



Bearing the climate burden

How households in Bangladesh
are spending too much

Shaikh Eskander and Paul Steele

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Photo caption: The tide-mark around Minoti Boiragi's house speaks volumes. The 60-year-old's home and land was flooded. Minoti cares for her cow – the sole source of income for her family.

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The debate around climate and risk reduction finances has focused on money from national governments and international donors, mostly ignoring contributions from individual households. Using data from Bangladesh, this paper demonstrates that rural households – the direct sufferers of climate change – spend almost US\$2 billion on disaster preparedness and response. In absolute terms, this is more than double the government climate and disaster risk reduction spending and over 12 times higher than multilateral international financing to Bangladesh’s rural population. Measured as share of income, women also spend three times more than men on climate and disaster.

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Summary

While the debate and analysis around climate and disaster risk reduction finance has focused on money from national governments and international donors, we know almost nothing about contributions from individual households. Yet, in many cases, households are likely to be the largest source of finance for climate and disaster risk reduction.

Using data from Bangladesh, this report demonstrates that climate and disaster spending by rural households – measured by spending on disaster preparedness and response – forms the largest share of climate and disaster expenditure in the country.

In 2015, rural households in Bangladesh spent just under US\$2 billion on climate and disaster management. This was more than double the government's spending and over 12 times more than multilateral international financing for the Bangladeshi rural population in absolute terms. This is particularly significant as Bangladesh has been spending a growing share of its government budget on climate and disaster since 2015.

We chose Bangladesh for this study for three reasons. First, it is an agricultural economy; and agriculture is especially vulnerable to the risks of climate change. Second, Bangladesh experiences recurring climate-induced disasters. And finally, as a developing economy, Bangladesh has limited ability to finance all the climate and disaster management actions it needs to carry out. To the best of our knowledge, this is the first investigation comparing government, donor and household contributions to climate and disaster risk reduction action.

Because disasters are a consequence of a changing climate, we can treat coping and response strategies in the case of these events as climate actions. So, we included all government and donor funding allocations for climate change and disaster risk reduction actions when we calculated public contributions to climate and disaster spend.

We obtained the data on government and donor contributions to climate and disaster from published, open-access documents. For rural household spending on climate and disasters, we used data from the

Bangladesh Integrated Household Survey (BIHS) 2015, a nationally representative panel dataset of 6,503 households representing all the agro-economic zones of rural Bangladesh.

The Finance Division of the Ministry of Finance has been identifying, maximising and managing sources and fund applications for financing climate-resilient and disaster risk-reducing actions for the last five years. The government's total allocation was US\$1.36 billion in 2015–16. These data are based on government allocations – not disbursements – as the latter are not available. BIHS data only cover rural areas, which is home to 65% of Bangladesh's population. Given that government spending is not broken down by rural and urban areas, we assumed that they receive equal shares of government expenditure, making total government spending for climate and disaster in rural Bangladesh around **US\$0.88 billion** in 2015–16.

The total multilateral climate and disaster spend of US\$1.19 billion over the 2012–16 period averages at **US\$237 million** per year. While this is not the full picture on donors' climate and disaster spend, these are the only sources of finance with enough transparency to be traced. And we do not believe that including the relatively smaller amounts of finance from bilateral funds would significantly alter the results we present in this paper. Using the 65% of rural population and assuming equivalent spread of funds to urban and rural populations, we calculated that the average annual contribution of US\$237 million works out at **US\$154 million** in 2015–16 for all rural households.

In the absence of direct expenditure data, we defined households' climate and disaster management actions in terms of actual and intended use of savings for disaster-related risk reduction activities. From the BIHS 2015 survey, we found that rural households each spend on average 759 taka (US\$9) on house repairs and/or purchases and 5,849 taka (US\$70) on other emergency preparedness. In other words, households spend more than 6,600 taka (US\$79) on climate-related disaster management and emergency actions, whether incurred, ongoing and/or intended. This is equivalent to 158 billion taka (**US\$1.9 billion**) by the 24 million rural households in 2015–16.

We also found that, in absolute terms, **female-headed rural households** spend similar amounts on climate and disaster as male-headed rural households. But because their average income is much lower, as a share of income they spend **three times more**. This means that climate change and climate-induced disasters have a bigger effect on female-headed rural households, so it is vital they are involved in developing solutions that work for them.

The BIHS survey also indicated that disaster-affected households do not have enough access to formal sources of finance as they are more likely to **borrow from informal sources** at high volumes. Given the significantly higher interest rates informal sources charge compared to formal financial institutions and microfinance NGOs, dependence on such loan sources can mean that households get stuck in a credit trap while trying to overcome the risks of climate-induced disasters.

Policy conclusions

Government and international agencies need to commit more climate adaptation and disaster risk reduction money to the local level to ensure they meet **poor households'** priorities in addressing climate change. This includes preparing for disasters and rebuilding houses – for example, by raising house plinths and raising household compounds with earthen foundations.

As **female-headed households** give climate and disaster management higher priority than male-headed households, government support must specifically involve women in designing solutions and investments to ensure these address and reflect their priorities.

To get **more data on how much households** are spending on climate and disasters, statistical offices such as the Bangladesh Bureau of Statistics must include more questions on the subject in their annual and periodical household expenditure surveys.

Poor households – especially those headed by women – need access to **low-cost finance** to address their climate priorities. This would also extend the reach of social safety net services and increased devolved climate finance. More inclusive and low-interest loans from formal financial institutions and microfinance NGOs can help to achieve this objective, allowing poor households – particularly those headed by women – to **respond to disasters** by switching and/or diversifying crops, migrating temporarily or rebuilding and repairing their homes.

Introduction



Bangladesh provides an ideal choice for this study due to the vulnerability of its agriculture to climate change, its exposure to climate-induced disasters and its limited ability to meet the financial costs of all the climate and disaster management actions it needs.

Academic and policy research alike often ignore the interlinkages between public and household sectors and their potentially complementary roles in combatting climate risks. To fill this void, this paper investigates the research question of household spending on climate and disaster management, comparing it with the contributions made by the national government and the international community.

In the absence of any formal recognition of their contributions, government climate finance usually treats households as beneficiaries. This paper establishes that they are much more than this. As well as providing information on households' contribution to the escalating costs of fighting climate change and climate-induced disasters, we demonstrate that households are partners in the joint effort against climate risks. It is time governments and donors stopped treating them as beneficiaries and recognised them as true partners.

Bangladesh has a per capita income of less than US\$2,000, so households finance their climate actions by cutting back on other important priorities, such as basic consumption goods (Duflo 2003, Jensen 2000). Our findings re-emphasise the need for government and the international community to increase their contributions to climate and disaster risk reduction finance while also ensuring their money reaches the local level to reduce financial pressure on individual households.

We chose Bangladesh for this study for various reasons. First, it is an agricultural economy and agriculture is especially vulnerable to the risks of climate change and associated weather events. Second, in addition to sea level rise, rainfall anomalies and temperature increases, Bangladesh experiences recurring climate-induced disasters with a high cost to development. Finally, as a developing economy, Bangladesh has limited ability to publicly finance all the climate and disaster management actions it needs to carry out.

People in Bangladesh's rural areas are highly dependent on agriculture. The sector employs around 41% of the labour force (aged 15 years and above) and contributes around 15% to gross domestic product (GDP) (Bangladesh Bureau of Statistics 2017). Many important markets – such as credit, land and property rights – are absent or limited. Coupled with widespread poverty, this also limits rural households' ability to invest in defensive measures against climate change and disasters. Instead, they resort to regressive response strategies, such as cutting back on basic food and nutrients, selling productive assets including agricultural land, seeking off-farm employment and increasing their participation in the land rental market (Duflo 2003, Jensen 2000, Banerjee 2007, Mueller and Quisumbing 2011, Eskander and Barbier 2016).

Frequent disaster events undermine development in Bangladesh. Between 1990 and 2018, Bangladesh experienced higher temperature levels, rainfall anomalies and 155 climate-induced disasters (see Table 1) – such as floods and storms – which had significant casualties and economic impacts (CRED 2019). Climate change hits agricultural production particularly hard: for example, sea level rise is predicted to reduce the country's agricultural GDP by 1.23% by 2030, compared to 0.11% for overall GDP (Banerjee et al. 2015).

