

Preparedness of farmers in Northern Samar on disaster risk reduction and management of livestock

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ABSTRACT

Food security, livelihood stability, and the resilience of farming communities are significantly influenced by how livestock fare during natural disasters. To assess their preparedness and response in managing livestock during natural disasters, 206 livestock farmers from representative municipalities in Northern Samar were interviewed using a nested sampling design. Findings revealed that farmers' disaster preparedness behaviors were shaped by their prior experiences with typhoons and flooding, leading the vast majority (196/206) to integrate livestock into their family disaster plans, including provisions for feed (119/206) and veterinary supplies (109/206). The village public address system was identified as an effective tool for disseminating disaster warnings and preparedness information. The respondents strongly express the need for designated livestock evacuation sites and government subsidies for feed and medicine, and underscored the importance of capacity-building activities focused on animal management during natural disasters. Overall, farmers demonstrated a proactive approach to disaster risk reduction and management by allocating feed resources and providing temporary shelters for their animals, despite the absence of formal livestock evacuation facilities and limited institutional support.

INTRODUCTION

According to the World Health Organization, a disaster is any event that causes destruction, economic loss, human casualties, and a decline in healthcare services to the extent that assistance from unaffected areas is necessary. Such events continue to threaten the resilience of agricultural communities across most provinces in the Philippines. Since the country is heavily dependent on agriculture, recurring adverse phenomena such as drought, flooding, landslides, earthquakes, volcanic eruptions, and typhoons can cause

considerable damage and losses to rural livelihoods. This vulnerability is illustrated by data reported by the Department of Agriculture (DA) in 2020, showing that Typhoon Quinta and Super Typhoon Rolly caused P4.56 billion in damage and losses in areas including Eastern Visayas (Galvez, 2020). These losses during disasters amplify household vulnerability and hinder community recovery, since livestock not only serve as economic assets but also as critical food security buffers for smallholder farmers (Behera et al., 2026).

Several countries have incorporated livestock and companion animals into their disaster risk reduction and emergency management frameworks, demonstrating that animal-inclusive disaster preparedness is both practical and achievable. In the United States of America, the Pet Evacuation and Transportation Standard Act of 2006 was enacted to require states seeking Federal Emergency Management Agency assistance to make provisions for pets and service animals in their evacuation and sheltering plans, thereby normalizing animal-inclusive emergency management (Taylor et al., 2015; Quijano et al., 2016). Similarly, the USDA Animal and Plant Health Inspection Service (APHIS), through its amendment to the Animal Welfare Act, mandates the development of contingency plans, personnel capacity building, and emergency protocols for livestock producers (USDA, nd). These global examples highlight animal protection as a core component of One Health, biosecurity, and food-system stability.

In the Philippines, livestock-focused DRRM at the local government unit (LGU) level remains largely absent. The translation of frameworks into operational policies or contingency plans is often overlooked at most LGUs despite the provision of national legislation to safeguard animals during emergencies - such as Republic Act (RA) 8485, otherwise known as Animal Welfare Act, and its amendment RA 10631. and a developed guideline for livestock evacuation by the Philippine Red Cross (Zavalla et al., 2021).

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KEYWORDS

Disaster Preparedness, Disaster Risk Reduction Management (DRRM), Farmers, Livestock, Northern Samar

Currently, there is no official policy in any LGU in the province of Northern Samar regarding disaster risk reduction and management for livestock and poultry. To prevent substantial losses to the local livestock and poultry industry amid intensifying climate-related hazards, it is important to bridge this governance gap to reduce risks to animal health, rural livelihoods, food security, and the broader One Health interface.

Despite these significant implications, the gap persists as no prior study has been conducted to assess livestock-focused DRRM practices, preparedness, and policy gaps among livestock farmers in Northern Samar. This study aims to: (1) assess the preparedness of livestock farmers in Northern Samar, (2) identify socio-demographic and hazard-related factors associated with farmers' decision-making, and (3) generate evidence-based recommendations essential for formulating LGU policies and ensuring alignment of local action with national and global One Health and food security directives.

MATERIALS AND METHODS

Sampling strategies

Representative municipalities, each from the Central, Pacific, and Balicuatro areas of the province, were selected as the project's locale (Fig. 1). As shown in the figure, the municipalities were Lope de Vega in the Central area, Palapag, Pambujan, and San Roque in the Pacific area, and Lavezares in the Balicuatro area. All selected municipalities were recipients of the SAAD (Special Area for Agricultural Development) Program of the Department of Agriculture (DA), a poverty-alleviation initiative that empowers vulnerable households and communities. From each identified municipality, three representative Barangays or villages, from among the interior, coastal, riverside, or highway-adjacent areas, were identified, from which participating livestock farmers were purposely selected. In each Barangay, up to 15 livestock farmers constituted the respondents, totaling to 206 respondents. There were 45 respondents each for municipalities of Palapag, Lavezares, and Lope de Vega, while 36 and 35 respondents were interviewed in San Roque and Pambujan, respectively.



