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HUMAN SEASONAL INFLUENZA VIRUSES IN PIG-HANDLERS IN LAGOS, NIGERIA: CONSEQUENCES FOR ANIMAL AND PUBLIC HEALTH

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Introduction

Background/ Statement of problem

1. Influenza A viruses in pigs have been scarcely investigated in Africa, with rare viral detection prior to 2009.
2. The spread of pandemic H1N1/2009 changed the epidemiology of swine influenza due to frequent human-to-swine transmissions.
3. New reassortants are emerging with a combination of genes from swine influenza and pandemic H1N1/2009 strains.

These underscore the need for continuous surveillance of Influenza virus in pigs that are considered as “mixing vessels”. Also, pig-handlers faced with occupational hazards are crucial players in the inter-species transmission of influenza A viruses.

Aim

This investigation was therefore intended to carry out serological and molecular surveillance of influenza A virus in pigs and pig-handlers.

Methods

Our study was designed as a cross-sectional epidemiological surveillance of influenza A virus in 7 different pig farm locations in Lagos. The pig handlers rear pigs of various ages in very close proximity in open pens on the same farm land, undermining biosecurity. Samples were collected between April, 2013 & March, 2014.

Figure 1. Sampling processes: safe and unsafe practices

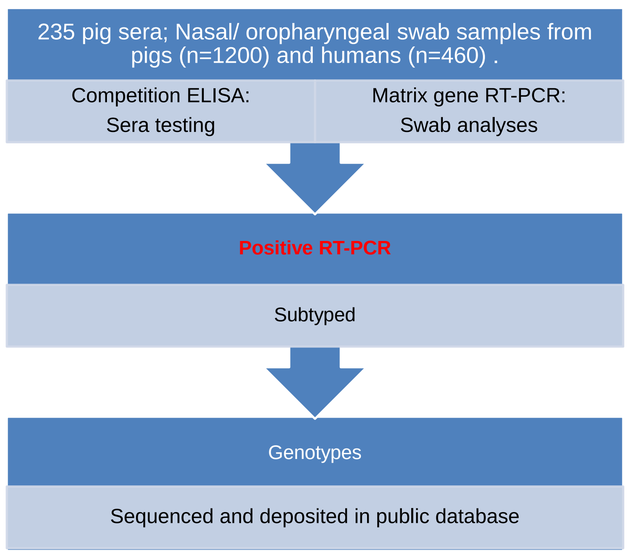

Figure 2: Flow chart of Laboratory testing employed for the Influenza viral study

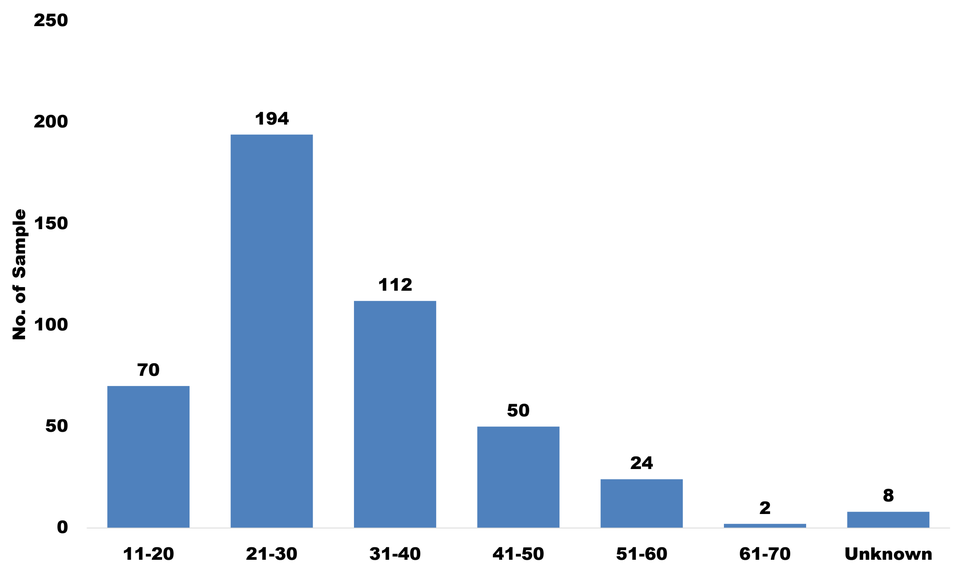

Figure 3: Age (year) Distribution of Pig-handlers sampled for influenza virus surveillance.

Results

Our findings showed that 58 (24.7%) pigs had anti-influenza A antibodies (table 1) but none of the pig swabs were positive by RT-PCR. Two influenza A viruses were detected in pig-handlers and characterized as seasonal human H3N2 influenza virus (figure 6) and pandemic H1N1/2009 influenza virus (figure 7) .