With small average farm sizes and a high incidence of rural poverty, public finance is clearly important in helping private households adapt. The government should make public disaster expenditure available in a way that optimises benefits for affected households, but the country's frequent exposure to climate-induced disasters means that it tends to allocate public climate action contributions to disaster risk reduction activities. So, instead of 'climate finance', we use the term 'climate and disaster spend' throughout this paper, calculating equivalent spending by rural households in disaster risk reduction activities to keep our comparison consistent. To the best of our knowledge, this is the first investigation comparing public and household contributions to climate and disaster risk reduction actions.

Climate change and disasters in Bangladesh



Bangladesh is extremely vulnerable to climate change. Major cyclones in 1970, 1991, 2007 and 2009 and major floods in 1988 and 1998 have all had huge economic and social impacts.

As one of the most vulnerable countries in terms of climate change and climate-induced disasters, Bangladesh ranks sixth in the world's most disaster-prone countries (UNU-EHS, 2015). Its subtropical monsoonal climate is characterised by heavy seasonal rainfall, moderately warm temperature and high humidity. Geographic location and land characteristics both contribute to the country's disaster-prone status: 26% of the population is affected by storms and 70% lives in flood-prone regions (Cash et al. 2014). Cyclonic storms primarily affect the southern coastal regions and flooding is more significant in the north.

Table 1 shows that there were 53 floods between 1990 and 2018. One of the world's worst-affected countries by tropical storms, Bangladesh also endured 70 storms during the same period (CRED 2019). It tops the list of Asian developing countries at relatively high mortality risk and is second on the list of Asian developing countries at relatively high economic risk from multiple hazards (ADB 2013).

Large natural disasters in Bangladesh that have had profound impacts on lives and livelihoods include the cyclones of 1970, 1991, 2007 and 2009 and the floods of 1988 and 1998. The 1970 Great Bhola cyclone is often considered the deadliest tropical cyclone ever, with around 0.3 million deaths and economic impacts of US\$86.4 million in current prices. In 1991, cyclone Gorky killed 0.14 million people and caused almost US\$1.8 billion in economic damages. Thanks to early warning systems and cyclone shelters, later cyclones have had lower casualties (around 4,000 deaths from cyclone Sidr in 2007 and 190 from cyclone Reshmi in 2009) but economic damages were considerably higher (around US\$2.3 billion in 2007 and US\$270 million in 2009). Floods usually result in fewer casualties, but their longer duration disrupts economic (especially agricultural) activities, resulting in huge financial losses. The death toll from floods was 2,379 in 1988 and 1,050 in 1998, with corresponding economic damages of US\$2.14 billion and US\$4.3 billion (CRED 2019). There were also many smaller disasters, which had considerable harmful effects.

Table 1. Natural disasters in Bangladesh, 1990–2018

DISASTER TYPE	NUMBER OF OCCURRENCES	TOTAL DEATHS	TOTAL PEOPLE AFFECTED	TOTAL DAMAGE (US\$ MILLIONS)
Floods				
Coastal flood	2	51	473,335	**
Flash flood	11	261	7,634,577	729
Riverine flood	40	4,954	108,114,785	7,433
Storms				
Convective storm	30	853	1,297,191	24
Tropical cyclone	39	145,857	42,506,713	5,118
Tsunami	1	2	**	500
Other				
Cold wave	17	2,012	313,200	**
Ground movement	6	40	19,195	**
Heat wave	2	62	**	**
Landslide	4	103	56,283	**
Mudslide	1	160	80,187	**
Severe winter conditions	2	230	101,000	**

Notes: ** data unavailable.

Source: CRED (2019).

Methodology and data

3

Because government climate and disaster spend in Bangladesh is lower than the country needs, rural households need to finance many climate and disaster management actions. Using data from published, open-access sources we established the different contributions to total spending made by the national government, multilateral donors and rural households.

In this paper, F_1 denotes total required climate and disaster spend and F_2 denotes actual climate and disaster spend. FH , FG and FD respectively stand for contributions from households, government and donors. We do not measure contributions from the private commercial sector. We assume that both government and donors recognise the risks of climate change and climate-induced disasters and the need to help farmers (or rural households in general).

We find that:

$$F_2 = FH + FG + FD \leq F_1$$

It is well recognised that $F_2 < F_1$. In other words, actual climate and disaster spend is lower than Bangladesh needs. Scarce overall public resources force the government to divide its funds between different priority sectors, including climate change and disaster management actions. As a result, rural households, who encounter the disaster risks caused by climate change in their daily lives, must find their own resources to finance many climate and disaster management actions.

Although this trade-off between public and household contributions to climate and disaster spending is not documented, both academic and policy literature widely recognise common regressive coping and progressive adaptation practices in the country. These include switching towards crops that are more suitable to a saline climate, temporary and seasonal rural-urban migration, selling or renting agricultural lands, school drop-out and early marriage for girls, and more children and adults seeking non-agricultural work.

Rural households also invest in many defensive measures, such as improving and repairing land and homes to make them more resilient to climate and disaster events, restocking livestock to resume productive (mainly agricultural) activities after disaster events, precautionary saving for emergencies and diversifying income and employment. Whether households use these strategies depends on their exposure to climate change and climate-induced disasters, socioeconomic and farm attributes and community-level factors.

Against this backdrop, we investigate:

1. Total actual spending on climate and disaster in Bangladesh (F_2) and public, donor and household contributions to this spending. By calculating the contributions from each party undertaking climate and disaster management actions, we identify whether rural households are the main contributors to climate and disaster spend.
2. The alignment of climate and disaster spend in Bangladesh with national and international priorities by qualitatively assessing the priorities reflected in the government's allocation of climate and disaster budgets to various ministries. The government is committed to combatting the risks of climate change and disasters and has formed specific frameworks and financing mechanisms to achieve its goals.
3. Heterogeneity in household climate and disaster spend by gender, education, access to electricity and urban proximity. Since household investments are contingent on socioeconomic, farm and community-level factors, we investigate whether these cause any significant differences in households' contributions.

Because disasters are natural consequences of a changing climate, we can treat coping and adaptation strategies in the case of these events as climate actions. So, we include all government funding allocations for climate change and disaster risk reduction actions when calculating public contributions to climate and disaster spend. We define all government and donor contributions as public finances, including direct climate budgets allocated according to the government's Bangladesh Climate Change Strategy and Action Plan (BCCSAP) framework.

We obtained the data on government and donor contributions to climate and disaster spend from published, open-access documents and websites. Various ministries – including the Local Government Engineering Division and the Ministries of Water Resources, Environment and Forest, Disaster Reduction and Management, Finance and Education – disburse the contributions. Since the Ministry of Finance allocates climate and disaster budgets to all other ministries, we consulted publicly available documents on the ministry's and various donors' websites to identify funding allocations by ministry. This allowed us to identify FG and FD (albeit with potential measurement errors).

Comparable climate and disaster management actions by households mostly consist of immediate coping strategies to overcome consumption risks, post-disaster recovery of productive capacity and longer-term preparedness for similar future risks. Around the world, farmers use several methods to adapt to climate change – including crop diversification, tree planting, soil conservation, early and late planting, new technologies and irrigation (Deressa et al. 2009, Adams et al. 1998). Common adaptation practices in response to disaster exposure in Bangladesh include migration and increased labour supply to agricultural and non-agricultural sectors (Penning-Rowsell et al. 2013, Banerjee 2007, Mueller and Quisumbing 2011). Farmers adapt to changing temperature and rainfall by switching to more climate-resilient crops and can overcome part of their disaster-inflicted financial losses through land rental transactions (Moniruzzaman 2015, Eskander and Barbier 2016).

