



# Bangladesh: Policy Options for crop and livestock and aquaculture insurance



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# Abbreviations

<b>AYII</b>	area yield index insurance
<b>BFID</b>	Bank and Financial Institutions Division
<b>DLS</b>	Department of Livestock Services
<b>GAIN</b>	Global Agricultural Information Network
<b>MFI</b>	microfinance institution
<b>MPCI</b>	multiple peril crop insurance
<b>NGO</b>	nongovernmental organization
<b>NPCI</b>	named-peril crop insurance
<b>SBC</b>	Sadharan Bima Corporation
<b>USAID</b>	U.S. Agency for International Development

# Executive Summary

**Agriculture is a key sector in Bangladesh, but it is highly exposed to risks.** While agriculture is a source of employment and livelihood for nearly one in two adults in Bangladesh and contributes about 16 percent to GDP, it is highly exposed to natural hazards. Indeed, Bangladesh is commonly ranked as one of the most vulnerable countries in the world to natural disasters<sup>1</sup> with agriculture heavily exposed to floods, cyclones, and drought. In 2007, for instance, Cyclone Sidr destroyed 0.69 million hectares of cultivated crop lands and killed over 460,000 head of livestock and poultry.

**In the past, the government of Bangladesh and development partners have provided substantial support to farmers in the aftermath of large disasters, but this approach has disadvantages in that support is not guaranteed to farmers and may be slow.** In the aftermath of Cyclone Sidr, recovery and reconstruction needs were estimated at US\$1.3 billion, or 28 percent of government expenditures.<sup>2</sup> In spite of efforts by the government of Bangladesh, the gap between available funding and needs is often large and can reach more than US\$1.5 billion in bad years (Air Worldwide and ADPC 2014). Bangladesh often relies on international assistance, as over the past ten years, only 33% of disaster-related expenses has been met by domestic resources. In addition, disaster relief transfers often take substantial time to reach beneficiaries and require to divert resources away from long term development projects.

**Agricultural insurance offers the government a planned, fast, ex ante alternative to ad hoc disaster response, one that (1) reduces the ex post fiscal burden on the government, (2) improves farmers' resilience to shocks, and (3) supports the expansion of agricultural credit.** Every five years on average in Bangladesh, production shocks lead to a drop of up to 50 percent in crop income available for consumption in average rural households. This drop pushes many small- and medium-scale farmers into poverty. Although many Bangladeshi farmers can access credit, their exposure to risks makes formal financial institutions reluctant to lend to them, so that most farmers borrow from informal lenders at average annual interest rates ranging from 19 percent to 30 percent.<sup>3</sup> Agricultural insurance transfers risk away from farmers, and therefore benefits financial institutions and the government of Bangladesh as well as the farmers themselves.

**International experience shows that government can play a variety of roles to support the responsible scale-up of agriculture insurance.** Government can invest in a robust legal and regulatory framework, data collection and management, support outreach (through awareness raising or subsidizing of premiums), undertake financing of catastrophic layers of risks, and support insurers in technical tasks such as product design.

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1 The 2014 report ranks Bangladesh as the 5th most risk prone (riskiest) country out of the 171 countries in the analysis.

2 General government final consumption expenditure in 2008 amounted to US\$4.7 billion, according to the World Bank. This category includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures for national defense and security, but excludes government military expenditures that are part of government capital formation.

3 Details on the welfare impact analysis model can be found in the accompanying technical report (*Bangladesh: Agriculture Insurance Solutions Appraisal Technical Report*).

**In consultation with the Bank and Financial Institutions Division (BFID) of the Ministry of Finance, the Ministry of Livestock and Fisheries, and other key public and private sector stakeholders, the World Bank Group team has identified four potential types of agricultural insurance to offer in Bangladesh, all of which would require implementation through a partnership between the public and private sectors.** The four types are dairy cattle insurance, aquaculture insurance, crop insurance, and fully subsidized agricultural insurance for the most vulnerable. All of these include a variety of design and distribution options, and for three selected options, a detailed fiscal costing and welfare impact analysis has been conducted to serve as a basis for policy decisions.

**For the 36 percent of rural households that own cattle, dairy cattle insurance could help unlock access to credit and higher-yielding breeds while stabilizing income in bad years.** Welfare impact analysis shows that dairy cattle insurance can reduce expected default rates of financial institutions' livestock lending portfolios and therefore could crowd in more productive credit, especially to smallholder producers<sup>4</sup>. By 2020, assuming 10% of national dairy cattle (i.e. approximately 1.1 million cattle) were insured under the program the annual fiscal cost to be borne by the government has been estimated at over US\$4 million.

**For the 4 million finfish producers and 300,000 shrimp producers, named-peril or all-risks aquaculture insurance products could help intensify production and make coping with large shocks easier.** Shrimp insurance is identified as a potential entry point for aquaculture insurance. If the government of Bangladesh decided to explore this option, a formal risk assessment and insurance demand and contract design study would be needed as a first step towards developing and implementing a program.

**For the 57 percent of rural households that are small- and medium-scale farmers, area yield index insurance (AYII) for aman and boro paddy (rice)<sup>5</sup> could help unlock access to credit and higher-yielding varieties while stabilizing farmers' income in bad years—and could do so more effectively than current ex-post disaster relief.** Welfare impact analysis shows that insurance can mobilize larger compensation to farmers following catastrophic shocks than can existing disaster relief programs; insurance compensation is found to increase crop income by 17 percent in bad years relative to disaster relief programs. In addition, AYII could increase loan repayment by up to 35 percent in bad years and thus allow banks to expand access to formal credit and therefore unlock productive investments. The combined effect of enhanced protection and increased productivity is estimated to result in a 100 percent increase in small- and medium-scale farmers' crop income in bad years, compared to current disaster relief. The annual fiscal costs to be borne by the government for supporting the development of a national AYII program are estimated at between US\$6 million and US\$9 million in 2020, when about 10 percent of the cultivated area would be insured<sup>6</sup>.

**While agriculture insurance can help increase agricultural productivity by lifting both demand-side constraints on investments and supply-side constraints on credit, agricultural insurance cannot deliver impact on agricultural productivity on its own.** Beyond agricultural risks, lenders might face other constraints to the expansion of agricultural credit such as transaction costs, health and price risks, lack of expertise in agriculture lending or lack of enabling environment. In addition, while unlocking agriculture credit is important, timely access to quality inputs as well as extension services are crucial for productivity improvements.

**For the most vulnerable households, such as char<sup>7</sup> populations, fully subsidized insurance may offer a cost-effective alternative to traditional ex post disaster relief.** For example, using 100 percent subsidized flood index insurance to scale up social protection for the poor and vulnerable bottom 50 percent of char populations could reduce long-term welfare impacts of catastrophic floods, and so result in 5 percent reduction in the averaged long-term poverty rate relative to a traditional

4 Interviews with main milk cooperative "Milk Vita" highlighted that cattle loans repayment performance over the past decade has averaged 85%.

5 Paddy accounts for 83 percent of crop income for rural households.

6 This fiscal costing exercise is based on the assumption that the government will provide financial support to the AYII scheme through premium subsidies, investment in data market infrastructure, and support to awareness raising activities. In this illustrative example, it is assumed that the government will cover a 50 percent share of premium subsidies.

7 River islands formed from sedimentation



social protection program with the same expected budget. Indeed, timely and adequate compensation provided by insurance can reduce the need for destructive coping strategies (such as asset sales or consumption reduction) that can have long-term damaging effects. The estimated total costs for scaling up the current Oxfam flood index insurance program, for example, which would cover 30,000 particularly vulnerable households over the next two years, are about US\$1.6 million, or an average of about US\$55 per beneficiary.

**If the Government of Bangladesh decided to go ahead with support for agriculture insurance, high-level buy-in from a broad range of stakeholders will be necessary, as will partnerships with the private sector.** Government may consider: strengthening the overall legal, regulatory, and supervisory insurance environment; developing a centralized database of data for agricultural insurance purposes; provision of financial support to the program, particularly in the early stages of the program; and establishing a dedicated technical team within government with responsibility for implementation and for providing input to policy. One option for consideration would be for some or all of these activities to be carried out through a project with technical support and/or financial assistance of a development partner with adequate expertise in this field, such as the World Bank Group.



# Introduction

**At the request of and guided by the Bank and Financial Institutions Division (BFID) of the Bangladesh Ministry of Finance, a team of local domestic and international experts from the World Bank Group conducted a diagnostic review of different agricultural insurance options for Bangladesh.** The team's appraisal, as set out in this document and the accompanying technical analysis, lays out the costs and benefits of developing large-scale agricultural insurance programs that involve both the public and private sectors. The appraisal team was led by representatives from the World Bank's Finance and Markets Practice and builds on the recent situational analysis.

