



# ASSESSMENT OF ECONOMIC IMPACT OF PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME VIRUS ON PORK PRODUCTION IN DELTA SOUTH SENATORIAL, DISTRICT, NIGERIA

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# ABSTRACT

The study assessed the economic impact of porcine reproductive and respiratory syndrome virus on pork production in Delta South Senatorial, District. A multi-stage sampling procedure was used to select 83 pork producers for the study. Questionnaire was used as the instrument for data collection. Data collected were analyzed using frequency, percentage, mean and standard deviation. The findings of the study showed that most of the pork producers in the study area were males, 57.0% were married; 47.3% of the pork producers had 6-20 years of pork production experience and majority of pork producers had relatively high level of education. The results also revealed that porcine reproductive and respiratory syndrome virus has negative economic impact (P<0.05) on pork production in Delta South Senatorial District. It was found out that there is no significant (P>0.05) difference between the socio-economic characteristics of the respondents on the economic impact of porcine reproductive and respiratory syndrome virus on pork production in Delta South Senatorial District. From the findings of this study, porcine reproductive and respiratory syndrome virus is associated with illness which causes reduction in growth rates and mortalities in all ages of pigs which leads to economic losses. It can therefore be recommended among others that the three tiers of government should organize public enlightenment programme to create awareness on measures to control porcine reproductive and respiratory syndrome virus against pork production.

Keywords: Economic, Porcine, Reproductive, Respiratory Syndrome, Virus, Pork Production

# **INTRODUCTION**

Nigeria is among the countries with high and fast growing population rate in the world. Pig production could contribute to feeding the growing population of Nigeria. Pig production is popular in many parts of Nigeria, which has the highest production rate in Africa (Dahiru *et al.*, 2021). Pig production is one of the sources of livelihood of people and contributes to food security. Kumar and Mazhar (2020) asserted that pork constitutes one of the crucial sources of animal protein for humans. Pork is a quality dietary protein. Consequently, Kumar and Mazhar (2020) stressed that pig farming is one of the most profitable enterprises as it possesses many economic traits like high prolificacy, faster growth rate, shorter generation interval, low cost of rearing and high dressing percentage with better feed conversion efficiency. A right hygiene practices in slaughtering of pigs can lead to high quality of meat. A sustained and steady supply of pork meat is threatened by Porcine Reproductive and Respiratory syndrome Virus (PRRVs). Porcine reproductive and respiratory syndrome virus is a disease that reduces reproductive capacity and increases mortality of pigs. According to Schweer *et al.* (2017), Porcine Reproductive and Respiratory Syndrome (PRRS) virus is a major swine virus that causes reproductive impairment in sows, as well as respiratory disease, reduction in growth rates, and





mortalities in all ages of pigs. Xuegang *et al.* (2020) also noted that PRRS is characterized by reproductive failure in sows and respiratory distress in pigs of all ages.

Valdes-Donoso and Jarvis (2022) posited that PRRS is an extremely contagious disease that causes great damage to the pork industry. PRRVs contribute to economic losses by leading to additional expenses to control the disease. You *et al.* (2022) noted that PRRS is an infectious disease caused by the PRRS virus that leads to reproductive disorders and severe dyspnea in pigs, which has serious economic impacts. Dee *et al.* (2023) noted that PRRS is a devastating disease of pigs, resulting in loss of production, reduced animal welfare, and economic losses. Some common clinical signs of porcine reproductive and respiratory syndrome virus were stillbirths, mummies, weak live-born pigs, pneumonia, stunted growth and mortality. However, Mesa *et al.* (2024) posited that Clinical signs of PRRS are highly variable depending on viral variant, immune status and age of the host, co-infections, and stage of the disease. They added that in sow herds, PRRS is mainly manifested as reproductive failure (e.g., abortion, mummies, weak live-born piglets, pre-weaning mortality, and return to estrous), which may be accompanied by anorexia, fever, and lethargy, while in growing pig farms, the virus causes respiratory disease (examples are sneezing, coughing), leading to decreased feed intake and growth.