Due to time and resource limitations, we relied on the data available for Bangladesh to decide the categories of climate and disaster management actions we would include in this study. Available household survey datasets from Bangladesh did not include any direct information on their contributions to climate and disaster spend. But the government's apparent focus on disaster management actions is consistent with our sole focus on households' comparable disaster spend. In the absence of complete and more direct measures for household expenditure, we resorted to using precautionary savings – which households make for emergencies such as floods and storms – as a reliable proxy measure

We defined households' climate and disaster management actions in terms of actual and intended use of savings for disaster-related risk reduction activities (see, for example, Eskander et al. 2018). We used data from the Bangladesh Integrated Household Survey (BIHS), which collected itemised savings information for all members of each rural household.¹ Actual and intended uses of savings included (BIHS 2015):

- Buying goods such as household goods, agricultural implements, land or a house
- Starting up a new business and helping existing entrepreneurship

- Educating and training children
- Financing girls' marriage and dowry
- **Building and repairing houses**
- Getting loans for more expensive purchases
- Lending to others
- **Preparing for difficult times or danger**
- Sending to someone abroad
- Financing medical or other emergencies, and
- Saving for children's future.

We included any savings for 'building and repairing houses', which is often necessary during and after a disaster in Bangladesh. 'Preparing for difficult times/ or danger' can also refer to preparing for floods and storms. So, we identified both 'building and repairing houses' and 'preparing for difficult times/danger' as directly related to disaster management actions.

Although there may be other reasons for building/ repairs and other emergencies or dangers than disasters, this is balanced out by the fact that many other sources of climate-related household expenditure – such as post-disaster damage to agriculture and livelihoods – are not on the list. We therefore considered 'building and repairing houses' and 'preparing for difficult times/danger' as precautionary savings for incurred or intended equivalent climate and disaster spend by rural households.

We calculated total precautionary savings at the rural household level by adding together all savings of this type by all household members. But we accept this is an incomplete measure, which provides only conservative estimates of household contributions. Complete, robust accounting would require a survey focusing solely on household climate-related expenditure.

¹ The BIHS is a USAID-funded survey designed and supervised by the International Food Policy Research Institute, administered by Data Analysis and Technical Assistance, Dhaka, Bangladesh, and approved for publication by the national government. The first round of data collection took place between October 2011 and March 2012; the second round from January to June 2015. BIHS is a nationally representative panel dataset of 6,503 households representing all the agro-economic zones of rural Bangladesh.

Contributions to climate and disaster spend in Bangladesh

4

Our calculations show that rural households in Bangladesh spend double the amount the government spends on climate and disaster management and over 12 times higher than multilateral international financing for the Bangladeshi rural population in absolute terms.

This section summarises the main contributions to climate and disaster spend by government, donors and rural households, looking at each source of funding in turn. Figure 1 shows that rural households contribute more than twice as much as the government and over 12 times more than multilateral international financing.

4.1 The national climate and disaster budget

To fulfil its commitment to combatting climate risks, the Bangladesh government has produced a range of strategies and action plans (Ministry of Finance 2018b):

- National Adaptation Programme of Action, 2005 (revised 2009)
- Bangladesh Climate Change Strategy and Action Plan, 2009
- Roadmap for Developing a National Adaptation Plan for Bangladesh, 2015
- Nationally Determined Contribution Implementation Roadmap (draft, 2017), and
- National Appropriate Mitigation Action.

The Ministry of Finance has been identifying, maximising and managing sources and fund applications for financing climate-resilient and disaster risk-reducing actions for the last five years. The Bangladesh Delta Plan 2100 also aims to formulate a long-term integrated and holistic investment plan to deal with the expected impacts of climate change and other delta-related challenges.

Figure 2 shows the annual climate and disaster management budget (nominal and real) for 2014–15 to 2018–19. The government’s total nominal allocation was 189.5 billion taka (around **US\$2.25 billion**) for 2018–19, up from 114.34 billion taka in 2015–16 (**US\$1.36 billion**). Irrespective of the share of the total national budget, it is encouraging that the government is steadily increasing its contributions over time. This data is based on government allocations – not disbursements – as the latter are not available.

To compare it with households’ equivalent spending, we needed to calculate public climate and disaster spend per rural household (see Figure 3). BIHS data only cover rural areas, which is home to 65% of Bangladesh’s population (Bangladesh Bureau of Statistics 2017). Given that government spending is not broken down by rural and urban areas, we assumed that they receive equal shares of government expenditure, making total public spending for climate and disaster in rural Bangladesh 123.18 billion taka (around **US\$1.46 billion**) in 2018–19 and 74.32 billion taka (around **US\$0.88 billion**) in 2015–16. Since planning and public budgeting is based on data and statistics from the previous year, we then divided current total

Figure 1. Contributions to climate and disaster finance per rural household, 2015

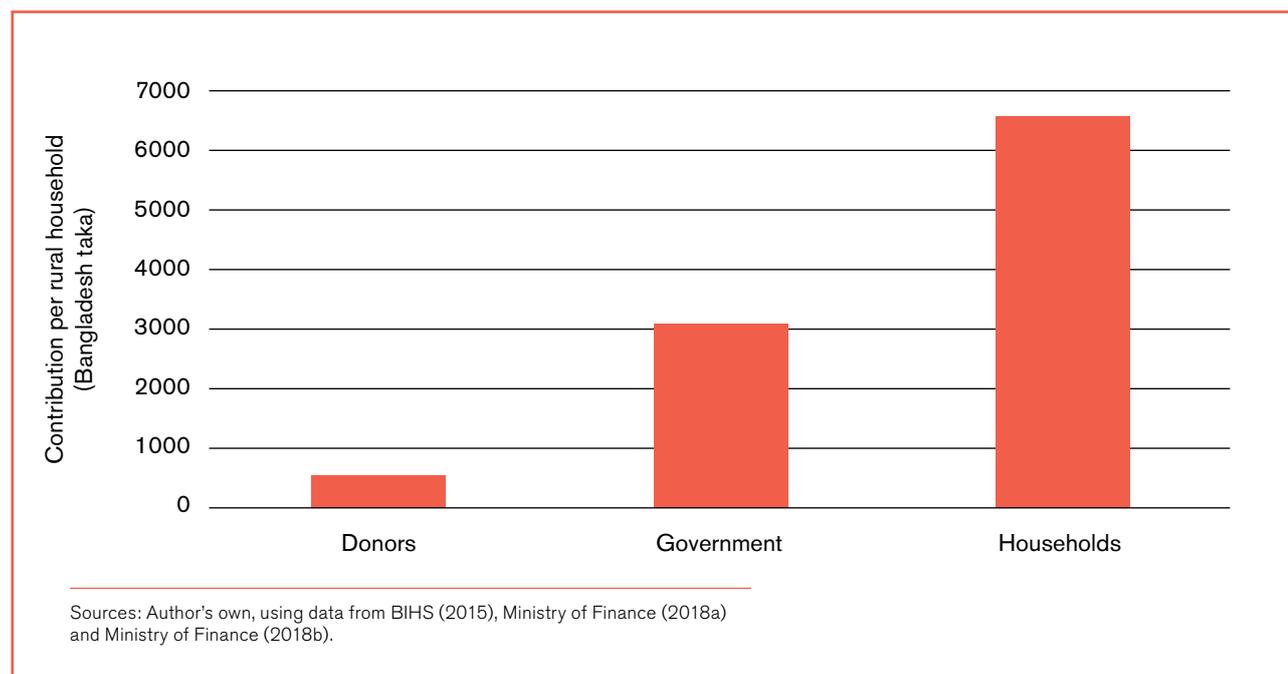
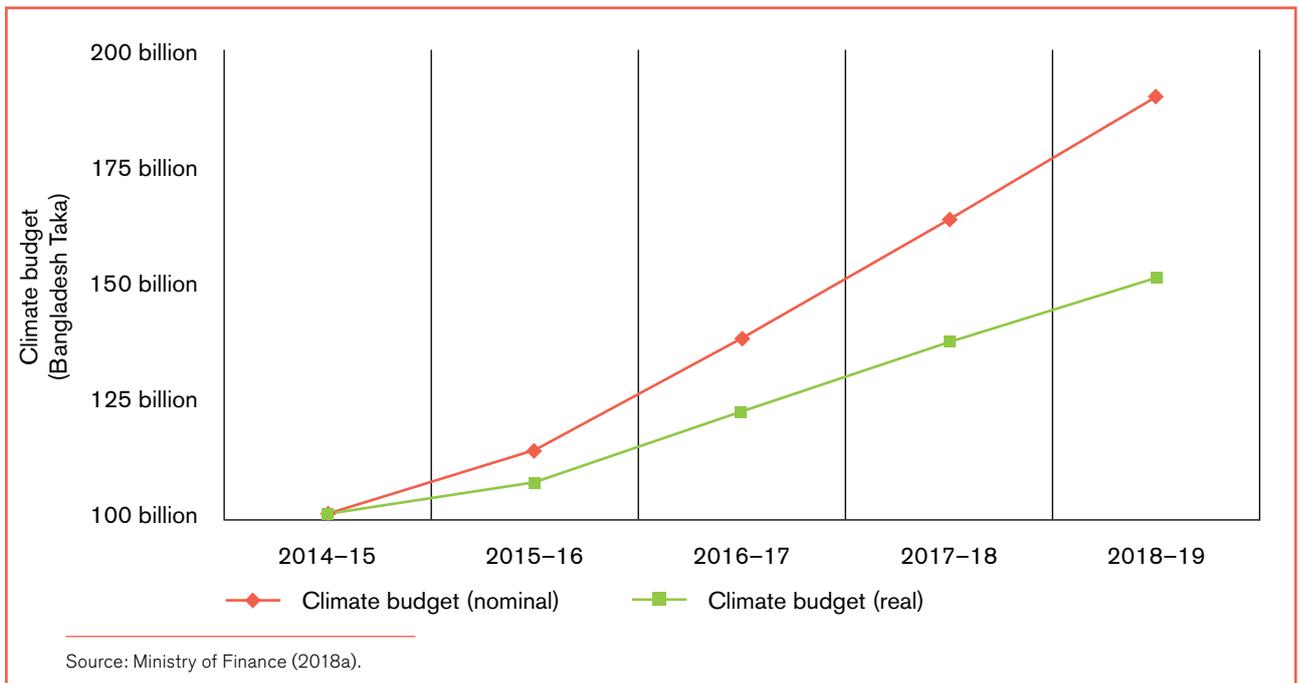


