

# The Condition Of Swine Industry In Calawitan San Ildefonso Bulacan After The Proliferation Of African Swine Fever: An Assessment

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**Abstract:** *The study aimed to determine the possible effects brought by ASF to the business of the hog raisers in Calawitan, San Ildefonso, Bulacan. ). This study used descriptive research design to describe the variables using structured interview and survey questionnaires. A total population of 103 recorded hog raisers in Calawitan San Ildefonso, Bulacan with a 20 people as sample using systematic sampling are the respondents in the study. The results revealed that ASF has no significant effect to the swine industry meaning, the barangay is not highly exposed to the virus for it only affected a small number of hogs. However, the surrendering of pigs had a negative impact to the income of the respondents.*

**Keyword:** African Swine Fever, Swine Industry, Demographic data

## THE PROBLEM AND ITS BACKGROUND

### Introduction

African Swine Fever (ASF), according to World Organization for Animal Health (2018), is a highly contagious hemorrhagic viral disease of domestic and wild pigs, which gives a huge impact to the economic and production process of a state. Despite that, pork meat is still safe for human consumption as long as they came from a reliable source and well-cooked (Rocamora J. A. L., 2019).

Just recently, the neighbor countries of the Philippines like China, Vietnam and Thailand suffer from ASF virus which weakens the swine industry in their respective countries. In September 2019, Philippines unfortunately confirmed to have the same virus.

Department of Agriculture Secretary, William Dar, remarked that the virus came to the Philippines due to the smuggled pork from China (Rivas R. 2019). The total pig population of the Philippines is around 13 million head, including a 1.75 million sow population (McOrist S., 2019). Many provinces in the country were being affected namely Bulacan, Rizal, Pampanga and some cities like Quezon and Antipolo.

Due to this issue, the meat production dropped after 70, 000 pigs have been killed (Simeon L.M. and Brago P., 2019). Many hog raisers went bankrupt because the Local Government Units (LGUs) mandate to surrender their pigs to bury. As a compensation, LGUs offered Php 3,000 per pig head.

ASF did not only affects the swine production but also the households. This study aims to determine the number of affected hog raisers in Calawitan San Ildefonso, Bulacan. It also ought to assess the effects of ASF to the business of backyard hog raisers.

The sudden proliferation of ASF in the country brought nightmares to the swine industry. This study will help the community in assessing the intensity of its effect on the local hog raisers. Also, to the help of the local government of San Ildefonso in terms of allocating budget to the affected citizens.

### Statement of the Problem

As ASF virus came to the country, many hog raisers especially the backyard hog raisers were being affected. Our country already lost thousands of pigs and revenues from the swine industry since then. In November 2019, Barangay Calawitan San Ildefonso, Bulacan facilitate the surrendering of pigs, which results to a serious problem to their meat production. This mixed qualitative and quantitative study ought to determine the possible effects brought by ASF to the business of the hog raisers in Calawitan.

Specifically, the researchers would like to determine the following:

1. The demographic profile of the students.

- 1.1. Age
- 1.2. Sex
- 1.3. Occupation
- 1.4 Civil Status
2. The number of affected hogs by African Swine Fever in Calawitan S.I.B.
3. The number of hog raisers in C.S.I.B.
4. To assess the effects of ASF to the swine industry in C.S.I.B.

### Hypothesis of the study

To achieve the objectives of the study set by the researchers, the following hypotheses with 0.05% level of significance were formulated:

H<sub>o1</sub>: There is no significant relationship between ASF and the swine industry.

H<sub>a1</sub>: There is a significant relationship between ASF and the swine industry.

### Theoretical Framework

The researchers used a theory to assess broadly the current condition of swine industry in Calawitan San Ildefonso, Bulacan after the proliferation of ASF virus.

A new influenza virus discovered in Missouri pigs has a combination of genes from avian and swine flu viruses, supporting the theory that pigs can serve as a mixing vessel for flu viruses.

The theory contains the idea that swine or pigs can be a carrier of virus more particularly influenza. Due to the case of the pigs in Missouri the idea of "Mixing Vessel's" has been made. According to this theory by Robert Roos (2007), pigs can actually be infected by virus. In an investigation there was a trace of H2N3 virus which can cause illnesses to mice and can be transmitted to mammals like pigs. Understanding this theory may raise awareness about the capacity of other mammals in carrying virus, which gives a lesson to the people to take extra care.

In assessing the condition of our swine industry after the coming of ASF, this theory of "Mixing Vessel" can be very essential as it helps in building up the thought that the ASF virus can be easily transmitted among pigs. This may also prove how rapid the growth and how big the damage that the virus in swine can be. "Mixing Vessel" can be used as a guide where the researchers can theorize their study.

### Conceptual Framework

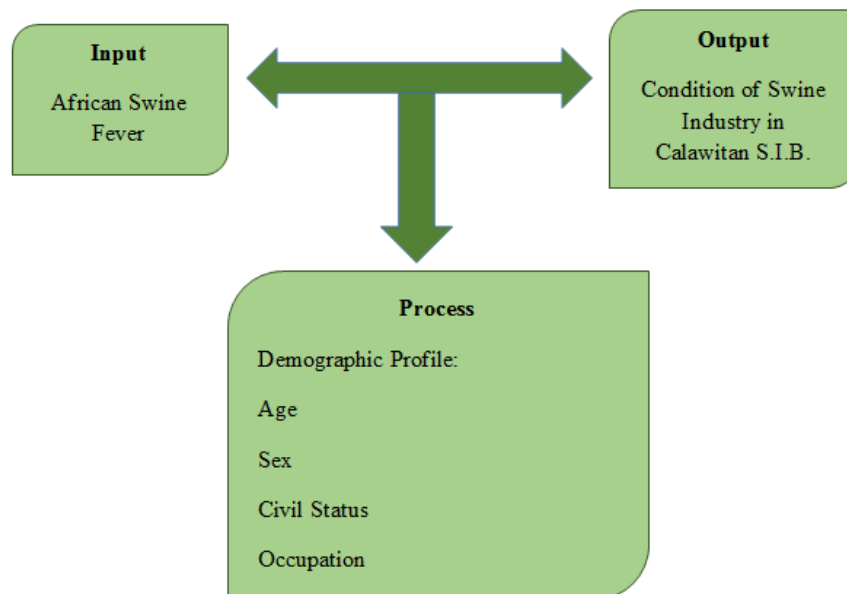


Figure 1. Paradigm of the Study

To explain broadly the concepts between the two variables, the researchers used the I-P-O model or the Input-Output-Process.