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## **The problem: Challenges with post-disaster support for the agricultural sector**

**Agriculture is a key sector in Bangladesh, but it is highly exposed to natural and climatic as well as biological risks, such as pests and diseases.** Agriculture is a source of employment and livelihood for nearly one in two adults in Bangladesh and contributes about 16 percent to GDP.<sup>8</sup> Contribution to agricultural GDP comes mainly from crop production (63 percent) but also from fisheries (23 percent) and livestock and poultry (14 percent). There are about 15 million farm households in Bangladesh, and a further 13 million landless households whose members work as sharecroppers or farm laborers. The most important staple food crop grown is paddy (rice). Bangladesh has made major progress in agriculture since independence, but its high population growth rate and major exposure to natural hazards and climate change make food security an ongoing challenge. Bangladesh's exposure to natural hazards—including floods, cyclones, and drought, all of which have large impact on agriculture—is among the highest in the world. In 2007, for instance, Cyclone Sidr destroyed 0.69 million ha of cultivated crop lands and killed over 460,000 head of livestock and poultry. Over the past 15 years, the annual average total damage to property and infrastructure in agriculture and other productive sectors due to floods, cyclones, storms, earthquakes, and other natural perils has been valued at US\$736 million or about 3% of agricultural GDP (Air Worldwide and ADPC 2014).

**The agricultural sector in Bangladesh has addressed such extreme risks with the support of government by investing in a range of innovative technologies to protect farmers from shocks.** Specifically, the government has invested in embankments along the rivers and polders in coastal regions to mitigate the impact of river flood and incursion by seawater associated with sea-level rises and tidal surge. In addition, the agricultural sector has turned to cultivation of flood-tolerant rice in flood-prone areas as part of an effort to stabilize rice production.

**However, such protection is incomplete, and farmers are still exposed to the threat of large shocks that could harm their businesses and households.** While low-income smallholder households have employed a wide range of strategies to manage shocks (e.g., community risk-sharing arrangements, savings, crop and labor diversification), these strategies tend to be ineffective against

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<sup>8</sup> World Bank data, <http://databank.worldbank.org/>.

extreme shocks, which potentially create widespread losses that affect the whole community simultaneously. Some strategies can also place a high cost on long-term development, such as households' decision to not to invest in a higher-return, higher-risk production strategy, therefore possibly keeping them trapped in a subsistence-based farming. Because they lack effective risk management tools, low-income smallholder households may be forced to reduce food consumption, take their children out of school, and sell productive assets. These destructive coping measures can deplete productive assets even further and drive poorer households into chronic poverty (Barnett, Barrett, and Skees 2008). A recent study in Bangladesh shows that catastrophic floods have been one of the major causes of persistent poverty in the country (Dasgupta 2012). Moreover, the 2010 Household Income and Expenditure Survey (BBS 2011) shows that disaster-prone districts are among the country's poorest and have the worst development outcomes.

**In the past, the government of Bangladesh and development partners have provided substantial support to farmers in the aftermath of large disasters.** Following Cyclone Sidr, for example, recovery and reconstruction needs were estimated at US\$1.3 billion, or 28 percent of government expenditures.<sup>9</sup> Each year on average since 2000, the government of Bangladesh and external donors have spent over US\$300 million for natural disasters; this figure rose to US\$1,050 million in the aftermath of Cyclone Sidr in 2007 (Air Worldwide and ADPC 2014). Only 33 percent of the total funding is met by domestic resources; foreign sources are responsible for the remaining 67 percent. Tropical cyclones and floods are the major cause of donor post-disaster expenditures, accounting for 40 percent and 38 percent of donor expenditures respectively.<sup>10</sup>

**From a farmer's perspective, a disadvantage of this approach is that the support is not guaranteed and that it often takes some time to be provided.** In spite of the government's efforts, the gap between available funding and needs in Bangladesh is often large and can reach more than US\$1.5 billion in bad years (Air Worldwide and ADPC 2014). In addition, international assistance is not always available immediately after a disaster; it is an uncertain coping mechanism for emergencies, one that requires negotiations and generally takes time to implement.

**From Government of Bangladesh's perspective, such support creates a contingent liability and the threat of fiscal volatility.** In response to disaster events, the government generally allocates budgetary funds for disaster relief and rehabilitation from a contingency account or reallocates funds across categories of expenditure, but this approach risks compromising long-term development programs.

**From the perspective of financial institutions, agriculture shocks create significant risks, and in spite of government's efforts, credit to agriculture is still constrained to 3 percent of total lending.** Only 25% of adults living in rural areas have an account at a financial institution (compared to 43% on average in South Asia) and less than 4% of adults have borrowed for a farm or business over the past year (compared to 9% in South Asia)<sup>11</sup>.

**Against this background, the government of Bangladesh has requested the assistance of the World Bank Group in conducting an appraisal of different agricultural insurance options for Bangladesh.** The scope of this request covers four major agricultural insurance sectors: livestock insurance, aquaculture fisheries insurance, crop insurance, and social protection.

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## Agricultural insurance as part of the solution

**Agricultural insurance offers governments a planned, fast, ex ante alternative to ad hoc disaster response, one that (1) reduces the ex post fiscal burden on the government, (2) improves farmers' resilience to shocks, and (3) supports the expansion of agricultural credit.** Agricultural insurance allows governments to use the financial system to deliver timely, reliable post-disaster support

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<sup>9</sup> General government final consumption expenditure in 2008 amounted to US\$4.7 billion, according to the World Bank. This category includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures for national defense and security, but excludes government military expenditures that are part of government capital formation.

<sup>10</sup> Data are from Financial Tracking Service, <http://fts.unocha.org/>.

<sup>11</sup> Global Findex, 2014.

to farmers. Using government resources to support agricultural insurance reduces threats to fiscal stability posed by disasters while improving farmers' resilience to shocks. In addition, sound agricultural insurance can crowd in credit by decreasing agriculture lending risks for financial institutions. It can also crowd in good mitigation techniques. Indeed, by putting a price on risk, insurance encourages farmers to switch to lower-risk crops where necessary or to take more prudent risks.

**Some livestock and flood insurance products are already being offered in Bangladesh, and two crop insurance initiatives are under preparation.** Several Non-Governmental Organisations (NGOs) and microfinance institutions (MFIs) are offering, including livestock-credit insurance, but in the absence of reinsurance agreements, these programs might not be able to cope with shocks that kill large numbers of animals. Since 2013, Oxfam has piloted a flood index insurance project in a flood-prone district covering about 1,700 low-income and vulnerable households. Most recently, two weather index-based initiatives are in the process of being launched. One of these initiatives is led by the government-owned insurance company Sadharan Bima Corporation (SBC) and supported by the Asian Development Bank, and the other is led by the private sector company Green Delta and supported by the World Bank Group (World Bank 2015).

**However, despite these pilot programs, few farmers in Bangladesh are currently protected by agricultural insurance.** A 2011 national survey showed that no respondents had access to crop insurance, and only 1.4 percent of respondents had access to some form of livestock insurance.<sup>12</sup> In 2015, it is estimated that no more than about 2–3 percent of livestock owners have microcredit insurance for livestock.<sup>13</sup>

**International experience shows that government can play a variety of roles to support the responsible scale-up of agriculture insurance.** The Chinese government, for instance, decided in 2007 to switch from ad hoc post-disaster relief to a new model that was based on agricultural risk prevention and subsidized insurance and that would better protect farmers against floods, droughts and cyclones. Today, subsidized agricultural crop and livestock insurance offers protection across the country, with premiums reaching US\$3.5 billion, of which the farmer pays about 40 percent and government pays about 60 percent on average. In India, the government supports agricultural insurance through a wide range of interventions (e.g., premium subsidies, mandatory bundling of rural credit with crop insurance, awareness raising, and investment in data). In 2014, 33 million Indian farmers were covered, equivalent to 20 percent of farming households.

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<sup>12</sup> Data are from a 2013 microinsurance market assessment conducted by the Palli Karma-Sahayak Foundation (PKSF). The assessment surveyed 3,490 urban and rural households that are predominantly involved in agriculture and that borrowed through microcredit.

<sup>13</sup> See details in the accompanying document *Bangladesh: Agriculture Insurance Situation Analysis*.

# Policy Options

**A wide range of design options exists for insurance products, including traditional indemnity insurance, as well as index insurance products (figure 1), and each has advantages and disadvantages.** Crop insurance is by far the largest class of agricultural insurance, and accounts for more than 80% of global agricultural insurance premiums. There are a wide range of traditional indemnity based crop insurance products ranging from named-peril crop insurance (NPCI) including crop hail which is widely available, through to individual grower multiple peril crop insurance, MPCI, which is a product providing comprehensive loss of yield protection. MPCI is a product which is only suitable for medium to large commercial farmers and it is a product that often experiences very high transaction costs and issues of moral hazard and adverse selection by farmers (see Figure 1). Over the past twenty years weather index insurance (both ground-based and satellite-based) products and programs have been developed as a low (transaction cost) alternative which are more suited to the needs to small-holder farmers in low income and middle income countries. There has also been major interest in Asia and Africa in applications of area yield index insurance as a small farmer policy linked to seasonal crop-credit (Figure 1) Indemnity-based livestock insurance provides mortality cover against named perils, business interruption risks, or sometimes all risks. There are also a few livestock index insurance products, but experience in this area is still limited. Fisheries and aquaculture insurance is a relatively small and specialized class of insurance, and cover is usually restricted to named perils that result in the death of the fish stock. Cover may also be purchased for damages to the fish farm's equipment and installations.