Figure 2. Government climate and disaster management budget, 2014–2019

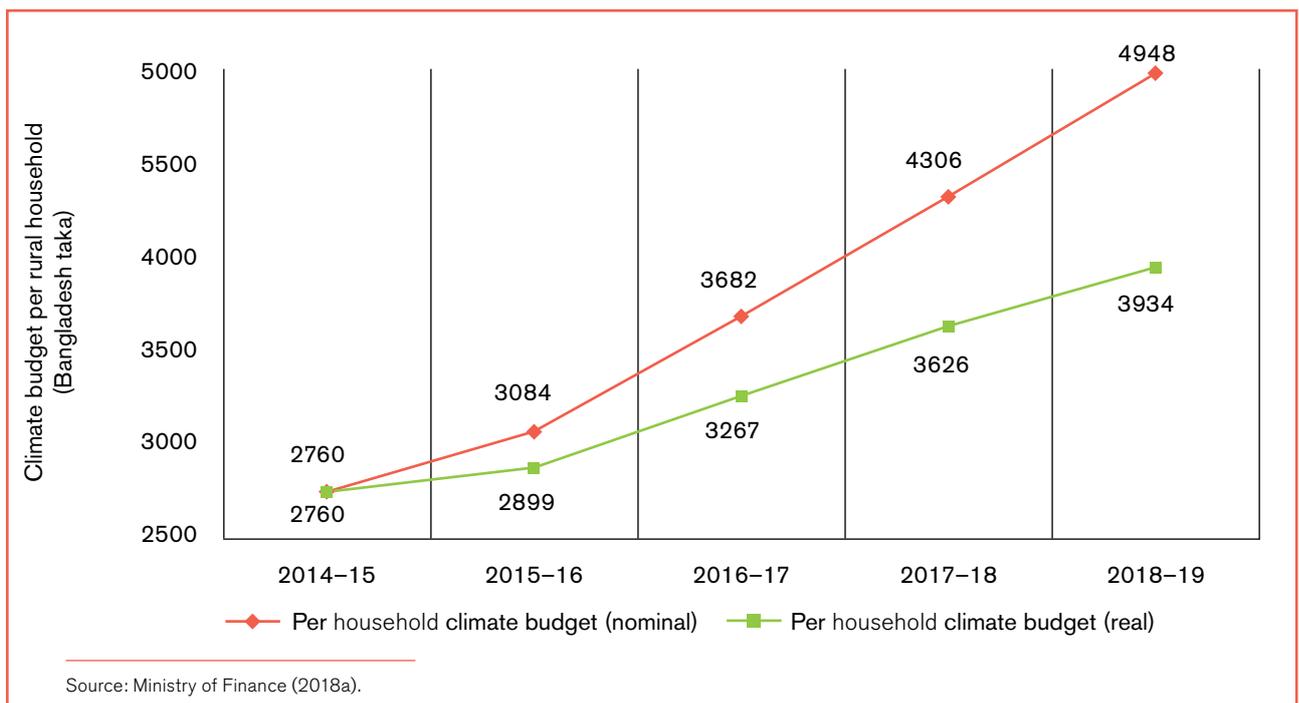


public climate and disaster spend by population from the previous year and multiplied it by average household size.

In 2014–15, Bangladesh had a population of 159 million with an average household size of 4.3 (Bangladesh Bureau of Statistics 2017). We calculated this as 37 million households, of which 24 million (65%) were

rural households, estimating public climate and disaster spend of 3084 taka (US\$36.7) per rural Bangladeshi household in 2015–16. Due to data unavailability, we took the same household size for all other fiscal years when calculating climate budgets per household. Figure 3 shows that the nominal budget rose from 2,760 taka (US\$32.60) in 2014–15 to 4,948 taka (US\$58.90) in 2018–19.

Figure 3. Government climate and disaster management budget, per rural household, 2014–2019



4.2 Multilateral international climate and disaster spend

Although the government contributes the bulk (82.5%) of the climate and disaster budget from its own funds via various ministries, approximately 17.5% comes from multilateral development partners (see Table 2). The World Bank and UN Development Programme are the main providers of disaster management funds, while

international climate finance came from three main sources: the Green Climate Fund (GCF), Bangladesh Climate Change Resilience Fund (BCCRF) and the Climate Investment Fund (CIF) (see Box 1).

The total multilateral climate and disaster spend of US\$1.19 billion over the 2012–16 period averages at **US\$237 million** per year. While this is not the full picture, these are the only sources of finance with enough transparency to be traced. But including the relatively smaller amounts of finance from bilateral funds would not significantly alter the results we present

BOX 1. MAIN SOURCES OF INTERNATIONAL CLIMATE FINANCE IN BANGLADESH

The **GCF** is intended to be one of the main sources of international climate finance, which Bangladesh will access via its national designated authority secretariat in the Ministry of Finance. The GCF has recognised two national implementing authorities: the Infrastructure Development Company Limited, which invests in renewable energy, and the Palli Karma-Sahayak Foundation, which channels finance to non-governmental organisations (NGOs).

BCCRF was a partnership between the Bangladeshi government, development partners and the World Bank to address the impacts of climate change. It was established in May 2010 with financial support from Denmark, the European Union, Sweden and the United Kingdom; Switzerland, Australia and

the United States subsequently joined the fund. The World Bank provided technical and financial management support to Bangladesh on behalf of development partners. The fund closed in 2017.

The Strategic Climate Funds' **Pilot Program for Climate Resilience** (PPCR) was established globally under the multi-donor **CIF**, which aims to help countries transform to a climate-resilient development path that reduces poverty and meets the Sustainable Development Goals. In Bangladesh, the government led the development of the PPCR investment plan in coordination with the Asian Development Bank, members of the World Bank Group, key Bangladeshi stakeholders and other development partners.

