

Original Research Article

Salt Literacy and Educational Disparities in Rural Bayelsa State, Nigeria

ABSTRACT

Aims: To assess salt literacy levels among adults in remote communities of Bayelsa State and examine its association with educational attainment.

Study design: The study was a community-based cross-sectional survey.

Place and Duration of Study: conducted in selected communities in the creeks of Bayelsa between September 2023 and April 2024.

Methodology: The study included 2,016 respondents selected purposively from nine communities in the creeks of the three senatorial districts of Bayelsa State. A validated salt literacy questionnaire was used to obtain salt literacy data. Descriptive statistics were used to obtain summaries of demographic and salt literacy data, while independent samples t-test and chi-square tests were used to determine district-based differences in salt literacy scores and the association between educational status and salt literacy level, respectively.

Results: Female respondents accounted for 57.2%, while males made up the remaining 42.8%. The average sample age was 39 (SD±7.2). A total of 1,655 (82.1%) respondents had low salt literacy, while 62 (3.1%) and 299 (14.8%) had moderate and high salt literacy, respectively. Salt literacy scores were not significantly different among communities in the three senatorial districts ($M_1 = 24$ [SD 5.26], $M_2 = 24$ [SD = 5.04]; $M_3 = 24$; [SD = 5.37]); $t(2,016) = 2.19$, $P = 0.104$, 2-tailed). There was also no significant association between respondents' educational status and salt literacy level ($\chi^2 = 0.237$, $df = 3$, $P = 0.124$).

Conclusion: Salt literacy level is low among adults in remote communities of Bayelsa State, and no significant association exists between educational status and salt literacy. The findings underscore the need for targeted health education interventions to improve salt literacy in these communities, focusing on addressing knowledge gaps regardless of educational attainment.

Keywords: Salt literacy, Educational status, Health education, Non-communicable diseases, Bayelsa State, Rural communities, public health

1. INTRODUCTION

Excessive salt consumption is a significant risk factor for hypertension and cardiovascular diseases, contributing substantially to global morbidity and mortality (World Health Organization [WHO], 2023; Grillo et al., 2019). The WHO recommends that adults aged 16 and above limit their daily salt intake to less than 5 grams, with lower amounts advised for children aged 2-15 based on their energy requirements to help prevent cardiovascular diseases. However, the global average salt consumption is approximately 10.8 grams per day, more than twice the recommended level (WHO, 2023). To address this, WHO has set a global target of reducing sodium intake by 30% by 2025 (WHO, 2012).

Achieving this goal requires improving public awareness and knowledge regarding salt intake, commonly referred to as salt literacy. Salt literacy encompasses understanding the health implications of salt consumption, recognizing sources of dietary salt, and adopting practices to reduce intake. While higher health literacy has been associated with better knowledge of blood pressure and hypertension, the relationship between education levels and salt literacy remains

underexplored, with some studies showing inconsistent findings (Akinyemi et al., 2019; Mohd Isa et al., 2021; Ubogun et al., 2023).

In Nigeria, national efforts to reduce dietary salt consumption are outlined in the 2019 National Multi-sectoral Action Plan for the Prevention and Control of Non-communicable Diseases, which incorporates the WHO SHAKE package. These strategies emphasize actions such as mandatory sodium limits in processed foods, advertising restrictions, mass media campaigns, school-based interventions, and improved front-of-package labeling (Santos et al., 2021; Sanuade et al., 2023). However, these initiatives often focus on urban and semi-urban populations, leaving rural and remote areas underserved like in other typical healthcare initiatives in Nigeria.

Remote communities, such as those in the creeks of Bayelsa State, face unique challenges, including limited access to health education, resources, and formal education. A significant proportion of the population in these areas has low levels of formal education, which may influence their ability to understand health-related information and make informed dietary choices. Bayelsa State is further constrained by a limited health workforce, posing additional barriers to effective health education and service delivery (McFubara et al., 2012). These factors raise concerns about residents' salt literacy and their ability to adopt healthy dietary practices.

