



ORIGINAL ARTICLE

A Rural-urban Comparative Assessment about Knowledge of Pregnancy Danger Signs by Women in a District of Ogun State

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Keywords

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ABSTRACT

Background: Danger signs in pregnancy are specific symptoms that signal serious complications requiring urgent medical attention to avert risks of maternal and foetal morbidity and mortality. This study compared knowledge of pregnancy danger signs among women in Ogun East Senatorial District.

Methods: This cross-sectional comparative study included 375 women from various communities, utilizing a multistage sampling method. An interviewer-administered, structured questionnaire was used for data collection and analysis using IBM SPSS version 22.0. Relevant descriptive and inferential statistics were calculated. The chi-square test was utilized to assess associations between categorical variables, while multivariate analysis identified factors independently associated with knowledge of these dangers signs. The significance level was set at a 95% confidence interval with a p-value ≤ 0.05 .

Results: Urban respondents were older than rural respondents (mean age 31.07 ± 6.115 and 30.69 ± 6.312 years, respectively). Respondents identified at least three danger signs (rural 85.3%; urban 86.7%). Fever was the most known danger sign (rural 96.5%; urban 95.2%) while convulsions (rural 8.5%; urban 14.1%; $p=0.016$), dizziness (rural 24.0%; urban 17.3 %; $p=0.024$) and anaemia (rural 38.4%; urban 25.6%; $p \leq 0.001$) were the least known danger signs. ANC attendance (AOR=0.307, 95% CI: 0.129-0.730) and marital status (AOR=0.335, 95% CI: 0.142-0.791) were significant predictors of knowledge of danger signs among urban and rural respondents, respectively.

Conclusion: Knowledge gaps regarding the danger signs of pregnancy indicate a need for tailored health education programs for pregnant women as well as a reinforcement of the importance of attending ANC.

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INTRODUCTION

Maternal health remains a significant public health challenge worldwide, especially in low- and middle-income countries where maternal

mortality rates are disproportionately high.¹⁻³

According to the World Health Organization (WHO), an estimated 295,000 women die each year from preventable pregnancy and childbirth

complications, with a substantial share occurring in sub-Saharan Africa.⁴ Many of these deaths are associated with delays in recognizing and responding to danger signs during pregnancy, which are critical indicators of life-threatening complications.⁵ In Nigeria, despite ongoing public health interventions, maternal mortality remains a persistent problem, partly due to inadequate awareness and timely response to critical warning signs during pregnancy.^{6,7}

The concept of danger signs in pregnancy encompasses a set of symptoms indicating severe complications that require immediate medical attention to prevent maternal and foetal morbidity and mortality.^{8,9} Recognizing these signs—such as severe fever, convulsions (fits), severe headaches, heavy bleeding and dizziness—signals the need for urgent medical intervention; is crucial for early intervention and the reduction of preventable maternal deaths.⁸ Knowledge of these signs among women is essential for timely healthcare-seeking responses, allowing for early interventions that can prevent maternal and fetal complications.⁷ However, awareness of these warning signs varies significantly across populations, often influenced by factors such as level of education, access to healthcare, socioeconomic status, and cultural beliefs.¹⁰ Previous research has shown that rural and urban differences in health literacy and access to care can significantly impact women's understanding and recognition of danger signs during pregnancy, with rural women often at a

disadvantage due to limited healthcare infrastructure and health education resources.^{11–14} Disparities in health literacy and access to antenatal care may contribute to differing levels of knowledge regarding pregnancy-related danger signs.^{15,16} Rural areas, often with limited healthcare infrastructure, may lack adequate maternal health education resources compared to their urban counterparts.¹⁷ Conversely, urban populations, despite greater healthcare accessibility, may experience other barriers, such as over-stretched health facilities, that may affect their understanding of maternal health risks. When health facilities are overburdened, healthcare workers may lack the time or capacity to provide thorough education to each patient, reducing the amount of information women receive about pregnancy risks. Understanding these knowledge patterns is essential to developing targeted educational programs that address the unique needs of both rural and urban populations, ultimately contributing to the reduction of maternal mortality in the region. This study aimed to assess and compare the knowledge of danger signs in pregnancy among women in rural and urban communities of Ogun East Senatorial District.

METHODOLOGY

This study was conducted in Ogun East Senatorial District (OESD), Southwestern Nigeria. Ogun East Senatorial District has a population of 1.25 million (Census 2006)¹⁸ and a projected population of about 8.4 million by 2026.¹⁹ Ogun East Senatorial District has three

urban and six rural local government areas. In the urban areas of Ogun East Senatorial District, the major occupations include white-collar jobs and petty trading. At the same time, farming is predominant in the rural area of the senatorial district.