Table 2. Bangladesh's main multilateral development partners in climate and disaster projects, 2012–16

PARTNER	PROJECT/PROGRAMME NAME	FUNDING (US\$)
Disaster management fund providers		
World Bank	Coastal Embankment Improvement Project (CEIP)	400 million
World Bank	Multipurpose Disaster Shelter Project (MDSP)	375 million
UN Development	Comprehensive Disaster Management Programme 2 (CDMP 2)	70 million
International climate finance providers		
CIF	Pilot Program for Climate Resilience (PPCR)	185 million
GCF	Global Clean Cooking Program	20 million
GCF	Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity project	25 million
GCF	Climate-resilient infrastructure mainstreaming in Bangladesh	40 million
BCCRF	Various	71 million
Total funding		1.19 billion

Sources: Donor websites (various).

in this paper. All donor funds are facilitated through government ministries, not by the donors themselves, so all contributions from donors and development partners are included in the total climate and disaster government budget.

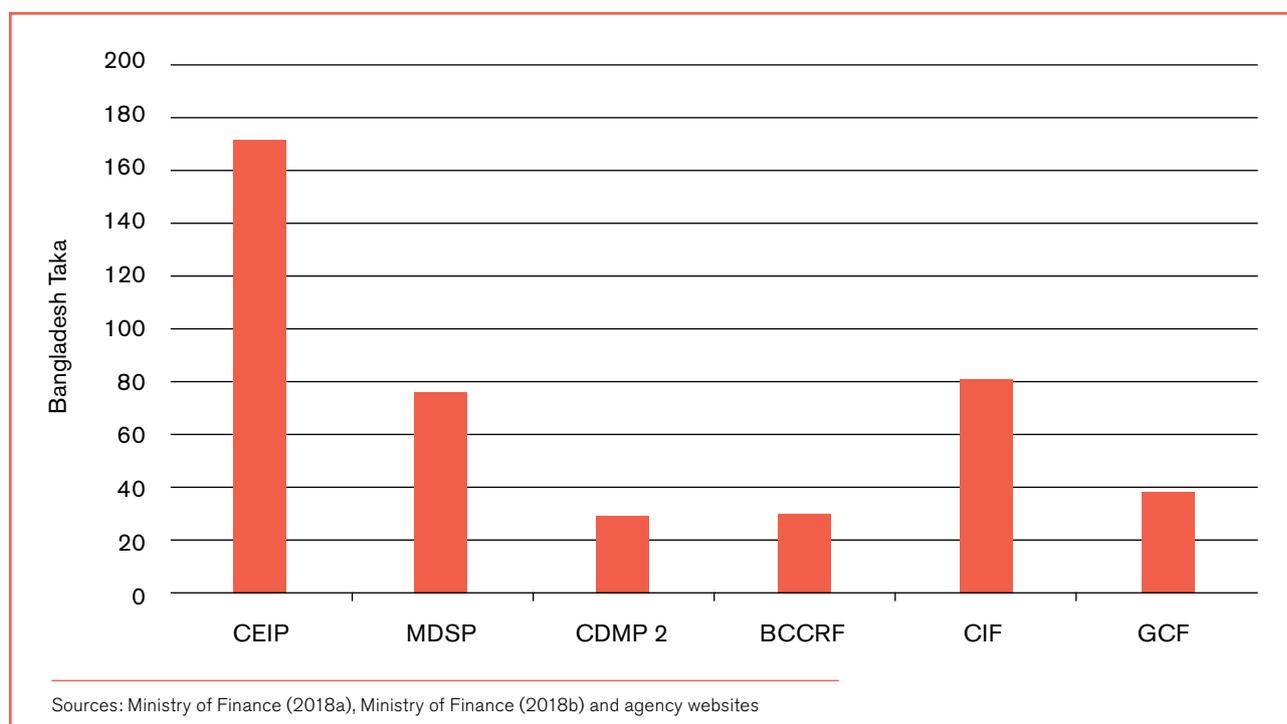
Using the household numbers established in Section 4.1 (37 million households; 24 million rural households) and assuming equivalent spread of funds to urban and rural populations, we calculated that the average annual contribution of US\$237 million works out at 533 taka (US\$6.42) per rural household or US\$154 million for all rural households.

Figure 4 plots international donor contributions to climate and disaster per rural household. This is equivalent to 172 taka (US\$2) per rural household for CEIP, 76 taka (US\$1) for MDSP, 30 taka (US\$0.36) per rural household for CDMP 2, 31 taka (US\$0.37) per rural household for BCCRF, 81 taka (US\$0.96) per rural household from CIF and 38 taka (US\$0.46) per rural household from GCF. Interestingly, GCF is not the largest source of climate and disaster finance, despite its focus in climate finance discussions.

4.3 Equivalent climate and disaster spend by households

Overall, we found that on average surveyed rural households spend 759 taka (US\$9) each on house repairs and/or purchases and 5,849 taka (US\$70) on other emergency preparedness (BIHS 2015). In other words, households that have precautionary savings spend more than 6,600 taka (US\$79) on climate-related disaster management and emergency actions, whether incurred, ongoing and/or intended. This is equivalent to 158 billion taka (**US\$1.9 billion**) by the 24 million rural households in 2015–16. See Section 6 for more detail on household spending.

Figure 4. Donor contributions per household (2014–16)



Alignment between Green Climate Fund and national priorities

5

In terms of budget allocation, Bangladesh is highly focused on increasing climate-resilient sustainable development. Since 2014, the government has allocated 80–85% of its climate budget to adapting to climate change, 9–13% to mitigating climate change and 5–8% to capacity building and institutional strengthening, which aligns to both.

In this section, we compare budgets for climate and disaster by ministry and thematic area with the priorities set by the Green Climate Fund (GCF). The GCF aims to help countries transition towards low-emission (mitigating climate change) and climate-resilient (adapting to climate change) development. As the premier international climate finance fund, its priorities are an important indication of international climate priority setting.

The GCF framework identifies the specific benefits of these two priorities, listed in Box 2.

5.1 Budget allocation by thematic area

The government's BCCSAP guidelines identify six thematic areas for spending its climate and disaster budget (see Figure 5). Since 2014, food security, social protection and health has consistently received the highest share of funding, although this has decreased from 57.41% in 2014–15 to 46.01% in 2018–19.

BOX 2. MAJOR MITIGATION AND ADAPTATION BENEFITS OF GCF PROJECTS

GCF Priority 1: Shifting to low-emission sustainable development pathways through:

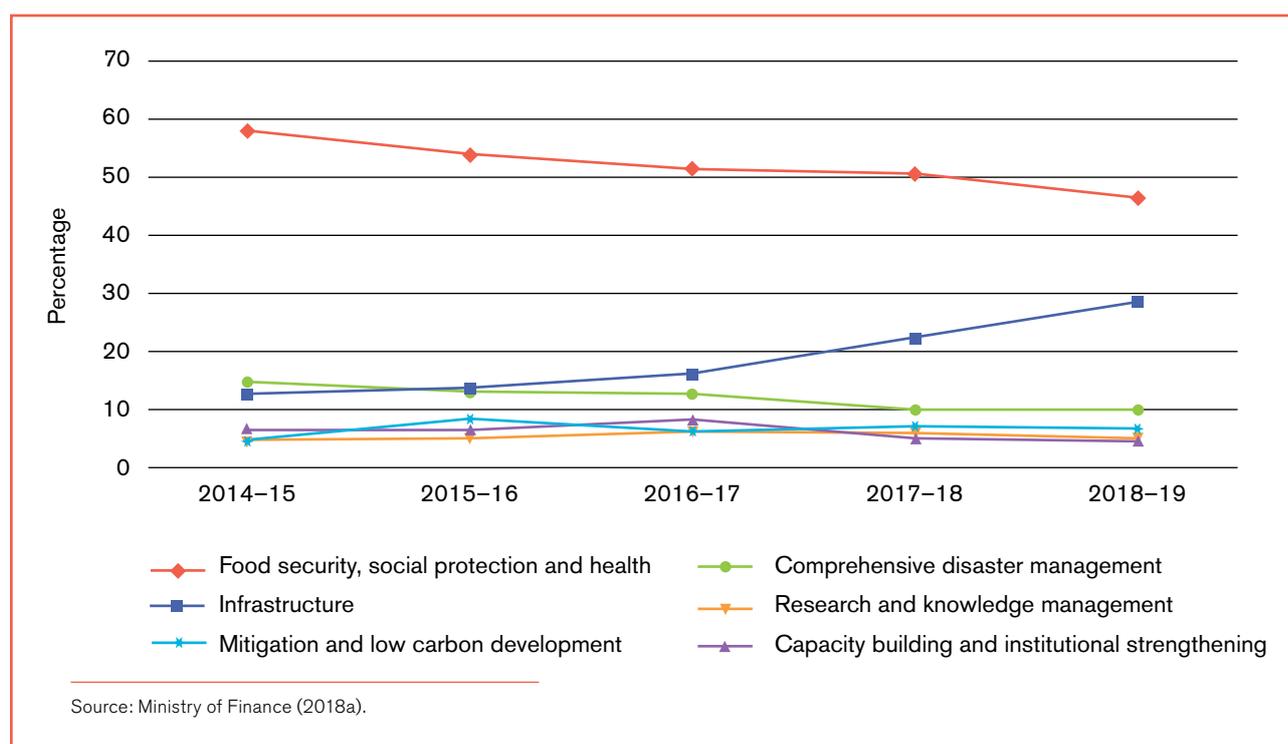
1. Low-emission energy access and power generation
2. Low-emission transport
3. Energy-efficient buildings, cities and industries
4. Sustainable land use and forest management

