MEDIA KEDOKTERAN HEWAN VOL 36(3)
https://e-journal.unair.ac.id/MKH
ISSN Online: 2775-975X pISSN : 0215-8930

Direct Financial Losses and Lived Experiences of Smallholder Pig Farmers in ASF-Affected Areas of Surigao del Sur, Philippines

Kassey Alsylle T. Dargantes[1*], Vincent Rafael D. Siton[2], Arianne T. Ebora[2,3], Ted Aries A. Daguro[1], Lowella R. Angcos[3], Alan P. Dargantes[2,1]

Corresponding email: kingdargantes@gmail.com

[1]Department of Microbiology, Parasitology, Pathology, and Public Health, College of Veterinary Medicine,
[2]Department of Medicine, Surgery and Zootechnics, College of Veterinary Medicine,
[3]Department of Economics, College of Agriculture,
Central Mindanao University

Received: May 10th, 2025
Accepted: May 30th, 2025
Published: September 10th, 2025

Abstract

Following the first reported African Swine Fever (ASF) outbreak in Surigao del Sur in 2020, subsequent outbreaks have had a significant impact on smallholder pig farms across the province. This study aimed to estimate the direct financial losses due to ASF and to describe the lived experiences of affected smallholder farmers, specifically their perceptions, livelihood impact, management responses, and emotional distress, one year after the outbreak. A total of 108 smallholder pig farmers from three ASF-affected municipalities were interviewed using validated survey tools. Financial losses were calculated using a deterministic approach with descriptive statistics, while qualitative data were examined using Colaizzi's descriptive phenomenological method. Results showed that the outbreak affected 819 farms and 29 villages across eight municipalities. Direct financial losses were estimated at USD 39,795.85, averaging USD 736.96 per household. Phenomenological data revealed six themes: ASF knowledge, misconceptions, perceptions of transmission, economic impact, and control efforts. Many farmers also reported emotional distress due to the outbreak. This study provides valuable insights to guide targeted interventions, emphasizing veterinary outreach, biosecurity education, and community support to enhance resilience and reduce vulnerability in smallholder pig production systems.

Keywords

ASF, Financial Losses, Socioeconomic, Pigs

DOI: 10.20473/mkh.v36i3.2025.290-303

Introduction

Swine production remains a primary industry in the Philippine livestock sector, contributing significantly to rural livelihoods, food security, and the national economy (Ligue-Sabio *et al.*, 2025). However, the swine industry faced major setbacks recently, most notably the emergence and spread of African Swine Fever (ASF). ASF is a highly contagious viral disease in domestic pigs characterized by severe hemorrhagic fever and often results in mortality rates as high as 100% (WOAH, 2024). The World Organization for Animal Health (WOAH) classified ASF as a notifiable disease due to its significant socioeconomic impact, rapid transboundary spread, and high morbidity and mortality rates (Blome *et al.*, 2020).

In the Philippines, ASF remains the most significant threat to the country's swine industry, negatively impacting production systems and destabilizing the pig farming economy (Department of Agriculture, 2021). Following the first ASF outbreak in 2019, the swine industry experienced a 31% decline, with pig inventory dropping from 12.71 million heads in 2021 to an estimated 8.75 million in 2024 (Philippine Statistics Authority, 2021). ASF has spread across 17 regions and affected 73 provinces, including Surigao del Sur in the Caraga Region, the study site (Bureau of Animal Industry, 2025). Despite intensified control measures, new cases continue to emerge (The Pig Site, 2021), resulting in substantial economic losses, disruptions in the pork supply chain, increased meat prices, job insecurity, and heightened concerns over national food security (Cooper *et al.*, 2021; Ligue-Sabio *et al.*, 2025).

The Caraga region plays a key role in the Philippine swine industry, with production predominantly driven by smallholder farms (Philippine Statistics Authority, 2021). However, in November 2020, the first ASF case in Caraga was reported in Cortes, Surigao del Sur, leading to immediate depopulation measures (Lopez, 2020). By 2021, the cumulative effects of the ASF outbreak had become more evident, with additional cases reported among smallholder pig farms in several towns and villages of Surigao del Sur, including Bayabas, Tandag, and Tagbina (Lopez, 2020; Ochave, 2021). The region's pig production volume declined by 4.3% compared to 2020 (Philippine Statistics Authority, 2021).

Although ASF's epidemiological features are extensively documented, a significant gap remains in local data on its direct financial impact and social effects at the smallholder farm level in Surigao del Sur. Thus, this study was conducted to determine the direct financial losses and describe the lived experiences of smallholder pig farmers in areas affected by ASF outbreaks, using a phenomenological approach. These lived experiences encompass cognitive and experiential dimensions, particularly socioeconomic hardships, emotional responses, coping strategies, and perceptions of ASF, as captured through in-depth interviews. Understanding the socioeconomic cost of ASF at the smallholder farm level is essential to inform policy responses, steer recovery initiatives, and develop targeted support programs. This will ultimately assist local and national stakeholders in developing evidence-based strategies to mitigate future disease

outbreaks and further enhance the country's swine industry's resilience.

