the floodplain⁴. Despite repeated crop losses, farmers seem to annually cultivate it as a “bonus crop”, rather than a crop fundamental to their household economy. Crucially, the short duration nature of mustard seed means that farmers often immediately replace a lost amon crop (eg. September) with mustard, which will be ready for harvest (in January) just in time for the next planting season of Boro rice (also in January). Because of the timing clash between Boro rice and jute (i.e. jute needs to be planted in March before the Boro rice is ready for harvest in April-May), a piece of land cultivated with Boro rice would otherwise lie fallow during the rainy season if amon is not planted. This underlines the “bonus” nature of cultivating amon, even though the last ten years indicates only a 30% chance of successful harvest. Both the river basin and char zones are net rice importers, from the northern end of the zones to the southern end of the zones. Boro rice produced during the robi season is both stored and sold. Rice is usually sold as paddy. Most farmers use high yielding varieties which requires them to purchase seed every time. This is the case for most crops, except jute which is typically grown from seed stored from the previous season.

In general, per-kilogram prices for crops sold by better off households are slightly higher than poorer households due to higher quality produce related to higher investment level as well as being able to delay sales until more opportune prices. Crop residues such as jute sticks and stover are typically used (fencing, fuel, fodder, etc) by the producing household, rather than sold. Cultivation of timber trees, in particular eucalyptus, is present on older chars.

Periods of highest demand for labour in both zones are the rice transplanting period and harvesting period of both rice and jute. The majority of agricultural labour is done by men, however women are also involved in harvest, processing, weeding and planting. Women from poorer households sometimes work as labourers, with pay rates at around 60% of men’s rates (around 200 - 225 taka per day). In times past advance selling of labour was a common issue, in which households in need of money would agree to future work at a rate lower than the market in return for immediate money. This is now rare due to increased supply of labour opportunities outside the zone which means people can search for normal paid work rather than sell their labour cheaply.

⁴ Aus rice faces the same constraints, coinciding with the rainy season.

In general, the chars are more suited to livestock rearing than the river basin zone, although it is an important component of livelihoods for both zones. Fundamentally this relates to lower population density (i.e. larger spaces for grazing), as well as availability of wild grasses growing on the chars, especially those that are not inhabited. Goat numbers are not high in either of the zones, in particular in the river basin zone. Not only are they deprioritized due to their lower importance and status value, but annual inundation and occasional flooding actually make keeping of goats burdensome. Bovine rinderpest (PPR) is a significant challenge in both zones.

Two methods of raising cattle are used in both zones. Fattening for sale is common. Households will often purchase young male cattle around October once the rains have reduced and fodder is widely available. They fatten for 7 to 8 months, then sell in April to June. Some fatten for a shorter duration, with a sale and re-purchase taking place around January/February. Religious and cultural festivals are also a peak period of sales. Cattle fattening is done using local varieties, except for some villages in the north in close proximity to India where Indian varieties are sometimes raised. Breeding of cattle is the other method of rearing, mostly done by better off households. Adult females are inseminated, calves are kept and raised for sale, with the milk being both consumed by the household as well as sold. Data from interviews during this research indicate that lactation is slightly longer in the char zone, likely due to greater availability of grass. The southern region of the two zones (in particular in Sirajganj district) have higher availability of natural fodder (grasslands including Napier grass) which explains the higher numbers of cattle raised than further north. Anthrax and foot and mouth disease are the two most common cattle diseases. Vaccines are provided by government and non-government actors for payment by cash.

Lack of cultivable land, especially in the river basin, and the high proportion of the population without access to land are the main barriers to greater crop production. Similarly, limitations on availability of fodder is the main factor limiting higher levels of livestock production.

Most households own at least a basic set of fishing nets. Fishing is not as widespread as a means of livelihood as might be expected on a major river. Except for a percentage of fisher families in each village, households intermittently catch small amounts for their own needs, to supplement fish that they buy.

Floods and Inundation

Variations in flood type affect livelihoods in different ways. The annual inundations, or “normal” floods, are generally non destructive as they are slow moving, not high enough and not long enough in duration to cause extensive damage. In fact, such annual inundations are beneficial in that they saturate soils for subsequent Robi season planting (see calendar above) as well as deposit nutrients. Variations in flood typology affect kharif 2 season crops differently. The main variations that are problematic are as follows:

- a. early onset - June or earlier (zero occurrences in last ten years)
- b. long duration – greater than 15 days
- c. multiple and consecutive – two or more floods in quick succession with almost no break between high water. This is essentially the same as a long duration flood.
- d. higher than normal water levels
- e. fast rising water level
- f. flash floods – only relevant for Teesta river area – related to sudden releases from India

The rainy season of 2015 (during the baseline reference period) had flood types B, C and D. Three floods occurred, two of them in quick succession, the height of water in one of them was around 45cm above the levels of the more damaging 2014 flood events, and one of the floods was 19 days in duration. Jute production was affected in some locations, suffering partial or full damage (determined by variations in land height). The 2014 floods were longer in overall duration because there was very little time between the three floods that occurred.

Due to the fact that floods are an absolutely intrinsic element of the livelihood system, communities living on both the chars and in the river basin have developed lifestyle, livelihood and survival methods that are necessarily resilient. This is in spite of the extremely challenging conditions faced by

living on a huge river, as well as the contextual economic poverty that is part of this region. People's capacity to firstly withstand, but also to recover when necessary is clear. Houses can be literally disassembled in a few hours and moved if necessary. Possessions are kept to a minimum to ensure everything can be raised above water level – including fuel and cooking stoves, bedding, etc. Cropping patterns have been adjusted over time to rely on the seasons before and after the rains, as compared with other parts of Bangladesh where transplanted amon cultivated during the rainy season is the most important crop of the year. These adjusted patterns also allow for replacement planting in the event that a flood damages a previous crop. Productivity in the Robi season immediately following a moderate to large flood typically increases due to increased soil moisture and deposited material. Livestock losses are kept to a minimum by movement to higher areas, or more commonly, by systematic and normal selling prior to the onset of rains. Poorer households have livelihood options that are not entirely dependent on the limited economic system of the village and immediate area, such as the significant proportion of their cash income that comes from work done outside the area.

The resilient capacity of people living in the chars and river basin, however, should not be romanticized. The general poverty levels in the area remain high, and the psychological energy required to be annually thinking about approaching floodwaters and how it *might* affect life is undoubtedly tiring. In spite of this, especially for those living on the chars, there is a calmness of lifestyle that many of them state they would never swap for a more stable life in mainland areas, where populations are more dense and competition uncompromising.

Researching the effect and impact of a possible increased frequency of floods associated with climate change was not the scope of this research. Considering communities are familiar with, and adjusted to, the regular presence of flood water around their villages, it is likely that there is some buffer in the system that would mean minor increases in frequency, duration and height of water will not have significant effects in the short term. However, any significant changes to frequency, duration and height of water are likely to eventually put stress on the system. These conclusions are impressions only, and are not based on extensive analysis and research of the matter.

SECTION TWO – SOCIOECONOMIC DESCRIPTION

WEALTH BREAKDOWN

Village leaders in both zones often describe three levels of wealth, usually based on ownership of land. Those with no land, those with very small holdings (less than one *bigha*), and those at the top with large to very large holdings. The situation is in fact more complex than this. Firstly, there is a tendency for leaders to describe a situation in which most people are poor and landless, with only a few (typically including themselves) with large land (it was rare for these leaders to suggest that they are poor or landless, perhaps influenced by the desire to maintain an appearance of importance and influence). This possibly relates to a mindset of assistance and NGO registration criteria in which people with little to no land are often included in projects. Rural economies rarely are able to function with this kind of a land distribution pattern for the simple reason that people without land must earn their survival from labour on the farms of the better off. If the ratio is too high at the bottom end there are not enough work opportunities available for people to survive from. With careful probing it was eventually established that in fact there are at least four, usually even five or six levels of wealth, based not only on ownership of land but various other criteria that determine and indicate wealth level. Section Three of this report presents findings for the lowest three wealth groups only (human resource limitations did not allow in-depth analysis of better off wealth groups).

The table below summarizes the key determinants and indicators of wealth for the river basin zone.

WEALTH GROUPS CHARACTERISTICS							
HH size		Land size in decimals (bigha)		Livestock	Miscellaneous Productive Assets	Non Productive Assets	
		Owned	Cultivated				
RIVER BASIN ZONE							
Labourers (Wealth Group 1)	15-30%	5	0	0	0 cow 0 goats	Fishing net	mobile
Sharecropper Labourers (Wealth Group 2)	30-40%	5	5-10 (~0.2)	30-50 (~1.2)	Some own 1 cow Some share 1 cow Approx.. half no cow Goats – as above	1-2 each of mango, jackfruit and banana trees Fishing net	mobile
Small Farmers (Wealth Group 3)	22-30%	5	80-90 (~2.6)	80-100 (~2.7)	2-4 cows 1-2 goats	4-5 each of mango, jackfruit and banana trees plus timber trees (eucalyptus) Fishing net Bicycle	mobile, solar panel (or electricity connection)
Large Farmers (Wealth Group 4)	10-20%	6	~275 (~8.3)	~250 (~7.7)	4-6 cows 0 goats	Many trees, all types mentioned above Power tiller, boat, rickshaw Fishing net Bicycle, Motorbike	mobile, gold, TV, solar panel (or electricity connection)

The table below summarizes the key determinants and indicators of wealth for the char zone.

WEALTH GROUPS CHARACTERISTICS							
CHAR ZONE	HH size	Land size in decimals (bigha)		Livestock	Miscellaneous Productive Assets	Non Productive Assets	
		Owned	Cultivated				
Labourers (Wealth Group 1)	20-35%	4-5	0	0	~ 50% own 1 cow ~ 50% share 1 cow 0 goats	1-2 each of banana, guava trees Fishing net	mobile
Sharecropper Labourers (Wealth Group 2)	30-40%	5	0	30-40 (~1)	Most own 1 cow Some also share 1 cow 1-2 goats	1-2 each of banana, guava, mango trees Fishing net	mobile
Small Farmers (Wealth Group 3)	15-25%	5	150-160 (~4.6)	140-150 (~4.4)	2-4 cows 2-5 goats	2-4 each of mango, banana guava trees Fishing net Irrigation pumps Bicycle	mobile, solar panel
Large Farmers (Wealth Group 4)	10-20%	6	~300 (~9.1)	~250 (~7.6)	5-10 cows (some shared out) 3-5 goats	2-5 each of mango, banana guava trees (some have many timber trees) Power tiller, boat, rickshaw Fishing net	mobile, motorbike, gold, TV, solar panel

Additional Notes

Percentages shown in the tables above represent a range of the proportion of total households in a village that fall within that wealth group. In other words, wealth group 3 households in the chars are around 15% of the population in some villages, ranging up to 25% in other villages.

