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Rubella Prevalence in Nigeria (1977–2015): An Update Review on the Impact

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ABSTRACT

Background: Rubella also known as German measles; a contagious viral infection caused by rubella virus, transmitted by respiratory droplets and causes generally a mild disease characterized by rash and fever primarily in children.

Objective: This review was aimed at determining the impact of the rubella scourge across the geopolitical zones of Nigeria.

Methods: Published twenty eight (28) articles that satisfied defined set of criteria as year of publication, geographical distribution, age range, sample size, type of antibody detected, method of diagnosis and gestational periods of the subjects were selected for further analysis from the PubMed online search engine. The articles covered the six geo-political zones of the country with no consistency in the ages cut-off points, the gender whether male or female or both in the study. Two methods of diagnosis; Enzyme Linked Immunosorbent Assay (ELISA) and Haemagglutination Inhibition (HI) test were used to diagnose the infection in the articles.

Results: According to the results, south western part of Nigeria reported research works Congenital Rubella Syndrome (CRS) were detected only in 20 patients from south–south zone.

Conclusion: It was concluded that the infection exists in Nigeria, particularly in pregnant women who predispose the babies to CRS, hence the need for initiation and institutionalization of rubella vaccine programme in Nigeria.

Keywords: Rubella, Congenital rubella syndrome, Haemagglutination inhibition, IgG, Nigeria

INTRODUCTION

Rubella also known as German measles or three–day measles is a contagious viral infection caused by rubella virus; an enveloped single stranded RNA virus belonging to the family Togaviridae [1], genus Rubivirus [2]. Rubella virus infection is transmitted by respiratory droplets and causes a generally mild disease characterized by a rash and fever, primarily in children. However, in women during early pregnancy may cause fetal death or Congenital Rubella Syndrome (CRS) in the infant [3].

The virus replicates in the nasopharynx, followed by multiplication in the cervical lymph nodes and then enters the blood stream and disseminates [4]. It has an incubation period of 2–3 weeks [5]. The infection is mild and self-limiting but commonly a contagious virus. Humans are the only known host of the rubella virus, which is also known to have a teratogenic effect in women particularly when contacted during the first trimester of pregnancy [6].

Rubella is a vaccine-preventable, with complications that include a spectrum of birth defects in the developing foetus [7]. Birth defects associated with rubella virus infection range from blindness, deafness and congenital heart disease

to mental retardation and central nervous system (CNS) complication which is often collectively referred to as CRS [8]. Furthermore, in extreme cases, in-utero infection of a foetus with rubella virus can cause the death of the foetus [8]. Pregnant women are usually tested for immunity to rubella. Therefore, the susceptibility of women in the reproductive age group to rubella virus, especially before gestation, is closely related to the potential risk for congenital infection and sequela [9].

In Nigeria, rubella and CRS are neglected diseases and there is no surveillance, national incidence figure, though in recent years studies have been carried out in some parts of the country to determine the prevalence of rubella among women of child bearing age and pregnant women [10]. In spite of the high perinatal mortality rate in Nigeria, screening for and vaccination of women and children against rubella is neither part of the antenatal nor among diseases recommended for vaccination in National Program on Immunization [11] and rubella infection and CRS are not reportable diseases in Nigeria (Figure 1) [12].



Figure 1: Map of Nigeria showing the six different geopolitical zones [13].

Rubella virus is circulating widely in Africa and primarily infects young children and women in their reproductive ages are predisposed to infection and closely related to potential risk of congenital infection and sequelae. In this study, we aimed to explore the impact of the prevalence of the rubella infection in the various susceptible hosts (children, pregnant women and women of child bearing age). Although the prevalence rates fluctuate within the political zones of Nigeria, but point prevalence estimates from serological surveys estimated susceptibility to rubella among children aged from 1.1 to 4.5. [39], suggest that by 15 years of age most children have developed immunity from natural infection. However, recurrent exposure to already infected people increases the sero-positivity of the children particularly in the congregation environment, like schools, social gathering and playground etc., as corroborated [35]. Other characteristics of CRS include intellectual disabilities, cataracts, deafness, cardiac abnormalities, intrauterine growth retardation and inflammatory lesions of the brain, liver, lungs and bone marrow [38].

For this study, data available on the prevalence of rubella viral infection in Nigeria, that could be used to develop information about the scourge of the disease across the country were collected and evaluated to ascertain whether any trend could be identified. Our particular interest was to have data from different regions of the country to make comparison among the six geopolitical zones, which are known to possess different cultural, ethnic and sexual behavioural backgrounds.