Materials and Methods

Study Sites and Time

This study was conducted in Surigao del Sur, a province located in the Caraga Region of Mindanao, Philippines, situated between 125°40′ and 126°20′ E longitude and 7°55′ and 9°20′ N latitude (8°32′25.766″ N, 126°6′52.113″ E) (Figure 1). The province experiences an average annual rainfall of 4,554mm and maintains a mean daily temperature of approximately 27°C throughout the year (Olaguera and Manalo, 2024). Out of the 17 towns and cities in Surigao del Sur, nine were confirmed ASF-positive during the study period (Figure 1). The study focused on three ASF-affected areas, Tagbina, Bayabas, and Tandag City, each with at least two affected villages. Eight accessible villages were randomly selected to ensure a representative sampling of affected households, as backyard pig farming is a common livelihood across most rural villages in the province. Random sampling minimized selection bias and allowed for a more generalizable understanding of the financial and experiential impacts of ASF among smallholder farmers (Thomas, 2023).

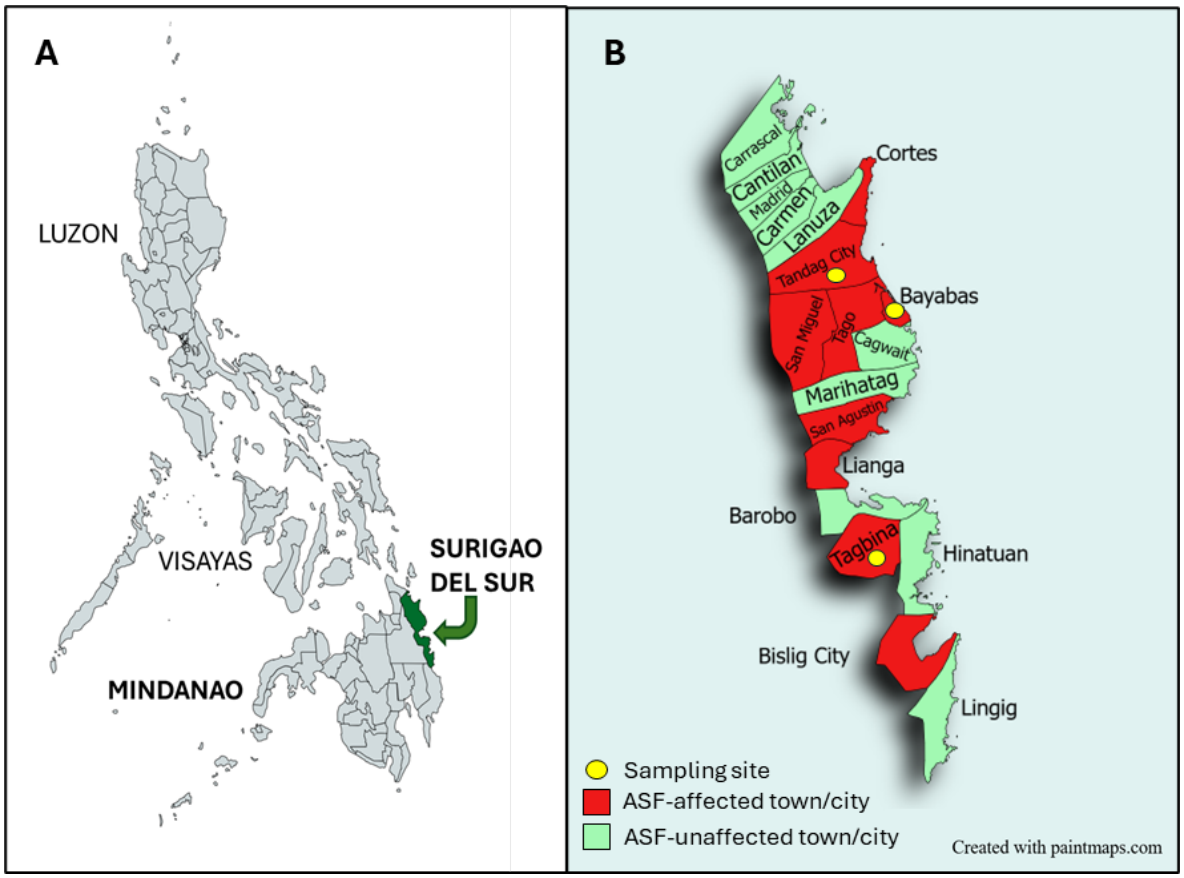

Figure 1. (A) Map of the Philippines showing Surigao del Sur, (B) highlighting the nine ASF-affected towns, and the sampling sites (●) (Information from the Provincial Veterinary Office of Surigao del Sur, 2021).