PRRS Virus is transmitted among pigs in several ways. Pileri and Mateu (2016) noted that trucks, trailers, and other vehicles used for transporting pigs, animal products, feed, offal, and contaminated equipment, are a potential risk for the spread of PRRVs. Also, Dee *et al.* (2023) noted that the routes of PRRS virus (PRRSV) transmission include infected breeding stock and contaminated semen, along with fomite-based risks (i.e., contaminated transport; personnel boots, coveralls, and supplies; and aerosols). The PRRSV could be transmitted through direct and indirect contact. Mesa *et al.* (2024) pointed out that the direct transmission of this virus can occur when susceptible pigs come in contact (e.g., nose to nose, natural breeding) with an infectious pig, while the indirect route of transmission may include exposure to PRRSV-contaminated fomites, other environmental materials, aerosols, and arthropod vectors.

There are many ways to control of PRRS virus. Pileri and Mateu (2016) posited that the control of PRRS virus (PRRSV) relies on four different aspects: early diagnosis and monitoring, biosecurity, herd management, and immunization. Colomer et al. (2019) noted that preventive medicine programs to control PRRSV are commonly based on performing gilt acclimation protocol, a PRRSV vaccination program for gilts and sows, and different management protocols to control the prevalence of pathogens in suckling pigs. There is currently an astronomical rise in the prices of food in Nigeria. Many Nigerians engage in agriculture especially pig production to curtail the current rising cost of food. Some people in Delta State depend on pig farming as source of their livelihood. Ajieh and Okwuolu (2015) noted that the trend in pig production has been dwindling in Delta State and Nigeria at large. The decline in pork production is probably due to the diseases that affect pig rearing in the state. These problems lead to the assessment of the economic impact of porcine reproductive and respiratory syndrome virus on pork production in Delta South District. The main purpose of the study was to assess the economic impact of porcine reproductive and respiratory syndrome virus on pork production in Delta South District. Specifically, the study sought to describe the socio-economic characteristics of the pork producers in the study area, assess the economic impact of porcine reproductive and respiratory syndrome virus on pork production in Delta South senatorial District and identify measures to control porcine reproductive and respiratory syndrome virus against pork production in Delta South District.





# METHODOLOGY

#### Study Area:

The study area is Delta State, Nigeria. The study area lies within the tropical savannah and mansoon vegetation, between longitude  $5^{0}.00$  and  $6^{0}45^{0}E$  and latitude  $5^{0}.00$  and  $6^{0}.3^{0}N$ . The main occupation of the people in the area is crop production, livestock rearing and trading. Some markets exist in the area where pork meat and other agricultural produce are sold. There are two different seasons of the typical tropical climate of the State, raining season between March and November, while dry season is between December and February. The total land area of the state is 17,108sq km and about one third of this is swampy and waterlogged. Delta is bounded on the North by Edo State and on the East by Anambra State, on the south by Rivers and Bayelsa States. The Atlantic Ocean forms the Western boundary while the north East boundary is Ondo State. Delta is endowed with many rivers and waterways.

#### **Population and Sampling Technique**

A multi-stage sampling procedure was used in selecting the respondents. Firstly, simple random sampling technique without replacement was used to select six LGAs in the state. Secondly, purposive sampling technique was used to draw 98 pork producers that met the criteria of the selected socio-economic characteristics of respondents required for the study.

#### Method of Data Collection

A structured questionnaire was administered as interview schedules to elicit information from the pork producers. A total of 98 copies of the questionnaire were distributed and 93 were properly filled and successfully retrieved indicating 95 % return rate.

# **Data Analysis**

Data were analysed using both descriptive and inferential statistics. The descriptive statistics used were frequency table, percentage, mean and standard deviation while the inferentiakl statistics used was ANOVA to test the hypotheses. The decision on the research questions were that mean scores that are 3.00 and above were taken to indicate agreement, while mean scores that are below 3.00 were taken to indicate disagreement. For decisions on the hypotheses, where p-value is equal to or less than level of significant value of 0.05 (p  $\leq$  .05), the null hypotheses was rejected but where p-value is greater than level of significant value of 0.05 (p > .05), the null hypotheses was accepted.

#### **RESULT AND DISCUSSION**

#### **Socio-economic Characteristics of Respondents**

The demographic profiles of the respondents are presented in Table 1. The results showed that majority (63.4%) of pork producers in the study area were predominantly males, while 36.6% were females. This agreed with the finding of Oyebanjo *et al.* (2023) which showed that pig farming was dominated by male (74.8%), while females constituted 25.2%. This is probably due to the fact that males are more energetic to handle pigs than their female counterparts. This disagreed with the finding of Omoregie and Osabuohien (2021) which indicated that majority (62%) of the respondents were females, while 38% were males.