The Paradigm of the study was presented in Figure 1. In the first box on the left side is where the input is located, which includes the independent variable or the ASF virus. While the box at the right side contains the output or the dependent variable or the condition of the swine industry Calawitan S.I.B. lastly, the box below between the two variables indicates the process which includes the demographic profile of the respondents such as, age, sex, civil status and occupation.

### Significance of the Study

The result of this is found to be beneficial to the following:

**Hog Raisers.** This assessment on the current condition of the swine industry can be beneficial to the backyard hog raisers since it will present the effects of ASF and the status of the industry. It can also raise awareness on how necessary the role of swine in the economy.

**Local Government Unit.** Due to the ASF virus, our meat production was greatly affected. This quantitative research will determine the numbers of affected hog raisers which can help them in allocating the budget to compensate the damages.

**Future Researches.** This study is significant in assessing further the effects of ASF virus in country. The future researchers can use this as a reference guide in conducting the similar studies.

### Scope and Delimitation

One of the heated arguments in agriculture recently is the proliferation of ASF virus in the country. Due to that the researchers will conduct a study that will assess the effects and the current condition of the swine industry.

This mixed study is descriptive in nature for it ought to describe the effects of the ASF in the swine industry at Calawitan San Ildefonso, Bulacan. The researchers used survey questionnaire to gain accurate data regarding the topic. The respondents is limited to the backyard hog raisers on the particular location of Barangay Calawitan only.

The study is delimited to the non-backyard hog raisers while the hog raisers from other barangays is also excluded. The researchers exclude them to have a focus on the study.

### Definition of Terms

For better clarification and understanding of the terms related to this study, the following are defined lexically and operationally:

**African Swine Fever.** A virus that infected the pigs which cause a plunge in the meat production. The ASF pathogen is a virus infects domestic pigs and wild boar and which leads to severe, often lethal, disease in these animals. It is transferred via direct contact or with excretions from infected animals or through ticks (BFR, 2019).

**Demographic data** refers to socio-economic information expressed statistically, also including employment, education, income, marriage rates, birth and death rates and more factors (Chappelow J., 2019).

**Swine.** They are considered as dirty animal because in free-range environments they eat primarily garbage and feces. Any attempts to alter this free-range environment would involve confining the swine and feeding them (Herbold N. H.,2003).

**Swine Industry.** A sector of government which is involved in mammals which are stout-bodied and short-legged omnivorous.

## REVIEW OF RELATED LITERATURE AND STUDIES

Philippines has been jolted by the proliferation of African Swine Fever (ASF) which causes a wide-spread death of the pigs in the country. Several household-hog raisers have lost an income due to this unfortunate epidemic.

Though ASF is lethal to swine it does not affect the welfare of the humans as assured by different organizations namely World Health Organization (WHO), Department of Health (DOH) and Department of Agriculture. But this is surely had a huge impact to the lives of people especially to the profitability of the economy.

There is an allegation that the virus was from our neighboring country, China, which is also suffering from ASF since we are importing meat products and canned goods from them. In fact, ASF has a significant effect on the Chinese pig industry and the Chinese economy. Changes in pig meat prices and domestic production can affect the Chinese economy because pig meat is the most consumed meat in China. In the year to August 2019, retail pork prices rose by 47%, contributing to a 10% increase in the food price index.

Between January and June 2019, according to official Chinese production statistics, Chinese pig production fell by 6% year-on-year. Lower Chinese production has resulted in an increase in Chinese pig meat imports—mostly from the European Union and the United States. In 2019–20 Chinese import demand is forecast to increase further, driving up global pig meat prices. The risks to global prices are amplified by Chinese trade tensions with Canada and the United States, both major pork exporting countries.

Pitts N. and Whitnall T. (2019), reported that African swine fever (ASF) has spread to every province in China since the first official report in August 2018. Outbreaks of the disease have also been reported in neighboring Asian countries and in wild pig herds in Europe. The impact of ASF on the global pig meat industry is only gradually becoming clear.

Chinese Government statistics indicate a 26% year-on-year decline in the national pig herd at 30 June 2019, but some industry estimates are as high as 40%. ASF in China will have a significant impact on global agricultural markets. This is because China has around 50% of the global pig herd and accounts for around 50% of global pig meat consumption. This article examines how ASF is likely to affect global and Australian agricultural markets.

Clark J.K. (2019), The outbreak of African Swine Fever (ASF) in China is making headlines as it impacts the biggest pork market in the world. Industry experts consider this a ‘transformational event’ for the global pork sector that is ‘creating a devastating effect.’

With China being the biggest producer, importer and consumer of pork globally, the ASF outbreak has a massive impact on the Chinese and international market. China accounts for 48% of the world’s pork production producing almost 55 million tonnes (mt) per annum in 2018. Despite being such a large producer, the country has been unable to produce enough to meet its domestic demand with the country importing 1.6 mt of pork in 2018. Whilst this number sounds insignificant compared to total Chinese production, it is very significant as it relates to the global traded pork market accounting for approximately 20% of world trade.

Moreover, Calxin (2019), stated that the impact of African swine fever hits China as consumer inflation hit its highest level in nearly six years as its consumer price index (CPI) edged up 0.2 percentage points to a 3% year-on-year rise. At the same time the producer price index (PPI), which tracks the prices of goods circulated among manufacturers and mining companies, fell 1.2%. An almost 70% rise in the price of pig meat contributes 1.65 percentage points to CPI growth.