Included smallholder farms had at least one pig infected with ASF (Ouma *et al.*, 2018). The study was conducted in 2021, shortly after the first confirmed ASF case in Surigao del Sur in late 2020. This timing enabled the researchers to assess the immediate and direct financial impacts of the outbreak on smallholder pig farmers, while data were still recent and reflective of the acute phase of the crisis.

Respondents

The study surveyed 108 randomly selected smallholder pig raisers from ASF-affected farms in eight villages across Bayabas, Tandag City, and Tagbina, with 36 respondents per town/city. Eligible participants were adults (≥18 years old) from non-vulnerable populations who owned or directly raised pigs and were capable of providing informed consent. Individuals unable to consent, those with incomplete responses, or those not residing in the study areas were excluded (Ouma *et al.*, 2018; Yan *et al.*, 2023). Key informants, such as representatives from the Provincial Veterinary Office (PVO), Municipal Agriculture Offices (MAO), and local leaders, provided data for estimating financial losses.

Ethical Considerations

The study adhered to recognized ethical standards, with approved protocol by the university's Institutional Ethics Research Committee (IERC) (IERC control number 0288 s. 2021). Informed consent was obtained from the respondents following a briefing and explanation of the study's objectives, voluntary nature, data confidentiality, and the potential use of anonymized data in publications (National Privacy Commission, 2025). Formal request letters were sent to the provincial, municipal, and village local government units before data collection. Survey activities and schedules were coordinated in collaboration with the PVO, MAO, and village officials. Courtesy calls were made to all relevant offices, and respondents were notified in advance by their MAOs.

Survey on The Demographic Profile and Direct Financial Loses due to ASF

Data on the number of ASF-affected smallholder pig farms and swine populations were obtained from the PVO, MAOs, and village officials. These were cross-referenced with field survey data to validate the extent of outbreak impact.

Individual face-to-face interviews were conducted with respondents, using a pre-structured, standardized, and validated questionnaire written in English and Bisaya. Each interview lasted approximately 20–30 minutes. The tool was pilot-tested with 10 respondents in Maramag, Bukidnon, to assess clarity and validity, followed by necessary revisions. The questionnaire included two sections: (1) Demographic Profile, which included data on age, education, primary livelihood, number of pigs raised, ownership of other animals, and years of pig farming experience; and (2) financial losses. The direct financial losses were computed using deterministic models adapted from Escarlos *et al.* (2017) (Table 1).

Table 1. Formula used in the computation of direct financial losses.

Item/Indicator	Formula
Total financial losses for Surigao del Sur	Average financial losses per town × Number of towns affected
Average financial losses per town	Total financial losses per town ÷ Number of surveyed towns
Total financial losses per town	Average financial losses per village × Number of villages affected per town
Average financial losses per village	Total financial losses of town ÷ Number of surveyed villages
Total financial losses per village	Direct cost – Indemnification
Direct cost	Total mortality cost + Total culling cost + Total treatment and biosecurity cost + Total diagnostic cost
Total mortality cost	Total grower-finisher-sow-boars mortality cost + Total piglet mortality cost
Grower-finisher-sow-boars mortality cost	(Number of growers died × Avg. weight × Market price/kg) + (Number of finishers died × Avg. weight × Market price/kg) + (Number of sows died × Avg. weight × Market price/kg) + (Number of boars died × Avg. weight × Market price/kg)
Piglet mortality cost	Number of piglets × Market price per piglet
Total culling cost	Total grower-finisher-sow-boars culling cost + Total piglet culling cost
Grower-finisher-sow-boars culling cost	(Number of growers culled × Avg. weight × Market price/kg) + (Number of finishers culled × Avg. weight × Market price/kg) + (Number of sows culled × Avg. weight × Market price/kg) + (Number of boars culled × Avg. weight × Market price/kg)
Piglet culling cost	Number of piglets culled × Market price per piglet
Culling services cost	Total labor fees + Equipment cost + Other culling-related costs
Treatment and biosecurity cost	Cost of treatment (e.g., vitamins, antibiotics) + Cost of biosecurity (e.g., disinfectants, fencing, PPE)
Diagnostic cost	20% of pig herd size × Diagnostic test cost
Projected direct financial losses for Surigao del Sur	Average financial losses per village × 309 villages

Phenomenological Survey Interview

The study employed a descriptive phenomenological approach to investigate the lived experiences of smallholder pig farmers impacted by ASF, selecting eight participants from each affected town. Guided by the questions of "how" and "what" (Bevan, 2014), unstructured interviews using a semi-structured guide allowed participants to share how ASF impacted their households and communities freely. Each interview lasted 20–30 minutes. Data were collected using an interview guide, field notes, and an observation checklist, with audio recordings and direct observations documented. Data were analyzed using Colaizzi's method (Morrow *et al.*, 2015).

