RESEARCH BRIEF ON

RISK MINIMIZATION IN LIVESTOCK FARMS IN BANGLADESH: AN APPROACH TO LIVESTOCK INSURANCE

Livestock production has emerged as a thrust sector not only as a source of nutrition but also as a strategy for poverty alleviation and employment creation. In Bangladesh, it contributes around 1.9 % of GDP. It is well documented that livestock, particularly cattle and goats, are major investments for the microcredit borrowers in Bangladesh. PKSF has been instrumental in developing home based family livestock enterprises as a profitable investment with positive impacts on employment, capital accumulation, financial health and nutrition. It has promoted investment in livestock through microfinance borrowers. But risks in livestock production remain. Relatively high mortality rate and higher individual exposure to risks make livestock farms more vulnerable.

PKSF has addressed the issue of risk through a concerted approach. In addition to collecting information through implementing different livestock projects, PKSF has established "Integrated Agriculture Unit" and 'Risk Mitigation Unit'. Offering livestock Risk Mitigation services and enhancing extension and technical services are important for managing risks at the farm level. PKSF has been promoting livestock sector at the household level through risk minimising insurance mechanism and better production technology based on good farm practices.

In 2017, PKSF launched a study* on 'Feasibility of Livestock Insurance in Bangladesh' with financial assistance of Swiss Agency for Development and Cooperation (SDC). The core goal of this study was to develop livestock sector through reducing both ex-ante and ex-post risks. Ex-ante risk minimization approach requires preventive measures. On the other hand, ex-post risk reduction approach requires insurance mechanism. Therefore, the study focused on (i) estimating mortality and morbidity rates of different types of livestock; (ii) developing premium based insurance products; (iii) ascertaining willingness of the borrowers to subscribe livestock insurance; and (iv) identify elements of best practices for promoting and developing livestock farms through reducing ex-ante risks. This research brief is drawn from the above study.

DATA AND RESEARCH METHODS

The study was conducted in 248 selected villages in 64 unions of 24 districts representing all the divisions. Data of some 30-35 livestock from each village were collected. The livestock farm households having (i) cattle regardless of size, or (ii) goats and sheep with minimum of 6; or (iii) poultry with minimum of 50 birds were selected. The farms with commercial approach were considered in the selection process from the insurance perspective. Table-1 presents total sample insurable population.

Livestock type	2016	2015	Aggregate
Cattle	21,340	17,491	38,831
Goats and sheep	8,672	5,290	13,962
Poultry	1,339,417	1,050,109	2,389,526

Table-1: Total Insurable Livestock population under the study

*The study was conducted by a research team comprising Dr. M. A. Baqui Khalily, Dr. Syed A. Hamid, Dr. Shubhasish Barua and Dr. Sharif A. Chowdhury in collaboration with Chowdhury Abdullah-Al-Asif and Ali Yusuf Hossain.

Data on livestock for 2015 and 2016 were collected from the same farm households. Risks for the livestock of different types were measured by mortality and morbidity rates.

The findings of the 2017 study were absolutely focused on livestock insurance and best farm practices. However, there were limited information and analysis on the following issues: the role of women in livestock production and the role of persons with disabilities (PWD) in livestock rearing. Moreover, the COVID-19 pandemic also affected the livestock sector. Considering the above issues, SDC and PKSF decided to update the 2017 study with a new survey to understand the role of women and the role of persons with disabilities (PWD) in livestock rearing and to examine the effects of COVID-19 on livestock sector, per incidence treatment and death cost. A small-scale survey was conducted in 2022 covering a total of 204 households located in 24 villages from 9 districts.

MEASUREMENT OF MORTALITY AND MORBIDITY RATE

Both mortality and morbidity rates were assessed separately for each year and also at the aggregate level for each type of livestock. The aggregate level estimation of mortality or morbidity rate gives average annual rate. Mortality rate is the percentage of deceased livestock in relation to total livestock population. Similarly, morbidity rate is the percentage of livestock fell sick in relation to total livestock. The formula for estimating mortality or morbidity Rate is measured (probability) as:

$$MR_{it} = \frac{\Sigma DL_{ijt}}{\Sigma(LS_{ijt-1} + LB_{ijt})}$$

where, t is 2015 or 2016 or aggregate; i refer to ith type of livestock in j area at time t. MR refers to mortality or morbidity rate of ith type of livestock. DL is number of livestock dead or suffered from diseases. LS represent stock of number of livestock at time t-1; and LB is number of newborn livestock. In case of poultry, it is number of chicks purchased in t year. Assessing mortality and morbidity rates required information on total livestock population and number of dead livestock or number of livestock suffered from different diseases.