Currently, there is limited data on salt literacy levels in these underserved populations and how they may relate to educational disparities. Understanding the extent of this knowledge gap is critical for designing tailored public health interventions. This study aimed to assess salt literacy levels among adults in remote communities of Bayelsa State and examine its association with educational attainment. The findings would provide valuable insights into the public health landscape in hard-to-reach areas and highlight opportunities for intervention.

2. MATERIAL AND METHODS

This study employed a community-based cross-sectional survey design to assess the levels of salt literacy among adults in remote communities of Bayelsa State, Nigeria. The study employed a multistage probability sampling method, starting with the random selection of one constitutionally established Local Government Area (LGA) from each of the three constitutionally created senatorial districts. Subsequently, three Rural Development Authorities (RDAs) were randomly selected from the 32 RDAs established under the Bayelsa State Laws of 2007 within the chosen LGAs. Finally, nine communities located in the creeks within the selected RDAs were purposefully selected. These communities were chosen due to their geographical remoteness and limited access to health education initiatives. The study population comprised adults aged 18 years and above who were permanent residents of the selected communities and willing to participate. A total of 2,016 respondents were selected using a purposive sampling technique, with each senatorial district contributing participants from three communities.

Data were collected using a validated Salt Literacy Questionnaire (SLQ) adapted from the Salt Intake-Related Knowledge, Attitude, and Practice Questionnaire for Malaysian adults (Zainal Arifen et al., 2024). The adapted questionnaire was structured into three sections, capturing demographic information, knowledge of dietary salt sources and health risks, and salt-related behaviors, such as cooking and consumption practices. Content validity was ensured through expert review done by two senior lecturers in Public Health and one senior lecturer in Community Medicine. The panel were asked to make judgment on relevance of the content across a three-point scale (1- not relevant; 2- somewhat relevant; 3- relevant), and the scale validity index (SVI) was calculated. The result of the computation yielded an SVI of 0.80, indicating a strong validity (Polit & Beck, 2021). The instrument's reliability was confirmed through a pilot study conducted with 30 participants, which yielding a Cronbach's alpha of 0.82.

Community health workers who were properly educated about the research task, helped in administering the questionnaire through face-to-face interviews to account for potential literacy challenges among respondents. Data collection spanned two months, from (September, 2023, to April, 2024). The data were analyzed using SPSS version 24.0, with descriptive statistics employed to summarize demographic characteristics and salt literacy levels. Mean score ≥ 3.5 were classified as high salt literacy, while mean score between 2.5 and 3, and mean score < 2.5 were classified as moderate and low salt literacy respectively. Inferential statistics included independent samples t-test to compare salt literacy scores across the three senatorial districts and chi-square tests to examine the relationship between educational status and salt literacy levels. A significance level of $P < 0.05$ was set for all analyses.

3. RESULTS AND DISCUSSION

A total of 2,016 respondents participated in the study. Female respondents accounted for 57.2%, while males made up the remaining 42.8%. The average sample age was 39(SD±7.2). However, the largest proportion of participants (30.5%) fell within the 28–37 age group. Most participants were married (61.1%), while 23.7% had no formal education, and only 14.6% had attained tertiary education. Regarding occupation, majority were farmers (46.2%), while 11.6% were either unemployed or engaged in other occupations (Table 1).

Table 1: Demographic Characteristics of Respondents

(n = 2,016)		
Characteristic	Frequency (n)	Percentage (%)
Age		
18 - 27 years	585	28.9
28 - 37 years	615	30.5
38 - 47 years	465	23.0
48 - 57 years	270	13.4
58 years and above	81	4.0
Mean/Standard 39(SD±7.2)		
Gender		
Female	1,152	57.2
Male	864	42.8
Educational Status		
No formal education	478	23.7
Primary education	625	31.0
Secondary education	619	30.7
Tertiary education	294	14.6
Occupation		
Farmer	932	46.2
Trader	682	33.8
Civil servant	169	8.4
Unemployed/Other	233	11.6
Marital Status		
Married	1,232	61.1
Single	488	24.2
Widowed	236	11.7
Divorced/Separated	60	3.0

Concerning salt literacy, the group mean for all participants' responses were less than 2.5, indicating low literacy for all the salt related questions that were asked (Table 2).