Statistical Analysis

The data collected were encoded and summarized using Microsoft Excel spreadsheets. Descriptive statistics were applied to summarize the demographic profile of respondents and calculate the direct financial losses incurred. Meanwhile, qualitative data from the phenomenological interviews were analyzed using MAXQDA software to extract themes and insights from the lived experiences of smallholder pig farmers affected by the issue.

Results and Discussion

Demographic Profile of Respondents

Table 2 presents the demographic characteristics of the 108 smallholder pig farmers interviewed across three ASF-affected towns in Surigao del Sur. The majority were middle-aged adults (31–55 years old), female, and married, with more than half having fewer than three children. All respondents had attended school, with most completing high school. Most respondents had over seven years of experience in smallholder pig raising. Additionally, awareness of ASF was high (92.59%), although a small percentage remained unaware. Major sources of ASF information included television/radio (25%), neighbors (21%), technicians (7%), and family members (7%) (Figure 2).

Table 2. Demographic profile of backyard pig raiser respondents (n=108) from three municipalities in Surigao del Sur.

Features	Number of Respondents	Percentage (%)
Age		
Older Adult	34	31
Middle Adult	61	56
Young Adult	13	12
Sex		
Male	36	33
Female	72	67
Status		
Married	103	95
Single	5	5
Number of Children		
Less than 3	59	55
More than 3	49	45
Educational Attainment		
Elementary	28	26
High school	56	52
College	24	22
Experience in Backyard Rising		
Less than 3 years	9	8
Between 3-7 years	17	16
More than 7 years	82	76

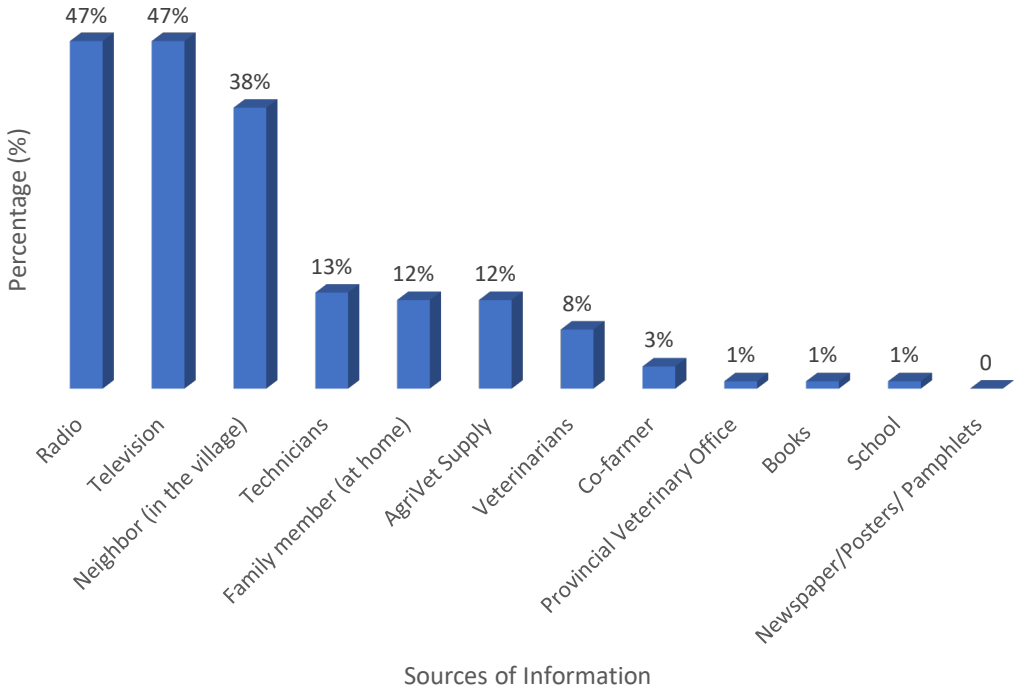

Figure 2. Distribution of information sources on African Swine Fever (ASF) as reported by the respondents.

Direct Financial Losses among Affected Pig Farms in Surigao del Sur

The number of affected towns and villages, as well as the total number of affected pigs, are presented in Tables 3 and 4, while the direct financial losses of the ASF-selected outbreak areas in Surigao del Sur, based on farmers' input, are presented in Table 5. The ASF outbreaks in the province resulted in substantial direct financial losses among smallholder pig farmers. Collectively, the three surveyed towns incurred losses amounting to USD 39,795.85. The average direct financial losses per town were approximately USD 13,265.28, USD 4974.48 per village, and an average of USD 736.96 per farmer. Overall, the estimated total direct financial losses for the nine affected towns in Surigao del Sur amounted to approximately USD 119,387.78, and for the entire province (17 towns), the losses were estimated at USD 676,530.74. Variations in losses across towns/villages can be attributed to differences in pig population densities, costs for diagnosis, treatment, biosecurity measures, veterinary services, and indemnification.