Wealth group 1 households in the river basin typically live on government owned land. These are very small blocks, often on minor roads, large enough to erect a small house only (~5m x 7m). Aside from a small amount of leafy green vegetables and gourds, these households are not even able to cultivate a banana or mango tree. They do not do any sharecropping. Equivalent households in the char zone typically live on their own land, which are also larger in area. Wealth group 2 households in the southern part of the char zone own around one bigha of land, as compared with zero owned land on chars further north (where farmers rely on sharecropped land). The reason for this is not known. It is clear from the table above that wealth group 3 households on the chars have far bigger land sizes than the equivalent wealth group on the river basin. This relates to the more expansive land available on the chars, while in the river basin there is high competition for land.

The 50-50 ownership of a single cow by wealth group 1 households in the chars as compared with zero in the river basin, is possibly attributable both to an intensive effort by donors and NGOs to improve livelihoods in the chars (one component of which was distribution of cattle to landless households), as well as the fact that cattle numbers in the chars tend to be higher than in river basin villages due to better suitability (large land, fodder availability). Poultry numbers did not typically follow patterns determined by wealth category.

House type is not a helpful indicator of wealth in either zone, as almost all households now live in so-called “tin shed” houses, made of corrugated zinc sheets (walls and roofs) on a frame made of concrete or bamboo (both of which can be dismantled). From the outside it is very difficult to know what is inside – it could be a poor family, rich family, a kitchen or a bullock shed. Even local mosques are often made with this “tin shed” technique.

Other minor wealth groups exist in most communities. A few percent of the total population of a village would include households that are heavily/totally reliant on government safety nets and gifts and begging from relatives and neighbours. These households mostly face labour constraints which prevent them being from fully economically active (typically widowed and elderly households or households in which an adult is living with a disability). Economic opportunities are limited for such households, but can include domestic work within the village and cash for work projects (government, NGO, etc). Children of these households rarely attend school beyond primary school, sometimes live with grandparents, and cases of child labour are not unheard of. Wealth group 1, as described in this report, does not include these households. There are also a few percentage of households at the very top of the wealth spectrum that are even better off than wealth group 4 in the table above. They are business owners (milling, transport, etc) and large traders of agricultural commodities, large land owners (often as absentee landlords especially for the chars where it is common for them to live in district and upazilla towns rather than on the char).

Government and non-government actors in Bangladesh use a long list of different terms for the poor; upper poor, lower poor, extreme poor, ultra poor, etc. This report does not suggest a specific matching together of these terms with the terms used in this report; wealth group 1, wealth group 2, etc.

The fundamental barrier to economic development in these two zones appears to be land-asset deprivation. This has two fundamental elements. The total amount of land available for utilization in proportion to the population size is limited. Of equal importance, is the unbalanced distribution of land ownership, which sees a high level of concentration of land-assets under the control of established power holders (both resident and non resident in the villages). It is difficult to conceive of meaningful economic development for the labourer and sharecropper classes in a system that is purposely structured against their ability to gain access to productive assets.

MARKETS AND TRADE

All agricultural commodities and livestock are traded at union and upazila level markets called *hats*. These typically open twice per week and are officially overseen by government. Medium to large grain traders and livestock traders operate mostly at upazila level *hats*, in addition to traders of agricultural inputs and equipment, livestock feed, fish and other commodities. Upazila level rice traders are linked with larger traders both within the district, as well as in distant trading centers such as Dhaka and Chittagong which purchase rice, as well as rice surplus districts in other parts of northwest Bangladesh. Most commodities produced in the char zone are traded in the upazila and union *hats* located in adjacent parts of the river basin zone (there are no upazila centres located on the chars).

Informal *bazars* operate most days of the week in all unions and most villages, however these have a narrower range of commodities and a lower trade volume. Average prices of most commodities are slightly higher in the char zone, than the river basin zone. For example, potatoes are around 18 taka per kg in the river basin zone, and 20 per kg in the char zone.

Interviews with major traders at upazila level confirm that annual inundation events do not disrupt the operation of upazila or union level *hats* or *bazars*, nor the flow of commodities through these markets. This includes major flood events such as occurred in 2014. There can be as many as 5 to 10 grades of rice available in the market at any particular time, meaning that increased per kilo rice (from increased transport costs) associated with flood periods can be offset by switching to a lower grade rice (see photo on next page – N.B. that the variety in the bottom left is animal feed).

The two zones are both sources of agricultural labour for neighbouring districts of the northwest region. Labour prices in major rice producing areas are around 50% higher than the labour price within the two zones. Distances between the two zones and these other areas are relatively close meaning that migrant labourers can travel back every month to take salaries to their families. Peak migration times are September/October/November/December when robi season crops are being cultivated and harvested, as well as March/April/May when Boro rice is being harvested and jute being cultivated. Typical destinations for migrant agricultural labour are Munshiganj, Syllhet, Tangail, Cumila, Boghra, Rashai, Dinajpur, Nougá and Rangpur.

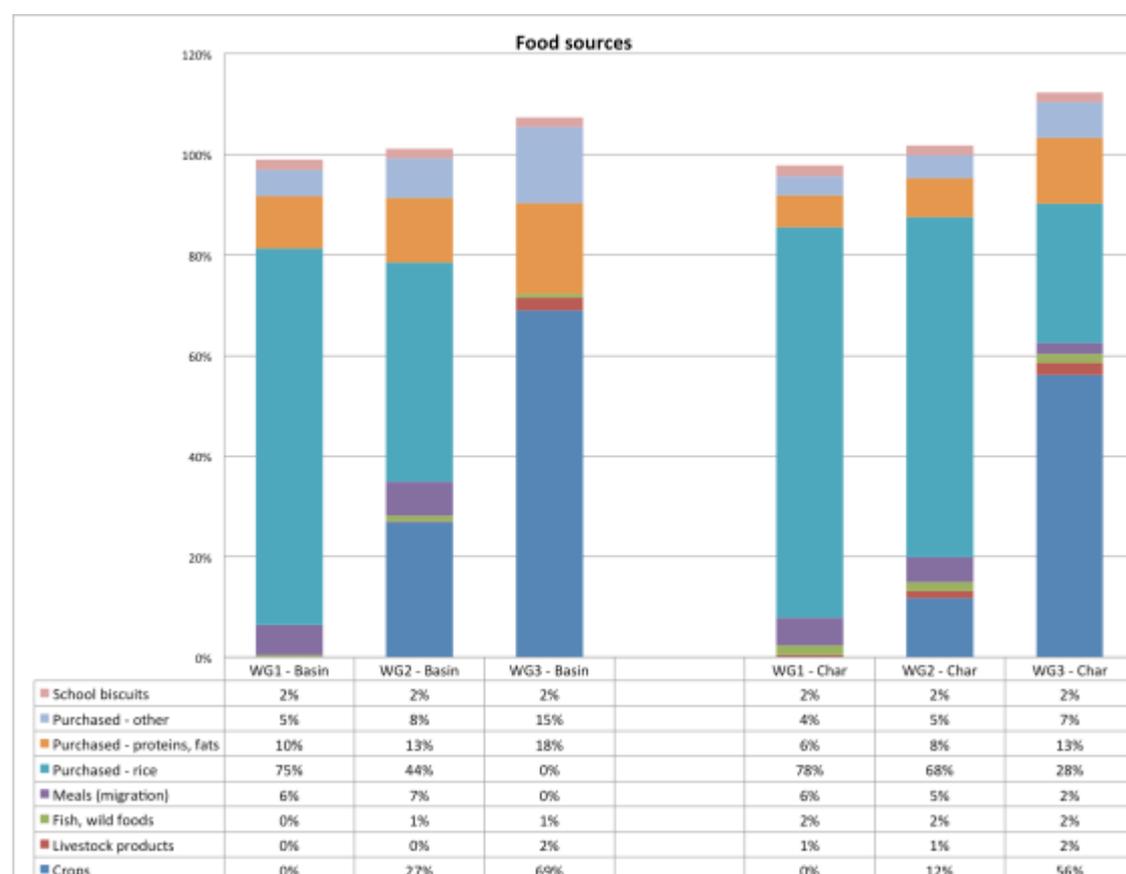


SECTION THREE – HOUSEHOLD ECONOMIC ANALYSIS

Section Three presents detailed findings on sources and amounts of food and cash income and patterns of expenditure separately for each wealth group and each location. Households in all wealth groups successfully met their calorific needs over the one year period of the baseline, however it is important to note that successfully meeting calorific needs does not equate to a healthy, balanced diet, as will be presented below. It might seem a surprise that the poor in this area “survive” given the very challenging conditions presented by the river. However, they do survive, and in fact they clearly have developed a livelihood system that is not as vulnerable to flooding as outsiders would imagine. The biggest determinant of being poor, and the biggest vulnerability for poor households is not the river, nor anything caused by the river. The biggest vulnerability for these households is the fact that they are deprived of land and cannot utilize land for productive purposes. As mentioned in Section Two, it is difficult to conceive of meaningful development for the labourer and sharecropper classes in the absence of a fundamental change in land ownership patterns. It is difficult to imagine significant numbers of wealth group 2 households moving up the socioeconomic spectrum just one notch to wealth group 3, who have two to three times their food and cash income, if they don’t have the equivalent land asset.

SOURCES OF FOOD DISAGGREGATED BY WEALTH GROUP

The table below provides a summary of contribution of various food sources disaggregated by wealth group. All data relates to the baseline reference period mid April 2015 to mid April 2016, with all foods quantified in calorific terms and expressed as a percentage of annual needs (based on WHO reference figure of 2,100kcal per person per day).



The crops category in the graph includes foods consumed by households from produced rice and other cereals, pulses, vegetables, fruits and oil seeds. Livestock products includes milk, eggs and meat produced by the household from their own livestock. Fish and wild foods includes fish and other species caught wild in rivers, wild taro and other tubers as well as various types of non-cultivated leaf vegetables. Meals refers to food consumed by the migrating member of the household, whether the meals are purchased or provided by the employer. Purchase of proteins and fats includes cooking oil, lentils and other pulses, milk, broiler chicken, fresh and dried fish, etc. Other purchases includes potatoes, *atta* flour, sugar, vegetables and fruits.