**Figure 1. Types of Crop Insurance Products**

**1. What are the various types of insurance products for agriculture**

	What is it?	Transaction costs	Moral Hazard and adverse selection	"Mismatch Risk"	Claims Settlement time
 <p>Traditional indemnity insurance</p>	<ul style="list-style-type: none"> <li>Payouts are determined through a farm-level loss assessment process.</li> <li>Protection can be offered for multiple perils or for a named peril.</li> </ul>	High	High	Low	Medium
 <p>Area-yield index insurance</p>	<ul style="list-style-type: none"> <li>Area-yield index insurance is based on average losses at the village level, rather than farm level.</li> <li>It is often based on crop cutting experiments.</li> </ul>	Medium	Low	Medium	Medium
 <p>Weather index insurance</p>	<ul style="list-style-type: none"> <li>Weather index insurance is based on weather parameters (such as rainfall, temperature, or soil moisture) correlated with farm-level yields or revenue outcomes.</li> </ul>	Low	Low	High	Low

\* A mismatch risk with index insurance can arise when indices are imperfectly correlated with farmers' losses. Some farmers with losses may not receive payouts while some farmers without losses may receive payouts. This might be due to the fact that the index does not capture insured perils correctly, or that it misses other important perils.

In consultation with the BFID in the Ministry of Finance, the Ministry of Livestock and Fisheries, and other key public and private sector stakeholders, the World Bank Group team has identified four potential types of agricultural insurance in Bangladesh. There are various possible design and distribution options for the insurance products, though all would require implementation through a partnership between the public and private sectors and investments in market infrastructure and capacity. A summary of these options, together with an estimation of their fiscal cost and economic impact, is provided in table 1.

**Table 1. Summary of Suggested Policy Options for Design and Distribution of Agricultural Insurance**

	Design options	Distribution options	Fiscal cost & welfare impact
Dairy Cattle insurance	<p>Traditional indemnity-based livestock accident and mortality cover</p> <ul style="list-style-type: none"> <li>Cattle are owned by 36% of rural households (or 10.4 million households), the vast majority of which are small scale producers</li> </ul>	<p>5 distribution options: (1) Government-sponsored bundling of insurance with credit for select banks, (2) partner agent model with MFIs and NGOs and commercial banks, (3) partner agent model with dairy cooperatives, (4) underwriting and distributions by MFIs, and (5) community based schemes</p>	<p>A 50% subsidized national dairy cattle insurance program would cost between US\$4 million and US\$16 million in 2020:</p> <ul style="list-style-type: none"> <li>When insurance can unlock credit and induce smallholder producers to switch to high value or hybrid breeds and improved inputs, this could allow them to double their productivity</li> </ul>
Aquaculture insurance	<p>Named-perils or all-risk insurance cover</p> <ul style="list-style-type: none"> <li>300,000 shrimp producers</li> <li>4 million finfish producers</li> </ul>	<p>To be assessed (e.g., value chain stakeholders, banks)</p>	<p>Further research to be undertaken</p> <ul style="list-style-type: none"> <li>Potential to double shrimp yields with significant impact on smallholders' income.</li> </ul>
Crop insurance	<p>Area-yield index insurance or weather-based index insurance</p> <ul style="list-style-type: none"> <li>Paddy accounts for 83% of crop income of rural households</li> </ul>	<p>Distribution bundled with agricultural credit:</p> <ul style="list-style-type: none"> <li>On voluntary basis or under legal requirement</li> </ul>	<p>A 100% subsidized national AYII program for aman and boro paddy would cost between US\$6 million and US\$9 million in the 2020:</p> <ul style="list-style-type: none"> <li>AYII could increase loan repayment by up to 35% in bad (1-in-10) years and therefore unlock productive investments</li> <li>The combined effect of enhanced protection and increased productivity is estimated to result in a 100% increase in small and medium-size farmers' crop income in bad years, compared to current disaster relief.</li> </ul>
Fully subsidized insurance for most vulnerable	<p>Fully subsidized insurance for the poorest households could be based on a flood index</p> <ul style="list-style-type: none"> <li>83 million people are poor</li> <li>30,000 households are particularly vulnerable</li> </ul>	<p>to be assessed</p> <ul style="list-style-type: none"> <li>Current flood index-based program piloted by NGO distributes payouts through an MFI</li> </ul>	<p>Estimated cost of scaling up current flood-index program (from less than 2,000 to 30,000 beneficiaries) is about US\$2 million at the start of the program (2015-2017).</p> <ul style="list-style-type: none"> <li>using 100% subsidized flood index insurance to scale up social protection for the poor and vulnerable bottom 50% of rural populations could reduce long-term welfare impacts of catastrophic floods and result in 5% reduction in averaged long-term poverty rate</li> </ul>

## Dairy cattle insurance

Dairy cattle production is very important to Bangladesh's economy, and the Ministry of Livestock and Fisheries have identified a need to develop suitable dairy cattle insurance products to strengthen the sector. More than 36 percent of all rural households own cattle; of these, the vast majority are small-scale producers.<sup>14</sup> The 11 million cows owned by Bangladesh farmers produce milk and calves for up to nine years and so constitute a key asset for small-scale producers. In its National Livestock Development Policy, adopted in 2007, the government of Bangladesh indicated that strengthening the dairy cattle sector and increasing milk production are priorities, and it identified livestock insurance as an important instrument for reaching these goals.

<sup>14</sup> 2009 National livestock and poultry survey. Most cattle in Bangladesh—85.3 percent—are owned by households with less than 2.5 acres (1 ha) of land.

### **Dairy cattle insurance can generate benefits for a range of stakeholders in a number of ways:**

(1) by protecting dairy producers against the death of their cattle, thereby protecting their livelihoods and incomes, (2) by protecting financial institutions' portfolios exposed in livestock lending, thereby unlocking livestock investment loans, (3) by helping dairy cooperatives/social enterprises increase the loyalty of their members by offering an added-value product, and (4) by supporting the government of Bangladesh's efforts to increase national dairy cattle milk productivity, reduce poverty, and reduce dependence on milk imports.

### **Dairy cattle insurance could help reduce the vulnerability of small-scale milk producers in Bangladesh.**

Rural households in Bangladesh are highly exposed to severe losses, including loss of livestock, associated with cyclone and flood events. Cyclone Sidr led to the death of 1.78 million head of livestock and poultry<sup>15</sup> and also led to major disease outbreaks.

### **Dairy cattle insurance could also have significant ex ante impact in facilitating investments in higher-productivity dairy cows and introducing minimum standards of animal husbandry practices, thereby reducing accidents and mortality.**

Dairy cattle productivity in Bangladesh is extremely low, with the average weight of local cows considerably lower than in India<sup>16</sup> and average milk yields much lower than other Asian country averages.<sup>17</sup> As a consequence, in spite of the government's efforts to support the dairy sector, Bangladesh currently produces only 43.4 percent of its daily milk demand, leading to large volumes of powdered milk and cream imports at an annual cost of US\$93.4 million.<sup>18</sup> Going forward, the government of Bangladesh estimates that by the year 2020, milk and meat production would need to be increased by 2.5 to 3.0 times to feed the country's growing population (MOFL 2007). Cattle insurance could help small-scale producers invest in high-yielding cross-bred or hybrid cattle that are capable of yielding between 7 and 10 litre or more of milk per day, compared to current averages of less than 2 litre per cow per day.

## **Design**

### **For dairy cattle insurance in Bangladesh, a traditional indemnity-based livestock accident and mortality cover would be most appropriate.**

Other countries have experimented recently with innovative index-based livestock insurance, such as a catastrophe freeze mortality index policy for livestock in Mongolia and satellite-based pasture drought indexes in Kenya, but indexed products would not be suited to the needs of small-scale dairy cattle owners in Bangladesh. First, while indexing weather events is fairly straightforward, disease—one of the main causes of cattle loss in Bangladesh—cannot be easily indexed. Second, the lack of time-series livestock mortality statistics by cause of loss would make it difficult to design an index-based livestock insurance product. Third, most milk producers in Bangladesh are small-scale producers who own on average two to three cows, and an index that operated at district or subdistrict level would expose them to significant basis risk. Conversely, a traditional indemnity-based cover would insure each cow belonging to the owner against a broad range of perils that result in the death of the animal, and such an individual animal cover is much more appropriate to the risk management needs of Bangladesh's small-scale dairy producers.

### **In the case of a new start-up dairy cattle insurance program in Bangladesh, it is unlikely that insurers and their reinsurers would grant all risk cover; instead, the policy would likely insure against key named perils that cause death of cattle in each part of the country.**

A traditional indemnity-based livestock product could be designed against a broad range of natural perils and named diseases that result in the death of the individual animal, which would enable the dairy producers to replace the dead animal and/or to repay their investment loans to the bank or MFI.

15 For more detailed BBS data on livestock mortality due to flood and cyclone, see the accompanying document World Bank 2015 *Bangladesh: Agriculture Insurance Situation Analysis*.