Table 3. Number of barangays and households affected in ASF-positive municipalities in Surigao del Sur (Provincial Veterinary Office and Municipal Agricultural Offices, 2021).

Municipality	Total no. of bara-ngay	No. of barangays affected (%)	Number of households		Total number of Affected Backyard farms
			With pig mortality	With pigs culled	
1. Tago	24	6 (25.00)	13	10	23
2. Bayabas*	7	5 (71.43)	44	49	93
3. Tandag City	21	5 (28.80)	88	48	136
4. Bislig City	24	4 (16.67)	9	9	18
5. Tagbina*	25	3 (12.00)	50	13	63
6. San Agustin	13	2 (15.38)	42	42	84
7. San Miguel	18	2 (11.11)	143	143	286
8. Cortes	12	1 (8.33)	57	57	114
9. Lianga	13	1 (7.69)	2	-	2
Total: 9	157	29 (57.88)	448	371	819

*Data from the Municipal Agricultural Office; -, no culling was done

Table 4. Total number of pigs affected pigs, either culled or died, in the ASF-affected municipalities of Surigao del Sur (Provincial Veterinary Office and Municipal Agricultural Offices, 2021).

Municipality	Pig Inventory (No. of Heads)	Number of Pigs		Total Number of Affected Pigs (%)
		Mortality (%)	Culled (%)	
Bayabas*	1,731	106 (6.12)	188 (10.86)	294 (16.98)
San Agustin	808	--	115 (14.23)	115 (14.23)
Cortes	1,478	--	165 (11.16)	165 (11.16)
Tagbina	5,203	211 (4.06)	22 (0.42)	233 (4.48)
San Miguel	7,569	--	244 (3.22)	244 (3.22)
Bislig City	3,922	--	156 (3.98)	156 (3.98)
Tandag City*	6,235	15 (0.24)	145 (2.33)	160 (2.57)
Tago	2,587	--	27 (1.04)	27 (1.04)
Lianga	312	--	--	0 (0.00)
Total: 9	29,845	332 (1.11)	1,062 (3.56)	1,394 (4.67)

*Data from the Municipal Agricultural Offices; --, no reported data available

Lived Experiences of Smallholder Pig Farmers in Surigao del Sur

Six themes were identified from the in-depth lived experiences survey with smallholder pig raisers (n = 24) in ASF-affected areas of Surigao del Sur: (1) Knowledge on ASF, (2) Misconceptions on ASF, (3) Viral transmission, (4) Swine farming as livelihood, (5) Impact of ASF on livelihood, and (6) Control and prevention of ASF (Table 5). These themes reflected the farmers' perceptions, struggles, and coping strategies during the ASF outbreak.

Table 5. Summary of the direct financial losses (US $) in selected ASF-outbreak areas in Surigao del Sur based on inputs from the backyard pig farmers

Direct Financial Losses	Municipality/City			
	Tagbina (n surveyed barangays=2) (US$)	Bayabas (n surveyed barangays=5) (US$)	Tandag City (n surveyed barangays=2) (US$)	Total (US$)
Total Direct Financial Loss (computed)	9804.86	19690.70	10300.33	39795.89
Average Financial Loss of surveyed				
per Farmer	544.71	1,093.93	572.24	736.96
per Barangay	4,902.43	4,922.67	5,150.17	4,974.49
per Municipality				13,265.30
Estimated total financial losses for the affected municipalities in SDS (n=9)				119,387.78
Projected total direct financial losses for the SDS (N=17)				676,530.74

n, number of affected municipalities/barangay; N, total number of municipalities in SDS

Table 6. In-depth lived experiences of smallholder pig farmers (n=24) in selected ASF-affected areas of Surigao del Sur.

Theme	Key Statements
Theme 1. Knowledge on ASF	*"ASF is a disease of pigs that cannot be treated."* *"The pig suddenly wouldn't eat, became weak, and then died after vomiting blood."*
Theme 2. Misconception on ASF	*"ASF might spread and cause disease to humans or other animals."*
Theme 3. Viral Transmission of ASF	*"It could be from the people selling cheap meat. We bought some, and that's when our pigs got sick."* *"It's possible the virus came from sausages and pork from outside the province."* *"ASF transmission from infected pigs mixed into their herd."*
Theme 4. Pig Farming as Livelihood	*"Raising pigs is the only thing I rely on. Without it, I have nothing."* *"Pig raising is just my sideline, but it paid for my child's education."*
Theme 5. Impact of ASF on Livelihood	*"We thought we'd earn from selling pigs. Now we have nothing."* *"Too much effect; four times the farmers' income was affected."*

Theme	Key Statements
	"We raised pigs for consumption. Now, we have to buy meat, which is expensive."
Theme 6. Control and Prevention of ASF	*"I reported it right away to the vet office."* *"We stopped feeding food scraps and cleaned the pens regularly."* *"We just follow what the government tells us to do."* *"What we need is an information campaign. People don't know how serious ASF is."*