Wealth group 1 households in the river basin zone relied almost totally on purchases for their food needs in the baseline reference period. They typically purchased around 65-70kg of rice per month, throughout the year. It was not typical for these households to reduce purchase of rice during the rainy season. Other commodities purchased consistently throughout the year included potatoes, lentils (or other pulse), cooking oil, sugar, and fresh fish, all be they in small quantities. Purchase of milk, chicken, beef and eggs was very low, contributing only around 1% of annual calorie needs. Meals consumed while working away outside the zone contributed around 6% of the household calories. Consumption of their own poultry meat and eggs was minimal, as were calories from fish caught in the river.

Wealth group 2 households in the river basin purchased less rice than wealth group 1 households as they cultivated rice themselves, which contributed around 25% of their annual needs. Sharecropping is the most typical method of farming for these households. Sharecropping is less common in the northern areas of the zone, possibly related to smaller holdings of better off households. These households typically harvested 15 *mond* of paddy rice (600kg) from one *bigha* that they cultivate, of which they need to pay around 5 *mond* of this to the land owner. Fruit and vegetables cultivated on their small pieces of land contributed a few percent of annual calories. They produced around 40kg banana per year of which half was consumed and half sold at 50 taka per kg. They harvested around 60kg mango from an average tree of which an estimated 20kg was eaten, and 40kg sold at 30 taka per kg. One jackfruit tree produces around 150kg of which an estimated 50kg was eaten and 100kg sold at 16 taka per kg. They purchased rice in similar monthly quantities as wealth group 1 households, however only for approximately 7 months of the year, starting around September/October up to the boro rice harvest in April/May 2016 (N.B. in northern area of the zone these households purchased rice all year). They purchased a slightly higher grade of rice than poorer households below them. Purchase patterns of other items including lentils, cooking oil, etc were similar except in slightly higher amounts than poorer households. In particular they purchased more of the “tasty” foods such as chicken, eggs, vegetables, etc. These households also caught and consumed more fish from the river, in total contributing around 1% of annual calories.

Wealth group 3 households in the river basin produced around 70% of their own food needs in the baseline reference year. This was mostly rice, but also includes fruit and vegetables. They typically harvested 40-45 *mond* of boro paddy rice (1,680kg) on their 3 *bigha* of land. They did not purchase rice during the baseline reference year. They bought significantly more of the “tasty” (i.e. nutritious) foods than poorer households below them as well as more snacks and tea in the local market, *atta* (wholewheat flour), and more fruit and vegetables. Around 3% of their annual calorie needs came from milk and chicken meat that they produced themselves.

Wealth group 1 households in the char zone were similar to wealth group 1 households in the river basin zone, relying almost totally on purchased food to meet their needs. These households did marginally reduce rice purchase for 3 weeks of the baseline reference period, during the rainy season. Instead of purchasing their normal amount of around 2.1kg of rice per day, they purchased around 1.6kg per day for the three week period. Interestingly, other regularly-purchased commodities including lentils, potatoes, sugar and oil were not reduced. As mentioned in the above section related to markets, there are various grades of rice available in the market, some are lower than the average price of 27 taka per kg spent by wealth group 1 households. Dietary habit may be playing a role in influencing households to slightly reduce the volume of preferred rice for a short while rather than switch to a less preferred variety of rice to maintain quantity. In no interviews with traders or households was there any mention of “non availability” of rice at any time during the baseline

reference period. It should be clearly emphasized that many, or most, households living in both the char and river basin zones, reduced their meal frequency during periods of inundation with flood water. Most people reported that they ate twice per day, rather than 3 times, during the periods of flooding. This, however, does not necessarily equate to a reduced overall quantity of foods (although it could indicate this) as is evidenced by purchase trends. The task of cooking is highly inconvenient when the standing water level is 50cm, with all food stocks, cooking stoves, fuel and preparation being raised above the water level. The research was unable to quantify accurately the role of sharing and gift food during these periods, however it is also possibly a factor in explaining why purchase is slightly reduced.



Source - Google (photographer unknown)

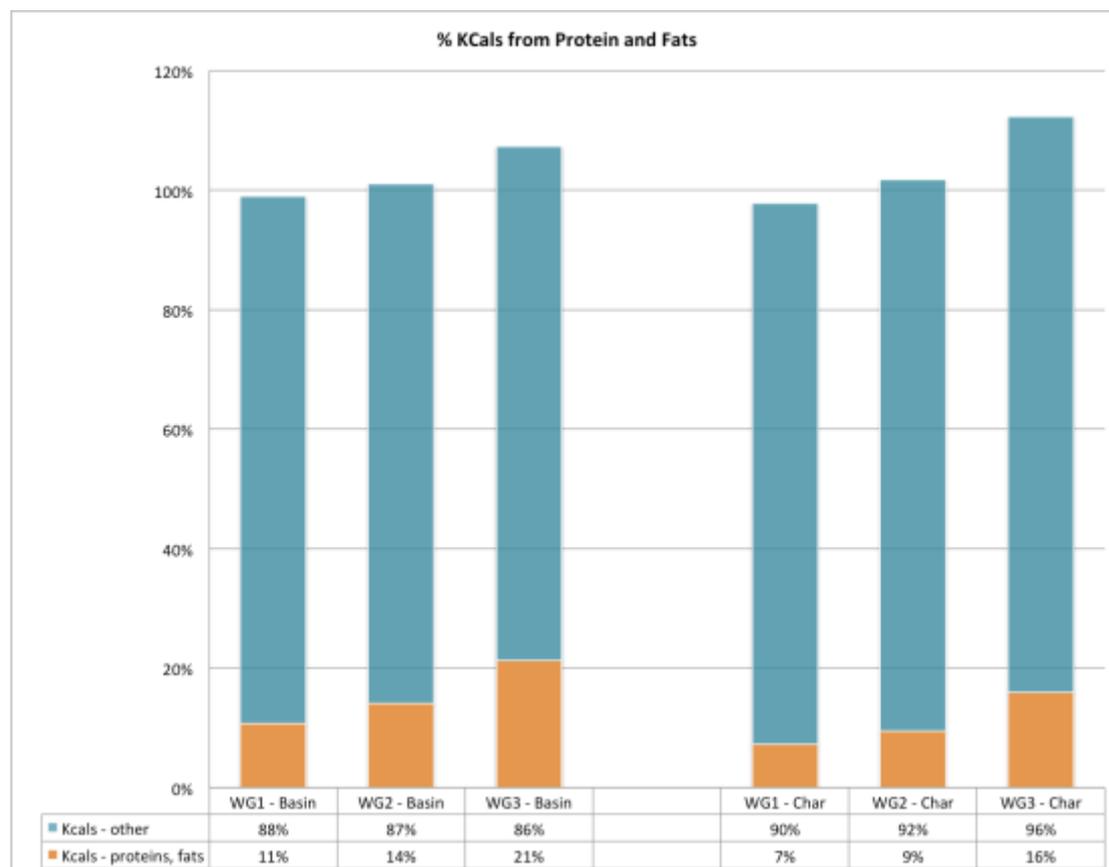
Wealth group 2 households in the char zone produced less rice than their counterparts in the river basin zone, due to higher suitability of cash crop farming on the chars. Small amounts of other food crops including mustard and sesame seed, pulses, vegetables, groundnuts, bananas, fruit, wheat and millet were also produced contributing around 2% of annual calories. None of these minor crops was typical in their own right, meaning that some of these wealth group 2 households produces sesame, others groundnuts, others pulses, etc but overall around 2% of calories were produced. Purchase was the primary source of food for these households with only minor amounts of calories coming from fishing and produced milk and meat. Consistent with other wealth groups in the char zone, this wealth group purchased less of the tasty, nutritious foods than their wealth group 2 counterparts in the river basin.

Wealth group 3 households produced around 60% of their annual calorie needs, much of this coming from boro rice. Small amounts of other crops (see list in above paragraph) were also produced and consumed, also contributing around 3% of annual calories. Unlike wealth group 3 households in the river basin, these char households needed to purchase rice for around 4 months of the year. Meals during migration, caught fish, and produced milk and meat each contributed around 2% of annual needs.

School biscuits are provided by government and the World Food Programme for all primary students. As this is a blanket programme, all wealth groups are recipients of the biscuits. There are 220 school days in the year, with children receiving a biscuit packet containing 338kcal per day. This contributes around 2% of needs for a household of 5. (The biscuit is usually consumed by the receiving child, but is calculated as a component of the household calorie requirement.)

Using the same data as above, the graph below shows the percentage of calories contributed by the primary protein and fat foods (e.g. lentils, milk, cooking oil, eggs, fish), from all sources. The actual percentages are likely to be marginally (but not significantly) higher due to small amounts in other foods that were not included in the totals. For example, households are accessing fats and proteins via foods such as jackfruit, moringa leaves, fresh beans etc, however these are in small amounts. Own fish consumption was surprisingly low for livelihood zones so intrinsically linked to a river. There has been a proliferation in the last ten years in the availability and consumption of factory-produced "broiler" chicken. This is the cheapest form of animal-based protein-calories in the area and can be considered a positive development from the point of view of rural people in these two zones, notwithstanding concerns of the "less than natural" methods of production and transport. One

percent of annual calories for a household of five is equivalent to one of: 40kg fish/5L cooking oil/60L milk/11kg lentils/425 eggs.



Standard HEA methodology does not attempt to analyse macronutrient and micronutrient composition of diet. However, even if only used indicatively, the amounts of proteins and fats being consumed by all three categories of households are in line with levels that would generally be considered low for a balanced diet. This may be one part of the complex story behind the high levels of stunting and under-nutrition in these zones.