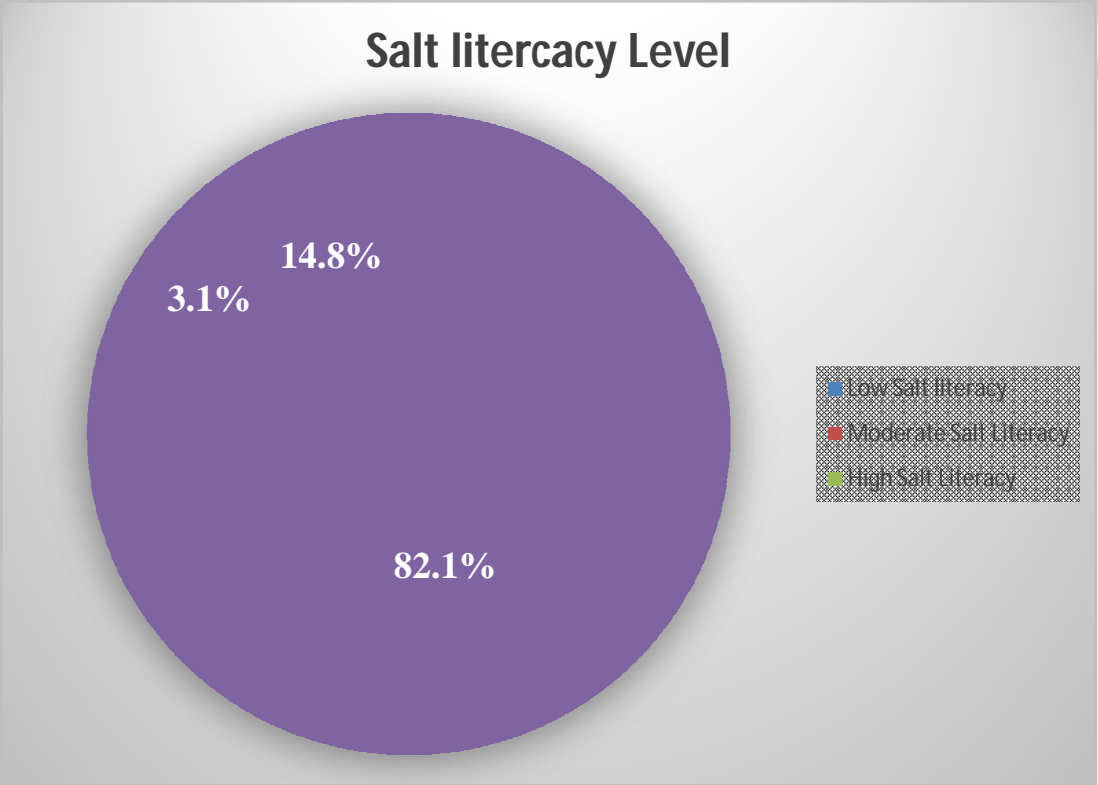
Table 2: Respondents' Responses to the Salt Literacy Questionnaire

(n = 2,016)