According to Costard S., Zagmutt F., Porphyre T., and Pfeiffer D.O. (2015), the expanding distribution of African swine fever (ASF) is threatening the pig industry worldwide. Most outbreaks occur in backyard and small-scale herds, where poor farmers often attempt to limit the disease’s economic consequences by the emergency sale of their pigs. The risk of African swine fever virus (ASFV) release via this emergency sale was investigated. Simulation modeling was used to study ASFV transmission in backyard and small-scale farms as well as the emergency sale of pigs, and the potential impact of improving farmers and traders’ clinical diagnosis ability-its timeliness and/or accuracy-was assessed. The risk of ASFV release was shown to be high and improving farmers’ clinical diagnosis ability does not appear sufficient to effectively reduce this risk. Estimates obtained also showed that the distribution of herd size within the backyard and small-scale sectors influences the relative contribution of these farms to the risk of release of infected pigs. These findings can inform surveillance and control programs.

A study to evaluate the impact of an African swine fever (ASF) outbreak in smallholder pig units in Rombo district of Kilimanjaro, Tanzania during the period of October 2013 was conducted by Swai E.S. (2014). The study involved 1085 smallholder farmers who owned pigs (n=5322) at different ages and stages of maturity during the period of March to September 2013. Information on the number of pigs owned pre- and post the ASF outbreak was collected through face-to-face interviews, direct farm observations and secondary data were retrieved from various district livestock office reports. This survey revealed that the pig density in Rombo district was 17/km<sup>2</sup> and average herd size to be 5 (range, 1- 57), higher than the national average of 3 (range 2-48). The overall revenue accrued from sales of live pigs and pork between 2005-2012 amounted to Tsh 65 million to 102 million and 257 million to 566 million per annum, respectively. Mortality losses specifically arising from the ASF outbreak were 84% (range 46-97) and on average the number of pigs lost per household was 4 (range 1-50). Translation of such mortality figures into financial terms produces a loss of Tsh 160.632 million, indicating that ASF is a deadly and devastating disease that can disrupt the pig industry and the entire local economy.

According to Samuel A. Agbede (2019), as African Swine Fever (ASF) continues to pose major economic and health challenges to pig production in south western Nigeria, it is needful to design clear maps of its spread risk pattern in predictive surveillance mode and proffer logical framework for its containment promotion. In this study, the authors identified ten environmental features related to ASF outbreak in six states of south western Nigeria and used them as explanatory variables for its distribution pattern in Oyo State, 2001-2008. Classical and spatial regression models were computed on all environmental features, including; proximity to ASF virus infected farm, pig slaughter facility, free-range pigs, pig population density, presence of wild pigs, stock trade middle-men, off-farm feed production, off-farm stock mating, perimeter fence and shared feed delivery vessel. A significant ( $p < 0.05$ ) spatial auto-correlation was found between ASF cases and the environmental features considered in this study. We inferred that certain environmental features influenced the transmission of ASF along spatial gradient to pig farms in Oyo State. The risk factors identified in this study offered clear perspectives of passive, active and predictive surveillance with logical framework for more effective control and containment of ASF in south western Nigeria.

As for the Philippines, the Department of Agriculture (DA) announced that 14 out of the 20 samples submitted to the World Animal Health (OIE) Reference Laboratory for Swine Diseases in the United Kingdom have tested positive for African Swine Fever (ASF). According to the DA, seven areas in two provinces in Luzon have been affected by ASF. These are Rizal Province (Rodriguez and Antipolo) and Bulacan (Guiguinto). The DA reports that a total of 7,416 pigs within the 1-kilometer radius of the affected areas in Rizal and Bulacan have been culled. The results of another test, which will determine strain and virulence of ASF, are still pending. ASF has caused serious production and economic losses in the region, and its impact in the Philippines will depend on the government and private sector's ability to limit its spread from the initially affected areas (Foreign Agricultural Service, 2019).

However, Chenais, E., Boqvist, S., Emanuelson, U., Brömssen, C. von, et.al (2017) investigated the socio-economic impact of ASF outbreaks at household level in northern Uganda. In a longitudinal study, structured interviews with 200 randomly selected, pig-keeping households were undertaken three times with a six-month interval. Questions related to family and pig herd demographics, pig trade and pig business. Associations between ASF outbreaks and economic and social impact variables were evaluated using linear regression models. The study showed that pigs were kept in extreme low-input-low-output farming systems involving only small monetary investments. Yearly incidence of ASF on household level was 19%. Increasing herd size was positively associated with higher economic output. The interaction between ASF outbreaks and the herd size showed that ASF outbreaks were negatively associated with economic output at the second interview occasion and with one out of two economic impact variables at the third interview occasion. No significant associations between the social impact variables included in the study and ASF outbreaks could be established. Trade and consumption of sick and dead pigs were coping strategies used to minimize losses of capital and animal protein. The results indicate that causality of social and economic impact of ASF outbreaks in smallholder systems is complex. Pigs are mostly kept as passive investments rather than active working capital, complicating economic analyses and further disqualifying disease control arguments based only on standard economic models.

Also, based on the article made by Gatpolintan L. (2019), the African swine fever (ASF) situation will not have a significant impact on consumer prices, with inflation rate expected to average below target of 3.2 percent this year, according to the country's chief economist.

"I don't think (its impact is) significant. Inflation is not going to spike for sure," Socioeconomic Planning Secretary Ernesto Pernia told reporters Monday.

He did not consider the ASF situation a risk in inflation expectations for the remainder of the year.

"Chicken is okay, people are able to substitute chicken for pork," Pernia, also the Director-General of the National Economic and Development Authority (NEDA), added.

Meanwhile, the most significant knowledge gaps in the prevention and control of African swine fever (ASF) were identified by the EU Veterinary services and other stakeholders involved in pig production and wild boar management through an online survey. The respondents were asked to identify the major research needs in order to improve short-term ASF risk management. Four major gaps were identified: 'wild boar', 'African swine fever virus (ASFV) survival and transmission', 'biosecurity' and 'surveillance'. In particular, the respondents stressed the need for better knowledge on wild boar management and surveillance, and improved knowledge on the possible mechanism for spread and persistence of ASF in wild boar populations. They indicated the need for research on ASFV survival and transmission from the environment, different products such as feed and feed materials, and potential arthropod vector transmission.

