



# Effects of Community-Based Paid Extension on Reducing Vulnerability of Smallholder Dairy Farmers of Southwest Bangladesh

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## Abstract

The study investigated the effect of Community-Based Paid Extension (CPE) on vulnerability reduction of smallholder dairy farmers. Randomly sampled 255 farmers were interviewed together with 15 key informants' interview. Both statistical analysis and thematic approach were employed to achieve triangulation. In about 68 % of cases, CPE reduced vulnerability to a degree experienced as 'moderate', whereas 20 % of them experienced a 'high' reduction in vulnerability. The CPE has addressed wide ranges of vulnerability of smallholder dairy system. The regression analysis confirmed the importance of sustainable and frequent paid extension service at community level. Other factors such as education level of the farmers, use of different interpersonal and mass extension media, as well as positive change in livelihood assets also significantly influence vulnerability reduction of the smallholder dairy farmers. CPE deserves dissemination throughout the country and seeks special dairy extension policy organized around it for rapid rural development.

### Keywords:

Bangladesh, dairy, fee-based Extension, livelihoods, rural development

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## INTRODUCTION

Rural dairy husbandry of Bangladesh is generally smallholder based (Uddin et al., 2011) that predominantly constitute 2-3 cows. The gradual farm mechanization has been replacing the bull driven tillage with power driven system, as a result cow is being replaced from that position. The market-oriented smallholder dairy farming can generate more income and employment than crop farming (Asaduzzaman, 2000; Omore et al., 2002; Samsuddin et al., 2007). Therefore, a good prospect is beckoning in smallholder dairy systems of the country (Anonymous, 2005). However, with the progress in dairy sector the need for extension service is increasing. Though the environment of Bangladesh is conducive for dairy farming, there are a lot of obstructions in production, processing and marketing of dairy products (Imtiaz & Rana, 2014; Jabbar, 2009; Khan et al., 2009; Uddin et al., 2011; Uddin et al., 2012). Invisible dairy extension policy and poor dairy extension service are the major barriers of dairy development in Bangladesh. Being an important sector dairy extension service is still merged with overall livestock extension which indicates its priority at the bottom in policy focus (Uddin, 2015).

Over the decades, the public extension system is being criticized for delivering poor and traditional services (Haque, 2010; Haq, 2011, Rashid, 2014; Rivera and Alex, 2004; 2013; Uddin & Gao, 2013; Uddin et al., 2016). The public livestock extension service in Bangladesh is neither demand driven nor cheaper than the fee-based extension. In public extension system one veterinary surgeon is responsible for serving 150000 animals. Moreover, this service hardly reaches 10 kilometers from the unit level livestock hospital (Uddin, 2015). Insufficient fund and inadequate extension personnel are the important causes of those problems (Haque, 2010). Public fund is mostly used for salaries of the staff whereas a negligible percentage is used for field functions (World Bank, 2005). At present about 25 percent of extension fund is donor supported. Donor funded projects stop their service just after ending the project tenure (Birner et al., 2010). The changed circumstances urge paid extension

to see demand driven and quality extension service rather than its mere accessibility (Rana et al., 2013). CPE has reached to farm gate with this notion. Right extension policy decision of government is depending on the evidence of successful extension program that impacts significantly to the smallholder farmers' livelihood. Yet very little is known about the success of CPE in reducing vulnerabilities of the smallholder dairy farmer. This gap has inspired the authors to investigate the effect of CPE on vulnerability reduction of smallholder dairy farmers and the trajectories that shapes the process.

## MATERIALS AND METHODS

Quantitative assessment of CPE's effect on vulnerability reduction is a multifaceted task, and there is possibility of yielding poor understanding of the context without thorough description by qualitative data. Considering the facts, the study pursued a mixed methods research to achieve consistency (Chow et al., 2010) and triangulation in findings (Sandelowski, 2003). The rigor of this approach has attracted great attention as a third methodological movement in recent decades (Johnson et al., 2007).