MORTALITY RATE OF LIVESTOCK

Livestock sector has flourished probably because of low mortality rate. A robust estimation requires large data set. The total insurable livestock population under the study, as reported in Table-1, is sufficiently large enough to call the estimated mortality rate as robust. Using this population, mortality rate was measured (Figure-1).

As expected, mortality rate of cattle and buffalo was lowest. An annual average rate of 1.76 suggests that on an average, out of 100 cattle, only 1.76 cattle are deceased. Highest mortality is found for goats and poultry. In both the cases of goats and poultry, average mortality rate was above 3.00 %. However, the rate shows a marginal increase in 2016 from the

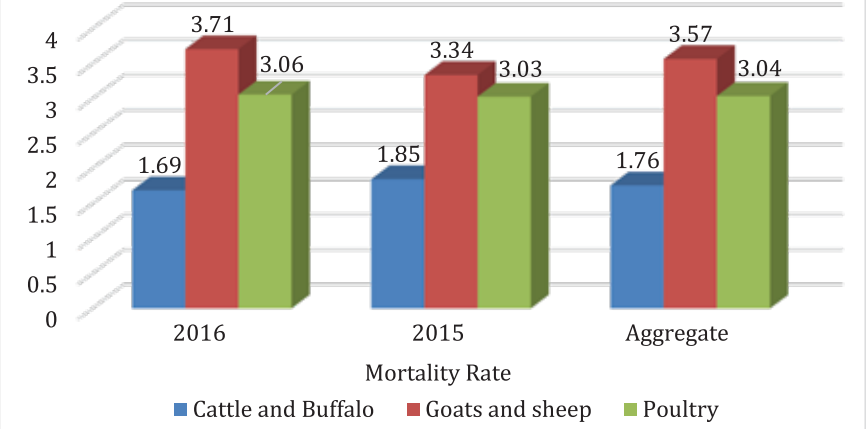
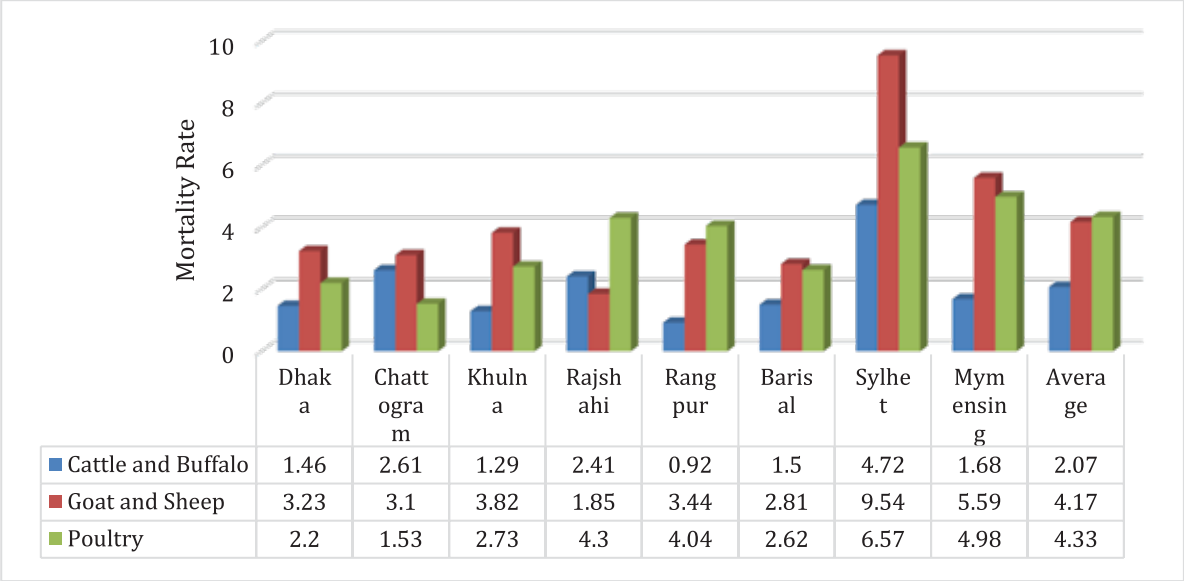


Figure 1: Mortality Rate of Livestock by Type and Year

2015 level. Exception is the mortality of cattle and buffalo that has declined in 2016 from the 2015 level. But from the policy perspective, the question of 'does it vary by region, age or farm size" needs to be examined.