Majority (48.40%) of the pork producers were between 19-45years; (34.40%) of the respondents were 46 years old and above, while (17.20%) of the respondents were 18 years and less. This affirmed the finding of Simangaliso and Sikelela (2021) which revealed that the respondents were aged between 20 and 45 years old. This also upheld the finding of Mekuriaw and Asmare (2014) which indicated that the majority of the pork producers were between ages 21 and 39 years. Oyebanjo *et al.* (2023) asserted that the pig farmers were young and active to handle the farm practices like mating, birth delivery, weaning, ear tagging, among others.





More than half (57.00%) of the respondents were married while 18.30%, 8.6% and 16.10% of the respondents were single, divorced and widowed respectively. This supported the finding of Aminu and Akhigbe-Ahonkhai (2017) which revealed that majority (76.30%) of the pig farmers were married, 2.50 % were single, 10.00% were widowed, while 11.30% were divorced. This is also in an agreement with the finding of Ogunniyi and Omoteso (2011) indicated that 18.75% of the respondents were single, 80% were married while 1.25% were widowed. The married pig farmers could use family members as sources of manual labours. Omoregie and Osabuohien (2021) which showed that only few (12.00%) of the respondents were single, majorities (76.00%) of the respondents were married, and 12.00% of the respondents were divorced/separated.

Educational background showed that 28.00% of pork producers had bachelor's degree, 20.40% had SSCE, 17.20% had OND, 16.10% had HND, 10.80% had FSLC and 7.50% had higher degree. This affirmed the finding of Simangaliso and Sikelela (2021) which showed that majority of the 45.80% respondents, attained high school, while only 35.50% of respondents have attained a tertiary education. This also agreed with the finding of Kadurumba *et al.* (2020) which revealed that a larger proportion of the pig farmers (98.50%) had, at least, primary education.

Majorities (47.30%) of the respondents had 6-20 years' experience in pork production; (30.10%) had 21 years and above experience of pork production, while (22.60%) had 5 years and below experience of pork production. This is consistent with the finding of which showed that Omoregie and Osabuohien (2021) which showed that 34% of the respondents had pig farming experience of 5 years and below, while 61.00% of the respondents had 6-15 years' experience in pig farming. This is also in consonance with the finding of Aminu and Akhigbe-Ahonkhai (2017) which showed that 30.00% of the respondents had between 1 and 10 years pig rearing experience, 56.30% had between 11–20 years, while 13.80% had more than 20 years of experience.





Socio-economic Characteristics	Freq.	%				
Gender						
Male	59	63.4				
Female	41	36.6				
Age						
18 and below	16	17.2				
19-45	45	48.4				
46 and above	32	34.4				
Marital Status						
Single	17	18.3				
Married	53	57.0				
Divorced	8	8.6				
Widowed	15	16.1				
Educational Certificate						
FSLC	10	10.8				
SSCE	19	20.4				
OND	16	17.2				
HND	15	16.1				
Bachelor's Degree	26	28.0				
Higher Degree	7	7.5				
Years of Pork Production Experience						
5 years and below	21	22.6				
6-20 years	44	47.3				
21 years and above	28	30.1				

Source: Field Survey (2024)

Result in Table 2 showed that the mean scores of the respondents for all items were above the cut off mean of 3.00 and this indicated agreement with the statements. The cluster mean of 3.23 is above the cut off mean of 3.00 and this shows that porcine reproductive and respiratory syndrome virus has significant economic impact on pork production in Delta South District.

**Table 2:** Economic Impact of Porcine Reproductive and Respiratory Syndrome Virus on Pork

 Production

S/N	ITEMS			
		Х	Sd	Remarks
1	Losses in livestock	3.23	1.04	Agree
2	Expenditure on treatment of livestock with the virus	3.16	1.00	Agree
3	Cost associated with controlling of porcine	3.35	1.01	Agree
	reproductive and respiratory syndrome virus			
4	Premature birth in pigs	3.26	1.06	Agree
5	Miscarriage in sows	3.20	1.10	Agree
6	Decline in the supply of pork meat	3.16	1.13	Agree
7	Increases in market prices of pigs	3.05	1.03	Agree
8	Losses of capital invested in pigs rearing	3.41	1.11	Agree
	Mean of means	3.23	1.06	Agree





The finding of the study indicated that porcine reproductive and respiratory syndrome virus has negative economic impact on pork production in Delta South Senatorial District. This supported the finding of Valdes-Donoso and Jarvis (2022) which showed that PRRS causes great economic damage. The negative economic impact were losses in livestock, expenditure on treatment of livestock with the virus, cost associated with controlling of porcine reproductive and respiratory syndrome virus, premature birth in pigs, miscarriage in sows, decline in the supply of pork meat, increases in market prices of pigs and losses of capital invested in pigs rearing. This agreed with the finding of Mesa *et al.* (2024) which revealed that porcine reproductive and respiratory syndrome (PRRS) causes high economic losses due to poor reproductive performance and mortality.