GCF Priority 2: Increasing climate-resilient sustainable development for:

5. Enhanced livelihoods of the most vulnerable people, communities, and regions
6. Increased health and well-being, and food and water security
7. Resilient infrastructure and built environment to climate change threats
8. Resilient ecosystems.

Source: GCF website

Figure 5. Government climate and disaster spend allocation by thematic area, 2014–2019



The percentage allocated to comprehensive disaster management has also decreased from around 15% to just under 10%. Allocations remain at steady levels for research and knowledge management (4.36–5.89%), mitigation and low-carbon development (4.48–8.36%) and capacity building and institutional strengthening (4.68–8.19%). The percentage share allocated to infrastructure has steadily and significantly increased from 12.69% to 28.43%.

In terms of climate budget allocations, the national government is highly focused on GCF Priority 2: increasing climate-resilient sustainable development. BCCSAP thematic areas 1–3, which align with GCF Priority 2 on climate-resilient development, get 80–85% of the climate budget over the time period. Thematic areas 4 and 5, which align with GCF Priority 1 on low-emission development, get 8.84–13.26%; while Theme 6 – which aligns with both GCF priorities – gets 4.68–8.19%.

Figure 6 shows the thematic allocation of the climate budget in the fiscal year 2018–19. As in other years, the highest shares were allocated to food security, social protection and health (46%) followed by infrastructure (28%).

5.2 Budget allocation by ministry

Figure 7 shows the government's allocation of climate budget by ministry in absolute terms. The Ministry of Agriculture has the largest budget, followed by the Ministry of Water Resources, Disaster Management and Relief and Ministry of Local Government. Due to its overall lower budget, the Ministry of Environment and Forest's climate budget only ranks eighth.

Figure 6. Climate and disaster budget allocation, 2018–19

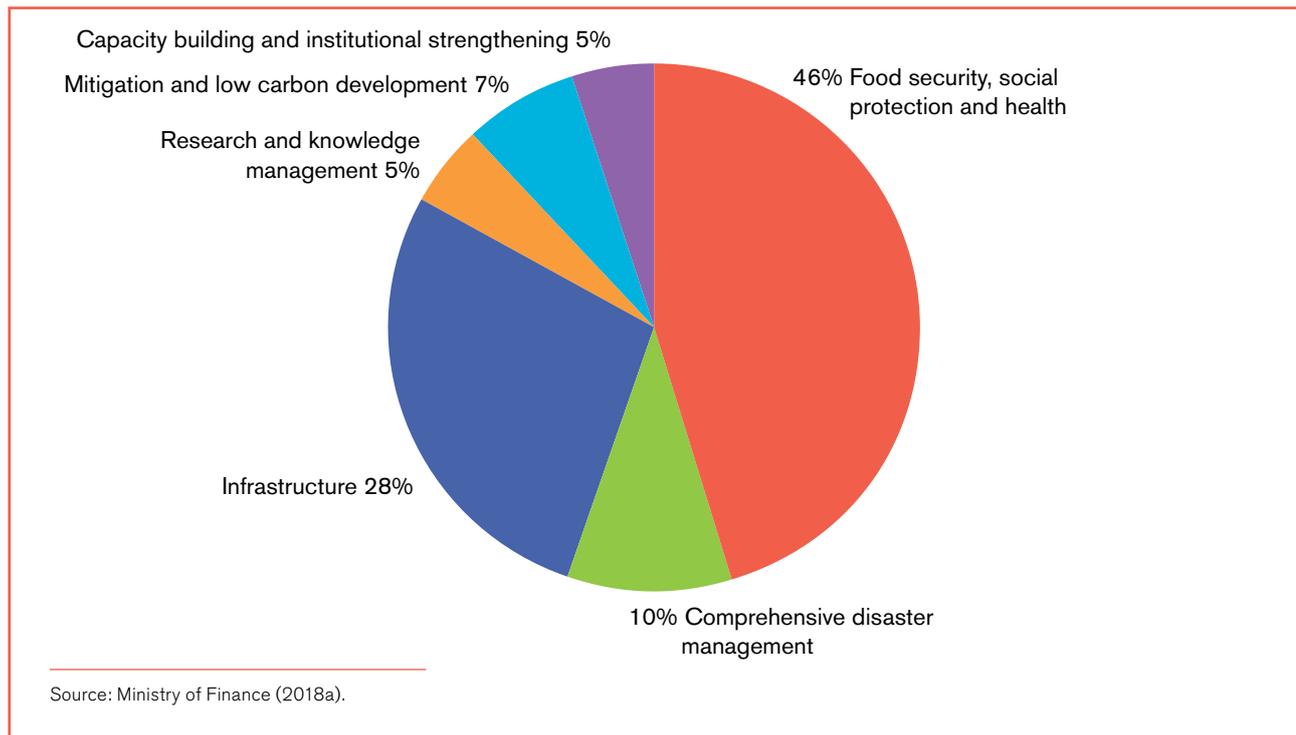
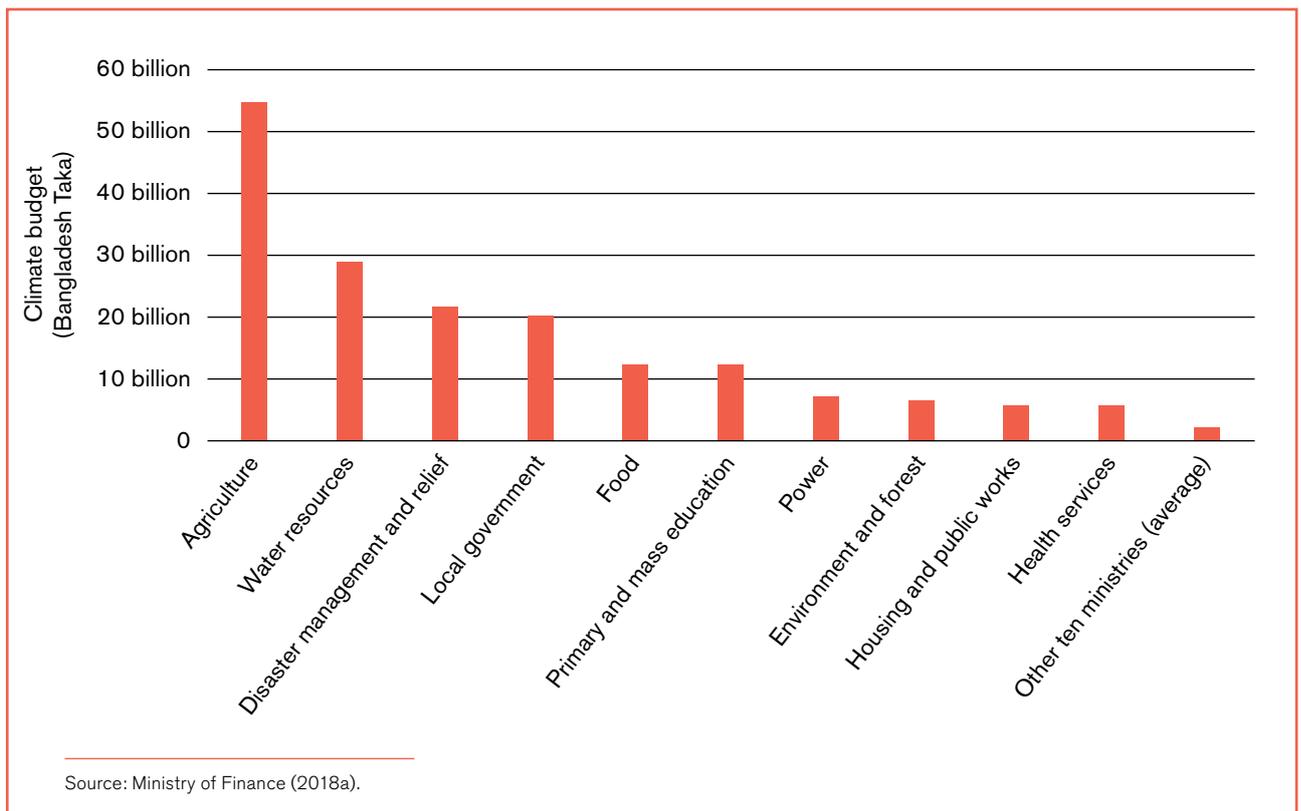