Figure 1: Map of the Province of Northern Samar. Highlighted in red stars are the selected municipalities for this study. Lavezares and Lope de Vega represented the Balicuatro and the Central areas, respectively. While the municipalities of San Roque, Pambujan, and Palapag represented the vast Pacific area.

Data Collection

A set of questionnaires for livestock farmers was prepared to guide in-person interviews conducted in accordance with minimum health and safety protocols. The questionnaire was designed to assess the awareness and preparedness of livestock and poultry farmers regarding disaster risk reduction and management (DRRM), as well as their perceptions of local government unit (LGU) initiatives related to livestock-inclusive disaster preparedness. The instrument consisted of five major domains: respondent profile, livestock production characteristics, disaster experiences, farmer preparedness and response practices, and LGU support and policy implementation.

Data Analysis

All data gathered were collated and analyzed descriptively. Data were expressed in frequencies and presented in tables or figures.

RESULTS AND DISCUSSION

Socio-demographic vulnerability and exposure to recurring natural hazards

A total of 206 farmer respondents were selected and interviewed for this study from across the participating five municipalities. As presented in Table 1, the majority of farmers were males (n=134), in the 41-60 age group (n=70), and living below the national

poverty threshold (n=188; Philippine Statistics Authority 2020). The most common farming type was poultry raising (n=65). These findings highlight the socio-demographic vulnerability of the respondents, as a large proportion were low-income livestock farmers.

Table 1: Demographic profile of the farmer respondents (n=206 heads) and types of animals being farmed.

Category		n=number of respondents
Sex	Male	134
	Female	72
Age	<20 years old	4
	21-40 years old	44
	41-60 years old	70
	>61 years old	43
Years of farming experience	<5 years	39
	5-15 years	69
	>15 years	78
Monthly income in Philippine Pesos	<12,000.00	188
	>12, 000.00	18
Type of livestock or poultry being farmed	Carabao	20
	Cattle	1
	Pig	32
	Goat	1
	Sheep	0

	Chicken	65
	Duck	6
	Turkey	1

High exposure of farmers to extreme weather aligns closely with the previously mentioned demographic constraints in the Philippines, which are located within the Northwestern Pacific Basin of the Pacific Ocean, the world's most active tropical cyclone region (Magee et al., 2021). In fact, the Philippines has the highest disaster risk index in the world (WRI, 46.86), followed by Indonesia (WRI, 43.50) and India (WRI, 41.52), respectively (The WorldRiskIndex 2023). Hence, it is predictable that most farmers

reported experiencing typhoons (n=191) almost annually, followed by flooding (n=114), which occurs after severe or prolonged rainfall (Table 2). The chronic risk environment in which smallholders operate is reinforced by the convergence of high hazard exposure and structural poverty. The most significant agricultural damage recorded in the country recently was caused by Super Typhoon Julian in October 2024 (Gomez, 2024). This resulted in estimated losses of Php 607.38 million, including in the livestock sector, in the affected regions, negatively impacting agricultural and food security (Israel & Briones, 2012).

Table 2: Common natural disasters encountered by animal farmers from selected municipalities in Northern Samar.

Common natural disasters experienced	Representative Municipalities of Northern Samar					
	Lope de Vega (n=45)	Palapag (n=45)	Lavezares (n=45)	San Roque (n=36)	Pambujan (n=35)	Total (n=206)
Earthquake	0	1	43	1	0	45
Typhoon	45	30	45	36	35	191
Landslide	0	0	0	0	0	0
Flood	45	14	37	6	12	114

n: number of respondents interviewed per locale

Preparedness and behavior of farmers on disaster risk reduction and management of livestock and poultry during natural disasters

It appears that prior experiences with natural disasters have shaped the farmers' preparedness and response to disaster risk reduction and management for their animals (Table 3). Many of the farmers (n=196) integrate livestock into their own family preparedness plan. This data suggest that livestock is perceived by farmers not only as an economic asset but also as an essential component of household stability, hence its deliberate inclusion in anticipatory plans for disaster events. In contrast, Rasool et al. (2020) reported that the majority of farmers did not prepare disaster management kits in advance, suggesting differences in household preparedness practices across study settings.