**Research Question Three:** What are the measures to control porcine reproductive and respiratory syndrome virus against pork production in Delta South District?

Table 3 indicated measures for the control of PRRS virus with mean scores of the respondents for all items above the cut off mean of 3.00. The cluster mean of 3.36 is above the cut off mean of 3.00 which indicate the correct use of appropriate measure by respondents for the control of PRRS virus in Delta South District. Colomer *et al.* (2019) noted that preventive medicine programs to control PRRSV are commonly based on performing gilt acclimation protocol, a PRRSV vaccination program for gilts and sows, and different management protocols to control the prevalence of pathogens in suckling pigs.

S/N	ITEMS			
		Х	Sd	Remarks
9	Performing gilt acclimation protocol	3.30	1.02	Agree
10	PRRSV vaccination program for gilts and sows	3.11	1.06	Agree
11	Applying of management protocols to control the prevalence of pathogens in suckling pigs	3.41	1.14	Agree
12	Proper isolation of incoming pigs	3.64	1.09	Agree
13	Procurement of PRRS virus-naïve breeding stock	3.35	1.04	Agree
14	Sanitation of vehicles transporting pigs	3.22	1.00	Agree
15	Putting in place a strict protocols of personnel movement between farms	3.54	1.07	Agree
16	disinfection equipment used in handling pigs	3.33	1.06	Agree
	Mean of means	3.36	1.06	Agree

**Table 3:** Control Measures against Porcine Reproductive and Respiratory Syndrome Virus against Pork Production.

It was observed that the farmers adopted measures to control porcine reproductive and respiratory syndrome virus against pork production in Delta South District. These measures were performing gilt acclimation protocol, PRRSV vaccination program for gilts and sows, applying of management protocols to control the prevalence of pathogens in suckling pigs, proper isolation of incoming pigs, procurement of PRRS virus-naïve breeding stock, sanitation of vehicles transporting pigs, putting in place a strict protocols of personnel movement between farms and disinfection equipment used in handling pigs.





**Table 4:** Analysis of the Socio-Economic Characteristics of the Respondents on the EconomicImpact of Porcine Reproductive and Respiratory Syndrome Virus on Pork Production in DeltaSouth District

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	38250.011	5	765	3.118	0.223
Within Groups	27741.422	211			
Total	23032.110	213			

Table 4 indicated that the F-ratio (df: 5/93) is 3.118 and the p-value (0.223) is greater that the stipulated 0.05 level of significance. Thus, the null hypothesis was accepted. Therefore, there is no significant difference between the socio-economic characteristics of the respondents on the economic impact of porcine reproductive and respiratory syndrome virus on pork production in Delta South District. This indicates that the socio-economic characteristics have no relationship with the observed economic impact of PRRS virus on pork production in the study area.

# CONCLUSION AND RECOMMENDATIONS

Based on the findings, it was concluded that porcine reproductive and respiratory syndrome virus has adverse economic impact on pork production in Delta South District. Outbreaks and prevalence of porcine reproductive and respiratory syndrome virus make pork producers to incur additional cost for purchasing drugs to control the disease. It has the potential for decreasing pig production which reduce supply of pork meat in Delta South District.

It can therefore be recommended that:

- 1. State Ministry of Agriculture and Agricultural Extension Agents should conduct periodic training programmes on pig production for pig farmers to enable them to upgrade their skills and knowledge in controlling porcine reproductive and respiratory syndrome virus against pork production.
- 2. The three tiers of government should organize public enlightenment programmes through Agricultural Extension Agents to create awareness on measures to control porcine reproductive and respiratory syndrome virus against pork production.
- **3.** Delta State Government should send veterinary doctors to town and villages in the district to vaccinate, diagnose and prescribe medication for pigs with porcine reproductive and respiratory syndrome virus.
- **4.** Delta State Government should subsidize the cost of treating pigs with porcine reproductive and respiratory syndrome virus.

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