Discussion

Direct Financial Losses among Smallholder Pig Farms in Surigao del Sur

The present study only considered the direct financial losses incurred by smallholder pig farmers due to ASF; yet, the results clearly show that the financial losses associated with ASF are substantial. This study revealed that ASF caused substantial direct financial losses among smallholder pig farmers in Surigao del Sur. On average, affected farmers lost approximately USD 736.96 per household, a considerable amount given the local economic context. These financial losses were primarily due to pig mortality, culling, treatment, and biosecurity expenditures. In some survey areas, the financial burden on farmers has been partly alleviated due to the government's financial assistance in the form of indemnification and insurance. While government programs, such as indemnity payments and insurance support, have helped cushion the burden for some, others were left uncompensated due to unmet requirements, procedural issues, or a lack of information on available assistance programs (Provincial Veterinary Office (PVO), pers. com., 2021). Some smallholder pig farmers have not received any indemnification for failing to cooperate with the mandated depopulation and culling protocol, or have received limited funds from the concerned villages. Additionally, not all farmers took advantage of the free insurance offered by the government due to misinformation and other reasons (PVO, pers. com., 2021).

These findings highlight the vulnerability of smallholder farms to the negative impacts of ASF and similar animal health emergencies. The sudden loss of pigs due to death or culling translates into the loss of a vital income stream, decreased household food security and savings, reduced access to protein sources, and a limited capacity to manage unforeseen expenses. Smallholders often lack formal safety nets, insurance coverage, or access to veterinary services, making recovery from such losses slow and complex, as they rely solely on their limited savings or external assistance.

ASF is among the most serious pig diseases, spreading rapidly through unregulated human movement near outbreak sites (WOAH, 2024; DA, 2021). Globally, it has resulted in significant economic losses, particularly in countries that rely heavily on pig farming. In 2018, China lost approximately 43 million pigs, resulting in losses of up to USD 111.2 billion (You *et al.*, 2021). Meanwhile, Vietnam reported a 20% pig mortality rate, with losses ranging between USD 880 million and USD 4.4 billion (Nguyen-Thi *et al.*, 2021; Ligue-Sabio *et al.*, 2025). Although this current study focused on a single province, the

experiences of smallholder pig farmers resonate strongly with the global ASF impact patterns (Sánchez-Cordón *et al.*, 2018; Nguyen-Thi *et al.*, 2021; You *et al.*, 2021). Despite the difference in scale, the depth of vulnerability disruption to livelihoods and household income in the studied province mirrors what has been observed in broader, national contexts. These local realities emphasize that even at a smaller geographic scope, the socioeconomic burden of ASF can be profoundly damaging; thus, there is a need for enhanced support systems.

Lived Experiences of ASF-affected Smallholder Pig Farmers

This study captured the in-depth lived experiences of smallholder pig farmers in Surigao del Sur, highlighting the multifaceted impact of ASF on livelihoods, knowledge, and disease response. At the same time, most respondents recognized ASF as a deadly, untreatable disease and identified common symptoms like fever, anorexia, and vomiting of blood. Many held misconceptions in the belief that ASF is zoonotic. Such misunderstandings hinder effective biosecurity, delay reporting, and contribute to the stigma, emphasizing the need for targeted, culturally sensitive education campaigns (Dixon *et al.*, 2019). The survey respondents also identified transmission risks, including swill feeding, poor carcass disposal, contaminated meat trade, and exposure to travelers. In one town in Surigao del Sur, an outbreak was linked to a vendor selling pork from an area affected by ASF. These findings align with previous research that has linked ASF spread to human behaviors, local practices, and poor movement control (Hsu *et al.*, 2023; Fernandez-Colorado *et al.*, 2024).

Additionally, the results emphasized the vital role of smallholder pig farming in sustaining rural households in Surigao del Sur. Pig raising served as a primary or supplementary income source for many families in the province, supporting food security, daily needs, education, and as a financial cushion during emergencies. These reflect the broader significance of smallholder pig farming in rural communities, as also documented by Arvidsson (2023), Hadar *et al.* (2017), and the FAO (2011). However, the sudden loss of pigs due to ASF resulted in severe financial distress and a devastating impact on household livelihoods in the province. Many farmers reported losing their entire investment. Their narratives demonstrate not only the material and financial loss but also the emotional toll of ASF outbreaks.