16 The average weight of local cattle ranges from 125 kg to 150 kg for cows and from 200 kg to 250 kg for bulls, or about 25–35 percent lower than the average weight of all-purpose cattle in India.

17 Average milk yields in Bangladesh are 200–250 L during a 10-month lactation period, in contrast to 800 L for Pakistan, 500 L for India, and 700 L for all Asia.

18 Hamid & Hossain 2014. Imports of powdered milk and cream in 2012–13 amounted to 20,000 MT valued at US\$ 93.4 million. By way of comparison, India is the world's largest producer and consumer of milk and dairy products. 2015 production is projected at 147 Million Metric Tons (MMT) of fluid milk and 550 MMT of non-fat dry milk (NFD). India is self-sufficient in milk production and is a major exporter of NFD with projected exports of 75,000 MMT in 2015, mainly to milk deficit countries such as Bangladesh, Egypt, Algeria, Sri Lanka and Pakistan (GAIN 2014)

**Such a product could be marketed on either an individual animal basis or (for large farmers) a herd basis.** Individual animal covers would be suitable for small- and medium-scale dairy farmers (with between 1 and 25 dairy cows), while larger commercial dairy farms (with 25 to 50 or more dairy cows) might elect to purchase herd-based covers.

**From an insurance viewpoint, some preconditions would need to be in place before implementation of a dairy cattle insurance program, which will require partnerships between insurers, the Department of Livestock Services, and distribution channels.** These preconditions include in particular the following: (1) Individual registration of all insured cattle identified by ear tagging, (2) preinspection to certify that the animal is in good health and has been properly vaccinated against the major diseases for which cover is requested, and (3) procedures for immediate declaration of loss and inspection of the dead animal. In spite of efforts by the government of Bangladesh to establish a national livestock registration system, there is currently no national system for identifying and tagging individual livestock animals, and no national livestock-registration database system. This lack will create high costs for insurers in the start-up phase of any dairy cattle livestock insurance program. It will be necessary to seek collaboration by the Department of Livestock Services and potential distribution channels—such as dairy cooperatives, social enterprises, and MFIs and NGOs—to assist insurers in carrying out these key operations and in sharing costs. Otherwise premium rates will be extremely high.

## **Distribution**

**Five main distribution options could be considered for cattle insurance in Bangladesh:** (1) a government-sponsored dairy cattle insurance scheme, under which selected financial institutions would distribute subsidized livestock insurance bundled with investment loans to all farmers to invest in high-yielding cross-bred or hybrid cattle;<sup>19</sup> (2) a partner agent model whereby commercial insurers distribute dairy cattle insurance bundled with livestock investment loans through MFIs, nongovernmental organizations (NGOs), and commercial banks; (3) a partner agent model whereby commercial insurers distribute dairy cattle insurance through major dairy cooperatives/companies; (4) a micro-dairy cattle insurance policy issued by the MFIs and NGOs linked to livestock microfinance;<sup>20</sup> and (5) a community-based livestock insurance schemes.<sup>21</sup>

**Any dairy cattle insurance program is probably most cost-effectively promoted and implemented through a partner agent model with MFIs, NGOs, or leading milk cooperatives/social enterprises in Bangladesh (Options 2 and 3).** Indeed, such a model would generate benefits for distribution channels while also significantly reducing costs and risks for the insurers including through aggregation benefits. MFIs have indicated strong interest in a livestock insurance product, which would allow them to reduce risks on their livestock lending portfolio while helping their borrowers to cope with cattle losses. One approach would be for MFIs to distribute on a mandatory basis a credit-linked insurance product covering only the value of a livestock investment loan, and then offer voluntary top-up to cover the full market replacement value of the cow (generally 50 percent higher than the loan value). Similarly, dairy cooperatives and social enterprises might be interested in providing insurance as a value-added product to dairy (milk) producers and as part of a strategy to retain their suppliers and market share in the face of strong competition from other milk processors. Such partner agent models would greatly reduce costs and risks for insurers because they would allow them to build on systems

<sup>19</sup> This scheme could contribute to the twin goals of promoting high-yielding and high-value cattle on the one hand, and providing risk mitigation/asset protection for farmers on the other.

<sup>20</sup> The provision of insurance services from MFIs in Bangladesh is regulated by the Microfinance Regulatory Authority Act 2006 and Microcredit Regulatory Authority Rules, published in the Bangladesh Gazette December 19, 2010. MFIs are allowed to provide insurance services to their members based upon approval of the regulatory authority. However, the Insurance Development and Regulatory Authority of Bangladesh (IDRA) does not recognize microinsurance products and services offered by MFIs. There are gaps in the legislation and regulations of the Microfinance Regulatory Authority and the IDRA, and these have led to different interpretations. Microfinance Regulatory Authority Act 2006, Art. 24. 2 states: "Each of the microcredit institutions should have authority and responsibility as mentioned below: . . . (h) Offer different types of insurance services and other social development-oriented loans facilities for loans recipient and members of their families." Microcredit Regulatory Authority Rules, 2010, Art. 2 includes this definition: "Microcredit Activities: Means the continuous activities related to the microcredit and deposit services for the clients under the supervision of the microcredit organization, and the Insurance services will also including." Art. 25 (INSURANCE SERVICES) states: "(1) The Microcredit Organization may offer Insurance services to its Clients. (2) For the Insurance services mentioned in sub-clause (1) the Microcredit Organization will provide to the Authority a complete description of the service, the applicable fees or premium to be realized from the Client and the settlement of claims and the financial solvency of the Microcredit Organization."

<sup>21</sup> These schemes are a form of mutual insurance program in which the policyholders are both the owners and managers of the scheme.

and practices already in place, specifically (1) existing rural distribution networks of NGOs, MFIs, and cooperatives/enterprises, which would reduce transaction costs of collecting premiums and paying claims and enable demand aggregation benefits; (2) existing livestock veterinary officers, who could conduct preinspections and evaluate losses on insurers' behalf; and (3) information on members maintained by MFIs, NGOs, and cooperatives/enterprises, which would allow insurers to minimize moral hazard or adverse selection.

**Other distribution options might be more difficult to implement but could be explored further.**

In particular, banks might not have the distribution network, livestock expertise, and borrower information that MFIs, NGOs, and cooperatives have. Furthermore, the model under which MFIs and NGOs would underwrite their own dairy cattle insurance (without involvement of commercial insurers) would be very exposed to catastrophe losses, given that MFIs are not able to obtain for their livestock portfolios excess of loss insurance from commercial insurers.<sup>22</sup> Finally, community-based livestock insurance schemes, which are a type of mutual insurance program where the policyholders are both the owners and managers of the scheme, could be considered, although further research would be required to identify their potential for scale and sustainability. In Andhra Pradesh state in India, a community-based dairy cattle insurance scheme begun in 2005 has achieved major scale-up over time and has attracted support from commercial insurers, including TATA AIG Insurance Company among others.

**Developing a sustainable commercial dairy cattle insurance market in Bangladesh will depend on the close partnership between government and the insurance companies.**

At an operational level, government through the Department of Livestock Services (DLS) could perform a range of very important roles, such as deploying DLS veterinarians to (a) carry out livestock preinspections, vaccinations, and health certification of the insured cattle, (b) confirm the breed, age, and sum insured of each insured animal, and (c) ensure the animal is properly tagged and identified and that its unique details are entered into a national electronic database registration system for cattle. This system would be invaluable for national planning purposes as well as for insurance purposes. DLS could also utilize its network of livestock extension officers to support insurance awareness and education programs for dairy farmers and distributors. Through the Ministry of Finance, the government could also consider providing financial support to scale up the program, specifically by providing financial support for the data market infrastructure (inspection, vaccination, certification, registration, and tagging) and for selective premium subsidies to make dairy cattle insurance more affordable to and accessible by small-scale dairy cattle producers. Government might also support the risk financing and reinsurance program, especially in the start-up phase if access to international reinsurance capacity is a limiting factor. The partnership between government and the insurance sector could be structured in different ways, ranging from free market competition between individual insurance companies that register to underwrite the government-supported dairy cattle livestock insurance product(s), to the formation by interested insurers of a livestock coinsurance pool. Finally, at an early stage in the planning and design of the dairy cattle insurance public-private partnership, it will be necessary to involve both Sadharan Bima Corporation (because of the compulsory market reinsurance 50 percent cessions to Sadharan Bima Corporation) and international reinsurers (because of their ability to take on high levels of catastrophic risk).

### **Costs and impact**

**Setting dairy cattle insurance premium rates will initially be difficult in Bangladesh, given the lack of historical mortality statistics at national, regional, local, and individual farmer level as well as the lack of insurance actuarial or experience data.**

For individual animal insurance, premium rates charged internationally for small farmer dairy cattle may range from a minimum of about 2.5 percent to 7.5 percent or higher. If in future dairy cattle insurance in Bangladesh is distributed through key institutions, including MFIs/NGOs and dairy cooperatives, these organizations may be able to supply livestock mortality data that can be used for rating purposes.<sup>23</sup>

<sup>22</sup> Because IDRA does not recognize microinsurance products or the services of MFIs/NGOs, MFIs could not contract excess of loss insurance on their livestock portfolio with a commercial insurer.