CASH INCOMES DISAAGGREGATED BY WEALTH GROUP

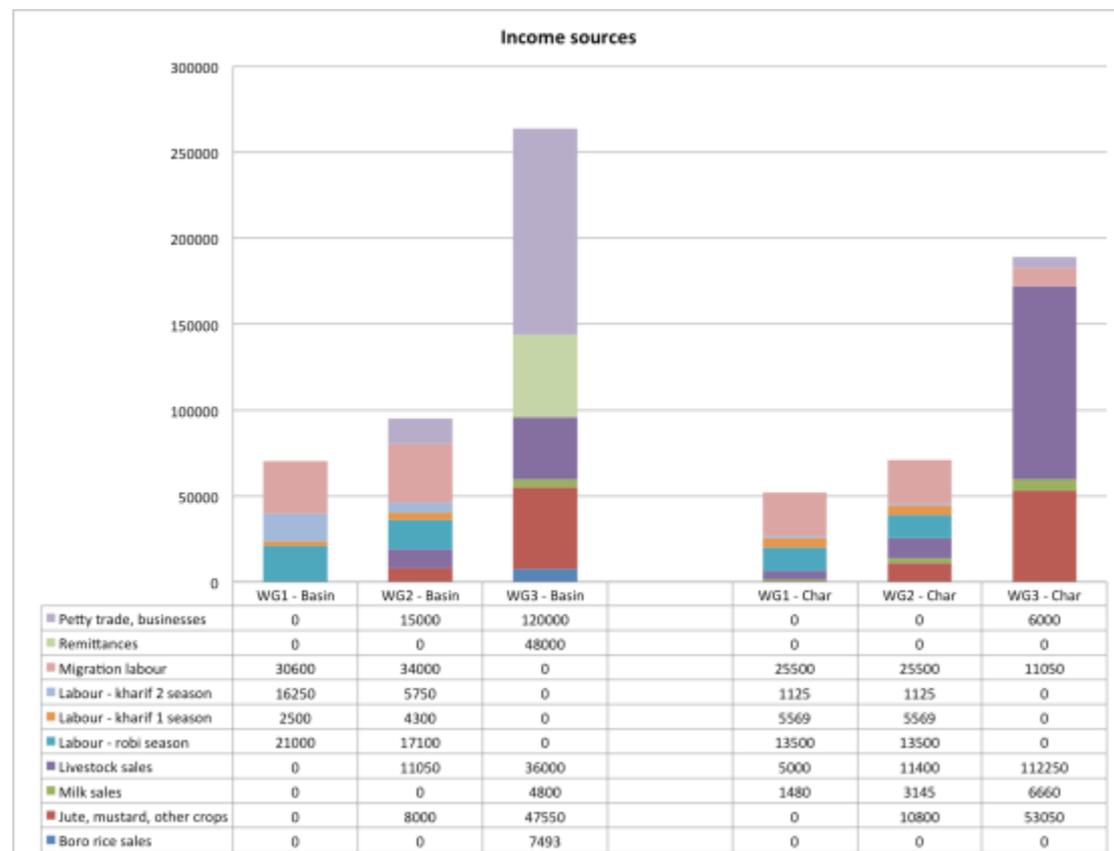
The graph below summarizes the annual cash incomes for all wealth groups in both zones. The information refers to the same 365 day period, mid-April 2015 to mid-April 2016, as the information on food and expenditures. All amounts are in Bangladeshi taka (roughly 80 taka per 1 USD at time of research).

Credit was typical for all wealth groups in both zones. It has been removed from the below graphs to avoid a visual impression of an income higher than actual. Accordingly, loan repayments have been removed from the expenditure graphs. Both credit and repayment amounts are described in the narrative explanation below.

Wealth group 1 households in the river basin zone had an annual cash income of roughly 70,000 taka, equivalent to 38 taka per person per day (around USD 0.50). Sale of labour was the only source of income for these households. Adult males in these households are highly mobile throughout the year. High demand for farm workers in neighbouring districts (outside the zone), with higher wages than are available within the zone, acts as a major pull factor for these households. Males often “migrate”

for work, making trips of 20-30 days, from which they clear around 7,000 to 8,000 taka (after meals and accommodation) which is either sent home electronically, or taken back home physically. Males from these households typically made 4 to 6 such trips in the baseline reference period. These are scheduled around labour demand in their own and surrounding villages, as well as the onset of floods (it is rare for men to be away from home when flood waters are approaching and present). In general, the rainy season is a period of low demand for labour, both within the zone as well as in neighbouring districts, however opportunities increase significantly at the end of the rains (late Kharif 2, early Robi season). Migration labour is considered by these households an expandable livelihood strategy. Opportunities are relatively abundant and when the need arises, adult males can do extra days or make an additional trip. However, given they already spend a significant proportion of time away from their families (around one-third of the year), this expandability has its limits.

Local, daily labour done within the zone (as well as in nearby villages which are technically outside the zone) during the *robi* and *kharif 2* seasons were important sources of cash for these households, contributing just over 50% of the annual income to the household. The higher proportion of the income was earned in the pre-harvest cultivation phase of the two seasons including land preparation, planting and transplanting, weeding, etc. A brief busy period comes at the start of the *kharif 1* season with the harvest of boro rice and planting of jute, however this is followed by a low period. Wealth group 1 households earned less than 10% of their annual income during the Kharif 1 period. It was commonly reported during interviews that households from this wealth group enter this low work period of the *kharif 1* season with savings accumulated from labour done in and out of the zone during the *robi* season. Savings of around 10,000 taka are enough for a *normal* level of purchases during the rainy season, although many households also take expenditure smoothing loans in the later part of the rainy season period, around September to October. Loans for this wealth group ranged from 5,000 to 15,000 taka, with an average of around 12,000 taka. Loans were taken at other times of year also, but the peak is late into, or at the end of, the rainy season.



Wealth group 2 households in the river basin had an annual cash income of around 95,000 taka for the baseline reference period, equivalent to just over 50 taka per person per day (around USD 0.65).

Similarly to wealth group 1 households, local and external labour were the main sources of cash over the course of the year, earning them around 60,000 taka in total. Wealth group 2 households earned less in the *kharif* 2 season than wealth group 1 households, possibly due to being busy with cultivation activities in their own small fields. Some variation in pay rates and types of work are evident between these two wealth groups, in particular for labourers with specific skills who tend to come from wealth group 2, and therefore get paid at a higher rate. This, however, was not the case for the majority of people in this wealth group.

Supplementing income from labour, it was typical for these households to earn small amounts of cash from sale of crops including jute, mustard and fruit, earning them around 8,000 taka per year (more typical in the south of the zone than the north). Sale of livestock earned these households around 11,000 taka for the year. Some made more than this when they sold a cow, others didn't sell one and so made less, some were part owners in a cow which was sold, and most sold a goat. It was in fact very challenging to conclude a specific amount for how much was earned from livestock sales, with 11,000 being the rough average between a range of figures. Many of these households also made around 15,000 per year from other sources, including petty trading and van pulling, most of which require a minimal amount of initial capital to engage in the activity. Credit was typical with these households taking loans of similar amounts to wealth group 1 households, with the most typical time of loan also after the rainy season.

Wealth group 3 households in the river basin zone earned cash income of around 260,000 taka in the baseline reference period, equivalent to around 140 taka per person per day (around USD 1.80). Trade and business is the largest contributor of cash to their households, around 120,000 taka. They are involved in operation of businesses such as mills, boat transport, ownership of vans which are rented to others, village shops as well as buying agricultural commodities and livestock and selling on to market. Remittances are both typical and regular for this wealth group, earning them around 50,000 taka per year. These remittances come from family members living in Dhaka and other locations including Naranganj, Gajipur, Chitagong, where many in garment factories. The southern part of the zone, being closer to Dhaka, has a stronger pattern of remittances than the remote north, where in some locations it was not typical for wealth group 3 households to be receiving remittances.

Livestock and crop sales were the next two most important contributors to cash incomes for these households. Boro rice, jute and mustard were typical for most of these farmers throughout the zone, with the balance more towards boro rice in the northern areas. Other important crops were aubergine (eggplant), cabbage, maize for livestock feed, cauliflower and chili. None of these crops was typical everywhere but most farmers grew one or more of them in addition to boro rice, jute and mustard.

As with households from other wealth groups, credit and loans were typical for this group. These were for higher amounts than for the lower wealth groups, and were mostly for productive purposes such as purchase of fertilizer, irrigation, young cattle for fattening, and purchase of other farmers' produce. Amounts of loans ranged from 15,000 to 50,000, an average of around 20,000 taka, with larger loans being typical in the south end of the zone.

Wealth group 1 households in the char zone earned around 52,000 taka of cash income in the baseline reference period, equivalent to around 32 taka per person per day (around USD 0.40). Cash income from labour was significantly lower than the wealth group 1 households in the neighbouring river basin zone. This was despite the daily labour price being slightly higher than in the river basin (225 taka per day, compared with 200 taka). There are fewer work opportunities available in the chars due to generally lower intensity of farming, as well the logistical constraints that make daily labouring in a neighbouring village unrealistic (i.e. because all travel requires a boat trip). Migration labour was also slightly lower for these households. This may be because households in the river basin, that are logistically connected by road and have more human movement, are more likely to hear of opportunities compared with people geographically isolated on an island. Around 45,000 taka was earned in the baseline reference period from all labour and migration, compared with around 70,000 taka for wealth group 1 households in the river basin. The only other sources of cash for these households, was small amounts from the sale of livestock and milk, around 6,000 taka. Small loans

were also taken by these households, although amounts are generally smaller than in the river basin zone, around 6,000 taka.

Wealth group 2 households in the char zone earned just over 70,000 taka in cash income, equivalent to 38 taka per person per day (around USD 0.50). Income from selling of local, daily labour, as well as income from migratory labour, was the same as for wealth group 1 households. Production of jute was typical for most households in this wealth group. Additionally, most households also sold one or more of other crops including mustard, sesame, lentils, vegetables, fruit, maize for livestock feed, groundnuts, millet and wheat (none of which was typical in their own right). Just over 10,000 taka was earned from sale of crops in total. Cash income of around 15,000 was earned from sale of livestock and milk. It was typical for these households to take small loans, rarely more than 10,000 taka.

Wealth group 3 households in the char zone earned roughly 190,000 taka in cash income, equivalent to around 105 taka per person per day (USD 1.30). Livestock sales were the most important source of income for wealth group 3 households, earning them just over 110,000 taka during the baseline reference year. This would include sale of two cows, as well as several goats. They also earned around 6,000 taka in milk sales. The second largest source of cash for these households was from sale of cash crops - just under 55,000 taka - in particular jute which was almost universally common across the zone. Other crops sold included mustard, sesame, lentils, vegetables, fruit, maize for livestock feed, groundnuts, millet and wheat, again none of them typical in their own right (wealth group 3 households typically also sold boro rice in the south of the zone).

These households also earned cash income from doing migratory labour, however far less often than poorer households, around 11,000 taka (again, geographical variations across the zone meant that households in central and north areas do this migratory labour, while in the south it was not typical). This is somewhat surprising, but may indicate a preference to maintain cash flow in the months before cattle are ready for sale April-June. Minor amounts of trade and business earned these households just over 5,000 taka for the year, perhaps highly limited by logistical constraints. Remittances were not typical for these households. Credit also tended to be lower for these households than for the equivalent households in the river basin.