In addition, several research topics on biosecurity were identified as significant knowledge gaps and the need to identify risk factors for ASFV entry into domestic pig holdings, to develop protocols to implement specific and appropriate biosecurity

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measures, and to improve the knowledge about the domestic pig–wild boar interface. Potential sources of ASFV introduction into unaffected countries need to be better understood by an in depth analysis of the possible pathways of introduction of ASFV with the focus on food, feed, transport of live wild boars and human movements. Finally, research on communication methods to increase awareness among all players involved in the epidemiology of ASF (including truck drivers, hunters and tourists) and to increase compliance with existing control measures was also a topic mentioned by all stakeholders (Alvarez, J., Bicout, D., Boklund, A., Botner A., 2009).

### METHODOLOGY OF THE STUDY

This chapter described the operational plan of work or strategy. Several activities in the plan includes the following; methods and techniques, population and sample of the study, instrument of the study, data processing, and statistical treatment.

#### Methods and Techniques Used

This study used both qualitative and quantitative approach to analyze and interpret the data. It particularly used the descriptive research design. Which means that researchers interpreted the collected data using words and numbers. Also, researchers observed and described the effects of African Swine Fever to the business of every hog raisers in Calawitan San Ildefonso, Bulacan.

Furthermore, according to Kowalczyk D., (2020), descriptive research design is ought to depict the participants in an accurate way. More simply put, descriptive research is all about describing people who take part in the study.

#### Instrument of the Study

The primary instrument used in the study in collecting data and information is survey questionnaire. Survey questionnaire has two parts; the first part includes the participants' demographic profile in terms of age, sex, occupation and civil status while the second part includes the key questions that are related to the variables of the study which are African Swine Fever and the business of the hog raisers in Calawitan San Ildefonso, Bulacan. The researchers interpreted the gathered information through the use of mixed quantitative and qualitative approach.

In addition, a survey questionnaire is a set of questions used in a survey. The survey questionnaire is a type of data gathering method that is utilized to collect, analyze and interpret the different views of a group of people from a particular population. Furthermore, survey questionnaire is a very well-known and widely-used research technique for quickly and efficiently gathering and analyzing data from a population under study (Escribano M. & Hewitt R., 2017).

#### Population and Sample of the Study

Based on the record given by the Office of the Municipal Agriculturist of San Ildefonso there is a total of 103 residents who surrendered their pigs to the authority. They are the source of information for the study through an interview. Their demographic profile such as age, sex, occupation and civil status are also needed for a broader analyzation and interpretation of data. The questionnaire used in the study is consisted of 10 questions that is used to determine the impacts of ASF to the hog industry.

Meanwhile, the researchers used systematic sampling in getting the sample of the study. The results showed that the sample will be 20 people.

Names
Bermas, Teresita U.
Cruz, Edna N.
Jimenez, Eduardo A.
Minday, Meliton V. Jr.
Pascual, Adelina P.
Pastrana, Joel A.
Petes, Erlinda S.
Santiago, Maricar B.



Sarmiento, Narcisco S.
Ubaldo, Ryan P.
Manapat, Michelle E.
Cruz, Lorena V.
Rivera, Lawrence Francis C.
Venturina, Juanita
Sarmiento, Nestor C.
Torres, Shirly B.
Iracta, April S.
Castro, Juvy S.

Table 1. Sample of the Study

The sampling technique to be used in this study is based on the number of pigs culled per houses. The names of the respondents will be arranged on the number of pigs culled and alphabetically.

### Data Processing

The researchers provided the questionnaires to the backyard hog raisers in Calawitan San Ildefonso Bulacan. The dissemination of the questionnaires was conducted personally by the researchers in their respective houses of the respondents. Through this procedure, the researchers were able to gather relative data needed to assess the impact of ASF in the barangay.

### Statistical Treatment

To interpret the data effectively, the researchers employed the following statistical treatment. The Percentage, Weighted Mean and descriptive statistic are the tools use to interpret data.

#### 1. Percentage

This is used to determine the frequency counts and percentage distribution of personal related variables of the respondents.

Formula:  $\% = \frac{F}{N} \times 100$

% is the percentage

F is the Frequency

N is the total number of respondents

100 is a constant value

#### 2. Average Weighted Mean

This is used to determine the assessment of the respondents with regards to their personal profiles.

Formula:  $X = \frac{Fx}{N}$

X is the weighted mean

F is the frequency

x is the weight of each item

N is the number of cases

### 3. Steps in Computing the Descriptive Statistic

- Go to 'Excel'
- Go to 'file'
- Click 'option'
- Click the 'add-ins'
- Click 'go'
- Go to 'data'
- Click the 'data analysis'
- Click the 'descriptive statistic'
- Enter
- Click the 'first cell until the last'

- Click the 'labels in first row'
- Put a check in the four boxes (Summary statistics, Confidence level for Mean, kth Largest, and kth Smallest)
- Click the 'ok' button
- The result will show

### PRESENTATION, INTERPRETATION AND ANALYSIS OF DATA

This chapter presents the data gathered, the results of the statistical analysis done and interpretation of findings. These are presented in pie graphs following the sequence of the specific research problem regarding the Condition of Swine Industry in Calawitan S.I.B. after the Proliferation of ASF: An Assessment.

#### Profile of the Respondents

The following figures show the presentation of the demographic profile of the respondents.