<sup>23</sup> As a reference, under the Grameen dairy cattle insurance program, the average livestock mortality rate was at 2.8 percent. Under the Proshika livestock insurance program for cattle (as well as sheep and goats), the average premium rate was 5.25 percent, with a 3.46 percent mortality rate and loss ratio of 68 percent.

**There are approximately 11 million dairy cattle in Bangladesh in 2015**, and according to the fiscal assumptions made for this analysis, between 5 percent and 10 percent (550,000 to 1,100,000 animals) might be insured under the dairy livestock insurance program by year 5. These assumptions will need to be reviewed and agreed to by DLS and the major potential delivery channels, including the government of Bangladesh (option 1), the MFIs and NGOs (option 2 partner agent model), and dairy cooperatives (option 3 partner agent model).

**The annual fiscal costs to be borne by the government for supporting the development of a national dairy cattle insurance program are estimated at between US\$4 million and US\$16 million in year 5**, when the program will likely have reached significant scale. This fiscal costing exercise is based on the assumption that the government will provide financial support to the scheme through 50 percent premium subsidies, as well as 100 percent subsidies to administration and operating costs (tagging and registration, preinspections, and awareness and education programs).

**Welfare impact analysis shows that dairy cattle insurance can reduce expected default rates of financial institutions' livestock lending portfolios and therefore crowd in more productive credit, especially to smallholder producers.** Ideally, insurance could unlock credit and induce smallholder producers to switch from the existing low-yielding, traditional subsistent system to an extensive or intensive system with high-value or hybrid breeds and improved inputs; smallholder producers might then be able to more than double milk productivity per dairy cow compared to local breeds and traditional dairy cattle production systems. More importantly, dairy cattle insurance could help smallholder producers to stabilize their livestock assets and to expand their herd size over time. Overall, these changes could potentially translate into a sustainable increase in income and food security among poor smallholders and could gradually move them out of poverty.

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## Fisheries/aquaculture insurance

**The Ministry of Livestock and Fisheries and Department of Fisheries have identified a need to develop suitable aquaculture insurance products for the fish-farming sector, and shrimp insurance potentially offers the most attractive entry point.** The Department of Fisheries is keen to introduce aquaculture insurance both for the 300,000 shrimp and prawn producers located in the southern coastal regions and for the 4 million or more smallholder freshwater-pond finfish producers of carp, tilapia, and catfish. A further option that might be considered in future is cover for the 60,000 artisanal in-shore fishermen who are registered with the Department of Fisheries. Shrimp production is an important source of income and employment among the dominant poor smallholder shrimp-farming households that make up 0.5 percent of the rural population<sup>24</sup>. The vast majority of shrimp producers in Bangladesh are smallholders who adopt a low-risk, low-investment strategy, with very low average annual shrimp production of about 250 kg/ha. Most shrimp producers are unwilling to invest in production because of the high risks of losses arising from tropical cyclones, storm surges, flooding, and diseases such as white spot virus disease.

**The two main shrimp insurance covers that might be developed in Bangladesh are (1) a named-peril cover for commercial shrimp producers located in Khulna Region, and (2) an all-risks cover for shrimp hatcheries located in Cox's Bazar.** Named-peril cover would help commercial shrimp producers by reducing the risk of catastrophe losses due to natural perils; it could also stimulate the transformation of the shrimp sector to a semi-intensive cultivation system through enhanced access to credit. It might also be possible to tailor an all-risk cover for shrimp hatcheries located in Cox's Bazar that included viral diseases.

**A named-peril shrimp mortality insurance policy would enable the many small-scale extensive shrimp producers to intensify their cultivation systems through modest investments in higher levels of inputs, improved technology, and better husbandry practices—and in this way to possibly double their shrimp yields.** Such a shift to a semi-intensive cultivation system would result in significant income gains.

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<sup>24</sup> According to HIES (2010), 85 percent of shrimp-producing households are smallholder producers (owning less than 2.5 acres of agricultural land). These smallholder producers are largely poor, with 30 percent poverty head count and average income of US\$1,535 per household per year.

**A series of major issues and challenges for the design and implementation of shrimp insurance in Bangladesh will need to be addressed at a later stage.** These include (1) the lack of aquaculture underwriting expertise, (2) the lack of shrimp mortality data and statistics for risk assessment and rating purposes, (3) the unknown demand for shrimp insurance cover by Bangladeshi shrimp farmers, (4) the need to identify and partner with cost-effective distribution channels for a shrimp insurance cover, (5) the need to develop accurate and cost-effective individual-farmer shrimp loss assessment systems and procedures, (6) the need to define the roles of the commercial insurers and the Government of Bangladesh/Department of Livestock Services, and (7) the need to obtain support from specialist international aquaculture reinsurers; and finally 8) skill gaps and low levels of management in artisanal small scale fisheries and aquaculture enterprises, where losses may be mainly due to poor management rather than insurable risks – management related risk is often very difficult for insurers to control.

**If the government of Bangladesh decided to explore this option, a formal risk assessment and insurance demand and contract design study would be needed.** To date it has not been possible for the World Bank Group to visit the main shrimp and prawn farming locations in Bangladesh. Further field-level research will be required to assess the issues and challenges and to determine viable shrimp insurance policy design options that will be acceptable to international reinsurers.

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## Crop insurance

### Design

**Crop production is a key source of food and income for rural Bangladeshi households, but is highly exposed to risks.** In Bangladesh, 36 percent of the population relies mainly on agriculture (BBS 2011), and crop production accounts for 30 percent of total economic income among rural households. Crop production in Bangladesh is highly exposed to catastrophic shocks,<sup>25</sup> and average annual production losses due to natural disasters account for 6.4 percent of the national crop production.<sup>26</sup> It is estimated that every five years on average net crop income available for consumption for average households could drop by up to 50 percent<sup>27</sup>. A 1-in-100-year disaster event could lead to a 23 percent loss of national paddy and wheat production.

**Given that the average farm size in Bangladesh is about one acre, the costs associated with administering individual farmer indemnity-based MPCI would be prohibitively expensive, and crop insurance should therefore be designed on an indexed basis.** In Bangladesh, 57 percent of farmers farm on a small or medium scale, while only 7 percent are large-scale farmers. Traditional indemnity-based crop insurance products include named-peril crop insurance (NPCI) and multiple peril crop insurance (MPCI); these require a loss-adjustment process in each farm to evaluate individual damages arising from one type of peril (for NPCI) or various perils (MPCI) and the costs of adjustment would be prohibitively high for small-scale farmers in Bangladesh. Crop index insurance policies are products based on an underlying index using objective variables such as average yields (for area yield index insurance) or weather variables (for weather index insurance [WII]) and do not require in-field loss adjustment making these products much more affordable to offer to offer to small-scale farmers.

**Area yield index insurance could be considered in Bangladesh for important cereal crops such as paddy, wheat, and maize.** The key feature of area yield index insurance (AYII) is that it does not indemnify crop yield losses at the individual field or grower level. Rather, an AYII product makes indemnity payments to growers according to yield loss or shortfall against an average area yield (the index) in a defined geographical area. An area yield index policy establishes an “insured yield” that is expressed as a percentage (or “coverage level”) of the historical average yield for selected crops in the defined geographical area, which forms the insured unit. If the threshold yield is lower than the insured yield, all insured farmers in the insured unit are eligible for the same rate level of yield shortfall (see figure 2).

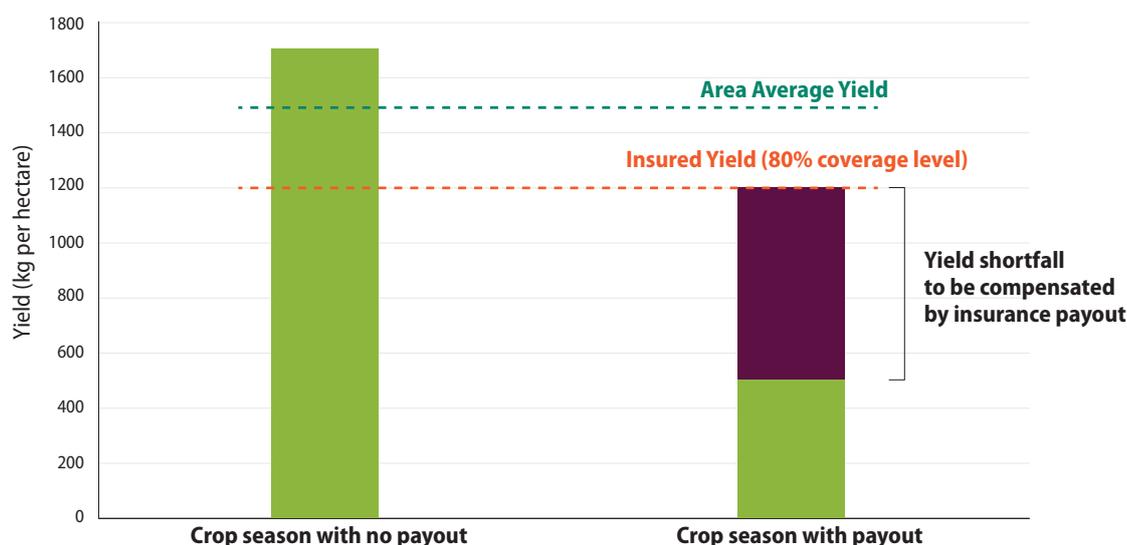
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<sup>25</sup> Shocks include (for example) tropical cyclone, flood, drought, hail, pests, and disease.