Question	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean	Standard Deviation
The recommended daily salt intake for adults is less than 5 grams.	200 (9.9%)	550 (27.3%)	1,000 (49.6%)	266 (13.2%)	2.1	0.92
Consuming too much salt can lead to high blood pressure.	220 (10.9%)	600 (29.7%)	950 (47.1%)	246 (12.2%)	2.2	0.91
High salt consumption increases the risk of heart disease.	227 (11.3%)	570 (28.3%)	1,003 (49.8%)	216 (10.7%)	2.0	0.91
Table salt is the main source of sodium in most diets.	240 (11.9%)	590 (29.3%)	980 (48.6%)	206 (10.2%)	2.0	0.90
Processed foods such as canned soups and snacks are high in salt.	239 (11.9%)	564 (28.0%)	969 (48.1%)	234 (11.6%)	2.2	0.91
Fresh fruits and vegetables typically contain low amounts of salt.	218 (10.8%)	569 (28.2%)	1,015 (50.3%)	214 (10.6%)	2.0	0.92
Food labels can help identify the salt content of packaged foods.	210 (10.4%)	648 (32.1%)	1,002 (49.7%)	156 (7.7%)	2.1	0.91
Sodium listed on food labels refers to the amount of salt in the product.	199 (9.9%)	580 (28.8%)	1,021 (50.6%)	216 (10.7%)	2.1	0.92
A high-salt diet can contribute to kidney disease.	230 (11.4%)	590 (29.3%)	950 (47.1%)	246 (12.2%)	2.1	0.91
Reducing salt intake can lower blood pressure in people with hypertension.	251 (12.5%)	649 (32.1%)	919 (45.6%)	197 (9.8%)	2.1	0.90
Excessive salt intake is linked to an increased risk of stroke.	240 (11.9%)	600 (29.7%)	964 (47.8%)	212 (10.6%)	2.2	0.91
Children who consume too much salt are at risk of developing health problems later in life.	227 (11.3%)	587 (29.1%)	963 (47.8%)	239 (11.8%)	2.0	0.92

Furthermore, salt literacy classification for each participant showed that 82.1% (1,655) of respondents had low salt literacy (mean score < 2.5), 3.1% (62) had moderate salt literacy (mean score between 2.5 and 3.4) while 14.8% (299) had high salt literacy (mean score ≥ 3.5) (Figure 1).

Figure 1: Salt Literacy Level



The mean salt literacy scores were consistent across the three senatorial districts of Bayelsa State: District 1, District 2, and District 3 all recorded a mean score of 24, with standard deviations of 5.26, 5.04, and 5.37, respectively. An independent samples t-test found no significant difference in salt literacy scores between the districts ($t [2,016] = 2.19$, $P = 0.104$, two-tailed) (Table 3). Similarly, a chi-square test revealed no significant association between educational attainment and salt literacy levels among respondents ($\chi^2 = 0.237$, $df = 3$, $P = 0.124$) (Table 4)

Table 3: Independent samples t-test comparing Salt Literacy Among Senatorial Districts

Senatorial District	Mean Salt Literacy Score (M)	Standard Deviation (SD)	t	CI	Significance (2-tailed)
District 1	24	5.26			

District 2	24	5.04	2.19	-1.621 – 2.314	0.104
District 3	24	5.37			

**t* – *t*-test; *CI* – confidence interval

Table 4: Association Between Educational Status and Salt Literacy Level

Educational Status	Low Salt Literacy	Moderate Salt Literacy	High Salt Literacy	Total	df	Pearson Chi-square (χ^2)	Significance (2-tailed)
No formal education	424	10	44	478 (23.7%)			
Primary education	530	16	79	625 (31.0%)			
Secondary education	510	25	84	619 (30.7%)	3	0.237 ^a	0.124
Tertiary education	191	11	92	294 (14.6%)			
Total	1,655	62	299	2,016(100.0%)			

**df* = degree of freedom

The findings of this study reveal a strikingly low level of salt literacy among respondents, with the mean score for all participants below 2.5. This result indicates that the majority of participants lacked adequate knowledge of recommended salt intake levels and the associated health risks of excessive salt consumption, such as hypertension and cardiovascular diseases. An analysis of the data shows that 82.1% of respondents had low salt literacy, 3.1% had moderate literacy, and only 14.8% demonstrated high salt literacy. This low literacy level may be linked to the respondents' educational attainment, as nearly a quarter (23.7%) of participants had no formal education, while only 14.6% attained tertiary education. The public health implications of respondents' salt literacy status are significant and far-reaching. Low salt literacy is a well-documented contributor to unhealthy dietary practices, which, in turn, increase the prevalence of non-communicable diseases (NCDs). The findings highlight a critical gap in public health education, emphasizing the urgent need for targeted interventions to improve knowledge about salt consumption and its health consequences. Addressing this issue is crucial for mitigating the rising burden of NCDs in these areas. Implementing community-based health education programs tailored to the cultural and socio-economic context of rural Bayelsa State is an essential step toward resolving this challenge.