This was a comparative cross-sectional study conducted among women of childbearing age (15-49 years), who have had at least a birth within the last 36 months, regardless of birth outcome. Women who were severely ill and unable to participate in the study were excluded.

The sample size was determined using the formula for comparative study.²⁰

$$n = \frac{(Z\alpha/2 + Z\beta)^2 (p_1q_1 + p_2q_2)}{(p_1 - p_2)^2}$$

where:

n is the minimum sample size for each group.

$Z\alpha$ is the standard normal deviate at 95% confidence level (1.96).

$Z\beta$ is the standard normal deviate with the power of demonstrating a statistically significant difference between the two groups at 90% (0.84).

p_1 = the proportion of urban respondents who had good knowledge of a danger sign in pregnancy was 33.5%

p_2 = the proportion of rural respondents who had good knowledge of a danger sign in pregnancy was 26.5%.²¹

Accounting for a 20% rate of non-responses and invalid responses brought the calculated sample size to 355 for each group making a total of 710

women. This was, however, rounded up to 750 women (375 in each rural and urban area).

A multi-stage sampling was used to select study participants. The local government areas were stratified into rural and urban in the first stage. Simple random sampling by balloting was used to select one rural LGA (Odogbolu) and one urban LGA (Sagamu). Stage two, involved the selection of one ward by simple random sampling (by balloting) from the list of wards in Odogbolu (Okun-owa ward) and Sagamu (Batoro) LGAs. In stage three, house numbering was conducted in Batoro and Okun-owa wards. Systematic random sampling by balloting was used to select houses with a sampling interval of five (determined by dividing the total number of houses by the minimum sample size). The first house was selected by simple random sampling, subsequently, every 5th house was selected. All households were identified in the selected houses. The eligible woman in the selected household was identified and interviewed in the final stage. Data was collected using a pre-tested, interviewer-administered, structured questionnaire adapted from the safe motherhood questionnaire of the maternal and neonatal health program of the Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) and the Nigeria Demographic Health Survey 2018.^{22,23}

Table 1: Socio-demographic characteristics of respondents (N=375 per group)

Variable	Rural n (%)	Urban n (%)	Test Statistics
Age Group (Years)			
<24	60 (16.0)	45 (12.3)	$\chi^2=5.189$ $p=0.393$
25-29	113 (30.1)	125 (33.3)	
30-34	95 (25.3)	98 (26.1)	
35-39	76 (20.3)	64 (17.1)	
40-44	22 (5.9)	30 (8.0)	
≥45	9 (2.4)	12 (3.2)	$t= -0.840, p=0.401$
Mean	30.69±6.312	31.07±6.115	
Occupation			
Unemployed	39 (10.4)	24 (6.4)	$\chi^2=16.367$ $p=0.006^*$
Agricultural worker	9 (2.4)	3(0.8)	
Civil servant	10 (2.7)	1 (0.3)	
Trader	151 (40.3)	173 (46.1)	
Unskilled	159 (42.4)	163 (43.5)	
Semi-skilled	7 (1.9)	11(2.9)	
Marital status			
Single	18 (4.8)	7 (1.9)	$\chi^2=7.190$ $p=0.126$
Married	347 (92.5)	350 (93.3)	
Divorced	2 (0.5)	3 (0.8)	
Separated	6 (1.6)	11 (2.9)	
Widowed	2 (0.5)	4 (1.1)	
Religion			
Christianity	330 (88.0)	313 (83.5)	$\chi^2=6.861$ $p=0.032^*$
Islam	45 (12.0)	57 (15.2)	
Traditional worshipper	0 (0.0)	5 (1.3)	
Ethnicity			
Yoruba	329 (87.7)	365 (97.3)	$\chi^2=27.322$ $p=<0.001^*$
Igbo	9 (2.4)	2 (0.5)	
Hausa	24 (6.4)	8 (2.1)	
Others	13 (3.5)	0 (0.0)	
Highest Educational status			
No formal education	57 (15.2)	17 (4.5)	$\chi^2=45.514$ $P=<0.001^*$
Primary	80 (21.3)	41 (10.9)	
Secondary	213 (56.8)	286 (76.3)	
Tertiary	25 (6.7)	31 (8.3)	
Attended ANC			
Yes	240 (64)	347 (92.5)	$\chi^2=89.744$ $p=<0.001^*$
No	135(36.0)	28 (7.5)	