Securing adequate feed (n=119) and veterinary drugs (n=109) are among the most notable preparedness practices of the farmers in anticipation of an increased likelihood of injuries or illnesses

during and after disasters. These practices show farmers' resilience and proactive approach to disaster preparedness despite their limited financial resources. Allocation of scarce household funds toward feeds and veterinary supplies reflects the farmers' value of livestock health to enhance preparedness and minimize losses, yet it poses an ethical and practical dilemma when faced with life-threatening situations. Several farmers (n=104) admitted to prioritizing the safety of their family members over their animals during emergency evacuations. This aligns with Velasco's (2021) observations on animal abandonment due to the perceived inconvenience of evacuating animals. The same study also noted an emerging shift, particularly visible on social media, away from animal abandonment and toward compassionate treatment - "no pets left behind" movement. The increase in societal expectation for improved animal welfare during disasters reveals a contrast between idealized public discourse and the practical constraints faced by farmers on the ground.

Table 3: Preparedness and response of farmers on disaster risk reduction and management of livestock during natural disasters.

	Responses	Representative towns of Northern Samar					
		Lope de Vega (n=45)	Palapag (n=45)	Lavezares (n=45)	San Roque (n=36)	Pambujan (n=35)	Total (n=206)
Inclusion of animals in emergency evacuation plan	Yes	38	42	45	36	35	196
	No	7	3	0	0	0	10
Provision of food for animals during natural disasters	Yes	37	13	Nd	36	33	119
	No	8	32	Nd	0	2	42
Provision of medicine for animals	Yes	26	1	16	34	32	109
	No	19	44	29	2	3	97
Incidence of leaving behind livestock during emergency evacuation	Yes	40	13	22	13	16	104
	No	5	32	23	23	29	112

n: number of respondents interviewed per locale;

nd: no data gathered

Strategies for relocation and associated risks

A substantial number (n=199) of farmer respondents indicated that there is no established animal evacuation center in their village (Table 4). Hence, many farmers rely on their own judgment and experience to determine appropriate relocation sites for their livestock, given their familiarity with the local terrain. Although one municipality has an established communal animal facility, respondents from that area opt to relocate their animals elsewhere due to concerns about overcrowding and disease transmission, which they fear may result in greater losses.

The most widely adopted strategy among farmers against flooding is the use of elevation-based solutions, since most of the respondents are poultry raisers. To prevent drowning or exposure to flood water, about one-third (n=83) reported relocating their poultry to higher ground or elevated platforms. In anticipation of severe flooding, some farmers construct cages suspended on tree branches. However, driven by a lack of suitable external shelter and the need for accessible protection during emergencies, others (n=42) opt to keep their chickens inside their homes. Carabaos and

pig raisers moved their animals to mountainous or hilly areas (n=73 or 28.7%) where they create temporary shelters.

Despite limited resources and infrastructural constraints, these data highlight farmers' resourcefulness in mitigating challenges during natural disasters. However, while adaptive, these solutions introduce new risks, such as keeping chickens indoors, which increases human exposure to zoonotic pathogens (Ceralvo et al., 2023; Güdücüoğlu, 2024). Farmers express fears about the limitations of informal or makeshift shelters, which expose their livestock to common hazards during typhoons and strong storms in rural communities where structures are often made of lightweight materials: falling debris (n=73), and drowning (n=54) due to a sudden surge of flood water, particularly in low-lying or flood-prone villages. Farmers and animals are also exposed to displaced fauna; snake bites in particular (n=53), were reported as a significant threat. Prolonged exposure to moisture or environmental stress, and the resulting illness in livestock (n=41), are additional risks of concern to farmers.

Table 4: Areas where animals are kept during natural disasters and risks associated with them.

	Responses	Representative towns of Northern Samar					
		Lope de Vega (n=45)	Palapag (n=45)	Lavezares (n=45)	San Roque (n=36)	Pambujan (n=35)	Total (n=206)
Is there an established evacuation center for animals in your area?	Yes	0	0	0	3	4	7
	No	45	45	45	33	31	199
Specific place of evacuation for animals	mountain	6	31	30	5	1	73
	side of road	2	6	0	0	2	10
	elevated place	19	9	35	6	14	83
	backyard	0	0	13	10	6	29
	inside the house	7	0	0	20	15	42
	outside the community evacuation center	14	0	0	1	2	17
Satisfaction with the chosen evacuation area	Yes	32	22	45	32	34	165
	No	13	23	0	4	1	41
Possible risks for animals at the location	Falling debris	3	22	25	10	13	73
	wound/injury	1	11	6	3	4	25
	snake bite	0	23	19	7	4	53
	drowning	30	0	24	0	0	54
	illness	15	0	0	13	13	41
	none	9	0	0	12	9	30

n: number of respondents interviewed per locale

Implications for DRRM policy

Data for government assistance specifically for animals during natural disasters were obtained from only two LGUs. Farmer respondents (n=4) from two municipalities were able to receive assistance from their Local Government Unit (LGU), which included free veterinary services, medication, or indemnity checks from insurance (Fig. 2). This suggests that the majority (n=67 or 94% of the 71 respondents who answered this question) were dependent on their own resources for managing their animals, particularly during health crises. Findings from other studies indicate that some farmers have been required to borrow capital in their restocking efforts (Agbay et al., 2023) or resort to distress sales of livestock or other resources as a management strategy to mitigate the effect of natural disaster experienced (Rasool et al.,