The Community-based Dairy Veterinary Foundation (CDVF) was selected as the paid extension organization that offers community-based dairy veterinary and market extension services to the smallholder dairy farmers. Being the pioneer in Bangladesh, this organization has been venturing for five years in four regions that cover about 4,000 smallholder farms only. The study was conducted in Southwest region of CDVF, which belongs to Satkhira district of Bangladesh. The highest number of milk producing and marketing associations of CDVF are working in this region. Satkhira Sadar milk producing and marketing association was selected purposively because of good knowledge of the researchers on study area. About 1,275 smallholder dairy farmers belong to this association that has been considered as the population of the study. Considering time, other resources and conveniences of the researchers, 255 farmers were selected randomly from the list supplied by the CDVF that repre-

sented 20 percent of the population. In addition to that, 15 key informants were also selected by snowball sampling technique following Hoque (2012). The key informants were dairy group leaders, cooperative leaders, milk processor, milk career, and community extension personnel. Although it is their program, which is being evaluated, some community extension personnel were selected as key informants, because they can explain the technical issues of veterinary extension services which are hardly possible by the farmers otherwise. Moreover, as a new extension approach, CPE's success is still unknown to the ordinary people of the country.

The effect of community-based paid extension on reducing vulnerability of smallholder dairy farmers was the dependent variable of the study. On the other hand, some demographic and CPE related characteristics of farmers such as age, gender, education level, length of paid service, distance of community extension center from the farm, extension communication frequency, daily milk production, annual household income, and change of livelihood assets were considered as the independent variables of the study. The effect of community-based paid extension on vulnerability reduction was measured through a 5- point Likert type scale- ranging from Highly Decreased (HD) to Decreased (D), Unchanged (UC), Increased (I), and Highly Increased (HI) with corresponding scores of 4, 3, 2, 1 and 0. The scale was checked with 10 selected items covering three dimensions of vulnerability (shock, seasonality, and trend). Accordingly, vulnerability reduction score of a respondent varied from 40 to 0. Though, retrospective and perception-based measurement is sometimes criticized, perception analysis is still the important tool where robust data of earlier years are absent (Ravindranath & Sudha, 2004). Yet, Vulnerability Reduction Index (VRI) was calculated by multiplying the response frequency and their corresponding weight and summing them afterwards as follows.

$$VRI = \sum (HD \times 4) + (D \times 3) + (UC \times 2) + (I \times 1) + (HI \times 0)$$

The smallholder dairy farmers were interviewed using a structured interview schedule, whereas

the in-depth interview of the key informants were conducted using a semi-structured schedule. Before final data collection, the interview schedule was pretested to achieve valid and reliable data. Data were collected by the researchers during March 2014 to June 2014. The computer software SPSS version 16 was used to analyze the quantitative data, whereas thematic approach was used for qualitative data interpretation. Descriptive statistics such as frequency, percentage, mean, mode, standard deviation, and so on were computed to interpret the quantitative data. Linear regression model was employed to see how the extension characteristics correlate with vulnerability reduction of the farmers.

## RESULTS

### Structure and functions of community-based paid extension

The CDVF has been emerged from a donor funded project of Bangladesh Agricultural University and later on 2009, it has started paid service to the smallholder dairy farmers organizing into groups and associations. The community extension center is usually located in village market so that the farmers can easily meet with extension provider during their everyday selling and buying. CDVF is operationalized by a Chairman, one Executive Director, one Assistant Director, one Regional Manager, nine Veterinarians, six Community Animal Health Assistants, five Lab and Office staff, and 90 Milk Carriers throughout the country. The veterinarians usually visit, at least, 10 farms per day. They offer vaccinations, deworming service, general health services, nutritional advice, and reproductive and udder health services. CDVF has an agreement with BRAC, a milk processing company, to buy milk regularly on fair price. The association collects milk and sells it to a processor (BRAC). The processor pays service charge to CDVF at the rate of one Bangladeshi Taka (BDT) per liter milk sales, which is used for the salaries of the staffs and office management. The processor also pays the carrying cost (@1.7 BDT/lit) of the collected milk. The farmers are paid bonus money at a three-month interval and at the rate of 1BDT/liter milk sales