Figure 7. Climate and disaster budget allocation by ministry, 2018–19



Heterogeneity in household climate and disaster spend

6

Socioeconomic and other factors such as gender, education, access to electricity and urban proximity influence household climate and disaster spending in rural Bangladesh. Regional variations also influence spending, with frequency of exposure to disasters – rather than the impact of exposure – affecting the amount households contribute.

6.1 Socioeconomic factors

We have already established that households contribute 69% of the country's total climate and disaster spend, and that household investments depend on many socioeconomic, farm and community-level factors. Table 3 illustrates how some of these factors influence households' equivalent climate and disaster spend.

Table 3. Heterogeneity in household climate finance

CATEGORIES	TOTAL INCOME (TAKA)	PRECAUTIONARY SAVINGS (TAKA)		
		HOUSE REPAIRS	EMERGENCY PREPAREDNESS	TOTAL
Total	89,898.27	759.45	5,849.28	6,608.73
(% of total income)		(0.84)	(6.51)	(7.35)
Gender				
Male-headed	101,850.60	829.61	5,806.64	6,636.25
(% of total income)		(0.81)	(5.70)	(6.52)
Female-headed	34,497.19	434.24	6,046.94	6,481.18
(% of total income)		(1.26)	(17.53)	(18.79)
Education				
HSC or higher	144,107.20	1,329.87	27,867.84	29,197.71
(% of total income)		(0.92)	(19.34)	(20.26)
Lower than HSC	87,901.74	738.44	5,038.33	5,776.77
(% of total income)		(0.84)	(5.73)	(6.57)
Electricity				
Connection	103,252.40	1,186.71	7,640.24	8,826.95
(% of total income)		(1.15)	(7.40)	(8.55)
No connection	78,168.09	384.15	4,276.11	4,660.26
(% of total income)		(0.49)	(5.47)	(5.96)
Proximity to city				
Travel time <90m	104,387.3	618.74	5,100.69	5,719.43
(% of total income)		(0.59)	(4.89)	(5.48)
Travel time >90m	83,610.64	820.51	6,174.14	6,994.65
(% of total income)		(0.98)	(7.38)	(8.37)

Note: HSC – higher secondary certificate.
Source: Based on data from BIHS (2015).

Conventional household labour division in Bangladesh means that men tend to work outside the home and women tend to manage the household. This may affect their priorities when it comes to climate change and disaster adaptation decisions. Men are usually more concerned about their income and/or crop losses, whereas women are more concerned about food consumption, drinking water supply and children's schooling. We found that, although male and female-headed households both have similar levels of precautionary savings allocated for repairs and emergency preparedness, women contribute three times more as a proportion of their total income.

Households with relatively educated heads (with a higher secondary certificate – equivalent to US 12th grade or UK A'levels – or above) have considerably more nominal savings than their less educated counterparts. Their total precautionary savings are on average 29,198 taka (US\$348), compared to 5,777 taka (US\$69) for those with a lower educational level. They also contribute a higher proportion of their total income to these savings. Relatively educated households are usually more economically capable and may have a better understanding of the need to put money aside in case of climate and disasters.

Access to electricity is important for economic activities such as irrigation and retail services. It also improves access to information, knowledge and an educational environment and is widely recognised as a measure of development. Households with electricity connections also tend to have higher precautionary savings (in both nominal and percentage of income terms), which is consistent with the potential short and long-term socioeconomic benefits of access to electricity.

Households living within 90 minutes' travel from cities with a population of more than 100,000 have lower precautionary savings than those living further away. But as BIHS data was only collected from rural areas, it is possible that those living close to cities may be slum dwellers and other lower income groups. This would be consistent with a lower household income, explaining their lower precautionary savings.

6.2 Regional variations

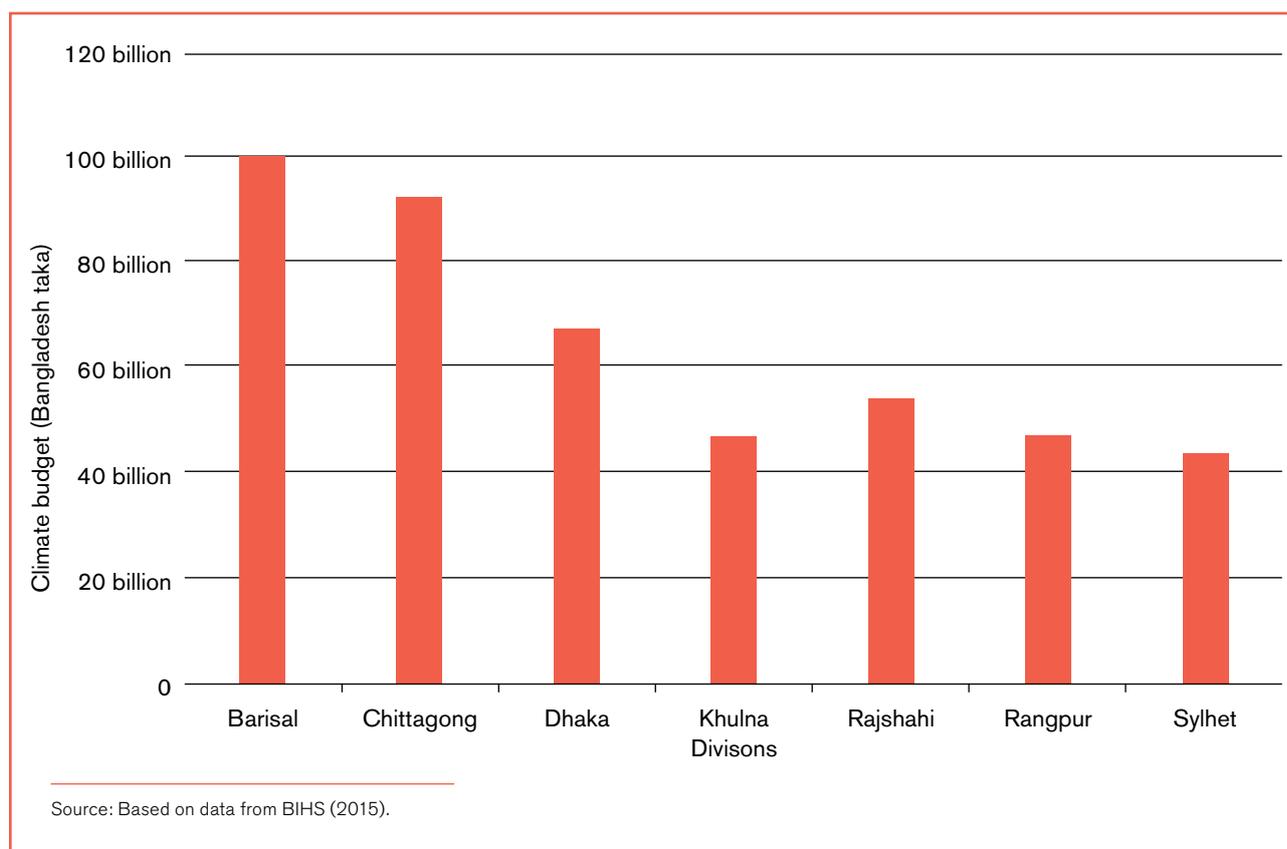
We also found regional variations in equivalent climate and disaster spend (see Table 4 and Figure 8).