RESULTS AND DISCUSSION

The search of published literature found 28 articles on rubella for inclusion in the review that was from 1977 to 2015. These were listed by states as indicated in Table 1. Most studies concerned much on the burden of the disease on pregnant women and their fetuses, although, few studies explore the impact on males. None of the studies represents government data from the ministry of health. The various researches cited depicted different approaches to the rubella diagnosis. The method for the diagnosis initially employed was Haemagglutination inhibition test as evident in 1977 which was substituted by ELISA technique in the later years (Table 2). Published articles on laboratory

results for rubella specific IgM, IgG and HI tests in Nigeria between 1977 and 2015 reported highest Congenital Rubella Syndrome of 16,394 in 2009 and 19 (0.12) were positive. Distribution of Rubella infection (IgM and IgG) in Nigeria based on gender, setting and age groups (Tables 1-3) did not depict consistent trend of infection amongst urban and rural settings. For example, 47 (29.6) and 62 (38.9) versus 129 (80.6) and 31 (19.4) infections were reported in 2004 and 2015 respectively. It is therefore difficult to ascribe high distribution of the infection to either urban or rural.

Table 1: Summary of published Rubella Sero-survey study results by states in Nigeria, 1977–2015.

Geopolitical Zones	State	Gender	Age Range	Sample size	Antibody detected	Distribution	Prevalence rate (%)
South East [14,16]	Abia	F	15–44	190	IgM	Urban/Rural	13(6.8)
	Abia	M+F	<1–>15	757	IgM	Urban	81(10.7)
	Imo	M+F	5–45	931	HI Test	Rural	620(66.6)
South South [17-19]	Akwa Ibom	M+F	<5–>21	781	IgM	Urban/Rural	94(12)
	Rivers	F	3 M	1	IgM/CRS	Urban/Rural	-
	Rivers	M+F	1–11 M	16,394	CRS	Urban	19(0.12)
	Edo	F	<19–>40	270	IgG+IgM	Urban	IgG 143(53); IgM 14(9.7)
South West [20-28]	Lagos	F	All Ages	152	IgG	Rural	116(76.4)
	Ogun	M+F	15–39	385	HI Test	Rural	289(75)
	Osun	F	15–>40	200	IgG	Urban/Rural	175(87.5)
	Osun	F	All Ages	90	IgG+IgM	Rural	IgG 86(96.6); IgM 6(6.7)
	Oyo	F	15–42	273	IgG	Urban/Rural	244(89.4)
	Oyo	F	17–43	272	IgG+IgM	Rural	IgG 249(91.54); IgM 5(1.84)
	Oyo	F	15–39	159	IgG	Urban/Rural	109(68.5)
	Oyo	F	All Ages	-	HI Test	Rural	(70)
	Oyo	F	15–45	230	IgG	Urban/Rural	215(93.5)
	Oyo	F	All Ages	92	IgG+IgM	Urban/Rural	IgG 6(7); IgM 1(1.1)
	Oyo	M+F	All Ages	1,847	HI Test	Rural	1256(68)
North East [29,30]	Borno	F	14–40	207	IgG	Rural	112(54.1)
	Borno	F	All Ages	90	IgG+IgM	Urban/Rural	IgG 75(83.3); IgM 34(37.8)
North West [31-35]	Kaduna	F	17–43	160	IgG+IgM	Urban/Rural	IgG 62(38.8); IgM 149(93.1)
	Kaduna	F	All Ages	430	IgG	Urban/Rural	421(97.9)
	Kaduna	F	17–47	180	IgM	Urban/Rural	70(38.9)
	Kano	F	15–47	288	IgM	Urban	50(17.4)
	Kano	F	15–45	89	IgM	Urban	7(7.87)
North Central [36-38]	Benue	F	18–36	534	IgM	Urban/Rural	21(3.9)
	Plateau	M+F	0–10	93	IgM	Urban	42(45.2)

	Plateau	F	15->41	267	IgG	Urban/Rural	247(92.5)
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Table 2: Laboratory Results for Rubella Specific IgM, IgG and HI-Tests in Nigeria by year, 1977–2015. Key: CRS: Congenital Rubella Syndrome; IgM: Immunoglobulin M; IgG: Immunoglobulin G; HI: Haemagglutination Inhibition.

Year of Study	Sample Size	IgM Tested	IgM+Prevalence	IgM % Positive	IgG Tested	IgG+Prevalence	IgG % Positive	HI Test	HI % +ve	CRS Cases	CRS Positive (%)
1977	1,847	-	-	-	-	-	-	1,256	68	-	-
1978	-	-	-	-	-	-	-	-	70	-	-
1985	931	-	-	-	-	-	-	620	66.6	-	-
1990	385	-	-	-	-	-	-	289	75	-	-
2000	152	-	-	-	152	116	76.4	-	-	-	-
2002	207	-	-	-	207	112	54.1	-	-	-	-
2004	159	-	-	-	159	109	68.5	-	-	-	-
2006	1	-	-	-	-	-	-	-	-	1.0	1.0
2008	230	-	-	-	230	215	93.5	-	-	-	-
2009	16,394	-	-	-	-	-	-	-	-	16,394	19(0.12)
	534	534	21	3.9	-	-	-	-	-	-	-
2010	430	-	-	-	430	421	97.9	-	-	-	-
2011	781	781	94	12	-	-	-	-	-	-	-
	270	270	14	9.7	270	143	53	-	-	-	-
	92	92	1	1.1	92	6	7.0	-	-	-	-
	93	93	42	45.2	-	-	-	-	-	-	-
2012	190	190	13	6.8	-	-	-	-	-	-	-
2013	757	757	81	10.7	-	-	-	-	-	-	-
	200	-	-	-	200	175	87.5	-	-	-	-
	90	90	6	6.7	89	86	96.6	-	-	-	-
	273	-	-	-	273	244	89.4	-	-	-	-
	267	-	-	-	267	247	92.5	-	-	-	-
2014	272	272	5	1.84	272	249	91.5	-	-	-	-
	90	90	34	37.8	90	75	83.3	-	-	-	-
	180	180	70	38.9	-	-	-	-	-	-	-
	288	288	50	17.4	-	-	-	-	-	-	-
2015	160	160	149	93.1	160	62	38.8	-	-	-	-
	89	89	7	7.87	-	-	-	-	-	-	-