<sup>26</sup> This figure is for average production of major cereal crops over the past 29 years and is based on World Bank (2010) estimates.

<sup>27</sup> Net crop income available for consumption accounts for crop revenues minus expenses (input costs and interest rate charges excluding family labor and rental cost for own land)

**Figure 2. Coverage Level and Insurance Payouts in area yield index insurance**



**AYII could be readily designed given Bangladesh’s highly developed system of seasonal crop production and yield estimation based on sample crop cutting.** The data for AYII is usually collected through crop-cutting experiments, in which samples of crops are harvested, dried, and weighed and grain yields calculated. The Bangladesh Bureau of Statistics and the Department of Agricultural Extension have long collected and recorded crop yield data for major crops such as paddy and wheat.<sup>28</sup> AYII products could build on the existing 25 years of historical yield data for seven major crops collected at the upazila (subdistrict) level.

**Other types of index insurance product, such as weather-based index insurance, might also be feasible and are currently being piloted in Bangladesh.** Two weather index insurance initiatives are currently under design and/or pilot implementation. One of these initiatives is a micro-level individual farmer rainfall index for rice, triggered by ground-based automated weather stations, which is led by the government-owned insurance company SBC and supported by the Asian Development Bank. The other is led by Green Delta, a private sector company, and supported by the World Bank Group. Weather index-based products usually cover a limited number of weather perils (e.g., rainfall deficit or excess rainfall, high or low temperatures), and are often significantly exposed to basis risk.

**If the government of Bangladesh decided to develop indexed insurance products, a partnership between public and private sector stakeholders would be needed to ensure that high-quality data were collected and audited.** High-quality data are necessary to ensure that insurance products reliably trigger payouts when needed, but also to manage the costs of crop insurance premiums. Indeed, reinsurance companies—which help off-load some covariate risk outside the country—have high standards for the data they are willing to use to develop and price insurance products, and will charge significantly higher premiums if they have concerns about how the data are audited. It is therefore important that agriculture data be audited through a transparent process. Both AYII and WII require reliable historical data for product design and rating. This is an area in which financial and logistical support from the government can help the private sector overcome the challenges related to providing insurance in the inception phase. Such support can include for instance conducting and auditing of crop cutting experiments, investments in weather stations or remote sensing data, and management of data on a centralized database.

## Distribution

**International experience suggests that crop insurance is typically distributed alongside agricultural credit, and this approach also seems to be an attractive option in Bangladesh.** In most agricultural insurance programs that have reached scale, insurance is sold as part of a broader package,

<sup>28</sup> Such data are not, however, available for cash crops, horticulture, and minor crops.

for instance with credit (as in India and Mexico) or together with agriculture inputs (as in Kenya and Rwanda).

**This approach would increase the cost of agricultural credit for some farmers, but decrease the cost for others, whilst also increasing financial protection.** For farmers who already have access to formal credit, mandatory bundles would increase the cost of access to credit. For farmers currently rationed out of the market, however, the overall cost of access to credit would be reduced.

**In some countries, ministries or central banks make agriculture insurance mandatory for government-supported agriculture credit; the aim is to secure agriculture lending and allow for the rapid scale-up of insurance.** This is the case in Mexico, where bundling of credit with insurance is mandatory for credit institutions that receive public support, and where 300,000 farmers are covered. This is also the case in India, where 33 million crop policies were issued in 2014, equivalent to 20 percent of farming households. A 2008 World Bank survey of 65 countries found that agricultural insurance is compulsory for crop and livestock borrowers in 11 percent of countries (Mahul and Stutley 2010).

**The decision to make crop insurance mandatory, however, would need to be considered carefully, given the cost and potential risks.** In countries where the government has made crop insurance mandatory, financial institutions and farmers can sometimes have limited ability to influence product design, leading to products that are compulsory but not appropriate. In addition, mandatory bundles raise customer protection issues, since customers might purchase an insurance product without fully understanding it or without even being fully aware that they have done so. On the flip side, where agriculture insurance is voluntary, scaling up of crop insurance can be slow and subject to adverse selection risk, and this can result in loss of appetite from insurers.

**The decision to make crop insurance mandatory and the decision to make it voluntary are not mutually exclusive, as compulsory basic catastrophic coverage could be complemented by voluntary products.** Indeed, the government might decide to make agriculture insurance mandatory for government-supported agriculture credit for low-frequency and high-severity events, while supporting the development of voluntary agriculture insurance for more frequent events.

**Premium subsidies are widely used by other governments to support crop insurance markets, and can be a useful policy instrument but need to be used carefully.** Premium subsidies can reduce the cost of insurance to the farmer, and thereby increase use of insurance, particularly for more vulnerable farmers and herders; and it can help insurance companies develop a minimum sustainable market size. However, if not used carefully, subsidies can distort price signals and provide inappropriate incentives to farmers (that is, can encourage them to take more risks or continue engaging in risky activities). Any subsidies to crop insurance should be designed with a clearly stated and well-documented policy objective, and should be designed to address a market failure or equity concern.

### **Costs and impact**

**The accompanying technical report presents an analysis of the potential costs and benefits of AYII for two varieties of paddy: aman and boro.** Paddy is the most important staple food crop grown in Bangladesh and accounts for 83 percent of crop income for rural households (BBS 2014).

**Annual fiscal costs to be borne by the government for supporting the development of a national AYII program for aman and boro paddy are estimated at between US\$6 million and US\$9 million by year 5 (assumed full-scale implementation), when about 10 percent of the area cultivated with aman and boro paddy would be insured.** This fiscal costing exercise is based on the assumption that the government will provide financial support to the AYII scheme through 50 percent premium subsidies as well as investment in data market infrastructure and support to awareness-raising activities. As a reference, this amounts to about 0.05 percent of the government of Bangladesh's 2014 budget, and 1 percent of the Ministry of Agriculture's budget for the same year.<sup>29</sup>

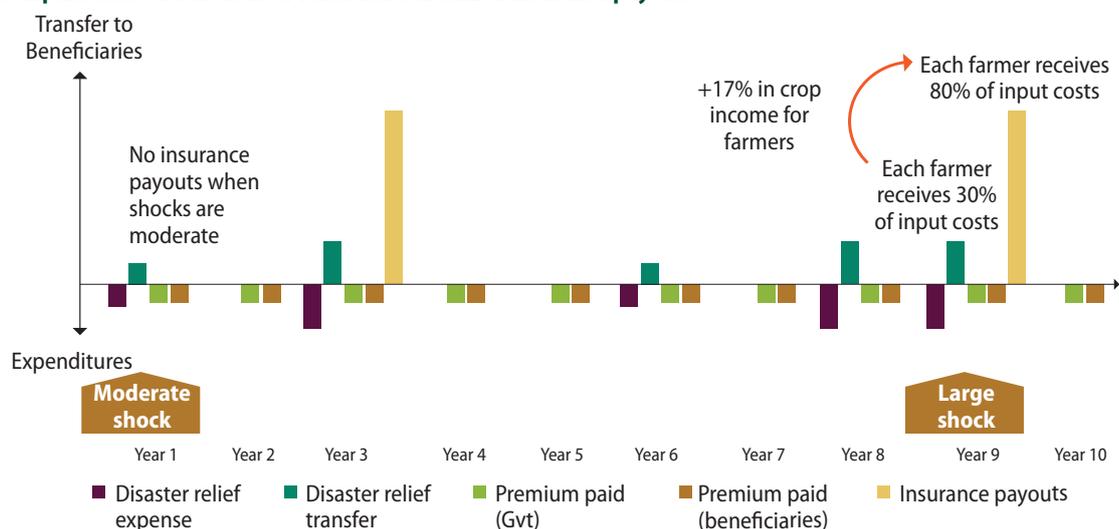
<sup>29</sup> The government of Bangladesh's 2014 budget is about US\$32 billion, and the Ministry of Agriculture's budget is about US\$1.5 billion.

**Welfare impact analysis shows that commercial insurance could help small- and medium-scale farmers stabilize and increase their crop income by up to 41 percent if insurance unlocks credit and adoption of high-yielding varieties.** Indeed, if farmers currently growing aman local or boro HYV<sup>30</sup> switched to higher-yielding varieties (aman HYV or boro hybrid respectively), the increase in expected yield would largely compensate for the increase in input costs.<sup>31</sup> Given that AYII could increase loan repayment by up to 35 percent in bad (1-in 10) years,<sup>32</sup> insurance could unlock these productive investments through enhanced access to cheaper credit. For large-scale farmers, the impact of AYII on access to credit and adoption of technologies would be more moderate.