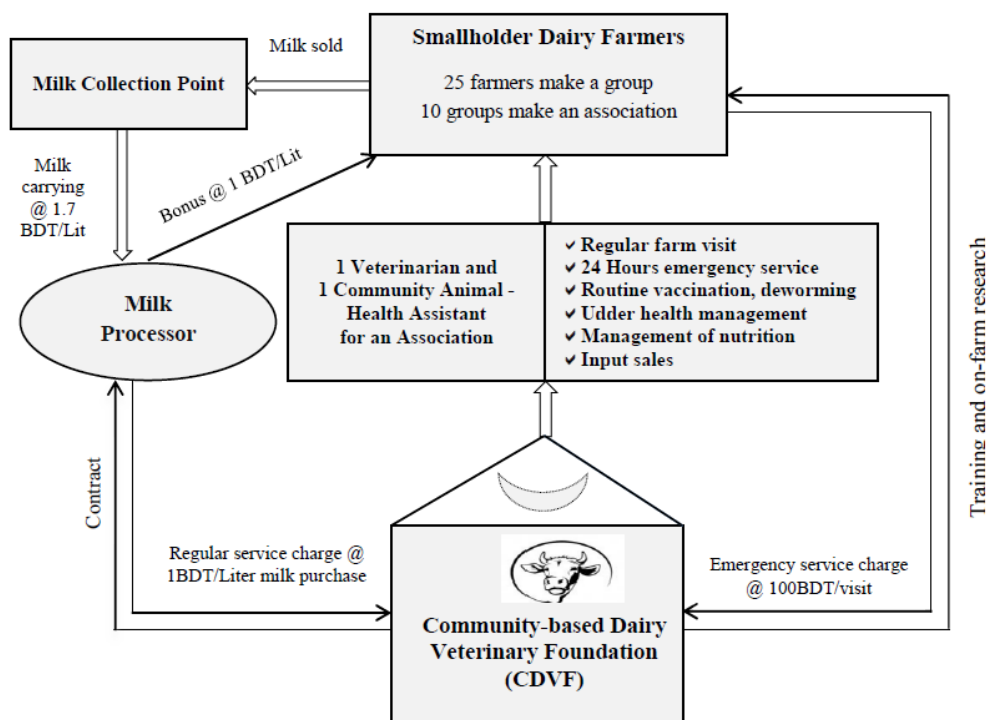


Figure 1. The CDVF model of community-based dairy extension service in Bangladesh  
Source: Adapted from CDVF<sup>1</sup>

to the processor. The service sustained if the respective association can produce 2500 liters milk per day. Whatsoever, the herd size, the service charge for regular farm visit is reimbursed from milk production (1 BDT/Liter). Moreover, CDVF charges 100 BDT for each emergency visit (Fig. 1). At present, CDVF farmers throughout the country produce about 15000 liters milk per day. Therefore, it is running as a self-sufficient privately managed extension organization. Yet, in some place absenteeism of community veterinarian was reported which causes sufferings of the farmers. Farmers are annoyed to absenteeism, which is hampering the reputation of this model. One of the causes of absenteeism is low salary and facilities of veterinarians as compared to other jobs. Therefore, the fresh graduate veterinarian seeks government job like civil service.

### Demographic features of smallholder dairy farmers

The findings of Table 1 show that age of farmers ranged from 20-80 years. Yet, the majority of the smallholder dairy farmers were in their early middle age (40 years). Among the

respondents, about 10 % were female farmers. Education level of the farmers ranged from 0-15 years, whereas most of them possess primary education. Farmers are receiving CPE service from 1 to 5 years. The mean distance of community extension center was about 6 kilometers from the farmers' home. However, the highest numbers of dairy farmers were located within 3 kilometer distance from the extension center. The dairy farmers had good communication with CPE. Every now and then they consult CPE regarding their farm problems. To the same extent, they also used other extension media including interpersonal and mass media. Farmers' rating on livelihood capital change shows that most of the farmers experienced increase of livelihood capitals as a result of CPE services.