Mean Age= 30.88±6.213 years; *Statistically significant *t=t-test

The data collected was analysed using the IBM SPSS for Windows version 22.0 software. Results were presented in frequency tables after descriptive analysis. Knowledge of danger signs of pregnancy was classified as "good" if respondents mentioned three or more danger

signs of pregnancy and "poor" if respondents mentioned less than three danger signs of pregnancy. A t-test was used to compare the mean ages of urban and rural respondents. Chi-square was used to compare the association between categorical variables. The independent variables

(socio-demographic variables like age, marital status, occupation, religion, etc.) that had a statistically significant association with the dependent variable (knowledge of danger signs in pregnancy) at a p-value less than 0.05 were included in a model of logistic regression to determine factors independently associated with the knowledge of danger signs in pregnancy.

Ethical approval was obtained from Babcock University Health Research Ethics Committee (BUHREC/309/20b) and the Ministry of Health, Ogun State (HPRS/381/339), Nigeria. Verbal and written informed consent was obtained from respondents, who were assured of their privacy and confidentiality.

Table 2: Knowledge of danger signs in pregnancy (N=375 per group)

Variable	Rural n (%)	Urban n (%)	χ^2	P Value
Vaginal bleeding				
Yes	185 (49.3)	222 (59.2)	7.355	0.007*
No	190 (50.7)	153 (40.8)		
High blood pressure				
Yes	205 (54.7)	270 (72.0)	24.258	<0.001*
No	170 (45.3)	105 (28.0)		
Anaemia				
Yes	144 (38.4)	96 (25.6)	14.118	<0.001*
No	231 (61.6)	279 (74.4)		
Dizziness				
Yes	90 (24.0)	65 (17.3)	5.083	0.024*
No	285 (76.0)	310 (82.7)		
Fever				
Yes	362 (96.5)	357 (95.2)	0.841	0.359
No	13 (3.5)	18 (4.8)		
Severe headache				
Yes	282 (75.2)	254 (67.7)	5.126	0.024*
No	93 (24.8)	121 (32.3)		
Fits				
Yes	32 (8.5)	53 (14.1)	5.851	0.016*
No	343 (91.5)	322 (85.9)		

Table 3: Knowledge of danger sign score (N=375)

Variable	Rural	Urban	χ^2
Mentions ≥ 3 signs	320 (85.3)	325 (86.7)	$\chi^2 = 0.277$, P=0.599
Mentions < 3 signs	55 (14.7)	50 (13.3)	
Mean	3.44 $\pm$ 0.866	3.51 $\pm$ 0.922	

Mean score 3.47 $\pm$ 0.894 *t=T-test

RESULTS

Table 1 shows the socio-demographic characteristics of the respondents. In the rural area, one hundred and thirteen respondents (30.1%) were aged 25-29 years. Also, in the urban area, most respondents (n=125, 33.3%) were in the age group 25-29 years. The difference in the mean age of rural and urban residents was not statistically significant ($t = -0.840$, $p = 0.401$). The majority of respondents in both rural (87.7%) and urban (97.3%) areas were of the Yoruba ethnic group. The association between ethnicity and place of residence was statistically significant ($p < 0.001$). In the rural area, fifty-seven (15.2%) respondents had no formal education compared to seventeen (4.5%) in the urban area. Among the rural respondents, twenty-five (6.7%) had tertiary education as the highest educational status. In comparison, thirty-one (8.3%) respondents in the urban area had tertiary education as the highest level. The association between educational status and place of residence was statistically significant ($\chi^2 = 45.514$, $p < 0.001$).

Among the rural residents, two hundred and forty (64%) attended ANC; this was lower compared to the three hundred and forty-seven (92.5%) of respondents in the urban area who attended ANC. The association between ANC attendance and place of residence was statistically significant ($\chi^2 = 89.744$, $p < 0.001$).

Table 2 shows the knowledge of danger signs in pregnancy among rural and urban respondents.