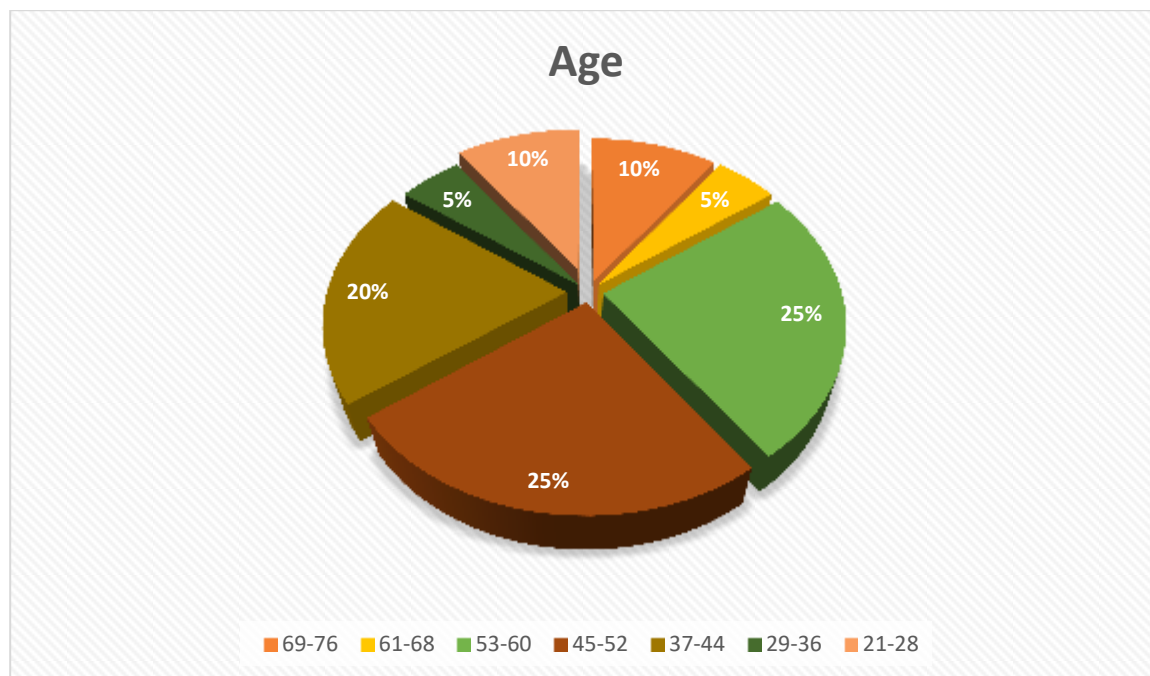


Figure 2. Demographic Profile: Age

Figure 2 showed that out of 20 respondents, 25% of them, with a frequency of five are in the age of 53 to 60 and 45 to 52 age. While, the age between 69 to 76 and 21 to 28 got the frequency of two or 10%, and the respondents aged 61 to 68 and 29 to 36 have a frequency of one respectively. It only implies that people aged 45 to 60 are more likely to be involved in backyard piggery than to those younger and older people.



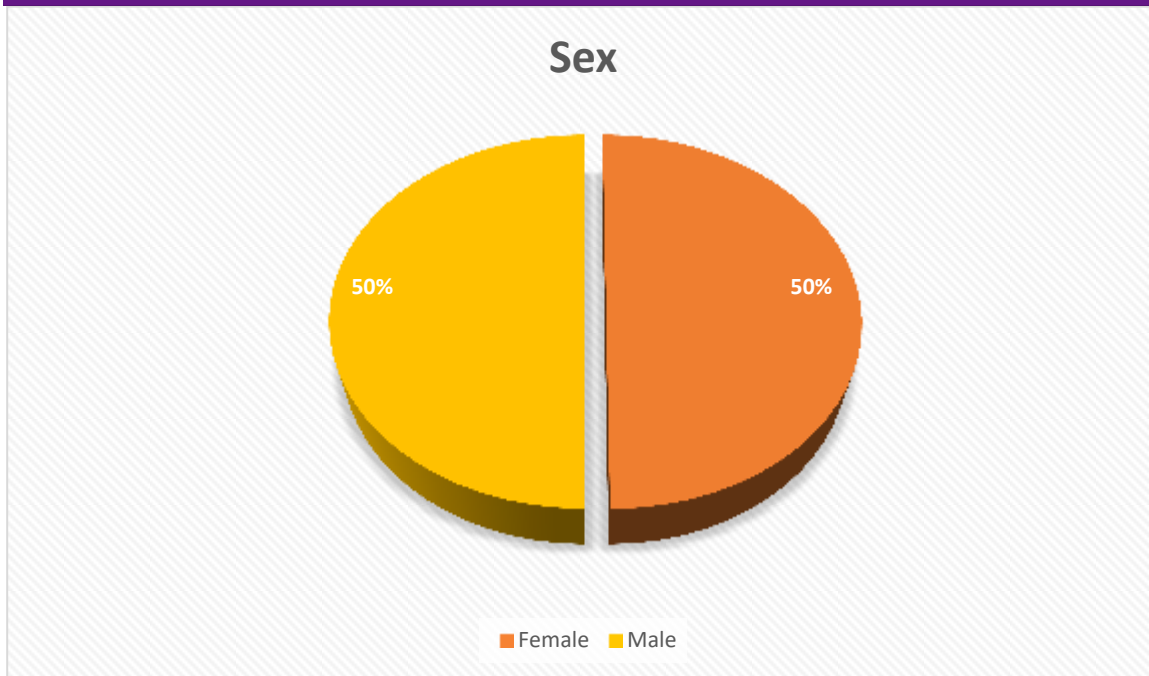


Figure 3. Demographic Profile: Sex

In Figure 3 it illustrates the sex of the respondents. The graph shows that from the 20 respondents, 50% of them male and the remaining half percent is female. We can conclude based on this data that both male and female are inclined in this kind of business.