**Subsidized AYII could also result in a 100 percent increase in small- and medium-scale farmers' crop income in bad (1-in-10) years, compared to pure disaster relief.**<sup>33</sup> This positive impact of insurance can be explained by two combined effects. On the one hand, AYII can crowd in credit and adoption of high-yielding varieties, thus increasing crop income in bad years by 83 percent.<sup>34</sup> On the other hand, insurance can mobilize larger compensation to farmers following catastrophic shocks than can existing disaster relief programs,<sup>35</sup> thus increasing crop income by 17 percent in bad years relative to disaster relief program (see figure 3).

**Figure 3.** Illustrative Comparison of Disaster Relief and 50 percent Subsidized AYII across Years with Different Levels of Shocks

**Comparison between disaster relief and subsidized insurance payouts**



Note: The figure shows ad hoc disaster relief expenditures and associated transfers in dark blue. Regular and fixed expenses for premium subsidy coupled with regular contributions from farmers are displayed in red. Insurance payouts, shown in light blue, are not triggered following moderate shocks (see year 1), but are very large following large shocks (see year 9).

30 These farmers account respectively for 13 percent and 94 percent of total farmers.

31 For more details, see the accompanying document *Bangladesh: Agricultural Insurance Solutions Appraisal*. The increase in expected yield would be 85–94 percent for aman and 31–32 percent for boro. The increase in input costs would be 21 percent for aman and 31 percent for boro. This result is based on an economic model and simulations that consider average farmers from each of the four farm-size groups (marginal, small, medium, and large) that are representative for two key rice-growing areas (with high- and medium-potential rice production) occupying 79 percent of all rice-growing areas of the country.

32 More precisely, repayment would increase by 16–35 percent. This result was obtained from the simulated loan repayment rates with the working assumption that a household will try to pay back its loan to the extent possible after meeting subsistent consumption set at 50–80 percent of the food poverty line.

33 This result is based on the assumption that the same expected amount in government expenditures is used for subsidized AYII and disaster relief, and that insurance crowds in credit and technology adoption.

34 In average years, this crowding-in effect also results in up to a 65 percent increase in crop income.

35 This result uses empirical evidence to model existing post-disaster relief programs for farmers that include (1) food aid under a vulnerable group feeding or gratuitous program and (2) input supports. This result holds despite the fact that the observed delay and unreliability of ex post disaster relief is not taken into account in the model.

## Fully Subsidized Insurance for Particularly Vulnerable Households

**The government might consider offering fully subsidized insurance to particularly vulnerable farmers who cannot afford to purchase insurance.** Extreme poverty remains prevalent in Bangladesh and is exacerbated by climate hazards. Indeed, 26 million people (or about 16 percent of the population) live below the extreme poverty line, and 83 million are poor; only two other countries, India and China, count more poor people among their populations.<sup>36</sup> For the most vulnerable households, subsidized insurance may offer a cost-effective alternative to traditional ex post disaster relief.

**An NGO is currently piloting such an approach for particularly vulnerable farmers and landless wage laborers.** Oxfam GB's flood index insurance initiative for Bangladesh offers catastrophe flood risk insurance to very poor rural households (including landless households) in river flood-prone areas in 14 villages in Sirajganj District. This pilot project offers a meso-level cover to a local microfinance institution, Manab Mukti Sangathi, and the beneficiaries are low-income vulnerable households in the selected villages—mainly women-headed landless households living in char areas of the River Jamuna whose main source of income and livelihood is agricultural labor. The Oxfam meso-level flood index cover is a business interruption policy that makes payouts according to the duration of flooding in each defined flood risk zone. This initiative started in 2013 in Sirajganj District and covers about 1,700 poor households. The feasibility of scaling up this initiative in other flood-prone areas of Bangladesh is currently being analyzed.

**Using fully subsidized insurance mechanisms to protect farmers quickly at the onset of a disaster could allow the government of Bangladesh to complement the humanitarian system with timely, efficient, and targeted payouts.** Bangladesh should consider using rules-based insurance principles to trigger contingent disaster-linked social protection mechanisms, such as an index-based social protection coverage for the most vulnerable. This could be a cost-effective ex ante risk management strategy that enables rapid, transparent, and accountable responses to shocks by rapidly disbursing financial assistance to affected households immediately after a disaster such as flood. Disaster-linked social protection programs could help fill the short-term post-disaster funding gap and complement the humanitarian system by providing funds immediately while additional assistance is sourced.<sup>37</sup> Such early and preventive resources can provide immediate support to affected households while post-disaster relief by the government and local and international partners is being mobilized.

**Using this pilot program as a reference, the total costs for scaling up the flood index insurance program to cover 30,000 particularly vulnerable households in flood-prone river valley areas of Bangladesh over the next two years is estimated at Tk 128 million (US\$1.6 million), or an average of about US\$55 per beneficiary.** The budgeted costs include product research and development, legal and regulatory expenses, capacity building and education and training, project implementation, and most importantly the costs of full premium financing.

**Using well-targeted, fully subsidized flood index insurance to scale up protection for the poor and vulnerable bottom 50 percent of char populations could reduce long-term welfare impacts of catastrophic floods, and so result in a 5 percent reduction in the averaged long-term poverty rate relative to existing social protection programs with the same expected budget.**<sup>38</sup>

<sup>36</sup> India has 613 million poor and China has 162 million.

<sup>37</sup> Kenya's Hunger Safety Net Program is an example of a social protection program that is being expanded into a disaster-linked social protection program. It provides unconditional cash transfers using biometric smart cards to 100,000 of the most chronically food-insecure households.

<sup>38</sup> Existing social protection considered in this analysis includes a combination of (1) regular (cash or food) transfer to the poorest 20 percent to allow beneficiaries to afford minimum consumption at the food poverty line, (2) a disaster response program with a fixed annual contingent budget targeted to the poorest 50 percent affected by disasters (e.g., gratuitous relief program, vulnerable feeding program), and (3) appeal-based humanitarian response arriving one period later following the disaster. The 100 percent subsidized flood index insurance program being considered would complement the existing disaster response program by preventing households from resorting to distress sales and other coping mechanisms as well as complementing the lagged appeal-based humanitarian response and existing transfer to the poorest 20 percent. The insurance program makes payout to the targeted 50 percent poorest population affected by severe floods based on the village-level flood index to compensate for up to four months of wage losses.

This potential long-term impact occurs because flood index insurance can mobilize larger financial resources to targeted beneficiaries in time of catastrophic floods than can existing disaster response with a fixed contingent budget, which is stretched thinner as the number of beneficiaries grows, especially during bad years. Flood index insurance thus can ensure the timely delivery of resources adequate for meeting the minimum consumption needs of affected beneficiaries (while more humanitarian budget is sourced). Hence it tends to reduce destructive coping strategies, e.g., selling assets or reducing consumption, all of which could harm long-term asset and human capital accumulation. Relative to existing social protection programs, an approach that scales social protection with flood index insurance could result in a 3.5 percent reduction in the probability of falling into destitution<sup>39</sup> and a 3.8 percent reduction in the probability of falling into severe malnutrition with long-term productivity losses.<sup>40</sup>

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39 The long-term average poverty rate is calculated based on the 50-year headcount ratio (using upper poverty line). A household is considered as falling into destitution when household assets drop to or below zero for five consecutive years.

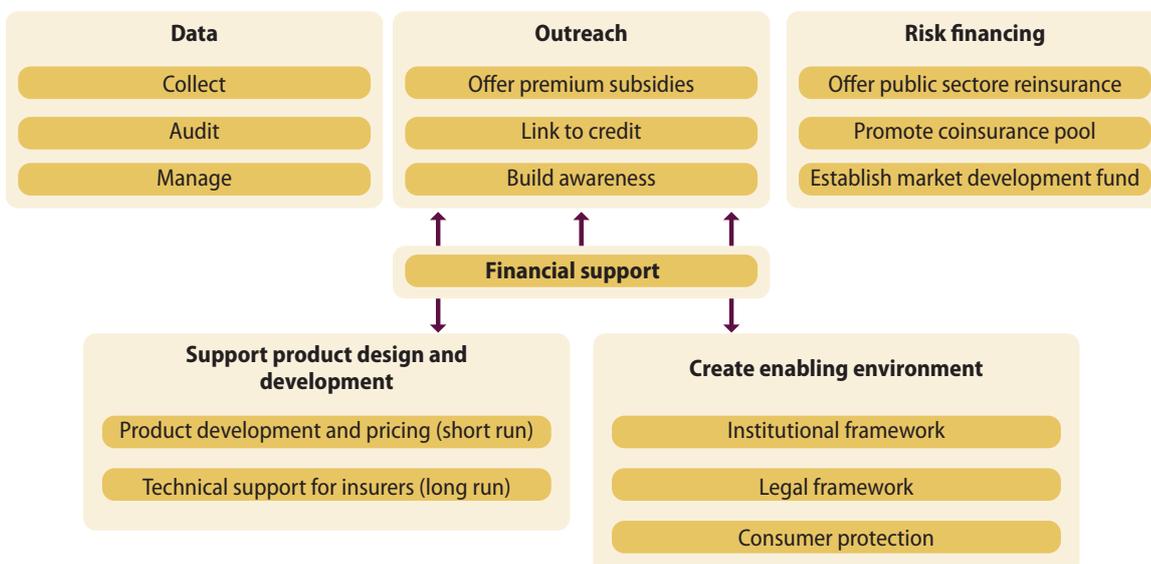
40 Especially in children, malnutrition can cause irreversible damage to health and cognitive ability, which in turn affects long-term productivity. The relevant literature finds that especially in children under two, malnutrition could carry a long-run cost estimated at 14 percent of lifetime earnings.