Fever was the most known danger sign in pregnancy, which was higher among rural than urban respondents (rural: $n = 362$, 96.5%, urban: $n = 357$, 95.2%). The difference in this knowledge was not statistically significant ($p = 0.359$). Fits (seizures) were the least known danger sign, followed by dizziness. Urban respondents showed a higher knowledge of fits as a danger sign (14.1%) compared to rural respondents (8.5%), and this difference was statistically significant ($p = 0.016$). Conversely, rural respondents had a higher knowledge of dizziness as a danger sign (24.0%) compared to urban respondents (17.3%), also with a statistically significant difference ($p = 0.024$). Less than half of respondents in both rural (38.4%) and urban (25.5%) areas recognized anaemia as a danger sign in pregnancy; the difference in this knowledge was statistically significant ($p < 0.001$). Table 3 shows the Knowledge of Danger Signs score. Most respondents in both rural and urban areas could mention three or more danger signs in pregnancy; however, this was higher among the urban respondents (86.7%) than rural respondents (85.3%). The difference in knowledge of danger signs score among rural and urban respondents was not statistically significant ($p = 0.599$). The mean score for the respondents' knowledge of danger signs in pregnancy was 3.47 ± 0.894 , indicating that most women had a moderate understanding of these danger signs.

Table 4: Bi-variate analysis Factors Influencing Knowledge of Danger Signs in Pregnancy

Variable	Rural		Urban	
	Good knowledge n(%)	Poor knowledge n(%)	Good knowledge n(%)	Poor knowledge n(%)
Age				
≥30	182 (89.7)	21 (10.3)	184 (90.2)	20 (9.8)
<30	138 (80.2)	34 (19.8)	141 (82.5)	30 (17.5)
χ ² (P value)	6.605 (0.01)*		4.823 (0.028)*	
Marital status				
Currently married	302 (87.0)	45 (13.0)	303 (86.3)	48 (13.7)
Not currently married	18 (64.3)	10 (35.7)	22 (91.7)	2 (8.3)
χ ² (P value)	10.711 (0.001)*		0.555 (0.456)	
Occupation				
Employed	289 (86.0)	47 (14.0)	306 (87.2)	45 (12.8)
Unemployed	31 (79.5)	8 (20.5)	19 (79.2)	5 (20.8)
χ ² (P value)	1.189 (0.276)		1.248 (0.264)	
Educational status				
Formal education	276 (86.8)	42 (13.2)	312 (87.2)	46 (12.8)
No formal education	44 (77.2)	13 (22.8)	13 (76.5)	4 (23.5)
χ ² (P value)	3.559 (0.059)		1.602 (0.206)	
Religion				
Christian	282 (85.5)	48 (14.5)	273 (87.5)	39 (12.5)
Non-Christian	38 (84.4)	7 (15.6)	52 (82.5)	11 (17.5)
χ ² (P value)	0.032 (0.857)		1.116 (0.2910)	
Ethnicity				
Yoruba	283 (86.0)	46 (14.0)	319 (87.2)	47 (12.8)
Non-Yoruba	37 (80.4)	9 (19.6)	6 (66.7)	3 (33.3)
χ ² (P value)	1.005 (0.316)		3.192 (0.074)	
Attended ANC				
Yes	213 (88.8)	27 (11.3)	306 (88.2)	41 (11.8)
No	107 (79.3)	28 (20.7)	19 (67.9)	9 (32.1)
χ ² (P value)	6.218 (0.013)*		9.265 (0.002)*	

Table 4 shows that women who were ≥30 years old had better knowledge of danger signs in pregnancy compared to those <30 in both rural and urban areas. This finding was statistically significant in both rural and urban groups. Married women in the rural area had better knowledge of danger signs in pregnancy than unmarried women, this was statistically significant (p=0.001). No significant difference was observed in the urban area. Generally, women with a formal education had better

knowledge of danger signs in pregnancy than women without a formal education. However, this difference was not statistically significant in the rural and urban areas. Women who attended ANC had significantly better knowledge in both rural and urban settings (p=0.013 and 0.002, respectively).

Table 5 shows that in the rural area, marital status (AOR=0.335, 95% CI: 0.142-0.791) remained a significant predictor of knowledge of danger signs in pregnancy, while in the urban area, ANC

attendance (AOR=0.307, 95% CI: 0.129-0.730) remained a significant predictor of knowledge of danger signs in pregnancy.