The study also found that formal veterinary consultation was relatively infrequent among respondents, despite a 92.59% awareness rate of ASF. This gap may be attributed to the limited availability and accessibility of veterinary personnel in some rural areas. As a result, many farmers relied on advice from agri-veterinary stores or chose to manage sick pigs on their own, with some opting not to intervene at all. These practices reflect broader challenges reported in smallholder pig farming, aligning with the findings of Ligue-Sabio *et al.* (2025), Haldar *et al.* (2017), and Conan (2023). Moreover, farmers expressed the need for more community-based education, indicating their openness to learning and recognition of the value of accessible, accurate information and clear guidance. The findings also reflect diverse experiences with the ASF outbreak response. While some farmers followed protocols, others expressed

uncertainty about appropriate control measures.

The findings of this study call for strengthened community awareness, village-level movement control, and farmer-centered regulations to support LGU's ongoing actions (Ligue-Sabio *et al.*, 2025). Encouraging greater engagement with animal health services is important, particularly by addressing accessibility and familiarity gaps among smallholder farmers (Hsu *et al.*, 2023). Additionally, efforts should not only focus on raising awareness but also be followed by periodic surveillance and targeted screening of suspected ASF cases to ensure timely detection and containment. Complementing these efforts with inclusive compensation schemes, livelihood recovery programs, and social safety nets can help alleviate the burden on ASF-affected households/farms. Continually empowering farmers with resources, knowledge, and appropriate incentives promotes early reporting and adoption of sustainable biosecurity practices (Fernandez-Colorado *et al.*, 2024). Finally, integrating their lived experiences and strengthening grassroots education can contribute to a more inclusive, locally grounded ASF control strategy (Kalpravidh and Holley, 2019).

Conclusion

ASF has had a significant impact on smallholder pig farms in Surigao del Sur, resulting in substantial financial losses and complex social challenges. ASF outbreaks have affected over 1,394 pigs across 819 farms in 29 villages, with direct financial losses estimated at USD 39,795.93 in surveyed towns, USD 119,387.78 across nine affected towns, and up to USD 676,530.74 for the entire province. Farmers' lived experiences reveal a mix of awareness, compliance, and adoption of preventive practices; however, some gaps in information, veterinary consultations, and access to resources remain. Notably, many respondents express a strong interest in receiving greater support through education and local animal health services, utilizing a community-based and coordinated approach.

Approval of Ethical Commission

The research was conducted in line with acceptable ethical standards, as approved by the CMU Institutional Ethics Research Committee, with IERC control number 0288 s. 2021.

Acknowledgement

The research team gratefully acknowledges the Bureau of Animal Industry, Central Mindanao University, and the College of Veterinary Medicine for their funding and institutional support. Sincere thanks to the team, collaborators of Surigao del Sur, and the GREASE Network for their valuable contributions.

Author's Contribution

KATD and APD: Conceptualization. KATD and VRDS: Data analysis, field survey, data analysis, and original draft preparation. ATE and TAAD: Review and editing. LRA: Economic analysis and review. APD: Supervision, funding acquisition, and final review.

Conflict of Interest

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

References

Agüero, M., Fernández, J., Romero, L., Sánchez Mascaraque, C., Arias, M., and Sánchez-Vizcaíno, J.M., 2003. Highly sensitive PCR assay for routine African swine fever virus diagnosis in clinical samples. *J.Clin.Microbiol.*, 41(9), pp.4431-4434. DOI: https://doi.org/10.1128/jcm.41.9.4431-4434.2003.

Arvidsson, A., Fischer, K., Chenais, E., Kiguli, J., Lewerin, S., and Ståhl, K., 2023. Limitations and opportunities of smallholders' practical knowledge when dealing with pig health issues in northern Uganda. *PLoS.One*; 18(6), e0287041. DOI: https://doi.org/10.1371/journal.pone.0287041.

Bevan, M.T., 2014. A Method of Phenomenological Interviewing. *Qualitative Health Research*, 24(1), pp.136-144. DOI: https://doi.org/10.1177/1049732313519710.

Blome, S., Franzke, K., and Beer, M., 2020. African swine fever - A review of current knowledge. *Virus.Res.*, 287: 198099. DOI: https://doi.org/10.1016/j.virusres.2020.198099.

Cooper, T.L., Smith, D., Gonzales, M.J.C., Maghanay, M.T., Sanderson, S., Cornejo, M., Pineda, L.L., Sagun, R.A.A., and Salvacion, O.P., 2021. Beyond Numbers: Determining the Socioeconomic and Livelihood Impacts of African Swine Fever and Its Control in the Philippines. *Front.Vet.Sci.*, 8:734236. DOI: https://doi.org/10.3389/fvets.2021.734236.

Department of Agriculture. 2021. Implementing guidelines for the "Bantay ASF sa barangay" program.

Dixon, L.K., Sun, H., and Roberts, H., 2019. African swine fever. *J.Antiviral.*, 165: pp.34-41. DOI: https://doi.org/https://doi.org/10.1016/j.antiviral.2019.02.018.

Escarlos Jr, J., Cane, J.F., and Dargantes, A., 2017. Knowledge, attitudes, practices (KAP), and financial losses of buffalo raisers due to Surra among selected villages in Southern Philippines. *Jurnal Ilmu Ternak dan Veteriner*, 21:190.