MORTALITY RATE BY REGION

Mortality rate does vary by region and livestock type (Figure-2). Aggregate mortality rate for cattle and buffalo was lowest (0.92 %) in Rangpur, and maximum of 4.72 % in Sylhet with a division level average rate of 2.07 %. The average division level rates for goat and poultry, however, are twice the mortality rate of cattle.



	Dhaka	Chattogram	Khulna	Rajshahi	Rangpur	Barisal	Sylhet	Mymensing	Average
Cattle and Buffalo	1.46	2.61	1.29	2.41	0.92	1.5	4.72	1.68	2.07
Goat and Sheep	3.23	3.1	3.82	1.85	3.44	2.81	9.54	5.59	4.17
Poultry	2.2	1.53	2.73	4.3	4.04	2.62	6.57	4.98	4.33

Figure 2: Mortality Rate of Livestock by Type and Division

The mortality rate for goats was lowest (1.85 %) in Rajshahi, and maximum of 9.54 % in Sylhet. It was relatively highest for poultry with minimum value of 1.53 % in Chittagong and maximum value of 6.57 % in Sylhet. In general, Sylhet experiences highest mortality rates for livestock. But why the rate varies by region? The analysis showed that regional characteristics including climate and topographical conditions explain variation in mortality rates.

MORTALITY RATE BY FARM SIZE

Mortality rate varies by farm size. Such variation may capture effects of different factors like management and scale economy. Table-2 reports mortality rate by farm size.

Farm Size	Cattle and Buffalo[a]	Goat and Sheep[b]	Poultry[c]
Small	1.23	-	6.15
Medium	1.58	3.02	7.31
Large	3.10	3.65	3.03

Table-2: Mortality Rate by Farm Size

[a] Cattle and buffalo size: small: 1-3; medium: 4-9; large: 10+.

[b] Goat and sheep size: medium: 6-10; large: >10. The study did not consider small farm size of less than six as commercially viable. Therefore, it was not reported in the above table.

[c] Poultry size: small: 50-200; medium 201-500; large: 501+

Mortality rate for cattle and buffalo increases with size; lowest for small farms and highest for large farms. This is probably because of the fact that small cattle farm is operated and managed more by family. More professional approach is likely to be adopted in medium and large farms. The same trend was also estimated for goat and sheep. The inverted-U relationship was observed for poultry farms. However, the rate was lowest (3.02 %) for large farm of poultry. That means, households with more than 500 chicken birds will experience lower mortality rate. This is quite expected because of the economies of scale. The results suggest that small and medium size farms for cattle and goats, and large farm for poultry (with size of more than 500 birds) can be risk-minimizing target groups for insurance,

MORTALITY RATE BY GENDER OF LIVESTOCK

The study found that the mortality rates vary by region and type of livestock. But this may be influenced by the gender and age of the livestock. This issue was examined in the study. The results are reported in Table-3.

Type of Livestock	Male	Female
Cattle	2.23	1.58
Buffalo	3.69	2.44
Cow fattening	1.00	-
Goats	3.68	3.52
Sheep	5.68	4.43
Poultry		
Layer Chicken	-	3.22
Layer baby chick	-	2.41
Broiler Chicken	3.77	-
Broiler baby chick	2.97	-