DISCUSSION

In this study, most respondents had some form of formal education, with a higher proportion of urban respondents having formal education than their rural counterparts. This concurs with findings from similar studies carried out in Cross-river²⁴ Edo²⁵ and Lagos²⁶ all of which are in

Nigeria. The higher educational status among urban respondents compared to rural respondents in this study could be attributed to better access to educational institutions, infrastructure, and opportunities in urban areas.²⁷ In addition, a lower level of tertiary education was observed among rural and urban respondents, in contrast to a finding in Abeokuta, Ogun State Nigeria, where more than half of the respondents had tertiary education.²⁸

Table 5: Multi-variate Analysis of Factors Influencing Knowledge of danger signs in pregnancy

Variable	AOR	Rural 95% CI	p-Value	AOR	Urban 95% CI	p-Value
Age						
≥30	0.572	0.311-1.053	0.073	0.543	0.294-1.004	0.051
<30	1			1		
Marital status						NA
Currently married	0.335	0.142-0.791	0.013*			
Not currently married	1					
ANC						
Yes	0.553	0.305-1.001	0.051	0.307	0.129-0.730	0.008*
No	1			1		

In the current study, more respondents in the urban area attended antenatal care clinics than rural respondents. This finding was in contrast to a study in Kano, northwest Nigeria where more rural than urban respondents attended antenatal care clinics.²⁹ This contrast could have been due to regional differences in healthcare accessibility, cultural practices, and possibly socioeconomic factors. Also, localized health outreach programs might have effectively encouraged ANC attendance among rural women in Northwest Nigeria.

The most known danger sign in the current study in both rural and urban areas was fever. This is in contrast to a study in Lagos²⁶ and Ethiopia,¹⁰ where the most known danger sign in pregnancy was vaginal bleeding. In Kenya, the most known danger sign was severe headaches.⁸ The contrast in the most known danger signs in pregnancy across these studies may have been influenced by variations in health education strategies focusing on maternal health risks like haemorrhage or severe headaches. In our study, the least known danger signs in pregnancy were dizziness and

convulsions, with less than half of respondents in both rural and urban areas recognizing anaemia as a danger sign. The low recognition of dizziness, convulsions, and anaemia as danger signs in pregnancy could be due to limited awareness and understanding of the seriousness of these conditions among the respondents despite public health interventions. Also, these symptoms may not have been widely discussed as other danger signs, like fever or bleeding during health education campaigns. The limited recognition of anaemia as a danger sign is particularly concerning. This underscores the need for more targeted interventions to address knowledge gaps related to hematologic complications in pregnancy.

A high awareness of danger signs was observed in both rural and urban women as respondents could identify three or more danger signs related to pregnancy. This finding aligns with a similar comparative study in Lagos State southwestern Nigeria,²⁶ where rural and urban dwellers could mention three or more danger signs. This finding was also in consonance with studies in Abia State, southeast Nigeria³⁰, Kenya⁸ and Ethiopia,¹⁰ where more than half of the respondents could mention at least three danger signs in pregnancy. The findings in this study may be attributed to the high proportion of respondents in both rural and urban areas who attended antenatal clinics. In these clinics, danger signs in pregnancy may have been communicated. The results in this study contradict the study conducted in Homa Bay, Western Kenya,³¹ where respondents had poor

knowledge of danger signs indicating poor awareness due to the absence of relevant intervention within the health facilities.³²

In addition, the bivariate analysis revealed that women in the current study who were ≥ 30 years old, currently married and attended ANC clinics had better knowledge of danger signs in pregnancy in both rural and urban areas. This was similar to studies in Enugu State, Nigeria,³³ and Kenya⁸, where age, marital status, and access to antenatal care were significantly associated with good knowledge of danger signs in pregnancy. This could have been due to increased exposure to health education and life experiences associated with these factors. Older women may have encountered more opportunities than younger women to learn about maternal health through previous pregnancies or community interactions. Marriage often provides some support systems that may encourage ANC attendance,^{34,35} where women receive targeted information on danger signs in pregnancy. Furthermore, marital status (in the rural area) and ANC attendance (in the urban area) remained significant predictors of good knowledge of danger signs in pregnancy in the current study. Future interventions must leverage spousal and community support systems to enhance awareness of danger signs in pregnancy, particularly in rural settings.

CONCLUSION

In conclusion, the knowledge gaps related to certain danger signs, especially fits, dizziness, and anaemia suggest the need for tailored health

education programs to reinforce the awareness of these less-known but critical signs and the importance of ANC attendance, which serves as avenues for maternal health education.

Strengths and limitations:

The study compared rural and urban communities, providing valuable insights into disparities in the knowledge of pregnancy-related danger signs among women in rural and urban areas of Ogun State. However, our study relied on self-reported knowledge, which may be influenced by recall bias. Additionally, the cross-sectional study design limits the ability to infer any causal relationship causality.

Implication for Policy

This study underscores the need for targeted health education on less-known danger signs (such as fainting, dizziness, and anemia), especially in rural areas. Policies should promote

early and consistent ANC visits through incentives and outreach programs.

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