Additional Notes

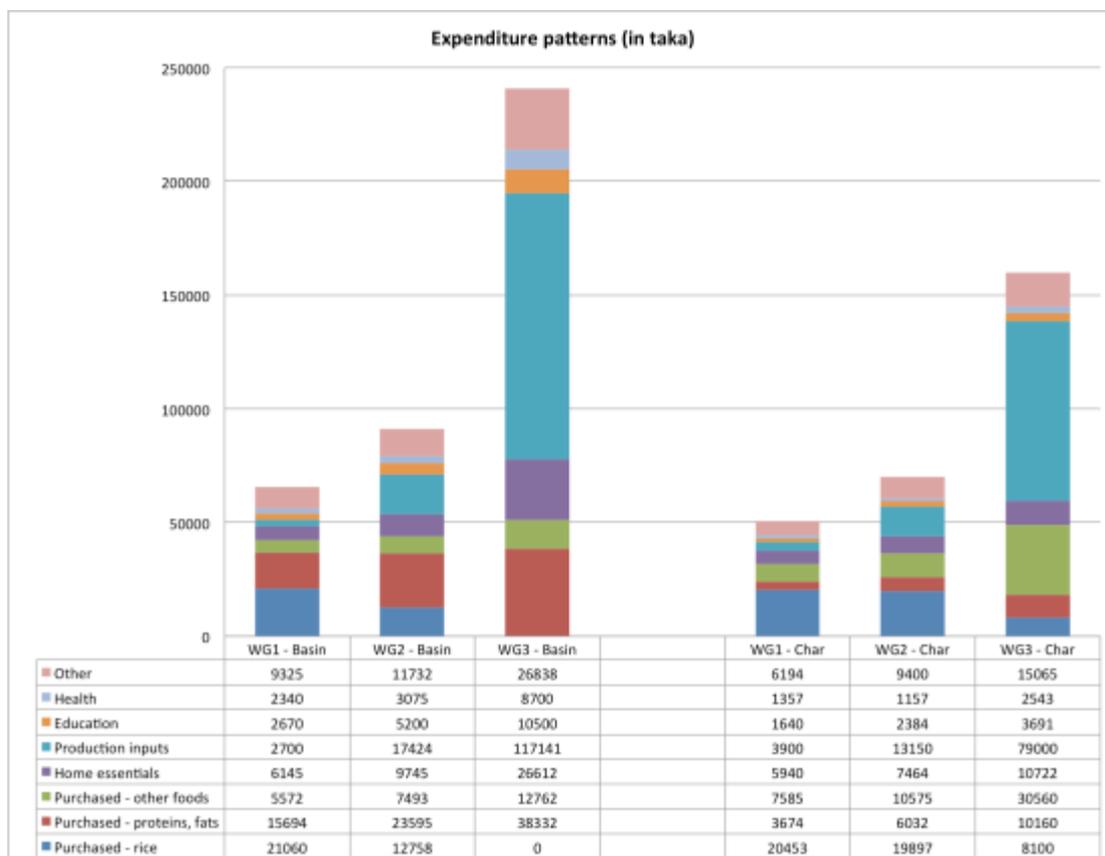
Various pensions and safety nets are paid to veterans, people with disabilities, widows, etc. It was challenging to quantify and incorporate these into the wealth group data because many of these payments are not distributed according to wealth category, meaning they do not appear as “typical” in any of the wealth groups described in this report. They are most definitely a component of some household’s cash income.

EXPENDITURE PATTERNS DISAGGREGATED BY WEALTH GROUP

The graph below presents expenditure patterns for the three wealth groups for the same 365 day baseline reference period, mid-April 2015 to mid-April 2016. All data is in taka. The categories of expenditure include:

- Purchased rice
- Purchased proteins and fats – fresh fish, dry fish, cooking oil, lentils, other pulses, chicken, milk, beef, goat, eggs
- Purchased other foods – potato, atta flour, vegetables, fruits, sugar, etc
- Home essentials – soap, clothes and kitchen detergents, women’s sanitary items, salt and cooking spices, tea, basic lighting costs (electricity, kerosene, candles, etc), milling and threshing, cooking utensils, bedding, house repairs
- Production inputs – transport costs, petrol, equipment purchase and rental (i.e. ploughs etc), seeds, fertilizer, pesticides, irrigation, labour payments, livestock purchase, livestock drugs and feed, nets and boats, other business investments
- Education – formal fees, uniforms, books and stationery, tuition fees, pocket money

- Health – doctor’s fees, medicines, informal medical costs
- Other - clothing, festivals, cigarettes and betel nut, barber, phone credit, non-essential hygiene products and cosmetics, etc



Purchase of protein and fat foods was far lower for all wealth groups in the chars, as compared with their equivalent wealth group in the river basin. For example, wealth groups 1 and 2 in the chars purchased around 15kg of lentils for the year, whereas their counterparts in the river basin purchased around 25kg. Purchase of fish for these two wealth groups was less than 20kg annually, compared with 40-50kg in the river basin (this was offset marginally by higher levels of fishing). Purchase of cooking oil, chicken meat, eggs, milk and beef also followed similar patterns.

Expenditure on home repairs, maintenance and furniture (included in “Home Essentials”) was generally higher in the basin area than on the chars, across all the wealth groups. This did not appear to be related to a greater need to spend money on maintenance, rather that the greater availability of cash flow enables repairs to be paid for (rather than to be done by the home owner which would be free of cost), as well as easier access to home items such as metal storage boxes and other furniture which people would be inclined to buy. Better off households also spent more on repairs and maintenance than poorer households, because they usually have multiple buildings to maintain.

Transport costs for going to market, visiting relatives, going for migration and schooling, including petrol, were higher for all wealth groups in the river basin compared with their respective wealth group in the river basin. This seems counter-intuitive given the logistical requirement to always use a boat for those living on chars, but in reality, people on the chars simply don’t travel as much. Movement from village to village on a single char, or intra-village movement, is done on foot in most cases, costing nothing. An equivalent trip in the river basin zone could be done for free also, however people have the choice of paying for rickshaws and vans which many actually do.

Education expenditure was lower in the chars. This is likely due to a lack of secondary schools on which to spend money on, rather than a lower value or preference for education. Despite census data

that suggests there is “coverage” across the country, it was not common to meet households whose children had graduated from a secondary school on the chars. Tertiary graduation is very low on the chars, according to interview data. These are likely factors for why remittances to wealth group 3 households were not typical in the char zone.

Medical expenditure was also lower in the char zone. This most likely is indicative of the limited options to spend money on health facilities, rather than a higher health status (although this could be the case). Expenditure on health also increased by wealth group in the river basin (and only marginally so in the char zone), likely resulting in better health outcomes for better off households.

Loan repayments were made by all wealth groups but have not been included in the graphs. Mostly households paid in one year the typical amount loaned plus 20% in interest – for example wealth group 1 households in the river basin borrowed 12,000 taka and repaid around 14,000 taka. Loans were taken both before the baseline reference period (for which incoming money is not calculated, but outgoing repayments are) as well as during the baseline period (for which incoming money is calculated, as well as any outgoing repayments during the baseline period).

Note on credit, loans and indebtedness

The research shows that a clear majority of households from all wealth groups are active users of credit facilities. In this sense, almost everyone is indebted. There was no sense, however, that this was crisis lending, nor trending towards unsustainable amounts over time. Some people complained of high-interest loan sharks, however these are in the minority as compared with the normal credit institutions which are considered to be an important element of the local economy. The standard interest rates of 15-25% per annum are considered acceptable. Rolling over of loans and switching of credit institutions was not uncommon.

Typically when asked, poorer households responded that loans are taken to purchase rice (usually rice was specifically mentioned) and to pay for schooling. This is probably true, however, the expenditure reality is more complex than this. A comparison of amounts spent on credit with amounts spent on “other” items by the three wealth groups in the river basin zone provide an interesting perspective on the nature of expenditure preferences. The “other” category includes items such as clothing, festivals, cigarettes and betel nut, barber and phone credit. It is arguable that some of this expenditure is “essential” – some of the phone credit is production related, some clothing is essential, participating in religious and cultural festivals is important for social cohesion – however it is also arguable that these are less essential as compared with expenditure on food, education, health and productivity. Purchasing an “advance income” to continue accessing the items households both need and want is not a negative sign, nor should it be termed a “coping strategy” per se.

	Wealth Group 1	Wealth Group 2	Wealth Group 3
Average credit amount	12,000	12,000	20,000
Expenditure on “other”	~9,000	~12,000	~27,000

Annex B includes profiles which include the above household economic data on food, incomes and expenditures, arranged wealth group by wealth group.

KEY PARAMETERS FOR MONITORING

Various components of the livelihood system in both zones are considered more crucial and important than others (based on the percentage of contribution they make to the overall economy of the village). The table below presents the key parameters that need to be monitored as an indication of possible losses or gains to household livelihoods.

River Basin Zone

<u>Item</u>	<u>Key Parameter - Quantity</u>	<u>Key Parameter - Price</u>
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Boro rice	Production volume	Rice price
Jute	Production volume	Jute price
Mustard	Production volume	Mustard price
Cattle	Production volume	Cattle price
Local labour	Amount of work available	Labour price
Migration labour	Amount of work available	Labour price
Remittances	-	Amount being sent
Petty trade, business	Trade volume	Amount earned
Home repairs expenditure	-	Amount spent
Credit	-	Amount accessed
Char Zone		
<u>Item</u>	<u>Key Parameter - Quantity</u>	<u>Key Parameter - Price</u>
Boro rice	Production volume	-
Jute	Production volume	Jute price
Cattle	Production volume	Cattle price
Goats	Production volume	Goat price
Local labour	Amount of work available	Labour price
Migration labour	Amount of work available	Labour price
Petty trade, business	Trade volume	Amount earned
Home repairs expenditure	-	Amount spent
Credit	-	Amount accessed

N.B. Due to the high variation in crop types, none of the crop types taken individually are critical, however any event that affects multiple crops such as sesame, groundnuts, wheat, millet, fruits, livestock maize, etc would need to be monitored.

SECTION FOUR – COPING MECHANISMS AND SCENARIO ANALYSIS

EXPANSION AND CONTRACTABILITY

During interviews, respondents were asked to explain what options are (or are not) available to them in the event of a major shock such as a large flood in order to maintain both survival and livelihood production. This includes reduction of expenditures when necessary, any additional expenditures incurred by responding to floods, as well as any expansions of opportunities they utilize to increase cash or food in the household. The following list are the more typical patterns.