2020). So far, the present study has revealed farmers' improvised risk-prone practices due to structural insecurity, recurrent hazard exposure, and the absence of formal DRRM mechanisms. Self-reliance and resourcefulness during disasters may not be sustainable in the long term without adequate support systems from the government or NGOs (Mutembei et al., 2015; Dalla Villa et al., 2020). This study demonstrates substantial adaptive capacity among farmers through anticipatory planning, resource pooling, and accumulated local knowledge. Formal integration of these insights into LGU-level DRRM policies, aligned with national directives and global One Health initiatives, is critical.

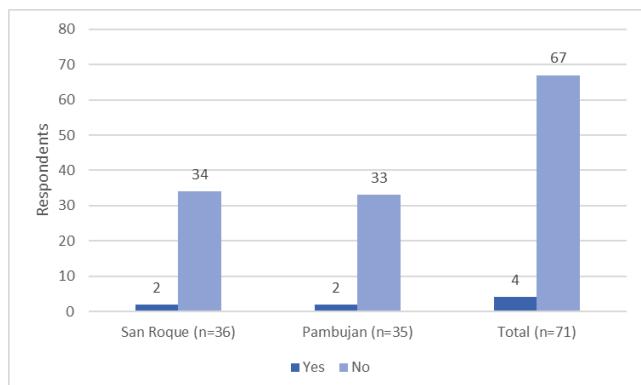


Figure 2: Availability of government subsidy to farmers due to damage caused by natural disasters.

Policy considerations

Despite the lack of government support in managing their animals during natural disasters, all farmer respondents unanimously agreed that livestock should be integrated into the government's disaster risk reduction and management (DRRM) programs. The farmers also proposed the establishment of animal evacuation centers, the provision of transport vehicles specifically for larger animals during relocation, opportunities to participate in DRRM seminars, and assistance with feeds and veterinary supplies. This study provides evidence for livestock-focused DRRM systems by synthesizing farmers' experiences with institutional gaps not only in Northern Samar but also in similarly hazard-exposed regions.

Aside from farmers' experience, this study also emphasized the significance of the public address system (PAS) in providing farmers with early warning of natural disasters. PAS, commonly known as "bandilyo" in the local dialect, is a traditional method of mobile public announcement that uses a trompa (a portable loudspeaker) or megaphones (Kumar & Kumar, 2024). Such guidance includes advice on safeguarding crops and livestock as preparedness measure before natural disasters strike. This includes safeguarding their crops and livestock as a preemptive measure against natural disasters. This data supports the previous report, which states that PAS is significantly associated with clarity of communication during natural disasters, especially in areas without electricity and strong internet signals, or among people with poor educational attainment (Banagbanag & Banagbanag, 2020). Nonetheless, reliance on traditional methods such as the PAS may be inadequate in modern contexts, where technology offers faster, more reliable communication for disaster preparedness, particularly in semi-urban or urban areas (Agbay et al., 2023).

CONCLUSION

In conclusion, the livestock farmers in Northern Samar demonstrated proactive disaster preparedness such as incorporation of livestock into household emergency plans, and implementing practical measures such as allocation feed resources and veterinary supplies, as well as animal relocation during natural disasters. However, these efforts were undertaken despite the absence of formal livestock evacuation facilities and limited institutional support.

To address the challenges faced by livestock during natural disasters and to promote a sustainable livestock and poultry industry, the development of a comprehensive animal management plan is crucial. Valuable insights and experiences from farmers, focusing on key aspects such as animal relocation sites and evacuation routes, should be actively incorporated by policymakers to strengthen support systems that supplement farmers' efforts. Enhancing both household resilience and animal welfare during natural disasters requires decisive action and shared responsibility

to protect farmers and their livelihoods amid unavoidable challenges.

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CONFLICT OF INTEREST

The authors declare no competing nor conflicting interests.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The authors declare that all procedures, as mentioned in this article, were in accordance with the Helsinki Declaration of the World Medical Association, updated in October 2024 as approved by the UEPCVM Research Committee Board with a protocol number 2024-001.

CONTRIBUTIONS OF INDIVIDUAL AUTHORS

KUR: Conceptualization of the project, analysis of results, and writing of the manuscript

NCA: Data gathering, and review and editing of the manuscript

DAE: Analysis of data

ARO: Data gathering

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