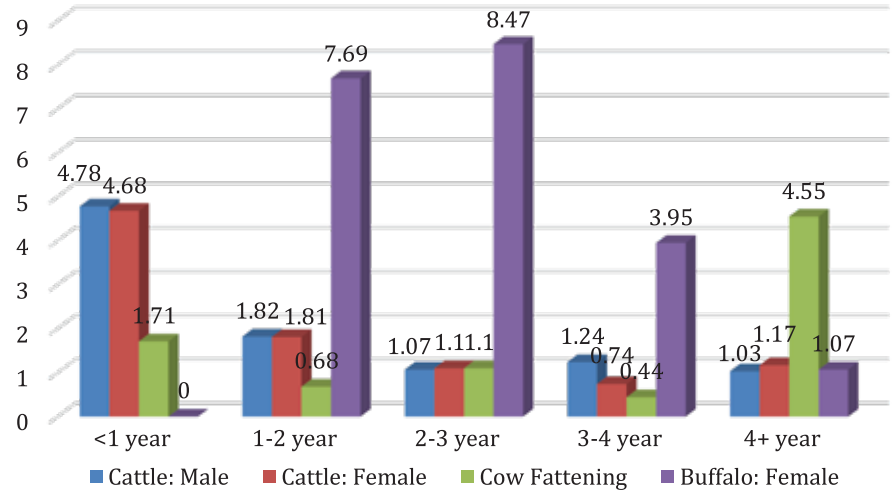
Table-3: Mortality Rate of Livestock by Type and Gender

The above table suggests that mortality rates vary by gender and livestock type. In case of cow and buffalo, mortality rate of female was lower than that of male group. However, it was lower for male goats and sheep. In the case of poultry, the study showed that mortality rate of chicks was lower than the broiler or layer chicken. The broiler and layer chicks have mortality rate of less than 3%, but it is above three percent for broiler chicken (3.77 %) and layer chicken (3.22 %). This group of chicken includes pullet chicken also. All these facts provide the basic information that cattle have the lowest mortality rate and it varies by gender.

MORTALITY BY AGE

The findings as noted above, generally also hold when mortality rate by age was estimated. But because of different age distribution of different types of livestock, mortality rates of different groups of livestock are reported separately.

Mortality rate of cattle by age is presented in Figure-3. Generally, the rate decreases with an increase in age. However, estimates of probability of cattle mortality, as reported in column six, suggest that cattle with age of less than one and



Note: *** implies significant at 1 percent level; ** implies at 5 percent level.

Figure 3 : Mortality Rate of Cattle by Gender and Age

more than four years have higher mortality rate. Lower mortality rate is noted for cattle in the age group of 1 and 4 years.

The story is quite similar for goats (Table-4). The rate decreases with increasing age of goats at a decreasing rate. This suggests that there is a tendency for higher mortality for older goats. It is also reflected in probability of goat mortality in percent in column four. Mortality rate of goats above the age of 36 months is expected to be higher with a rate of 6.64 %.

The story of poultry is little different as it has multi-stages (Table-5). In the first stage, it is newborn chicks, either to be raised as layer chicken or as broiler chicken. In the second stage, growing chicks are called pullet. From pullet, it enters the phase of layer chicken or broiler chicken. Broiler chickens are sold in the market. Layer chickens lay eggs and continue to do so, generally till the age of 52 weeks. Older layer chickens are sold generally in the market after 52 weeks. In the first stage, the newborn chicks have higher mortality rate, as expected. The rate increases for the 6-10 weeks old chicks (often called as pullet). It was highest for the layer chicken after 52 weeks.

Age	Goat: Male	Goat: Female	Marginal Probability of Goat Mortality (percent)
<6 months	6.63	5.96	12.2***
6-12	3.17	4.12	7.50***
12-24	2.16	4.47	5.28***
24-36	1.51	2.46	4.44**
>36	1.48	2.12	6.64***

Note: *** implies significant at 1 percent level.

Table-4: Mortality Rate of Goats by Gender and Age

Age (weeks)	Layer Chicken	Broiler Chicken
1-2	2.77	2.83
2-3	1.45	5.20
3-4	2.62	3.10
4-5	3.12	2.85
5-6	1.74	3.49
6-8	0.69	4.09
6-10	5.20	9.53
10-20	5.71	-
20-52	1.68	-
>52	6.91	-

Table-5: Mortality Rate of Poultry by gender and Age

All these results on the risk-distribution by age and other parameters do provide information estimating premium for introducing livestock insurance.

ROLE OF MFIS AND TRAINING IN LIVESTOCK MORTALITY RATE

MFIs may have played a key role in livestock development. In the survey, it was found that almost fifty percent of the households had access to micro finance services. MFIs provide loans particularly cattle and beef fattening. Not only they provide finance, they are also instrumental in providing training. Similarly, with increasing awareness, livestock farms have arranged training for their employees and family members involved in management. PKSF has significantly contributed to livestock sector development through their PLDP I and II and DIISP, in addition to normal financing for livestock. Therefore, the study evaluated the role of MFIs and training as indicators for risk minimizing (Table-6).