- Increased milk sales were not mentioned as a strategy for increasing income
- Increased cattle sales for wealth group 3 households were not considered necessary or likely in the case of a flood destroying a jute crop. Access to credit, but also residual savings for some households, means that households would not need to resort to increased sale of a cow. Similarly, wealth group 2 households are also likely to access credit before increasing sale of cattle.
- Credit can be increased:
 - WG 1 Basin – up to 50% more than baseline levels – i.e. up to 18,000 taka
 - WG2 Basin – up to 50% more
 - WG 3 Basin – up to 50% more
 - WG1 Char – up to 75% more
 - WG 2 Char – up to 75% more
 - WG3 Char – up to 100% more
- Jute and other cash crops are usually sold in their entirety at time of harvest, or shortly after. No expansion possible.
- After the flood has passed, if households that normally do migration need more money they usually stay away longer. If they stay away normally for 20 days, they would stay an extra 5 days per trip. Some would also make an additional trip. Approximately equivalent to a 25% increase compared with the baseline.
- Local labour, done within the village or in a neighbouring village is not considered expandable. All opportunities are fully exploited in the baseline period.
- During the actual moment of floods, people will not leave the home and family.
- Remittances for wealth group 3 households in the river basin typically would increase by around 1,000 taka per month (from 4,000 to 5,000) for 3 to 6 months after an event (equates to a 10% increase on the baseline).
- In cases of large floods, additional expenses can be incurred for home repairs (over and above the normal baseline amount) as well as for movement of possessions by boat.
- Expenditure on animal treatment can increase marginally after a flood.
- Fishing could increase marginally after big flood, but not substantially.
- Reduction on food expenditures as follows:
 - Rice – no reduction typical or possible
 - Potatoes – no reduction typical
 - Lentils, salt spices – reduced by 25% of baseline amount if necessary
 - Oil, spices, onions and tomatoes, tea, snacks – reduced by 50% of baseline amount if necessary
 - Sugar, vegetables and fresh fish – reduced by 75% of baseline amount if necessary
 - Atta, chicken, dried fish, milk, eggs, fruits – reduced to zero if necessary

SCENARIO OUTCOMES

Using the baseline data, combined with the above expansion and contraction information, and information on the impact of a flood, it is possible to model hypothetical scenarios to determine what set of conditions would need to take place for households to experience a deficit. It is difficult to forecast how floods affect households specifically, as individual flood conditions vary to some degree.

Suffice to say that when a particular flood affects any of the key parameters it has the potential to result in a deficit. Presented below are three scenarios of differing degrees of impact.

1. Moderately bad flood scenario – this is a scenario in which jute crops are destroyed resulting in zero sales, additional home repair expenditures are 7,500 taka more expensive than the amount spent by the respective wealth groups in the baseline, rice price in the market has increased to 30 taka per kg (an increase of around 10% above the baseline price), kharif 1 season harvest labour has been reduced to zero, kharif 2 cultivation labour has been reduced by 50%.
2. Very bad flood scenario – same as scenario 2 except that damage to homes was severe and expenditure related to repairs and moving was 15,000 taka more expensive than the baseline, rice prices increase by 25% above the baseline amount, cattle sales reduced by 25% as compared with baseline,
3. Catastrophic flood – massive flood waters affect many neighbouring areas reducing migration labour opportunities by 25%, rice price increases by 50% above baseline, cattle sales reduced by 50% and all other parameters same as scenario 3.

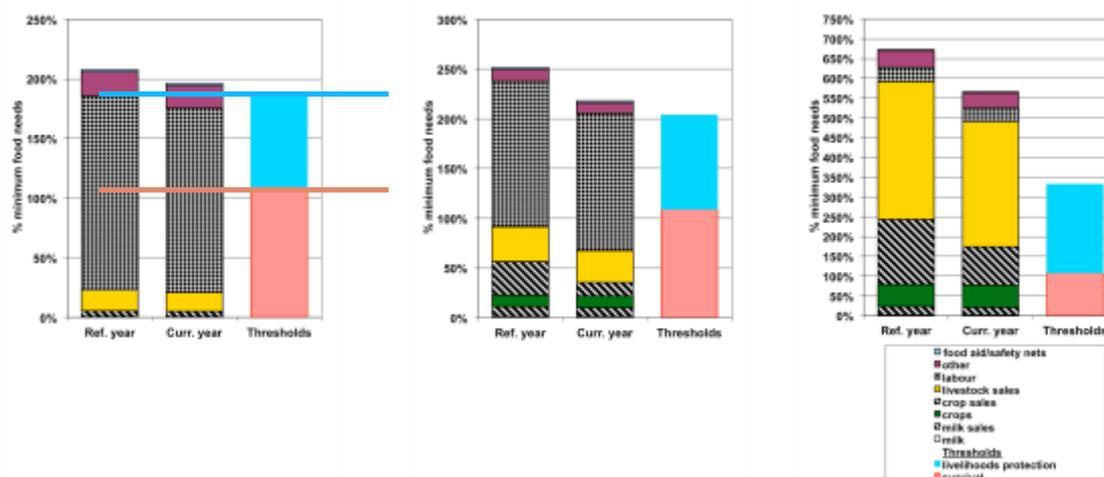
To develop the graphs below the above scenarios were entered into the outcome analysis spreadsheet in addition to the expansion and contraction information described above. It is important to keep in mind that the baseline period itself was not a period without a shock. Other years may be better than the baseline year, especially those in which jute production is normal and in which amon rice is successfully harvested.

Each of the graphs presented below has three columns. The left column is the baseline “reference” year. The middle column is the scenario outcome after taking into consideration the impact of the flood and household’s coping options (titled “current year” in the graphs). On the right are the Survival Threshold and Livelihoods Protection Threshold. The Survival Threshold is the amount of food and cash income required to ensure survival in the short-term, to cover minimum food and non-food needs. Minimum non-food needs include the costs of preparing and consuming food (grinding, salt, etc) as well as basic lighting. The Survival Threshold is represented in pink. Above this in light blue, is the Livelihoods Protection Threshold which is the amount of food and cash income required to protect livelihoods, in other words the basic amount needed to maintain the status quo – to continue paying for animal vaccines, purchasing calves, paying for ploughing and seeds, paying for basic schooling and medical expenses, etc. In any case that the middle column (i.e. the flood scenario) is below the Survival Threshold, an intervention is essential to ensure the survival of the population. In any case that the middle column is below the Livelihoods Protection Threshold (but still above the Survival Threshold) there is a need to make a decision regarding intervention that will assist households to maintain their baseline level livelihoods.

Note that the percentage level on the Y axis on the graphs below changes by wealth group.

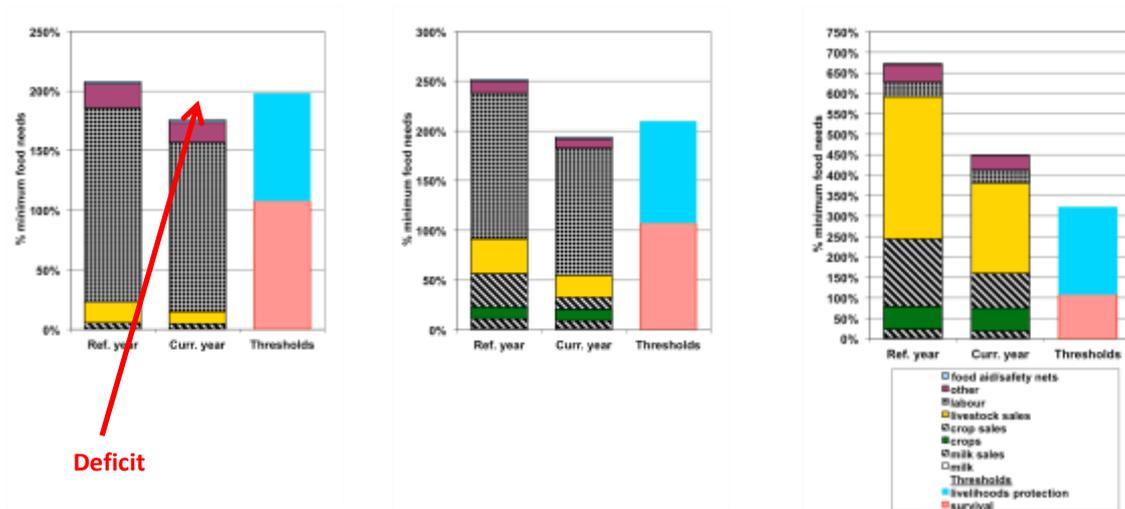
Flood Scenario One – Char Zone

None of the three wealth groups have a deficit below the Livelihoods Protection Threshold (and therefore no deficit below the Survival Threshold).



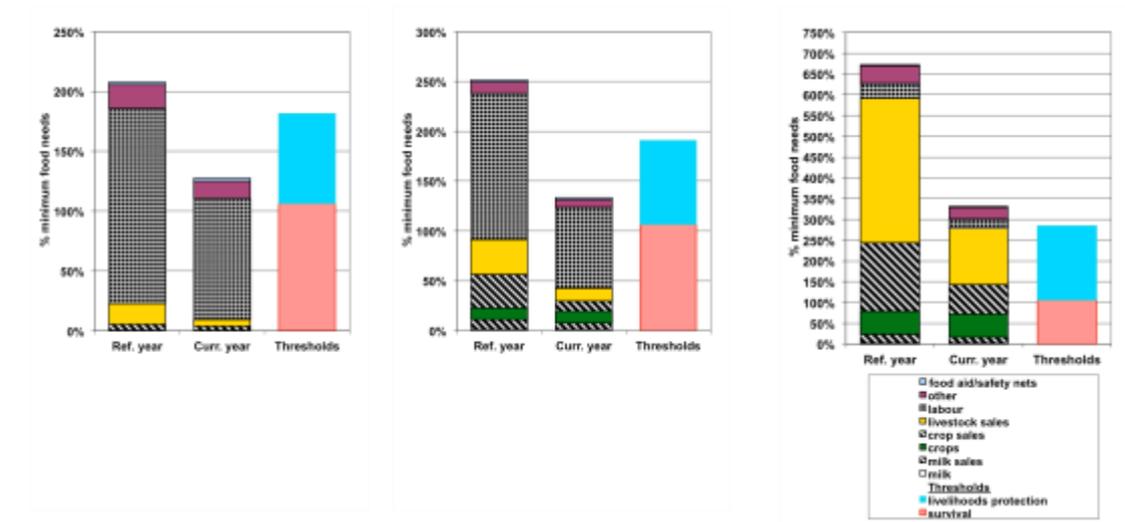
Flood Scenario Two – Char Zone

Wealth group 1 and 2 both have deficits below the Livelihoods Protection Threshold meaning that an intervention would be required to assist them to maintain their livelihoods for the following year. These two wealth groups do not have deficit below the Survival Threshold meaning that this scenario is not a matter of life and death. Wealth group 3 does not have any deficits.