### The effect of CPE on vulnerability reduction

Findings show that the most of the smallholder dairy farmers (67.84%) observed moderate effect of CPE in reducing their livelihood vulnerability whereas a small fraction of about 13 percent mentioned low effect. About 20 percent of the smallholder dairy farmers experienced high effect of CPE on vulnerability reduction (see

Table 1  
Descriptive Statistics of the Socio-Demographic Features of the Smallholder Dairy Farmers (n=255)

Socio-demographic characteristics of the farmers (Measuring Unit)	Range Observed	Mean	Mode
Age (Years)	20-80	39.58	40
Gender (Male=1, Female=0)	Male=230, Female=25	-	1
Education level (Year of schooling)			
Length of paid extension service (1 for each year)	0-15	5.8	2
Farm-to-community extension center distance (1 for each kilometer)	1-5	2.8	2
Communication frequency with paid extension (Frequent =3, Now & then = 2, Seldom =1, Never = 0)	0.5-12	5.8	3
Use of other extension media (Frequent=3, Now and then=2, Seldom=1, Never=0)	-	-	2
Changes in livelihoods assets (Highly Increased=4, Increased=3, Unchanged=2, Decreased=1, Highly Decreased=0)	10-36	24.73	24
	42-93	66.97	65

Figure 2).

Cow and calf mortality was also reported as a major problem in traditional smallholder dairy farming. About 90 percent and 68 percent farmers mentioned that cow and calf mortality respectively has decreased as a result of CPE services (see Table 2). The infectious diseases cause death of cows which bring complete loss to the farmers. When calf dies milk secretion of cow gradually reduces. So, calf mortality brings dual economic loss of milk yield and future milking cow. Calf suffers from malnutrition, navel infection, hernia, skin diseases and diarrhea. Regular parasite control through deworming tablet supply and nutritional service of CPE has reduced the mortality of calf (see Figure 3). Prior to the CPE intervention in this area, farmers reared local cows which usually give only one

liter of milk per day. Now farmers are inseminating their local cows with semen of high yielding bulls. BRAC (the contract buyer of milk) has distributed the improved breed semen among the members of farmers’ cooperatives. About 90 percent farmers report that they are no longer rearing local breed (see Table 2).

Farmers faced an unknown cause of milk production fluctuation. The community veterinarian mentioned that solution to this problem deserves close examination of cow’s diet and diseases. Poor health of cow, inadequate feed supplement and poor knowledge in farm hygiene reduced milk production and enhanced calf mortality. A dairy group leader expressed his previous condition as:

*Vignette 1: We were not conscious enough about diseases and nutritional deficiency of*

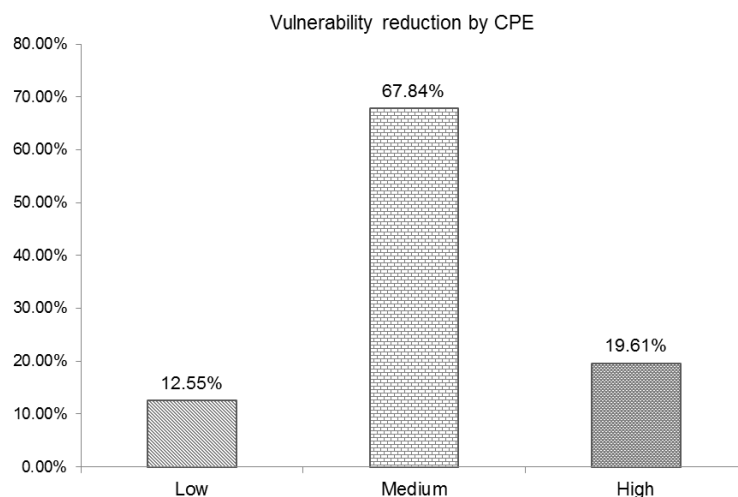


Figure 2. Vulnerability reduction in smallholder dairy by CPE intervention (n=255)