MFI Membership	Cattle: Aggregate	Goats and Sheep	Poultry
No MFI membership	2.06	3.52	3.27
Have MFI membership	1.43	3.62	2.80
No training	1.49	3.44	-
Received Training	3.49	6.63	-

Table-6: Mortality Rate by MFI Membershipand Access to Training

The results show that mortality rate of the cattle farms with membership of MFIs is lowest (1.43 %) compared to that of non-membership. The pattern also holds for poultry. However, no direct evidence was found for training. This may have been captured by MFI memberships and other extraneous variables like environment. However, training is more likely to have impact on reducing morbidity of the livestock.

RISKS IN LIVESTOCK: MORBIDITY

Mortality rate is an outcome of morbidity. Livestock are exposed to different diseases that may contribute to mortality rate. Morbidity rate is higher than the mortality rate. But what is important is the ratio of mortality and morbidity. This may be treated as vulnerability in the context of access to veterinary and other services. It may also indirectly capture inability of the households to manage diseases and livestock, in general.

Division	Morbidity Rate: Cattle	Cattle Mortality-Morbidity Ratio (%)	Morbidity Rate: Goats	Goat mortality-Morbidity Ratio (%)	Morbidity Rate: Poultry	Poultry Mortality-Morbidity Ratio (Rate)
National	12.71	13.85	9.47	37.69	9.51	31.97
Dhaka	14.75	9.9	7.01	46.08	14.6	15.07
Chattogram	13.78	18.94	13.09	23.68	4.35	35.17
Khulna	11.47	11.25	8.96	42.63	4.63	58.96
Rajshahi	10.7	22.52	9	20.56	7.27	59.15
Rangpur	9.85	9.34	8.67	39.68	8.17	49.45
Barisal	17.51	8.57	8.71	32.36	5.37	48.78
Sylhet	16.53	28.55	10.53	62.39	28.52	42.91
Mymensingh	16.89	9.95	12.78	43.74	15.8	31.51

Table -7: Morbidity Rate of Livestock by Type and Region

Morbidity rate is quite higher for cattle compared to goats and poultry (Table-7). Lowest rate (9.85 %) is evident in Rangpur and highest (16.89 %) in Mymensingh. But because of lower mortality rate, the ratio of mortality rate and morbidity rate is quite low, and in fact, it is lowest for cattle compared to goats and poultry. Better management and access to livestock medical infrastructure along with learning experience may have contributed to such lower ratio. Vulnerability of the goats and poultry is quite reflected in higher mortality-morbidity ratio although they have lower morbidity rate.

EXPOSURE TO DISEASES

Livestock are exposed to different diseases (Table-8). Different types of livestock suffer from different diseases. In case of cattle, it fwasound that Khura is the dominating disease (5.12 % of cattle), followed by *parasite Krimi* (1.74 %), Badla (1.55 %), *Milk-fever* (1.35 %) and *Tarka* (1.25 %).

What is the effect of morbidity on mortality rate? We estimated marginal effect of diseases on mortality rate (Table-11?8-10). The results showed that *Jolantonko*, and *Torka* increases higher percentage of mortality. Although lower percentage of cattle suffer from these two diseases, The probability of death of cattle from *Jolantonko* (36.5 %) *Torka* (28.3 %) is higher. Among other diseases that contribute significantly to higher probability of death are poisoning (14.7 %) *Rinder paste* (13.4 %) and *Milk-fever* (11.7 %). The analysis of the determinants of cattle morbidity showed

that households with higher education, membership of MFIs and cattle fattening have lower intensity of mortality rate.

As noted, the mortality-morbidity rate for goats and sheep is higher than the cattle despite lower rate of exposure to diseases. They seem to be exposed to some 17 diseases (Table-9). The most common disease was PPR (32 % of the goats), followed by worm-related diseases (18 %), Milk-fever (12 %) and Ektima (8 %).

Disease	Aggregate	Effect on Cattle Mortality (%)
Khura	**5.12%**	6.41***
Jolatonko	0.12%	36.5***
Go-bosonto	0.48%	03.57
Rinder paste	0.19%	13.4**
Torka	0.84%	28.3***
Badla	0.90%	05.34***
Gola fola	**1.46%**	04.86***
Olan prodaho	0.45%	01.67
Krimi	**1.74%**	00.22
Louse	0.09%	00.235
Atuli	0.21%	04.84
Dugdho jor	0.95%	11.7***
Kitosis	0.20%	10.0*
Poisoning	0.53%	14.7***

Note: *** significant at 1 percent level; ** 5 percent level; * 10 percent level.