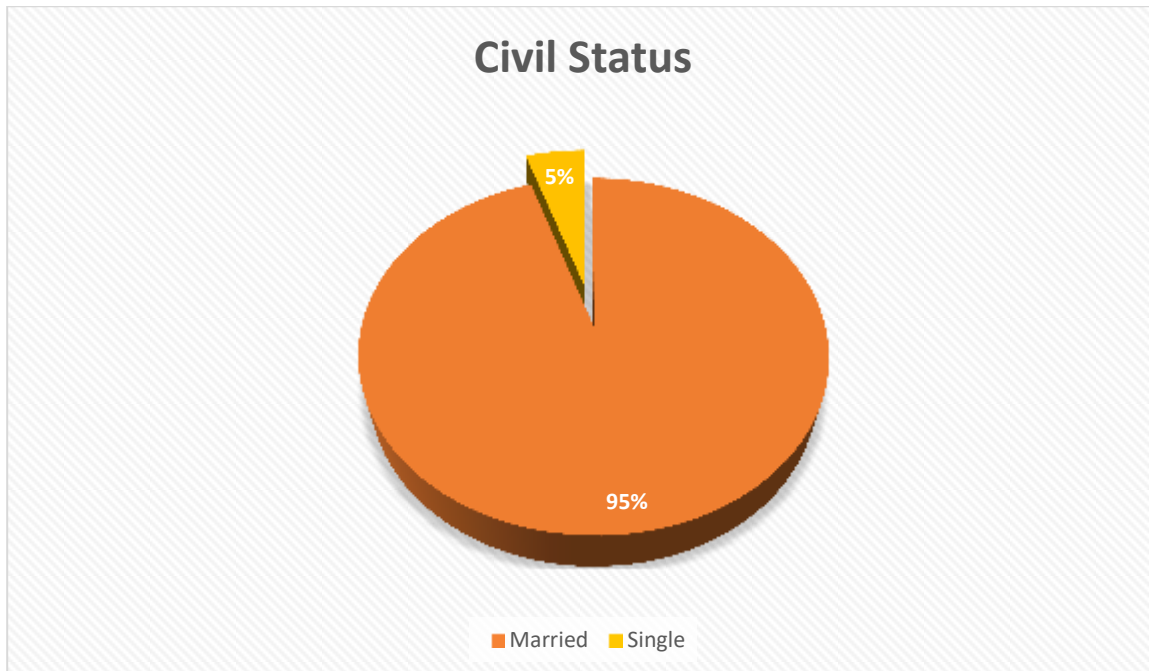


Figure 4. Demographic Profile: Civil Status

In this figure, it shows the data about the civil status of the respondents. Five percent of the respondents are single while 95% are married. According to the Department of Agriculture (DA), Livestock Development Council (LDC) and Housing and Land Use Regulatory Board (HLURB) said that an average Filipino family usually raises a small number of pigs to augment their

daily needs. While both parents are busy with their work, children may help in raising a few piglets until they reach their marketable age.

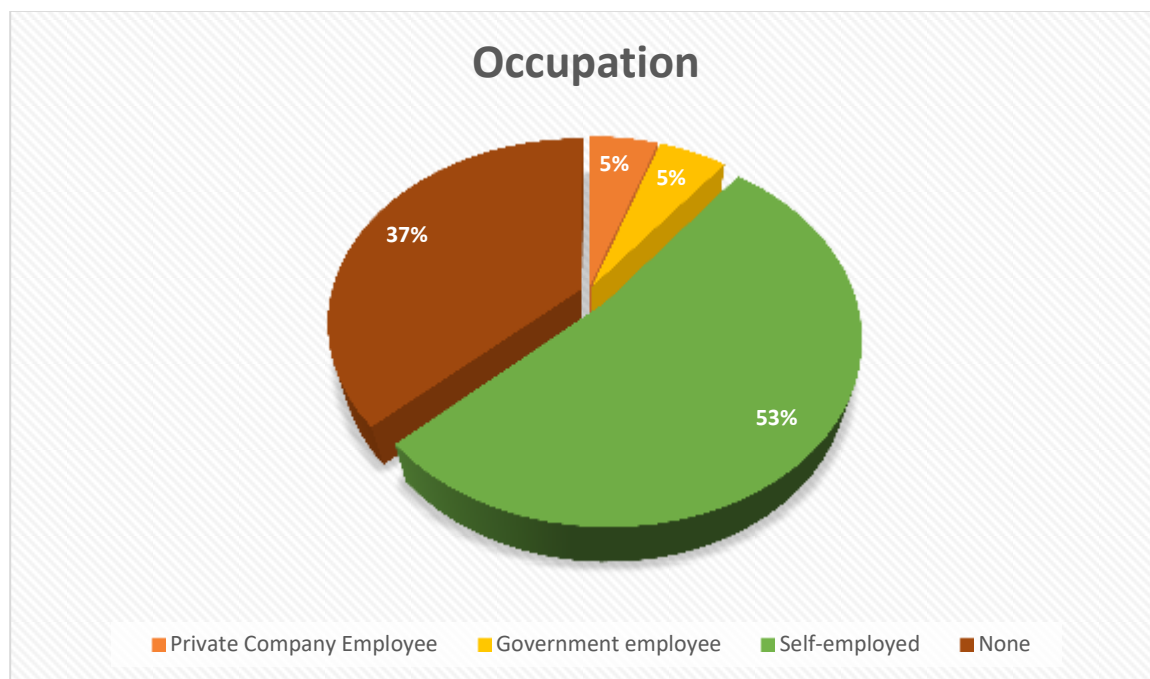


Figure 5. Demographic Profile: Occupation

In this figure, the researchers presented the occupation of the respondents. Only 5% of the respondents are private company employee as well as the government employee. While the 37% do not have a job and only stays at home. The biggest percentage of 53% are self-employed meaning they own a small-scale business. This implies that self-employed employees or those who work at home are those who usually establish a business like piggery.

In order to assess the real condition of the effects of the ASF in the business of the hog raisers in Calawitan S.I.B, the researchers also conducted an interview. The following information showed the response of the hog which regards to their business.

#### Proliferation of ASF

After the proliferation of African Swine Fever in the country, many of our fellowmen suffered whether their pigs got infected or not nor they are the suppliers or the consumers. On October 2019, the Municipality of San Ildefonso mandated that every backyard and commercial piggery in the municipal shall surrender their pigs because the virus has reached the town. So, every barangay in San Ildefonso collected the pigs and bury them in one place on each barangay.

Based on the interview that the researchers conducted, all the hog raisers stated that they gain loss when ASF came to the country. Though among the 20 respondents, only one said that his pigs became infected while the rest, their pigs are free of ASF but due to the mandatory surrendering of pigs, they just admit them in the authority instead of selling them to the market since no one wants to buy pork meat that time.