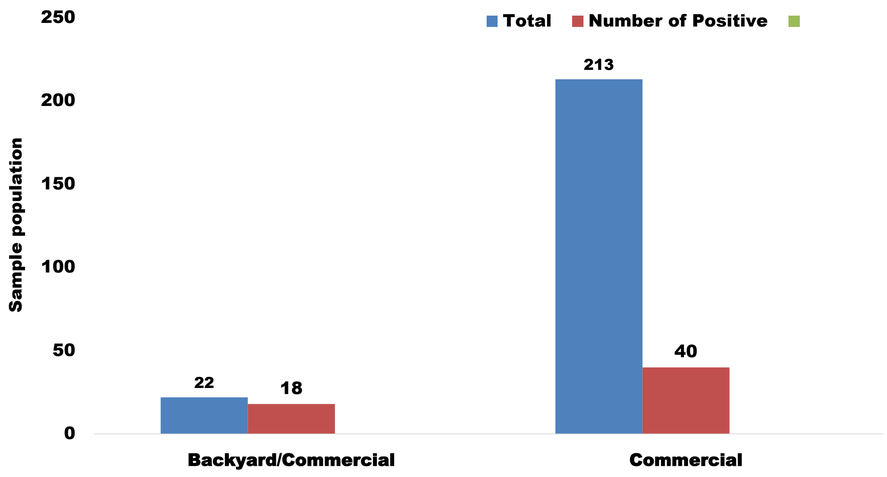

Figure 4: Proportion of influenza virus distribution based on the farm type in Lagos.

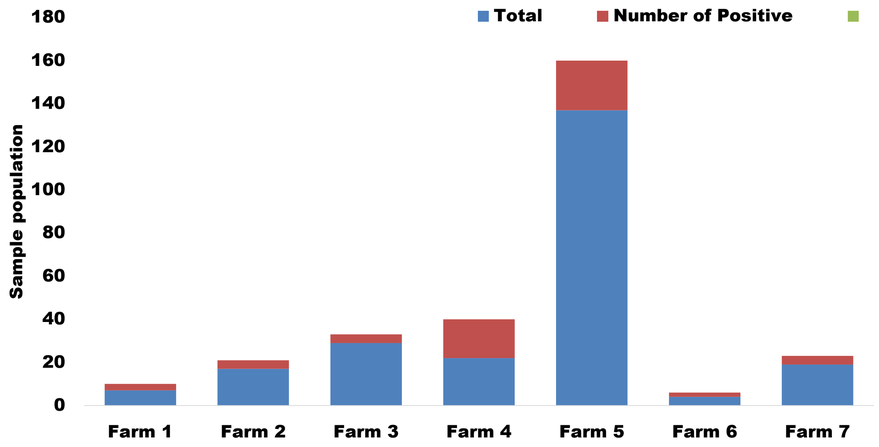

Figure 5: Serological evidence of distribution of influenza virus in pigs according to farm locations in Lagos

Table 1. Result showing Epidemiological parameters of Pigs recruited for Sero-Epidemiological Study of Influenza virus in Lagos Nigeria

EPIDEMIOLOGICAL PARAMETER	TOTAL SAMPLE (%) (N=235)	NUMBER OF POSITIVES (%) (N=58)	P-VALUES Chi-square/F' Test
Division			
Badagry	29 (12.3)	4 (13.4)	0.0001
Ikeja	183 (77.9)	48 (26.2)	
Ikorodu	23 (9.8)	6 (26)	
Town/ Village			
Afromedia	7 (3)	3 (42.9)	0.0001
Agric	22 (9.4)	18 (81.8)	
Badagry	29 (12.3)	4 (13.8)	
Ikorodu	4 (1.7)	2 (50)	
Gberigbe	19 (8.1)	4 (21.1)	
Oko-Oba	154 (65.5)	27 (17.5)	
Health/ Condition			
Castrated	37 (15.7)	9 (24.3)	0.91
Dead	1 (0.43)	0 (0)	
Healthy	195 (83)	49 (25.1)	
Sick	1 (0.43)	0 (0)	
Wounded	1 (0.43)	0 (0)	
Sex			
Female	138 (58.7)	31 (22.5)	0.0368
Unknown	2 (0.85)	2 (100)	
Male	95 (40.4)	25 (26.3)	