Table-8: Impact of exposure to diseases on cattle mortality

Variable	Probability of Goat Mortality	Variable	Probability of Goat Mortality
Bone degenaration	34.0*	Olan prodaho	09.17
Anemia (harkhoi)	14.8**	Diphtheria	39.2***
Goiter	11.20	Anthrax	54.1***
Worm related disease	4.87*	Poison	10.0
Mites attack	6.42	Foot and mouth disease	18.8***
Ketosis	25.5*	PPR	27.5***
Milk Fever	9.09**	Ektima (*chulkani*)	40.4***
Grass Tetany	-04.51	Pox	17.9

Note: N=1460, level of significance: *** p<0.01, ** p<0.05, * p<0.1

Table-9: Marginal effect of Disease on Goat Mortality

The analysis showed that of the 16 diseases, ten diseases have significant impact on death of goats. Anthrax is the most important disease that has higher impact on the death of goats. The probability of death of goats from this disease is 54.1 %. This is followed by Ektima (40.4 %), Diphtheria (39.2 %), Osteomalacia or bone Degenration (34.0 %), *PPR* (27.5 %) and foot and mouth diseases (18.8 %). But the question is, what determines high incidence of goat diseases?

Poultry birds suffer from different diseases (Table-10). Of the seven major diseases, our logit estimates showed that *Gumboro* has higher probability to cause death with probability of 30.5 Percent. This is followed by cold (26.9 %) and new castle disease (23.5 %). Cholera has a probability of 20.7 % to cause poultry death.

The analysis showed that goat size and MFI membership have impact on exposure to diseases.

Types of disease	Number of bird suffered	Number of bird died	% of bird died	Probability of Poultry Mortality (%)
Newcastle disease	38189	10518	28%	23.5***
Pox	620	550	89%	-0.21.0
Cholera	7948	3608	45%	20.7***
Blood dysentery	16968	1313	8%	14.4***
Eye disease	575	58	10%	13.8*
Cold	37411	7935	21%	26.9***
Gumboro	19477	7928	41%	30.5***

Table-10: Impact of diseases on poultry mortality

It increases with increases in farm size. With the MFI membership, probability of exposure to diseases decreases. This is because of monitoring by the MFI technical staff and the support that they provide to their goat farm-borrowers.

SOCIO-ECONOMIC CHARACTERISTICS OF THE PEOPLE ENGAGED IN LIVESTOCK-REARING

The updated study (2022) explained the characteristics of the livestock households (Table-11). Among the sample households, a total of 468 individuals were involved with livestock rearing. Hence, on average 2.3 persons per household were involved in livestock rearing which is about 44% of the average household size. More than 50% of the family members were engaged in goat/sheep rearing.

Particulars	Cattle rearing household	Buffalo rearing household	Goat/sheep rearing household	Aggregate
Number of population actively involved in livestock rearing	419	57	260	468
%age of total population actively involved in livestock rearing	46.09	44.88	50.49	44.36
Female (% of active rearer)	55.61	45.61	54.23	55.77
Age (% of active rearer)				
20 or less	10.7	12.3	11.2	10.5
21 to 30 years	15.0	15.8	14.6	14.1
31 to 40 years	20.8	15.8	23.8	22.2
41 to 50 years	22.7	22.8	21.9	23.3
51 to 60 years	19.6	17.5	18.8	18.6
61 to 70 years	9.5	15.8	8.1	9.6
More than 70	1.7	0	1.5	1.7
Years of schooling of active rearer	4.64	3.37	4.9	4.55
Primary occupation (% of active rearer)				
Agriculture	23.15	26.32	21.92	22.22
Livestock rearing	5.97	19.3	8.08	6.84
Housewife	47.02	38.6	45.77	47.86
Student	7.16	5.26	8.08	6.62

Table 11: Characteristics of the population involved in livestock rearing

It is further evident that compared to males, more females are actively involved in livestock rearing, particularly cattle and goat/sheep. Among the population who were actively involved in livestock rearing, about 56% were female. It is also reflected in the fact that more than 47 % of the housewives are engaged in livestock-rearing. This is quite expected as these are household-based enterprises. Higher percentage of male population are engaged in buffalo-rearing and other external activities.