# Potential Roles for Government of Bangladesh in Promoting Crop, Livestock, and Fisheries Insurance

International experience shows that in order for agricultural insurance programs to develop, both private sector and public sector support are critical. Governments can support the development of agricultural insurance through investments in reliable data. This includes for instance conducting and auditing of crop cutting experiments, investments in weather stations, registering, tagging, and vaccination of dairy cows and management of data on a centralized database. In addition, Governments can also support appropriate outreach to potential policyholders, risk financing of the catastrophic layer of reinsurance, support for the design of appropriate insurance products, and establishment and implementation of an enabling legal and regulatory environment (see figure 4). Few functions belong exclusively to the public sector or exclusively to the private sector. Most may be considered to be shared functions. For example, both the public sector and private sector have separate functions in relation to data, marketing and outreach, and risk financing.

**Figure 4. Government Roles in Agricultural Insurance**





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**The fiscal costing analysis is based on the assumption that the government of Bangladesh would support the development of agricultural insurance through both direct premium subsidies and investments in data market infrastructure, and assumes that there would be complementary investments in strengthening regulatory and supervisory capacity.** The expectation is that the government would offer direct premiums subsidies (e.g., 50 percent subsidized crop insurance, or 100 percent subsidized insurance for the most vulnerable) and also invest in broader market-enhancing subsidies (e.g., tagging, registration, pre-inspection of dairy cattle, crop-cutting experiments for paddy, investments in awareness creation and education). Table 1 (See Policy Options Section) provides a summary of the fiscal costs of suggested policy options.

# Moving Forward

**If the Government of Bangladesh decides to go ahead with support for agriculture insurance, high-level buy-in from a broad range of stakeholders will be necessary, as will partnerships with insurers.** On the one hand, the government will have to facilitate establishment of an appropriate legal and regulatory framework addressing market and regulatory imperfections, and on the other, it will need to create necessary insurance infrastructure, particularly in the start-up phases of new private commercial agricultural insurance programs. Thus, it would be important for any public support to agricultural insurance to be part of government's overall agricultural policy, which would seek to correct market and regulatory inefficiencies and support government's broader objectives.

**Agricultural insurance is at the intersection of various policy areas and will need to be integrated with financial sector development policy in particular (figure 5).** By protecting the farmer and their bank, agricultural insurance can support resilient agricultural credit markets. It is also one tool that can be used by farmers as part of a comprehensive strategy for agricultural risk management. As an alternative to ad-hoc ex-post disaster expenditures, agricultural insurance can contribute to lower budget volatility for government, and enhanced public financial resources for funding disaster relief. Regarding social protection, fully subsidized insurance can help support particularly vulnerable farmers, and partially subsidized insurance can be viewed as a form of contributory social protection.

**Figure 5. Agricultural Risk Financing and Insurance at the Intersection of Different Policy Areas**



Source: GFDRR 2012; World Bank—GFDRR Disaster Risk Financing and Insurance program 2014.

**If agriculture insurance programs were to be developed in Bangladesh, the following next steps could be considered.**

**The overall legal, regulatory, and supervisory insurance environment would require strengthening.** Created four years ago with only 45 staff and low actuarial expertise, the Insurance Development and Regulatory Authority of Bangladesh (IDRA) faces capacity constraints in supervising the country's 77 insurance companies. Potential World Bank Group support for strengthening the capacity of IDRA and government-owned insurance companies is currently being explored. The government would

need to develop the current legal and regulatory framework so that the framework allows for the development of both traditional indemnity-based and innovative agricultural insurance products, such as index-based insurance, whilst crowding in insurance and reinsurance companies, and protecting farmers against potential insurers' malpractice (for example, nonpayment of valid claims).

**A centralized database of agricultural statistics for the agricultural insurance practitioners would be essential for developing a market for agricultural insurance in Bangladesh.** Time-series data and information on crop yields and/or climate are necessary for the design and rating of crop insurance products and the government may consider setting up such a database at IDRA and providing all insurers with access to this database.

**There may be a need for technical assistance in the design and implementation of agricultural insurance products.** Among the major start-up costs for any new crop or livestock insurance program is the design (including the design of loss assessment procedures) and rating of new products, and then in the pilot testing of the new products and programs. Such costs may be prohibitive for individual private commercial insurers, especially in developing countries. In such situations there is justification for government to provide financial support to product design and rating, especially where the products and rates are then made available to all interested insurers. Such a need applies specifically to Bangladesh, where there is very little experience in the design and rating of crop and livestock insurance programs, and thus technical assistance would be required to enable Bangladeshi insurers, MFIs, and their partners to develop agricultural risk-assessment methodology; develop rate-making methodology; develop crop and livestock products; develop loss-adjustment procedures; train underwriters and sales agents; train field assessors and loss adjusters; and to educate farmers and livestock producers on the role and functions and benefits of risk transfer/insurance.

**Financial support from Government would be required, particularly in the early stages of the program, but such support can be designed to be better targeted, and with lower leakages, than many other types of subsidy due to the auditability of the financial system.** The government would need to carefully analyze the fiscal implications of government sponsored agricultural insurance programs as suggested in this report (table 1), including medium and long term sustainability. The provision and structuring of subsidies on agricultural insurance premiums should be carefully considered. Without premium subsidies in the initial years it would be challenging to reach many farmers but, if they are structured inappropriately subsidies can distort price signals and provide poor incentives to farmers and herders to invest in risk reduction. Some countries justify public subsidies as a way to correct market imperfections in the insurance sector, and as a planned alternative to post-disaster relief. Often governments of the developing countries, e.g. India, Mongolia, China, Mexico design their sponsored agricultural insurance programs with technical support of and financial assistance from donor agencies, and the World Bank has already supported a number of countries in this regard.

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**A dedicated technical support unit would ideally be created within government with responsibility for implementation and for providing input to policy.** In the start-up situation, where market infrastructure is not yet developed, the government may consider establishing a technical support unit to provide specialized services/technical assistance to agricultural insurance companies and other risk-pooling vehicles. This unit should have support from the government, insurers, and reinsurers. It could be a stand-alone entity, or hosted by government, for example by IDRA or SBC. The goals of the technical support unit would include the following: (i) create a center of expertise able to support the development and scaling up of agricultural insurance; (ii) establish a core team of agricultural insurance experts to provide technical support to agricultural insurers in underwriting, product development, pricing, product delivery, loss adjustment, catastrophe risk financing, and so forth; (iii) create and manage a centralized database of agricultural and weather statistics, and make the database available to agricultural insurance practitioners; and (iv) promote the exchange of expertise among insurance companies and access to international best practice through training courses, operations manuals, and other means.

**To partner with insurers to prepare and implement a large-scale agricultural insurance program, it is recommended that a series of stakeholder workshop are organized to review the findings and of the World Bank Studies including:** this Policy Note; the Agricultural Insurance Situation Analysis Report; and the Agricultural Insurance Solutions Appraisal Report. Such workshop would include key stakeholders both on the public sector side (e.g. IDRA, Bangladesh Bank, Ministry of Finance, Ministry of Agriculture, public banks and insurance companies) as well as on the private sector side (e.g. insurance companies, financial institutions etc.). This workshop could help select agricultural insurance priorities and identify key areas for Government of Bangladesh to support.

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## References

- Air Worldwide and ADPC (Asian Disaster Preparedness Center). 2014. "ADB Bangladesh Capacity Building for Disaster Risk Finance Project."
- Barnett, Barry J., Christopher B. Barrett, and Jerry R. Skees. 2008. "Poverty Traps and Index-Based Risk Transfer Products." *World Development* 36, no. 10: 1766–85. doi:10.1016/j.worlddev.2007.10.016
- BBS (Bangladesh Bureau of Statistics). 2011. *Report of the Household Income and Expenditure Survey 2010*. <http://203.112.218.66/PageWebMenuContent.aspx?MenuKey=320>.
- \_\_\_\_\_. 2014. *Report on Rural Credit Survey 2014*. [http://www.bbs.gov.bd/webtestapplication/userfiles/Image/LatestReports/RCS\\_2014.pdf](http://www.bbs.gov.bd/webtestapplication/userfiles/Image/LatestReports/RCS_2014.pdf).
- Mahul, Olivier, and Charles J. Stutley. 2010. *Government Support to Agricultural Insurance*. (Washington, DC: World Bank).
- World Risk Report 2014, United Nations University