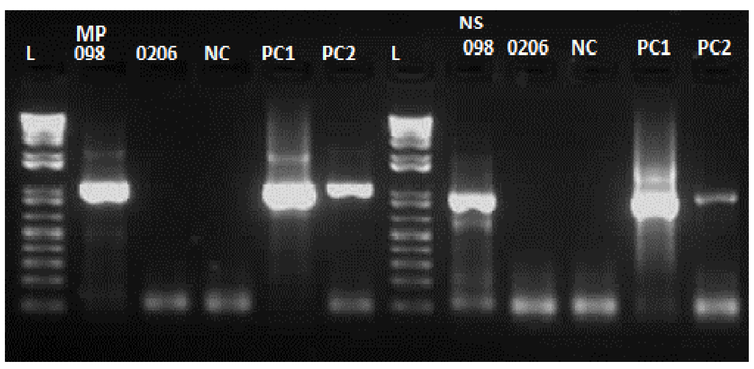

Figure 8. Panel showing Gel Electrophoresed Sequencing PCR amplicons for influenza virus MP and NS Genes. L represent 1Kb plus ladder (L) of 100bp to 12kb at 100bp interval. PC1 and 2 means Positive Control 1 and 2 at 10^{-3} and 10^{-6} dilutions respectively.

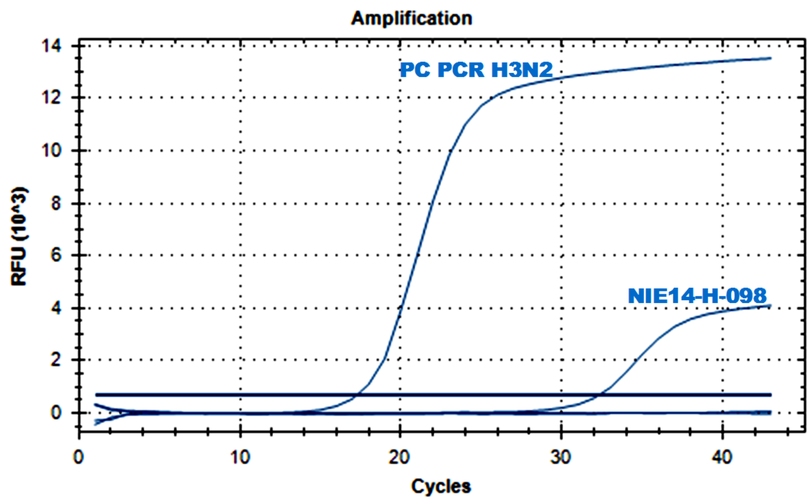

Figure 6: Signal Indication for Sample NIE14-H-098 Subtyped as Influenza A H3N2 virus by specific Real-time RT-PCR.

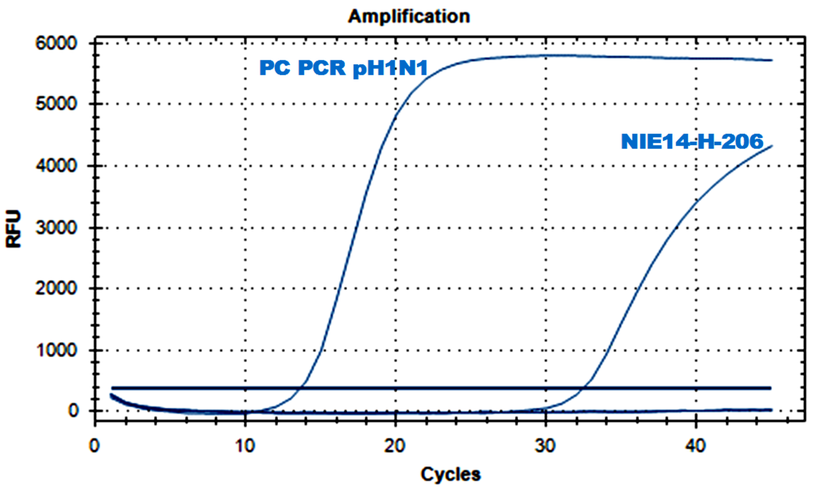

Figure 7: Signal Indication for Sample NIE14-H-206 Subtyped as Influenza A Pandemic H1N1 virus by specific Real-time RT-PCR with Superscript III Platinum One-Step qRT-PCR system kit (Invitrogen).

Conclusions

- Seroprevalence data of influenza A virus in the virtually healthy pig population category have provided evidence of sub-clinical viral circulation. Non-vaccination practice in the pig population studied indicates exposure to wild type strains.
- This study is the first evidence of molecular detection of influenza A virus in pig-handlers in Nigeria and Africa to the best of our knowledge. Even if the viruses identified are typical human seasonal influenza viruses and are not linked to swine husbandry, sick pig-handlers attending to animals can transmit human influenza viruses to their pigs, a phenomenon known as anthroponosis or reverse zoonosis.
- More awareness of pig-handlers towards reverse zoonosis is needed to avoid the generation of reassortant viruses with new genetic and antigenic features capable of human-to-human transmission.
- Annual vaccination of pig-handlers and institution of such practice backed-up by policy legislation would definitely decrease influenza inter-species transmission, while regular and continuous surveillance should be adequately supported as early detection program.

Acknowledgements

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