Since they have no pigs left to be an alternative source of income, two of the respondents tried to start a new business which is also under the animal production, the poultry but the instead of being profitable, they also gain loss. While one of the respondents answered that she is planning to start a mushroom production.

Currently, most of the respondents are still looking for a way to pay their debt which they use for the business. Because they loss a large amount of money after they surrender their pigs. One of them claimed that he loss an estimated amount of 1 million because he surrendered 100 pigs on October 2019.

This unfortunate event happened to the swine industry in our country is visible on the current state of our countrymen especially to their income. Before, they are expecting a return on equity every four months and they are gaining Php 10,000 – Php 13,000 to every patterner and Php 2500 to every piglet but today, they are expecting nothing. The most ill-fated thing happened according to them is that the promise compensation of the Local Government Unit (LGU) of San Ildefonso is still far from the hand of the hog raisers.

Condition of Swine Industry in Calawitan S.I.B.

This ill-fated event has changed the industry not only to barangay Calawitan but half of the country. In the first months of the proliferation of the virus many of our countrymen were hesitant to buy pork in the market due to lack of awareness that ASF cannot be transferred to humans. Then later on, the virus spread quickly and killed more than 70,000 pigs (Simeon L.M. and Brago P., 2019).

All of the respondents admitted all their pigs in the authority, and no one dared to start the same business after that. According to the interview conducted by the researchers, the respondents are frightened to start a new business under animal production because of the proliferation of different animal viruses that could affect their business. They do not want to take the risk and just loss again.

Due to that, the swine industry is the most affected, as for Calawitan it is as if it died because there was no piggery left to operate after the surrendering pigs last year. Though there is still enough production of pork meat in the local market, still, it is in no doubt that the swine industry has weakened due to ASF.

Indicator	Mean	Interpretation
1. I knew ASF very well.	3.95	Agree
2. All my pigs do not suffer from ASF.	4.9	Strongly Agree
3. ASF had a bad impact in my income.	4.9	Strongly Agree
4. I still do not recover from my loss.	4.9	Strongly Agree
5. I do not have pigs left on my backyard.	4.8	Strongly Agree
<b>AVERAGE</b>	<b>4.69</b>	

Table 2. Descriptive Statistics by Mean

It can be noted in Table 2 that most of the respondents, with the mean of 3.5, agreed that they know ASF. While almost all of them answered that their pigs do not suffer from ASF yet they an average of 4.9 strongly agreed that ASF had a bad impact in their income. From the loss they had after the proliferation of ASF, most of them exclaimed that they still do not recover from the damages that they experience due to the this. Meanwhile, a mean of 4.8 stated that they do not have pigs left on their backyard. This only implies that many hog raisers were not affected by the virus, but they still surrender their pigs to the authority.

**SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION**

In this chapter, the conclusion derives from the findings of this study based on the effects and the damages brought by ASF in the Barangay Calawitan San Ildefonso, Bulacan. The conclusions and recommendations were based on the purpose, research problem, and result of the study.

**Summary of Findings**

The results of the study showed that the hog raisers suffered financially after surrendering their pigs to the authority as mandated by the Municipal Office. It is evident in the study that a large amount of income was lost to the respondents which according to them, is can be acquired every four months. Many citizens were left with debt after the unfortunate event while waiting for the promise compensation from the LGU. It also revealed that there are more respondents who were not affected by ASF who surrendered their pigs to the authority. Only one of them said that some of his pigs were affected by the virus.

AVERAGE	
Mean	4.69
Standard Error	0.067239
Median	4.8
Mode	4.8
Standard Deviation	0.300701
Sample Variance	0.090421
Kurtosis	4.250864
Skewness	-2.11303
Range	1.2
Minimum	3.8
Maximum	5
Sum	93.8
Count	20
Largest (1)	5
Smallest (1)	3.8
Confidence Level (95.0%)	0.140732

Table 3. Descriptive Statistics by Confidence Level

As shown in Table 3, ASF has no significant effect to the swine in Calawitan S.I.B. meaning, the barangay is not highly exposed to the virus for it only affected a small number of hogs. The result showed that the computed confidence level of the is greater than 0.05 ( $> 0.05$ ). However, the surrendering of pigs had a bad impact to the income of the respondents.

## Conclusion

Assessing the intensity and damages of ASF in different aspects is helpful in amending the issue on such cases. Based on the findings in the demographic profile, interview and survey, the researchers then formulated conclusion about the condition of swine industry after the proliferation of ASF in Calawitan S.I.B.

## Demographic Profile

After determining the age of the backyard piggery owners, the researchers therefore concluded that people aged 45 and above are more likely to be involved in this kind of business since it is near to the retiring age. They are already preparing and settling their lives after their working years. This is their way of gaining income even after they retire. This is for the reason that they do not have to go out of their house for a long period of time to have revenue.

Backyard piggery does not promote sexism for both sexes can establish and handle this kind of business. It does not choose what sex are suitable for this job. In here, what men can do, women can do it as well. Therefore, we can say that backyard hog raising is a business with no gender preference.

Moreover, married people are more likely to be part of this business than to single people. This have something to do with the responsibility they are facing. Married people became more responsible because they are already having or making their own families. Therefore, this only indicates that married people are more conscious about gaining more income for their family. This

also means that married people are more desperate to provide for the necessity of their family compared to single people, so they tend to find other ways to have extra income.

Just like the 45 and above aged people, self-employed individuals are more involved in backyard hog raising compared to the private or government employees because they can gain income every four months without leaving their houses. Since this is a convenient job people are engrossed to be part of this industry.

#### Proliferation of ASF

Since September 2019, Philippines are suffering from ASF. This has brought nightmares not only the hog raisers but also to the consumers. Many municipalities and cities in the country authorized to surrender their pigs with or without infection of the virus if there is a recorded case in the area.

As for Calawitan S.I.B., there are only few piggery owners who are directly affected by ASF. In the sample used by the researchers, there is only one out of 20 respondents who is reportedly have pigs died due to the virus. Meaning, most of the respondents surrender their pig to the authority because order but not because they were affected by the ASF.