IMPACTS OF COVID-19

The updated study in 2022 analyzed the impacts Covid-19 on livestock and related business. Covid-19 affected livestock business from both the demand and supply sides. Because of the lockdown, input prices increased, prices of livestock decreased and price of milk decreased. Consequently, business was affected. The survey in 2022 showed that around 37% of the livestock-farms were affected by Covid-19. Average amount of loss was around BDT 54 thousand. However, most of them recovered with the withdrawal of lockdown and economic normalization. Around 94% of the livestock farms recovered at least at the pre-lockdown level. But around 3% could not repay loans and 4% could not recover fully.

PER INCIDENT TREATMENT AND DEATH COST OF LIVESTOCK

The updated study showed that the average treatment cost per affected cattle was estimated at BDT 1,774. It is higher for female cattle than that of male cattle. Average treatment cost is lowest for cattle less than one year. It increases eventually with the age of cattle. Highest treatment cost is observed for the older cattle (more than 3 years).

The study also reported that about 96% of the affected buffalo received treatment. Average treatment cost per affected buffalo was BDT 1,690. About 94 % of the affected buffalo were vaccinated.

Interestingly, vaccination coverage for goat was very low. Only around 37 % of the affected goat/sheep were vaccinated. There is a positive relationship between incidence of vaccination and the age of goat/sheep.

In the 2022 survey, a total of 180 cattle was affected by disease or other incidences. Of these, 30 cattle died. These cattle may have died due to diseases or other reasons. Average value of these cattle was about BDT 62 thousand. It was about BDT 41 thousand for dead buffalo.

IMPLICATIONS OF MORTALITY RATE ON MICRO LIVESTOCK INSURANCE

Livestock insurance is a new concept in Bangladesh, but it has been in practice in many countries including India, Nepal, Mexico, Vietnam, Kenya, Brazil and Ethiopia. In Bangladesh, the penetration rate is very low, and the household-based livestock farms are not covered by formal insurance companies.

PKSF has implemented a pilot project on micro insurance from 2010 to 2014. Based on the findings of the 2016 study, PKSF has still been introducing livestock insurance on a limited scale. The results have been encouraging. Mortality rate of cattle is less than one percent. This is expected to be so low because of the role of MFIs. The 2016 study results clearly demonstrated that MFI membership has negative effect on both mortality and morbidity rate. Consequently, insurance reserve fund has increased. We found higher cattle mortality rate of 1.74 % based on the pooled cross-sectional two-year data. The critical question is, what is the implication of such mortality rate? Does it encourage farms to join any livestock insurance?

WILLINGNESS TO JOIN AND PURCHASE LIVESTOCK INSURANCE

The study analysis shows that 94% of all respondents expressed their keen interest to join the livestock insurance program. This is an overwhelming response. However, the rate is higher for the farms that have experienced death of livestock. Probably considering the high mortality rate, more than 98% of the poultry farms expressed their desire to join. It may not necessarily reflect actual intensity of purchase of policy, as the decision to purchase will depend on many factors including the ability to pay premium and financial health of the farm.

The updated study showed that about 72% of all respondent livestock households were willing to purchase risk-mitigating tools if offered. Over 95% of the buffalo rearing households expressed their willingness to purchase 'surokkha'. This is quite expected given the high mortality and morbidity rates for buffalo. However, less than 70% of the cattle or goat/sheep households expressed their willingness as they experienced lower mortality rates. Based on the willingness to subscribe livestock insurance, it can perhaps be argued that introducing livestock insurance will be feasible and beneficial.

REDUCING EX-ANTE RISKS THROUGH BEST FARM PRACTICES

The study found that ex-ante risk reduction through best farming practices has significantly reduces the morbidity and mortality risks in livestock. The report in 2017 constitutes following elements of best practices:

- Quality and hygienic room/shelter of livestock is important. The study found that cattle rooms/shelter with mud have higher morbidity rate. Similarly, the study observed balanced feed management and timely health care services are necessary to reduce ex-ante risks;
- Institutional association/arrangement with access to MFIs for credit and local livestock department for veterinary services reduce mortality rate;
- Farm size should be reasonably within the management capacity of the household;
- Households or persons engaged in livestock should be trained. Data showed that training has negative effect on mortality and morbidity rates;
- Farms in lower altitude have less risk. The study found that villages with altitude of less than 10 meter have lower mortality and morbidity rates.
- Markets should be developed, in particular for feed, essential vaccine and medicine;
- Veterinary services should be well developed at the village level as well as the institutional level;
- Households or persons engaged in livestock should be trained. The updated study (2022) mentioned the training and the risk mitigation services of PKSF in livestock sector have been reducing morbidity and mortality of livestock.