When comparing salt literacy across the three senatorial districts of Bayelsa State—District 1, District 2, and District 3—the mean scores were identical at 24, with only minor differences in standard deviations (5.26, 5.04, and 5.37, respectively). The uniformity of these scores, confirmed by non-significant *t*-test results ($t[2,016] = 2.19$, $P = 0.104$), suggests that low salt literacy is pervasive and not limited to specific geographical areas. This finding supports the need for region-wide public health campaigns rather than district-specific interventions. Since the problem appears uniform

across the state, adopting a comprehensive approach to addressing salt literacy would likely be more effective than isolated efforts.

These findings align with similar studies conducted in other rural regions of Nigeria. For instance, Ogunmoyela et al. (2020) reported low levels of salt literacy among rural dwellers, attributing this to limited access to health information and low levels of formal education. Similarly, Akinyemi et al. (2019) found a strong correlation between poor salt literacy and high rates of hypertension in rural populations. However, studies conducted in urban settings, such as Salihu et al. (2021) in Lagos, documented higher levels of salt literacy, likely due to better access to health education resources and healthcare professionals in urban areas. This urban-rural disparity underscores the need for differentiated public health education strategies in Nigeria, with tailored approaches to meet the unique needs of rural communities.

The results also showed no significant relationship between educational attainment and salt literacy levels among respondents ($\chi^2 = 0.237$, $df = 3$, $P = 0.124$). While it may be expected that individuals with higher education levels would exhibit greater salt literacy, the findings suggest that salt-related knowledge does not necessarily increase with formal education in this population. A closer examination of the data reveals that among participants with no formal education, the majority (88.7%) had low salt literacy, with only 9.2% demonstrating high literacy. Similarly, those with primary and secondary education showed comparable distributions, with over 80% exhibiting low literacy and fewer than 15% achieving high literacy.

Interestingly, although participants with tertiary education had the highest proportion of high salt literacy (31.3%), a significant majority (65.0%) still fell into the low literacy category. These results suggest that formal education alone may not be sufficient to improve salt literacy. While education generally equips individuals with critical thinking skills and the ability to process health-related information, specific topics like dietary salt consumption may require targeted health education interventions. This finding highlights the need for community-level health education programs specifically addressing salt literacy. Public health campaigns should focus on demystifying the dangers of excessive salt intake, translating scientific recommendations into actionable steps, and leveraging local communication channels to reach all educational strata.

Comparing these findings with previous studies, Ogunmoyela et al. (2020) reported a significant association between higher education and salt literacy in urban settings, suggesting that urban dwellers may have better access to health information resources. However, Akinyemi et al. (2019) observed no such relationship in rural communities, aligning with the current study's findings. The disparity between rural and urban areas underscores the influence of environmental and infrastructural factors, such as access to media and healthcare services, on the dissemination of health information. These findings call for tailored health education strategies that address the contextual realities of rural populations.

Overall, public health efforts should emphasize practical knowledge dissemination methods that do not rely solely on formal education systems. These initiatives should prioritize culturally sensitive communication and collaboration with local leaders to ensure broad community engagement. Integrating health education into non-formal settings, such as churches, markets, and community meetings, could enhance outreach to populations with limited formal education. By addressing these contextual factors, it is possible to improve salt literacy and reduce the associated health risks in rural Bayelsa State and similar regions.

4. CONCLUSION

Salt literacy level is low among adults in remote communities of Bayelsa State, and no significant association exists between educational status and salt literacy. The findings underscore the need for targeted health education interventions to improve salt literacy in these communities, focusing on addressing knowledge gaps regardless of educational attainment.

CONSENT

Informed consent was obtained from participants, and all responses were treated with confidentiality and anonymity.

ETHICAL APPROVAL (WHEREEVER APPLICABLE)

The Bayelsa State Health Research Ethics Committee (BSHREC) granted ethical approval (BSHREC /Vol.1/23/05/027), permissions were sought from local community leaders.

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- 2.
- 3.

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