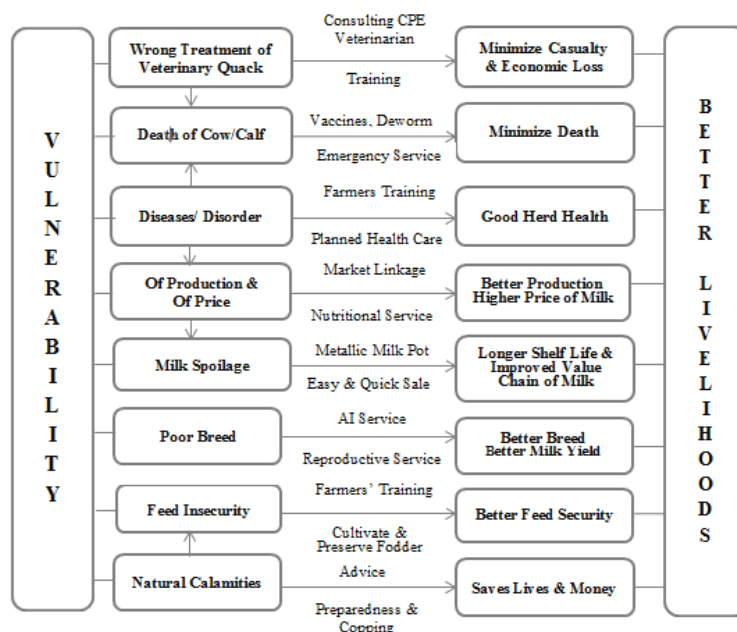


Figure 3. The trajectory of vulnerability reduction by CPE intervention

Source: Developed by the authors

cattle. Therefore, a lot of cows and calves died. Milk production fluctuated very often. We did not know that the lactating cow needs calcium supplementation and vitamins. We tried to feed hay and grass but cow lost its appetite.

fluctuation problem with their regular productivity and health services (Figure 3). They provide dietary chart for the lactating cows and also sell good feed, vitamins and calcium from the community extension center at fair price. Seasonality in milk price badly affected the dairy farmers

Table 2

Diary Farmers' Experience of Vulnerability Reduction by CPE Intervention (n=255)

SI.	Nature of vulnerability	HD (%)	D (%)	UC (%)	I (%)	HI (%)	VRI (Rank)
1	Health shock of dairy cattle	15 (5.88)	171 (67.05)	21 (8.24)	45 (17.65)	3 (1.17)	660 (7)
2	Seasonality in milk price	16 (6.27)	154 (60.39)	73 (28.63)	11 (4.31)	1 (0.39)	683 (5)
3	Fluctuation in milk production	46 (18.04)	122 (47.84)	70 (27.45)	15 (5.88)	2 (0.78)	705 (3)
4	Poor breed	80 (31.37)	150 (58.82)	24 (9.41)	1 (0.39)	0 (0.00)	819 (2)
5	Death of calf	90 (35.29)	85 (33.33)	32 (12.55)	2 (0.78)	1 (0.39)	681 (6)
6	Death of cow	138 (54.12)	92 (36.08)	20 (7.84)	2 (0.78)	2 (0.78)	870 (1)
7	Milk carrying and market constraints	7 (2.75)	152 (59.61)	30 (11.76)	64 (25.09)	2 (0.78)	608 (9)
8	Wrong treatment of quack	44 (17.25)	113 (44.31)	91 (35.69)	5 (1.96)	2 (0.78)	702 (4)
9	Capital loss in natural calamity	3 (1.18)	21 (8.23)	164 (64.31)	57 (22.35)	10 (3.92)	460 (10)
10	Feed insecurity	30 (11.76)	70 (27.45)	143 (56.08)	11 (4.31)	1 (0.39)	627 (8)