#### Condition of Swine Industry

Currently, the swine industry in the barangay are facing a huge dilemma in terms of financial status. Based on the findings, the hog raisers gain a large amount of loss after their surrender their pigs. So, even if their pigs were not infected, they are still affected by the loss of income. They became the collateral damage in solving the problem in ASF.

Therefore, the researchers deduced that surrendering their pigs even without ASF is the factor that gives a huge impact to the swine industry. Because it causes to decline the financial income of the piggery owners, and it also lessen the production of pork in the barangay. From this, we can conclude that there is a significant relationship between surrendering of pigs with or without ASF to the current state of swine industry in Calawitan S.I.B.

To sum it all, ASF may not affect most of the hog raisers directly but they still suffer to the after effects of ASF in the country.

#### Recommendation

Based on the conclusion, the following recommendation were formulated:

1. A large population and broader locale can be used to gather more credible and reliable data in assessing the effects of ASF.
2. A proper observation to the pigs affected by ASF can be beneficial way to scientifically assess the condition of the swine industry during the ASF outbreak.
3. The sample must also have a cluster to interpret the data more accurately and broadly.

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## APPENDICES

### Population of the Study

NAME	NO. OF PIGS CULLED
Bermas, Teresita U.	20
Buenaventura, Francisco V.	20
Castro, Bernard M.	20
Castro, Lawrence C.	20
Castro, Mario M.	20
Cruz, Cindy S.	20
Cruz, Edna N.	20
Cruz, Kharren S.	20
Cruz, Nicolas J.	20
Culala, Alberto G.	20
Damandaman, Geraldine M.	20
De Castro, Severino P.	20
Dela Cruz, Lanie C.	20
Dela Cruz, Marlon R.	20
Dela Cruz, Mary Jane P.	20



Delos Reyes, Alexter S.	20
Delos Reyes, Romeo J.	20
Espenilla, Crizaldy B.	20
Gonzales, Lorraine V.	20
Ileto, Graciela C.	20
Jimenez, Eduardo A.	20
Jimenez, Mayfert A.	20
Jimenez, Reynald Andrew M.	20
Manansala, Maricel S.	20
Mempin, Lucena C.	20
Mempin, Peter Vic C.	20
Minday, Meliton V. Jr.	20
Pascual, Adelina P.	20
Pastrana, Bonifacio V.	20
Pastrana, Evelyn M.	20
Pastrana, Joel A.	20
Pastrana, Justino V.	20
Patiag, Myra B.	20
Pecaña, Raymart S.	20
Petes, Erlinda S.	20
Reyes, Enrique I.	20
Santiago, Jocelyn M.	20
Santiago, Maricar B.	20
Santiago, Mark Gil B.	20
Santiago, Ramon V. Jr.	20
Santiago, Virgilio V.	20
Sarmiento, Emmalyn P.	20
Sarmiento, Jeffrey N.	20
Sarmiento, Jenny Rose A.	20
Sarmiento, Lucena N.	20
Sarmiento, Narcisco S.	20
Ubaldo, Demerio S.	20
Ubaldo, Marilou V.	20
Ubaldo, Mary Jane N.	20
Ubaldo, Ryan P.	20
Venturina, Philip Q.	20
Villanueva, Bibian B.	20
Villanueva, Joseph S.	20
Villanueva, Mikka Joy B.	20
Zapanta, Nenita D.	20
Manapat, Michelle E.	19
Raja, Bob Jovi S.	19

Sarmiento, Remelon V.	18
Ubaldo, Miriam V.	18
Vendivil, Dante S.	18
Vendivil, Richard R.	18
Cruz, Felicidad M.	17
Samson, Emelita V.	17
Cruz, Jinky S.	16
Sarmiento, Jayvee R.	16
Cruz, Lorena V.	15
Santiago, Wilhelmina B.	15
Villanueva, Roberto V.	15
Culala, Guadalupe I.	14
Mallari, Maria Lucia S.	14
Villanueva, Froilan P.	14
Pastrana, Eduardo V.	13
Pastrana, Igmedio V.	13
Rivera, Lawrence Francis C.	13
Sarmiento, Marvin C.	13
Grapa, Mary Gouin S.	12
Villianueva, Sarah Jane G.	12
Buenaventura, Manolito V.	10
Jimenez, Romeo C.	10
Sarmiento, Andriano C.	10
Vendivil, Gracianov.	9
Blas, Rommel D.	8
Bermas, Alfredo T.	8
Friginal, Romeo P.	8
Pastrana, Nesllie C.	8
Venturina, Juanita	8
Pastrana, Ericson S.	7
Jimenez, Erasmo G. Jr.	7
Roldan, Adora S.	6
Sarmiento, Nestor C.	6
Torres, Shirly B.	5
Tomas, Rizziele C.	5
Rivera, Alejandro U.	5
Iracta, April S.	5
Castro, Juvy S.	4
Sarmiento, Raymond C.	4
Dela Cruz, John Joko P.	1
Delos Reyes, Richelle S.	1

Interview Questionnaire

Demographic Profile

Name:

Age:

Sex:

Civil Status:

Occupation:

1. When did you start your business?
2. What is your starting capital?
3. How did you come up with this kind of business?
4. Is there any cases that you just surrendered your pigs to the Municipal authority instead of selling it to market?
5. What are the hindrances/challenges you encountered during the ASF outbreak?
6. How many pigs did you surrendered during the outbreak?
7. Does ASF virus has a huge impact to your monthly income/salary?

Survey Questionnaire

*Direction:* Put a check inside the column of your answer.

<b>Questions</b>	<b>Strongly Agree 5</b>	<b>Agree 4</b>	<b>Neither 3</b>	<b>Disagree 2</b>	<b>Strongly Disagree 1</b>
1. I knew ASF very well.					
2. All of my pigs do not suffer from ASF.					
3. ASF had a bad impact in my income.					

4. I still do not recover from ASF already.					
5. I do not have pigs left on my backyard.					