Flood Scenario Three – Char Zone

Wealth groups 1 and 2 both have very significant deficits below the Livelihood Protection Threshold, but are still above the Survival Threshold. Wealth group 3 still does not have a deficit.



ANNEXES

Annex A – Methodology

Annex B – Summary Profiles by Wealth Group

River Basin Zone, Wealth Group 1

River Basin Zone, Wealth Group 2

River Basin Zone, Wealth Group 3

Char Zone, Wealth Group 1

Char Zone, Wealth Group 2

Char Zone, Wealth Group 3

Annex A – Methodology

The first step in the sampling process was the definition of the livelihood zones. Through discussions with senior partners and key informants from relevant districts it was agreed that villages on the *chars* should be disaggregated from the villages located on the (mainland) banks of the river. Types of cropping and livestock production are relatively similar, however ability to market products is significantly different. Villages located on the *chars* have, by definition, a major geographical constraint in the form of a very large river. Villages located on the mainland bank of the rivers, were differentiated from villages further inland (slightly higher in elevation) on the basis of whether they are subject to annual inundation or only occasional flooding when there is a larger flood event. Villages subject to annual inundation are referred to as being in the river basin.

From the six districts of interest mentioned in the introduction section of the report (all of which have both river basin and *char* zones) three districts were selected and villages sampled for the fieldwork; Kurigram, Gaibandha and Sirajganj. Although no villages were visited from the other locations, the conclusions and findings are considered relevant for these locations also as livelihood patterns are essentially the same as the three sampled districts. Nineteen villages were purposively sampled for representivity (listed below). The distance between the northern-most and southern-most village visited was significant.

District	River Basin Zone	Char Zone
Kurigram	Patrokhata	Astamichar
Kurigram	Noyabosh	Pattola
Kurigram	Kumuriarpar	Pakiura
Kurigram	Madargonj	
Gaibandha	Maddhya Uria	Chondonshor
Gaibandha	Vasharpara	Char Charitabari
Gaibandha	Poschim Belka	Tangrakandi
Sirajganj	Rehaipukuria	Hijulia / Gushuria
Sirajganj	Thakurpara	Bagvwara
Sirajganj	Char Gudibari	Vadtikulia

In each village both formal and informal leaders of the village were requested to come together for a focus group discussion to discuss the context and livelihood systems within the village. Matters of asset ownership, wealth determinants, seasonality, production levels, commodity prices and floods were discussed in a systematic way in every location. As a result of this meeting, three follow-on focus groups were arranged with purposively-sampled representatives of three different wealth groups; very poor, poor and middle ranked households. Each of these focus group discussions has four to six men and women from four to six different households. Better off and rich households were not interviewed. In each of these three focus group discussions a semi-structured but systematic investigation of food, cash income and expenditure was completed. Fixed questionnaires were not used for this research.

Internal interview cross checks are a key feature of the HEA methodology where cash income and expenditure need to roughly balance in the interview, while food calories must come to a total considered reasonably close to the annual calorific requirements of the household. Additional cross-checks are made across the three interviews, as well as between these interviews and the village leader interviews. Discrepancies in production levels, prices, events, etc must be investigated and explained at the time of interview.

A total of 233 people were present in the focus groups (leaders and wealth groups) in the River Basin zone. A total of 182 people were present in the focus groups in the *Char* zone. Additionally, traders

and local authorities were interviewed at the union, *upazila* and district levels. Fieldwork took place between 15 May and 4 June, 2016.

An intrinsic weakness of the HEA methodology is that it tends to miss the aspects of the livelihood system that are present for a few individuals but not typical for the majority. For example, if only a few households of the dozens of households considered very poor catch and sell fish, the data will indicate that fishing is not a typical livelihood activity for this wealth group. If widows are receiving subsidized rice, it is possible that this will not reflect in the data as widows are not a majority in any of the wealth groups. In an effort to capture what is the most normal and typical for a majority of the households in a wealth group, some outlier information can appear to be missing. This report attempts to capture some of these “missing elements” in a narrative form.

A few significant challenges were faced during this fieldwork. Geographical challenges related to the large area, as well as the logistical difficulty of reaching remote *chars* made the normally heavy fieldwork schedule of HEA even more tiring. The required number of field researchers, as well as the skill level of some of the field researchers, was not as high as was needed to ensure high quality, high confidence data. As HEA relies on analytical ability rather than random statistical methods, the lower than expected staff capacity was a significant challenge. A third challenge relates to what appears to be “NGO savviness” and a tendency of human nature to exaggerate to what is said or heard. Respondents will describe a situation in which the majority of their village is landless, or very poor, simply because they know we are from NGOs. They will refer to extreme cases (“a family with 5 hectares of land can become landless overnight”) in a general way that makes the listener think that this is something that happens all the time. Even NGO staff have a tendency to do this. They will describe the constant river erosion, and land losses, without mentioning the inevitable opposite effect of land deposition and char generation. This tendency means that to reach information that is accurate and reliable requires time and cautious analysis through more probing.

All findings detailed in the food, cash and expenditures sections refer to the 365-day period mid-April 2015 (Bangladesh new year) to mid-April 2016, referred to as the baseline reference period. Findings are valid for a minimum of 5 years, in the absence of any major disruption to livelihoods.

Further information on HEA is available at foodeconomy.com

Annex B – Summary Profiles by Wealth Group

This annex presents identical information included in the report, re-sorted by wealth group, to allow a reader to get a summary understanding of a particular wealth group of interest.

Summary Profile – River Basin Zone, Wealth Group 1

Wealth group 1 households in the river basin typically have 5 household members, they are landless and it is rare that they cultivate any land, even under sharecropping arrangement. Selling of labour is the primary source of income. The majority of them do not own any livestock, except for a few poultry. Most have a simple fishing net, a small “tin shed” home, and a cheap mobile phone.

These households relied almost totally on purchases for their food needs in the baseline reference period. They typically purchased around 65-70kg of rice per month, throughout the year. It was not typical for households to reduce purchase of rice during the rainy season. Other commodities purchased consistently throughout the year included potatoes, lentils (or other pulse), cooking oil, sugar, and fresh fish, all be they in small quantities. Purchase of milk, chicken, beef and eggs was very low, contributing only around 1% of annual calorie needs. Meals consumed while working away outside the zone contributed around 6% of the household calories. Consumption of their own poultry meat and eggs was minimal, as were calories from fish caught in the river. School biscuits provided by the government and the World Food Programme contributed around 2% of the needs of the household.

These households had an annual cash income of roughly 70,000 taka, equivalent to 38 taka per person per day. Sale of labour was the only source of income for these households. Adult males in these households are highly mobile throughout the year. High demand for farm workers in neighbouring districts (outside the zone), with higher wages than are available within the zone, acts as a major pull factor for these households. Males often “migrate” for work, making trips of 20-30 days, from which they clear around 7,000 to 8,000 taka (after meals and accommodation) which is either sent home electronically, or taken back home physically (more typical). Males from these households typically made 4 to 6 such trips in the baseline reference period. These are scheduled around labour demand in their own and surrounding villages, as well as the onset of floods (it is rare for men to be away from home when flood waters are approaching and present). In general, the rainy season is a period of low demand for labour, both within the zone as well as in neighbouring districts. Migration labour is considered by these households an expandable livelihood strategy. Opportunities are relatively abundant and when the need arises, adult males can do extra days or make an additional trip. However, given they already spend a significant proportion of time away from their families (around one-third of the year), this expandability has its limits.

Local, daily labour done within the zone (as well as in nearby villages which are technically outside the zone) during the *robi* and *kharif 2* seasons were important sources of cash for these households, contributing just over 50% of the annual income to the household. The higher proportion of the income was earned in the pre-harvest cultivation phase of the two seasons including land preparation, planting and transplanting, weeding, etc. The *kharif 1* season, which coincides with the low-productivity rainy season, is a low period of work opportunities with households earning less than 10% of their annual income during this period. It was commonly reported during interviews that households from this wealth group enter this low work period of the *kharif 1* season with savings accumulated from labour done in and out of the zone during the *robi* season. Savings of around 10,000 taka are enough for a *normal* level of purchases during the rainy season, although many households also take expenditure smoothing loans in the later part of the rainy season period, around September to October. Loans for this wealth group ranged from 5,000 to 15,000 taka, with an average of around 12,000 taka. Loans were taken at other times of year also, but the peak is late into, or at the end of, the rainy season.

Summary Profile – River Basin Zone, Wealth Group 2

Wealth group 2 households in the river basin typically have 5 household members. They own very small pieces of land of 5-10 decimals, which they cultivate, in addition to land that they cultivate for others under a sharecropping arrangement (30 to 50 decimals). These households are as much labourers as they are sharecroppers. Some own one cow, some share-raise a cow for better off households, but around half of these households do not raise a cow at all. The situation is broadly the same for small livestock such as goats. Most of these households have a few fruit trees including mango, jackfruit and banana trees. It is common to own a small fishing net and a mobile phone.

These households purchased less rice than wealth group 1 households as they cultivated rice themselves, which contributed around 25% of their annual needs. Sharecropping is the most typical method of farming for these households. Sharecropping is less common in the northern areas of the zone, possibly related to smaller holdings of better off households. These households typically harvested 15 *mond* of paddy rice (600kg) from one bigha that they cultivate, of which they need to pay around 5 *mond* of this to the land owner. Fruit and vegetables cultivated on their small pieces of land contributed a few percent of annual calories. They produced around 40kg banana per year of which half was consumed and half sold at 50 taka per kg. They harvested around 60kg mango from an average tree of which an estimated 20kg was eaten, and 40kg sold at 30 taka per kg. One jackfruit tree produces around 150kg of which an estimated 50kg was eaten and 100kg sold at 16 taka per kg. They purchased rice in similar monthly quantities as wealth group 1 households (65-70kg per month), however only for approximately 7 months of the year, starting around September/October up to the boro rice harvest in April/May 2016 (N.B. in northern area of the zone these households purchased rice all year). They purchase a slightly higher grade of rice than poorer households below them. Purchase patterns of other items including lentils, cooking oil, etc were similar except in slightly higher amounts than poorer households. In particular they purchased more of the “tasty” foods such as chicken, eggs, vegetables, etc. These households also caught and consumed more fish from the river, in total contributing around 1% of annual calories. School biscuits provided by the government and the World Food Programme contributed around 2% of the needs of the household.