Note: HD=Highly Decreased, D=Decreased, UC=Unchanged, I=Increased, HI=Highly Increased, VRI=Vulnerability Index  
 $VRI = \sum (HD \times 4) + (D \times 3) + (UC \times 2) + (I \times 1) + (HI \times 0)$

over the years. In rainy season, production usually increases due to availability of green grasses. On the other hand, due to continuous rain the consumers cannot move freely to the markets. The village milkmen stop collecting milk, supply of milk in local market increases and price goes down. Regular market extension service of CPE and value chain development has resolved this problem. CDVF has successfully removed milkmen by linking the smallholder dairy farmers with the milk processing company within the community. Prior to CPE service local milk was consumed by some sweet shops and village milkmen. The milkmen bought milk with very low price and sold it to town with higher price. One of the exploited farmers narrated, "The milkman cheats with me several times. They are not sincere in paying money. Sometimes, they flew away to other areas without paying money. It was very tyrannous to me".

The CPE has significantly reduced the wrong treatment of veterinary quack (Figure 3). A veterinary quack is a person who without a formal technical education treats animals. Before CPE intervention, farmers usually took cattle health service from the veterinary quack which caused death of many cattle. These quacks unnecessarily push expensive injection to the cattle just for their benefits. Mostly poor, illiterate and unaware dairy farmers seek this kind of service because the service is free with high price drug sale. Mastitis, FMD, Anthrax, Brucellosis, Hemorrhagic Septicemia, Worm, Anorexia, Food Poisoning, and Enteritis were reported as the major diseases and disorder in dairy cattle which badly affected income and livelihood of the smallholder dairy farmers. Farmers reported that when a dairy cow is infected with FMD milk production decline, for example from 20 liters to 3 liters within 3 days, and never back to previous production level even if it is cured. The CPE service has significantly reduced the prevalence of infectious cattle diseases through regular vaccination and health services.

In traditional milk marketing system milk was carried to distant market by plastic containers. As a result, the quality of milk was deteriorated quickly during the hot summer. Now milk is

carried in hygienic metallic container which lowers the milk temperature and keeps it good up to 10 hours. Consequently, milk spoilage has decreased significantly (Figure 3). Of the 255 dairy farmers, more than 60 percent reported that milk quality and marketing vulnerability has been decreased due to CPE intervention (Table 2). CPE is playing an important role in improving feed security and disaster preparedness. Fodder and hay become scarce just before the two major rice harvesting seasons. Moreover, during rainy seasons the lowland goes under water as a result open grazing become impossible. The price of concentrate feed in the local market increases sharply in that time. Therefore, CPE has trained the farmers on fodder cultivation and feed preservation techniques. Hence, feed security of the smallholder dairy farmers has improved to some extent. During disaster aftermath, cattle suffer from various diseases. CPE has played role in managing the disaster vulnerability by veterinary services, awareness creation, disaster preparedness and introducing appropriate coping strategies such as making silage for critical period, cultivation of short duration fodder crops, making brick made shelter for cows, rainwater harvest during excessive rainfall, raising the homestead during dry seasons and taking the cattle in cyclone shelter during disaster.

### **Relationship between Vulnerability and Characteristics of CPE**

CPE's characteristics such as distance of community paid extension center, communication frequency with CPE and length of paid service were presumed as predictors of vulnerability reduction. In testing the hypothesis other factors like age, gender and education level of the farmers, use of other extension media and change in livelihood assets were taken as control variables. Regression results (Table 3) confirmed that all the considered characteristics of CPE can precisely predict the vulnerability reduction of the smallholder dairy farmers whereas distance of community paid extension center and vulnerability reduction shows a negative significant relationship. Among the control variables education level, use of other extension media and