Given the findings and the elements for good farm practices, there are some challenges to make the ex-ante risk reduction process meaningful. The challenges are:

- Expanding services of the institutions like MFIs, training services, veterinary services. It is a challenge, as it will require multi-faceted interventions.

- Access to feed market is equally a challenge because its expansion will depend on both demand and supply side behavior.
- Developing quality cattle house requires financial support. It is particularly true for the low-income farm households. In the absence of banks, MFIs can play a critical role in financing building or constructing cattle house.
- Imparting training on access to information particularly access to disease-related information and potential treatments will be a challenge because of inadequate institutions and associated high cost.

However, challenges can be addressed through an institutional approach. PKSF has been playing a major role in addressing the challenges through its partner MFIs.

IMPLICATIONS FOR LIVESTOCK INSURANCE TOWARDS A BUSINESS MODEL

The core goal of this study was to develop livestock sector through reducing both ex-ante and ex-post risks. Ex-ante risk minimization approach requires preventive measures. On the other hand, ex-post risk reduction approach requires insurance mechanism. In both the cases, there are challenges. The challenges particularly for ex-ante risk reduction are multi-faceted, as many dimensions and many institutions are involved in providing livestock-related services. Similarly, ex-post reduction strategy is transfer of risk through insurance mechanism.

Policymakers need to consider two critical issues in developing livestock sector through insurance mechanism: (i) degree of risk; and (ii) demand for insurance product considering the amount of premium. The study showed that degree of risk, as measured by mortality rate, is quite low for cattle. It was estimated to be 1.73 % but it was around one percent for cow fattening. It is almost twice the cattle mortality rate for goats and poultry. Therefore, we can at least conclude that cattle insurance will be less costly based on mortality rate. The second issue of demand for insurance product was addressed in the study. Overwhelmingly, more than 94 % of the respondents expressed their interest in subscribing policies. However, the demand was higher for the farms that incurred loss. It may, however, be mentioned that intensity of willingness to subscribe livestock insurance may be different from actual willingness to pay. The Research Team had some discussion with farms during their field visits. They perceived that, in reality, all the respondents expressing their willingness to join may not actually pay. However, they felt that the market would be quite large even if fifty percent of them subscribe.

Considering the lower cattle mortality rate and percentage of farms willing to join livestock insurance, the study recommends that cattle insurance will be feasible. Goats and poultry insurance can be feasible if floor-limit of farm size is higher. However, the core issues that have to be addressed are: (i) mortality table has to be constructed over long period, as this study is based on data for two years; (ii) asymmetric information problem needs to be resolved through establishing close contact between insurers and cattle farms; (iii) premium has to be flexible so that it varies over time as more and more information are available on mortality and morbidity rates; (iv) veterinary services should be easily available; (v) access to credit should be available.

RECOMMENDATIONS

Based on the findings and the challenges identified, we put forward following recommendations for the consideration of PKSF and SDC:

(i) Morbidity & mortality table has to be constructed over long period;

(ii) Asymmetric information problem needs to be resolved;

(iii) Actuary expert should design livestock insurance product. Premium has to be flexible so that it can review over time as more and more information are available on mortality and morbidity rates;

(iv) Access to institutions like feed market, veterinary medical services and medicines at least at the union level should be available. MFIs can play a role of intermediary between institutions and farm households.

(v) Access to credit should be available;

(vi) An effective insurance marketing system should be undertaken

(vii) Regulatory framework should be broad-based;

(viii) Institutional arrangement for reinsurance;

(ix) Experimental research on livestock insurance should be undertaken;

(x) Capacity of partner MFIs through training of its staff and information systems should be developed for scale up of livestock insurance.

(xi) Livestock farm households should be trained on farm management, marketing and disease management for reducing ex-ante risk, and they should be also trained about livestock insurance as an ex-post risk transfer mechanism.

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