Fernandez-Colorado, C.P., Kim, W.H., Flores, R.A., and Min, W., 2024. African Swine Fever in the Philippines: A Review on Surveillance, Prevention, and Control Strategies. *Animals,* 14(12). 1816. DOI: https://doi.org/10.3390/ani14121816.

Hsu, C. H., Schambow, R., Montenegro, M., Miclat-Sonaco, R., and Perez, A., 2023. Factors Affecting the Spread, Diagnosis, and Control of African Swine Fever in the Philippines. *Pathogens*, 12(8), 1068. DOI: https://doi.org/10.3390/pathogens12081068.

Kalpravidh, W., and Holley, C.K., 2019. Strengthening the cooperation on African swine fever prevention and control in the Asia–Pacific region. Asia – OIE Regional Commission. DOI: http://dx.doi.org/10.20506/TT.2989

Ligue-Sabio, K. D. B., Lacaba, M.F.T., Mijares, J.E.C., Murao, L.A.E., and Alviola, P.A., 2025. Spatiotemporal patterns and risk factors for African swine fever-affected smallholder pig farms in Davao Region, Southern Philippines. *Preventive Veterinary Medicine*, 239:106495. DOI: 10.1016/j.prevetmed.2025.106495.

Lopez, A. 2020. DA confirms 'isolated' ASF case in Caraga. Philippine News Agency.

Mato-Amboage, R., Touza, J., and Soliño, M., 2022. Understanding Farmers' Preferences Towards Insurance Schemes that Promote Biosecurity Best Management Practices. *International Journal of Disaster Risk Science*, 13(5), pp.705-715. DOI: https://doi.org/10.1007/s13753-022-00435-0.

Morrow R, Alison, R., and Nigel, K., 2015. Colaizzi's descriptive phenomenological method. *The psychologist*, 28(8), pp.643-644.

Nguyen-Thi, T., Pham-Thi-Ngoc, L., Nguyen-Ngoc, Q., Dang-Xuan, S., Lee, H.S., Nguyen-Viet, H., Padungtod, P., Nguyen-Thu, T., Nguyen-Thi, T., Tran-Cong, T., and Rich, K.M., 2021. An Assessment of the Economic Impacts of the 2019 African Swine Fever Outbreaks in Vietnam. *Front.Vet.Sci.*, 8, 686038. DOI: https://doi.org/10.3389/fvets.2021.686038.

Ochave, R. M. 2021. Active ASF cases recorded in 8 provinces.

Olaguera, L. M. P., and Manalo, J.A., 2024. Climatological analysis of rainfall over Hinatuan, Surigao del Sur in eastern Mindanao—the wettest location in the Philippines. *Theoretical and Applied Climatology*, 155(12), pp.10069-10085.

Ouma, E., Dione, M., Birungi, R., Lule, P., Mayega, L., and Dizyee, K., 2018. African swine fever control and market integration in Ugandan peri-urban smallholder pig value chains: An ex-ante impact assessment of interventions and their interaction. *Preventive Veterinary Medicine*; 151, pp.29-39. DOI: https://doi.org/https://doi.org/10.1016/j.prevetmed.2017.12.010.

Philippine Statistics Authority. 2021. Swine situation report, January-March 2021. https://psa.gov.ph/livestock-poultry-iprs/swine/production.

Sánchez-Cordón, P. J., Montoya, M., Reis, A.L., and Dixon. L.K., 2018. African swine fever: A re-emerging viral disease threatening the global pig industry. *Vet.J.*, 233, pp.41-48. DOI: https://doi.org/10.1016/j.tvjl.2017.12.025.

The Pig Site. 2021. Philippines declares "state of calamity" due to ASF. https://www.thepigsite.com/news/2021/05/philippines-declares-state-of-calamity-due-to-asf.

Thomas, L. 2023. Simple random sampling. Definition, steps & examples. Scribbr.

World Organisation for Animal Health (WOAH). 2024. Addressing African swine fever: Protocols and guidelines for laboratory diagnosis. Paris, 38. DOI: https://doi.org/10.20506/asf.3475. Licence: CC BY-SA 3.0 IGO.

Yan, Z., Wang, M., Li, X., and Jiang, H., 2023. Impact of African Swine Fever Epidemic on the Cost Intensity of Pork Production in China. *Agriculture*, 13(2), 497. DOI: https://www.mdpi.com/2077-0472/13/2/497.

You, S., Liu, T., Zhang, M., Zhao, X., Dong, Y., Wu, B., Wang, Y., Li, J., Wei, X., and Shi, B., 2021. African swine fever outbreaks in China led to gross domestic product and economic losses. *Nat.Food.*, 2(10), pp.802-808. DOI: https://doi.org/10.1038/s43016-021-00362-1.