Wealth group 2 households in the river basin had an annual cash income of around 95,000 taka for the baseline reference period, equivalent to just over 50 taka per person per day (around USD 0.65). Similarly to wealth group 1 households, local and external labour were the main sources of cash over the course of the year, earning them around 60,000 taka in total. Wealth group 2 households earned less in the *kharif* 2 season than wealth group 1 households, possibly due to being busy with cultivation activities in their own small fields. Some variation in pay rates and types of work are evident between these two wealth groups, in particular for labourers with specific skills who tend to come from wealth group 2, and therefore get paid at a higher rate. This, however, was not the case for the majority of people in this wealth group.

Supplementing income from labour, it was typical for these households to earn small amounts of cash from sale of crops including jute, mustard and fruit, earning them around 8,000 taka per year (more typical in the south of the zone than the north). Sale of livestock earned these households around 11,000 taka for the year. Some made more than this when they sold a cow, others didn't sell one and so made less, some were part owners in a cow which was sold, and most sold a goat. It was in fact very challenging to conclude a specific amount for how much was earned from livestock sales, with 11,000 taka being the rough average between a range of figures. Many of these households also made around 15,000 per year from other sources, including petty trading and van pulling, most of which require a minimal amount of initial capital to engage in the activity. Credit was typical for these households, taking loans of similar amounts to wealth group 1 households, with the most typical time of loan also after the rainy season.

Summary Profile – River Basin Zone, Wealth Group 3

Wealth group 3 households in the river basin typically have around 5 household members. They are small farmers (by local standards), cultivating around 90 decimals. They typically own their own

livestock including 2 to 4 cattle, and 1 to 2 goats. They have 4 to 5 trees each of various fruits, and some with timber trees. It is typical for these households to have either a solar panel or an electricity connection. Mobile phones, bicycles and fishing nets are typical.

These households produced around 70% of their own food needs in the baseline reference year. This was mostly rice, but also includes fruit and vegetables. They typically harvested 40-45 *mond* of boro paddy rice (1,680kg) on their 3 *bigha* of land. They did not purchase rice during the baseline reference year. They bought significantly more of the “tasty” (i.e. nutritious) foods than poorer households below them as well as more snacks and tea in the local market, *atta* (wholewheat flour), and more fruit and vegetables. Around 3% of their annual calorie needs came from milk and chicken meat that they produced themselves. School biscuits provided by the government and the World Food Programme contributed around 2% of the needs of the household.

Wealth group 3 households in the river basin zone earned cash income of around 260,000 taka in the baseline reference period, equivalent to around 140 taka per person per day (around USD 1.80). Trade and business is the largest contributor of cash to their households, around 120,000 taka. They are involved in operation of businesses such as mills, boat transport, ownership of vans which are rented to others, village shops as well as buying agricultural commodities and livestock and selling on to market. Remittances are both typical and regular for this wealth group, earning them around 50,000 taka per year. These remittances come from family members living in Dhaka and other locations including Naranganj, Gajipur, Chitagong, where many in garment factories. The southern part of the zone, being closer to Dhaka, has a stronger pattern of remittances than the remote north, where in some locations it was not typical for wealth group 3 households to be receiving remittances.

Livestock and crop sales were the next two most important contributors to cash incomes for these households. Boro rice, jute and mustard were typical for most of these farmers throughout the zone, with the balance more towards boro rice in the northern areas. Other important crops were aubergine (eggplant), cabbage, maize for livestock feed, cauliflower and chili. None of these crops was typical everywhere but most farmers grew one or more of them in addition to boro rice, jute and mustard.

As with households from other wealth groups, credit and loans were typical for this group. These were for higher amounts than for the lower wealth groups, and were mostly for productive purposes such as purchase of fertilizer, irrigation, young cattle for fattening, and purchase of other farmers’ produce. Amounts of loans ranged from 15,000 to 50,000, an average of around 20,000 taka, with larger loans being typical in the south end of the zone.

Summary Profile – Char Zone, Wealth Group 1

Wealth group 1 households in the char zone have household sizes of 4 to 5 members. They do not typically own or sharecrop any land. Most of these household raise a single cow, of which around half own the animal, and the other half share-raise for better off households. Keeping of goats is not typical for these households. They typically a simple fishing net and a mobile phone, as well as a few fruit trees.

These households were similar to wealth group 1 households in the river basin zone, relying almost totally on purchased food to meet their needs. These households did marginally reduce rice purchase for 3 weeks of the baseline reference period, during the rainy season. Instead of purchasing their normal amount of around 2.1kg of rice per day, they purchased around 1.6kg per day for the three week period. Interestingly, other regularly-purchased commodities including lentils, potatoes, sugar and oil were not reduced. As mentioned in the above section related to markets, there are various grades of rice available in the market, some are lower than the average price of 27 taka per kg spent by wealth group 1 households. Dietary habit may be playing a role in influencing households to slightly reduce the volume of preferred rice for a short while rather than switch to a less preferred variety of rice to maintain quantity. In no interviews with traders or households was there any mention of “non availability” of rice at any time during the baseline reference period. It should be

clearly emphasized that many, or most, households living in both the char and river basin zones, reduced their meal frequency during periods of inundation with flood water. Most people reported that they ate twice per day, rather than 3 times, during the periods of flooding. This, however, does not necessarily equate to reduced intake of foods, as is evidenced by purchase trends. The task of cooking is highly inconvenient when the standing water level is 50cm, with all food stocks, cooking stoves, fuel and preparation being raised above the water level. The research was unable to quantify accurately the role of sharing and gift food during these periods, however it is also likely to be a factor in explaining why purchase is slightly reduced. School biscuits provided by the government and the World Food Programme contributed around 2% of the needs of the household.

Wealth group 1 households in the char zone earned around 52,000 taka of cash income in the baseline reference period, equivalent to around 32 taka per person per day (around USD 0.40). Cash income from labour was significantly lower than the wealth group 1 households in the neighbouring river basin zone. This was despite the daily labour price being slightly higher than in the river basin (225 taka per day, compared with 200 taka). There are fewer work opportunities available in the chars due to generally lower intensity of farming, as well the logistical constraints that make daily labouring in a neighbouring village unrealistic (i.e. because all travel requires a boat trip). Migration labour was also slightly lower for these households. This may be because households in the river basin, that are logistically connected by road and have more human movement, are more likely to hear of opportunities compared with people geographically isolated on an island. Around 45,000 taka was earned in the baseline reference period from all labour and migration, compared with around 70,000 taka for wealth group 1 households in the river basin. The only other sources of cash for these households, was small amounts from the sale of livestock and milk, around 6,000 taka. Small loans were also taken by these households, although amounts are generally smaller than in the river basin zone, around 6,000 taka.

Summary Profile – Char Zone, Wealth Group 2

Wealth group 2 households in the char zone typically have 5 household members. They typically cultivate around 30 to 40 decimals under a sharecropping arrangement. Most of these households do not own any of their own land. Around half of these households own a cow, while the other half typically raise a cow on behalf of a better off household. They own 1 to 2 goats typically, as well as several fruit trees. Simple fishing nets and a mobile phone is typical for these households.

These households produced less rice than their counterparts in the river basin zone, due to higher suitability of cash crop farming on the chars. Small amounts of other food crops including mustard and sesame seed, pulses, vegetables, groundnuts, bananas, fruit, wheat and millet were also produced contributing around 2% of annual calories. None of these minor crops was typical in their own right, meaning that some of these wealth group 2 households produces sesame, others groundnuts, others pulses, etc but overall around 2% of calories were produced. Purchase was the primary source of food for these households with only minor amounts of calories coming from fishing and produced milk and meat. Consistent with other wealth groups in the char zone, this wealth group purchased less of the tasty, nutritious foods than their wealth group 2 counterparts in the river basin. School biscuits provided by the government and the World Food Programme contributed around 2% of the needs of the household.

Wealth group 2 households in the char zone earned just over 70,000 taka in cash income, equivalent to 38 taka per person per day (around USD 0.50). Income from selling of local, daily labour, as well as income from migratory labour, was the same as for wealth group 1 households. Production of jute was typical for most households in this wealth group. Additionally, most households also sold one or more of other crops including mustard, sesame, lentils, vegetables, fruit, maize for livestock feed, groundnuts, millet and wheat (none of which was typical in their own right). Just over 10,000 taka was earned from sale of crops in total. Cash income of around 15,000 was earned from sale of livestock and milk. It was typical for these households to take small loans, rarely more than 10,000 taka.

Summary Profile – Char Zone, Wealth Group 3

Wealth group 3 households in the chars typically have around 5 household members. They own and cultivate around 150 decimals of land, own 2 to 4 cattle and a similar number of goats. They have fruit trees of various types, as well as productive assets including fishing nets, irrigation pumps and bicycles. Mobile phones and solar panels are typical for households in this wealth category.

These households typically produced around 60% of their annual calorie needs, much of this coming from boro rice. Small amounts of other crops (see list in above paragraph) were also produced and consumed, also contributing around 3% of annual calories. Unlike wealth group 3 households in the river basin, these char households needed to purchase rice for around 4 months of the year. Meals during migration, caught fish, and produced milk and meat each contributed around 2% of annual needs. School biscuits provided by the government and the World Food Programme contributed around 2% of the needs of the household.

Wealth group 3 households in the char zone earned roughly 190,000 taka in cash income, equivalent to around 105 taka per person per day (USD 1.30). Livestock sales were the most important source of income for wealth group 3 households, earning them just over 110,000 taka during the baseline reference year. This would include sale of two cows, as well as several goats. They also earned around 6,000 taka in milk sales. The second largest source of cash for these households was from sale of cash crops - just under 55,000 taka - in particular jute which was almost universally common across the zone. Other crops sold included mustard, sesame, lentils, vegetables, fruit, maize for livestock feed, groundnuts, millet and wheat, again none of them typical in their own right (wealth group 3 households typically also sold boro rice in the south of the zone).

These households also earned cash income from doing migratory labour, however far less often than poorer households, around 11,000 taka (again, geographical variations across the zone meant that households in central and north areas do this migratory labour, while in the south it was not typical). This is somewhat surprising, but may indicate a preference to maintain cash flow in the months before cattle are ready for sale April-June. Minor amounts of trade and business earned these households just over 5,000 taka for the year, perhaps highly limited by logistical constraints. Remittances were not typical for these households. Credit also tended to be lower for these households than for the equivalent households in the river basin.