Table 3

Regression Results for the Predictors of Livelihood Vulnerability Reduction

Independent Variables	B	SE	$\beta$	t	p-value	VIF
(Constant)	22.018	1.76		12.50	.000	
Age	.001	.013	.004	.107	.915	1.103
Gender	.394	.446	.029	.88	.378	1.040
Education level	.277	.069	.243	4.01	.000	2.036
Length of paid service	.454	.132	.138	3.44	.001	1.552
Farm-to-community extension center distance	-.836	.056	-.607	-5.04	.000	1.560
Communication frequency with paid extension	.468	.273	.071	1.71	.000	1.548
Use of other extension media	.180	.023	.239	3.99	0.04	2.062
Changes in livelihoods assets	.004	.002	.117	2.66	.003	1.442

R = .868, R<sup>2</sup> = .754, Adjusted R<sup>2</sup> = .752, F = 105.79, p=0.000

change in livelihood assets significantly influenced the vulnerability reduction of the smallholder dairy farmers. The other factors like age and gender of the respondents did not perceive as important determinants of vulnerability reduction.

### DISCUSSIONS

The curious readers may ask why the smallholder farmers seek paid services where government extension service is provided at free of cost. In response to that question we want to disclose that the smallholder dairy cooperative under CPE is commercially-oriented whereas the other smallholder farmers of the community are subsistence type. These farmers have been connected with secondary milk market by direct interference of CPE. The CPE supply quality feed, drug and other inputs at fair price which reduce production cost. Moreover, the regular service charge is fully shared by the milk buyer on the basis of milk sale (@1BDT/liter). In addition to that, CPE responses to the emergency even at mid night with a negligible charge (100 BDT/visit) whereas public livestock extension staff is absent in villages (Jabbar, 2009). Now, farmers are selling their dairy milk to nearby collection point at fair price which saves their working hours too. After all, CPE has brought farmers convenience and increases farm profit. Therefore, farmers are willing to pay for the CPE services sincerely. Uddin et al. (2016) also found that the willingness of farmers to pay for agricultural extension services is connected with profit potentiality, service quality and convenience

in accessing the services. The higher income on the other hand makes an individual able to spend more money in reducing their farm vulnerability (Swain & Floro, 2008).

How the farmers became vulnerable and what mechanisms does CPE use to overcome the situation, deserve further clarification. The CPE has a very positive effect in reducing death of milking cows. Cows usually die of pregnancy complications, food poisoning and infectious diseases. Farmers usually buy dairy cow with high interest credit (Halder & Barua, 2003). At the day of getting loan they need to pay the first weekly installment. When cow dies, the daily income stops. Farmers take another loan and in a time people refuse them as they lack payback capacity. This is a vicious cycle which leads to food insecurity, stops schooling of children, reinforces to engage in odd jobs and push them below average social status. The CPE service has greatly reduced this vulnerability through regular vaccination of infectious diseases, reproductive health care of the of cows and farmers' training on feed management and hygiene. Farmers had little knowledge on high yielding breeds and modern farm management practices. Therefore, they could not go for commercial dairy farming and remained as subsistence since long. Imtiaz and Rana (2014) and Khan et al. (2009) also found that lack of knowledge on high yielding breed, poor management knowledge on diseases and feeding standard are the major problems of smallholder dairy that limit commercialization. However, by timely Artificial Insemination (AI) service and regular health



care service of pregnant cows, CPE has improved the local poor breed.

It is a unique finding that the CPE service has positive effect both on veterinary quack and farmers' knowledge development. The community veterinarian is a university graduate and specialized surgeon. Therefore, many veterinary quacks are gaining experiences with the intimate touch of community veterinarians. In case of any serious circumstance they consult with community veterinarian for appropriate drug and doses. Farmers are now being conscious about their cattle health and progressively seeking quality service from CPE. A conscious farmer differentiated the present and past situation in following way:

*Vignette 2: Once I thought that snake sucks milk which causes inflammation in cow's udder. Later I learned from our community veterinarian that it is actually a deadly bacterial disease called "mastitis". Over the last five years I have received some training on crossbreed dairy rearing. I have frequent contact with veterinarian also. Therefore, I learned many things from him informally. As a result many of us come to me for advice before going to veterinarian.*