Table 4. Household climate financing by region, 2015

DIVISION	TOTAL INCOME (TAKA)	PRECAUTIONARY SAVINGS (TAKA)		
		HOUSE REPAIRS	EMERGENCY PREPAREDNESS	TOTAL
Barisal (% of total income)	77,969.90	417.42 (0.54)	9,628.65 (12.35)	10,046.07 (12.88)
Chittagong (% of total income)	75,383.40	832.29 (1.10)	8,403.53 (11.15)	9,235.82 (12.25)
Dhaka (% of total income)	89,886.51	1,046.71 (1.16)	5,734.87 (6.38)	6,781.57 (7.54)
Khulna (% of total income)	97,544.56	1,065.12 (1.09)	3,658.15 (3.75)	4,723.27 (4.84)
Rajshahi (% of total income)	96,165.25	146.21 (0.15)	5,267.77 (5.48)	5,413.98 (5.63)
Rangpur (% of total income)	81,115.02	782.50 (0.96)	3,928.84 (4.84)	4,711.34 (5.81)
Sylhet (% of total income)	111,624.20	248.49 (0.22)	4,104.76 (3.68)	4,353.25 (3.90)

Source: Based on data from BIHS (2015).

Figure 8. Total household climate and disaster spend by region, 2015



The impacts of exposure to climate-induced disasters are greatest in Dhaka, followed by Barisal, Khulna, Rajshahi, Chittagong and Sylhet, with Rangpur experiencing the least impacts (ICCHL 2015). But it is the frequency of climate-induced disasters rather than impact from exposure that seems to affect the amount households contribute. We found that households in Barisal and Chittagong (where storms are more frequent) and Rajshahi (where floods are more frequent) allocate more of their money to precautionary savings than households in other divisions. Rangpur and Khulna are traditionally considered to be poor divisions and their lower precautionary savings may be due to poverty. Dhaka and Sylhet have more non-agricultural income opportunities, so their lives are less affected by climate change, which may explain their lower levels of precautionary savings.

6.2.1 Household borrowing

Disaster-affected households are more likely to borrow from informal sources at higher volumes and higher interest rates (see Table 5).

Given the significantly higher interest rates informal sources charge compared to formal financial institutions and microfinance NGOs, affected households clearly do not have enough access to formal sources of finance.² Households' dependence on informal loan sources at high interest rates may mean that they get stuck in a credit trap while trying to overcome the risks of climate-induced disasters.

² Since BIHS 2 data were collected in 2014–15, we considered regions of Bangladesh affected by climate-related disasters such as floods and storms in the same year as the disaster-affected regions. Disaster-affected districts include Barguna, Bhola, Bogra, Brahmanbaria, Chittagong, Faridpur, Feni, Gaibandha, Jamalpur, Kurigram, Lalmonirhat, Manikganj, Munshiganj, Mymensingh, Naogaon, Netrokona, Nilphamari, Patuakhali, Rajbari, Rangpur, Sherpur, Sirajganj, Sunamganj, Sylhet and Tangail. Data comes from CRED (2019).

Table 5. Sources of loans: disaster-affected vs unaffected regions

SOURCES OF LOANS	UNAFECTED REGIONS	AFFECTED REGIONS
Share of households borrowing from		
Informal sources	39.8%	42.6%
Formal financial institutions	16.5%	17.1%
NGOs	43.7%	40.3%
Average loan amounts (taka)		
Informal sources (SD)	68,702 (126,143)	71,000 (186,905)
Formal financial institutions (SD)	51,646 (219,103)	41,114 (135,486)
NGOs (SD)	29,915 (54,199)	26,837 (38,580)
Average outstanding loan amounts (taka)		
Informal sources (SD)	65,149 (125,515)	64,626 (159,838)
Formal financial institutions (SD)	41,367 (170,855)	37,597 (143,833)
NGOs (SD)	18,933 (35,578)	16,205 (26,943)
Average interest rates on loans		
Informal sources (SD)	12.23% (25.60%)	23.54% (48.76%)
Formal financial institutions (SD)	12.20% (6.38%)	12.29% (5.48%)
NGOs (SD)	14.50% (4.58%)	14.93% (11.81%)

Source: Based on data from BIHS (2015).

Note: SD = standard deviation.

Conclusion



The Bangladesh government needs to improve the quality and quantity of data it collects to track how much households spend on climate and disasters. The government, its donors and development partners must also increase financial contributions to climate and disaster spend, ensuring these reach poor households and address their priorities.

We have established that rural households are contributing almost US\$2 billion to climate and disaster spend in Bangladesh, often at the expense of other household needs. This is by far the largest share of overall climate and disaster spend in the country. The national government, its donors and development partners must all increase their contributions and treat households as partners – not beneficiaries – in the fight against climate change. This means ensuring finance reaches poor households and working with them to ensure it addresses their priorities.

To do this effectively, the government needs access to more and better data on how much households are spending on climate and disasters. It can do this by ensuring statistical offices such as the Bangladesh Bureau of Statistics include more questions on the subject in their annual and periodical household expenditure surveys.

Bangladesh is one of the most vulnerable countries to climate risks. And while international agencies, developed countries and government agencies all contribute to climate and disaster finances, they do not always properly align their contributions to the needs of the poor. The high concentration of people living in

poverty in rural Bangladesh means that livelihoods are predominately based on agriculture and therefore highly vulnerable to climate risk. As such, poor households often focus on preparing for and responding to climate disaster. In the absence of properly functioning credit markets and property rights, rural households are under continuous pressure to make ends meet while making private adaptation and coping decisions. Carrying out a range of adaptation and coping strategies on limited incomes, households need cash and in-kind assistance from central and local government, donors and NGOs. Microinsurance, social safety nets and devolved climate and disaster finance that is invested in ways that will meet their priorities – for example, raising house plinths and raising household compounds with earthen foundations – would help them prepare for disasters and future-proof their homes.

To address the geographical and gender-based inequalities in households' equivalent climate and disaster spend, providers of low-cost finance must ensure they reach all poor households. Female-headed households spend three times as much as a percentage of income as male-headed households on climate and disaster management. More public intervention would ensure greater coverage by formal financial institutions and NGOs, which could provide low-interest loans for disaster risk reduction actions and climate and disaster spend. This would allow poor households – particularly those headed by women – to respond to disasters by switching and/or diversifying crops, migrating temporarily or rebuilding and repairing their homes.

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Abbreviations and acronyms

BCCRF	Bangladesh Climate Change Resilience Fund
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BIHS	Bangladesh Integrated Household Survey
CDMP	Comprehensive Disaster Management Programme
CEIP	Coastal Embankment Improvement Project
CIF	Climate Investment Fund
GCF	Green Climate Fund
GDP	gross domestic product
MDSP	Multipurpose Disaster Shelter Project
NGO	non-government organisation

The debate around climate and risk reduction finances has focused on money from national governments and international donors, mostly ignoring contributions from individual households. Using data from Bangladesh, this paper demonstrates that rural households – the direct sufferers of climate change – spend almost US\$2 billion on disaster preparedness and response. In absolute terms, this is more than double the government climate and disaster risk reduction spending and over 12 times higher than multilateral international financing to Bangladesh's rural population. Measured as share of income, women also spend three times more than men on climate and disaster.

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