Table 3: Distribution of Rubella infection (IgM and IgG) in Nigeria based on gender, setting and age group.

		Gender	Setting	Age Group
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Year of Study	Sample Size	No. F Examined	No. F Positive	% F Positive	No. M Examined	No. M Positive	% M Positive	CRS (%)	Urban (%)	Rural (%)	1 – 20(%)	21 – 40(%)	>41(%)
1977	1847	1847	1256	68	---	---	---	---	---	---	---	---	---
1978	-----	---	---	70	---	---	---	---	---	---	---	---	---
1985	931	931	620	66.6	---	---	---	---	---	---	---	---	---
1990	385	385	289	75	---	---	---	---	---	---	---	---	---
2000	152	152	116	77	---	---	---	---	---	---	---	---	---
2002	207	207	112	54.1	---	---	---	---	---	---	---	---	---
2004	159	159	109	68.5	---	---	---	---	47(29.6)	62(38.9)	14(8.8)	39(24.5)	---
2006	1	---	---	---	---	---	---	1	---	---	---	---	---
2008	230	230	215	15	---	---	---	---	171(74.3)	59(25.7)	13(5.6)	206(89.6)	11(4.8)
2009	16394	---	---	---	---	---	---	19(0.12)	---	---	---	---	---
	534	534	21	3.9	---	---	---	---	---	---	---	---	---
2010	430	430	421	97.9	---	---	---	---	---	---	---	---	---
2011	781	409	71	17.4	372	23	6.2	---	257(32.9)	524(67.1)	753(96.4)	28(3.6)	---
	300	270	157	58.1	---	---	---	---	---	---	---	---	---
	92	92	13/3	14.1/3	---	---	---	---	---	---	---	---	---
	93	---	28	30.1	---	14	15.1	---	---	---	93(100)	---	---
2012	190	190	13	6.84	---	---	---	---	---	---	57(30)	133(70)	---
2013	757	384	48	12.9	373	33	8.6	---	166(21.9)	591(78.1)	757(100)	---	---
	200	200	175	87.5	---	---	---	---	---	---	7(3.5)	191(95.5)	2(1.0)
	90/89	90/89	31533	60/96.6	---	---	---	---	46(51.1)	44(48.9)	---	---	---
	273	273	244	89.4	---	---	---	---	---	---	30(11.0)	239(87.5)	4(1.5)
	267	267	247	92.5	---	---	---	---	0	267(100)	41(15.4)	222(83.1)	4(1.5)
2014	272	272	249/5	91.5/1.84	---	---	---	---	---	---	247(90.7)	---	---
	90	90	34/75	37.8/83.3	---	---	---	---	---	---	17(18.9)	73(81.1)	---
	180	180	70	38.8	---	---	---	---	---	---	25(13.8)	153(85)	2(1.2)
	288	288	50	17.4	---	---	---	---	---	---	21(7.3)	263(91.3)	4(1.4)
2015	160	160	62	38.8	---	---	---	---	129(80.6)	31(19.4)	23(14.4)	137(85.6)	---

	89	89	7	7.89	---	---	---	---	---	---	55(61.8)	25(28.1)	9(10.1)
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CONCLUSION

The findings of the researched articles is an evidence for the existence of the Rubella virus in Nigeria, particularly in the pregnant women hence the need for routine screening and vaccination are of paramount importance to combat the occurrence of CRS.

LIMITATIONS OF THE STUDY

The 28 studies on rubella virus conducted in Nigeria were identified and summarized, they may not be representative of the whole published articles on rubella in Nigeria, because some possibly are on the process of being published in some journals and some probably were not available online which deter their accessibility for inclusion into this work. Secondly, the published studies, employed varied methodologies, limiting the ability to combine and compare results directly. Thirdly, in some studies, authors presented a small number of the used small samples size were either low or even a single digit in the context of case findings that also which limited comparison based on sample size. Finally, the paucity of the data in some of the states also limits comprehensive comparison among the geopolitical zones.

CONFLICTS OF INTEREST

Authors declare no conflict of interest in this study.

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