The findings deserve discussion on how vulnerability of the dairy farmers is shaped by its determinants. In connection to distance of community extension center, we found that the farmers who lived far away from the community extension center experienced less vulnerability reduction. It was less convenient to access and deliver the extension service from a distant place. On the other hand, the farmers who lived nearby the community extension center had a good scope to purchase the service at any time. Even they had informal contact with extension personnel at different place of the community. [Chander and Sulaiman \(2014\)](#) found that the delayed response and infrequent service of public veterinarians such as unwillingness to respond at night sometimes increases farmers' vulnerability. [Adesiji et al. \(2013\)](#) also found more or less similar results in their study. Frequent communication offers update information, clarifies message, improves relationship,

increases confidence and improves knowledge of the dairy farmers which helps them to tackle the vulnerable situation. On the other hand, vulnerability of disease, disorder and poor farm performance was inclined with less or no extension contact. This finding is consistent with [Dercon et al. \(2008\)](#) that extension visits reduce farmers' vulnerability and improves livelihood standard of the farmers. [Hasan et al. \(2013\)](#) also found similar result in their study. On the contrast, [Jabbar et al. \(2005\)](#) found that even large number of public extension visits have failed to reduce farmers' vulnerability because of lacking demand-driven extension contact. Producer organization-based extension service on the other hand has significantly reduced farmers' vulnerability and increases farm efficiency through demand-driven services ([Birner et al., 2009; Chander & Sulaiman, 2014](#)). It is obvious that to have an effect takes time. Accordingly, the farmers who are taking paid service for long time enjoyed more vulnerability reduction in their small scale dairy farm.

Education level, among the control variables, significantly determines vulnerability reduction (see Table 3). Education level of the farmers and vulnerability reduction is positively related. It means the educated farmers perceived more vulnerability reduction as compared to the illiterate and semi-literate farmers. The educated farmers are good decision makers and can take right decision during the vulnerable period. The educated farmers are enlightened and can follow any written action guide even after long time. This study, therefore, supports [Muttarak and Lutz \(2014\)](#) that education directly influences risk perception, skill and knowledge and indirectly reduces poverty and enhances access to information and assets thereby reduces vulnerability. Similarly, the positive relation between livelihood capital change and vulnerability reduction proves the fidelity of livelihood theory ([Uddin, 2015](#)). The present study discloses that there is a significant positive relationship between other extension media use and vulnerability reduction of the farmers. Various interpersonal and mass media played vital roles (other than CPE) making farmers aware and resilient against the vulnera-

bilities. Therefore, CPE, despite having great contribution, is not the sole factor in reducing vulnerability of smallholder dairy farmers' of Bangladesh.

### CONCLUSIONS AND RECOMMENDATIONS

Vulnerability of the smallholder dairy farmers is so notorious that vulnerability leads to other vulnerabilities and continues like a vicious cycle. Lack of demand driven and timely services worsens the vulnerability of the farmers. The CPE offers competitive advantages over the public extension in reducing vulnerabilities of smallholder dairy farmers through rendering better accountability, sincerity, service quality, convenience, and profitability. Consequently, farmers' willingness to pay for the services has increased. However, vulnerability eradication is not an instantaneous process; longer year practice of systematic dairy hard management, frequent veterinary, as well as market extension support within the community remove vulnerability of the farmers and bring higher production and profit. As community-based paid extension suffers from adequate infrastructure facility, both government and private sector should come forward to facilitate them in this regard. CPE indicates that empowering community extension service can increase coverage of service area and reduce expenditure of public extension thereby bring mutual benefit for both dairy farmers and government. Therefore, government should formulate and execute special dairy extension policy organized around community-based extension to have greater impact on rural development. A rigorous national dairy plan together with an efficient dairy development board deserves direct government interference to function immediately.

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