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Prevalence, Perceptions, and Factors Associated with Smokeless Tobacco Use among Adults in a Rural Community in South-Eastern Nigeria: A Cross-Sectional Study

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Background: Smokeless tobacco use remains an important public health concern, particularly in communities where snuff is traditionally available. Evidence on its prevalence, patterns, and associated perceptions in rural South-Eastern Nigeria remains limited. **Objective**: This study assessed the prevalence, patterns of use, perceptions, and factors associated with smokeless tobacco use among adults in Ukpo community, Dunukofia Local Government Area, Anambra State, Nigeria. **Methods**: A cross-sectional study was conducted among 490 respondents using a structured questionnaire adapted from the Adult Tobacco Survey. Data on sociodemographic characteristics, tobacco-use history, frequency and type of use, exposure to tobacco use, reasons for use, and perceptions were collected. Data were analysed using descriptive statistics, chi-square/Fisher's exact tests and multivariable logistic regression, with significance set at $P<0.05$. **Results**: Of 490 respondents, 210 (42.9%) reported ever using smokeless tobacco. Among ever users, 129 (61.4%) were daily users. Dry snuff was the predominant product (155, 73.8%). Ever use of smoked tobacco was reported by 116 (23.7%), while 101 (20.6%) reported dual use. Stress relief was the most frequently reported reason for smokeless tobacco use (115, 61.2%). Social exposure was evident, with 87 (41.4%) reporting use among close friends. More than half (254, 51.8%) perceived smokeless tobacco as safer than cigarettes. Significant associations with smokeless tobacco use were observed for age, sex, marital status, and educational attainment. **Conclusion**: Smokeless tobacco use was common in this community, with dry snuff predominating. Findings highlight the need for context-specific tobacco education, risk communication, and prevention and cessation interventions targeting users and influential social networks.

Keywords: Prevalence, Perceptions, Predictors, Smokeless tobacco, Rural Community.

Introduction

Tobacco use remains a major preventable public health problem worldwide, contributing substantially to premature morbidity and mortality(1). Although cigarette smoking has received considerable attention in tobacco-control research, tobacco can also be consumed in smokeless forms, including snuff, chewing tobacco, snus, and other oral or nasal preparations(2). These products contain nicotine and other potentially harmful constituents and can result in dependence and adverse health consequences(3). Consequently, smokeless tobacco use represents an important component of the global tobacco epidemic that should not be overlooked(3).

Smokeless tobacco products vary considerably in their composition, method of preparation, and route of administration(2). In Nigeria, nasal and oral snuff have traditionally been used, particularly in some rural communities. More recently, commercially packaged smokeless tobacco products have also become available(2). The coexistence of traditional and commercially produced products is important because patterns of use may differ according to cultural practices, accessibility, socioeconomic circumstances, and individual perceptions of tobacco-related risks(2).

The burden of tobacco use is of particular concern in developing countries, including Nigeria, where substantial proportions of the population live in rural communities(2). Rural populations may experience socioeconomic and educational disadvantages and limited access to preventive and cessation services(4,5). In addition, social norms and community practices can influence tobacco-related behaviours(5). These factors may contribute to continued tobacco use and may also affect individuals' perceptions of the health risks associated with smokeless tobacco(6).

In South-Eastern Nigeria, tobacco has historically featured in certain social and cultural settings, including ceremonies, meetings and hospitality. Smokeless tobacco, particularly snuff, has therefore been incorporated into some traditional practices. Such cultural familiarity may influence its social acceptability

and patterns of consumption. At the same time, changing tobacco markets have introduced newer smokeless tobacco products into Nigeria, potentially broadening the range of products available to consumers(7). These developments underscore the importance of understanding contemporary patterns of smokeless tobacco use at the community level(7).

An additional concern is the perception that smokeless tobacco may be less harmful than cigarettes. Such perceptions can influence initiation, continued use, and willingness to quit. In communities where smokeless tobacco is socially accepted, inadequate knowledge of its potential health effects may further reduce motivation to discontinue use. Assessment of both tobacco-use behaviour and perceptions is therefore important for designing context-specific health education and tobacco-control interventions.

Previous studies in Nigeria and other countries have documented variations in the prevalence and patterns of smokeless tobacco use according to sex, age, educational attainment, socioeconomic characteristics and cultural context. However, much of the available tobacco research has focused predominantly on cigarette smoking, with comparatively less attention given to smokeless tobacco, particularly within rural communities in South-Eastern Nigeria. Community-specific information on the prevalence, forms of use, social influences, reasons for use, and perceptions of smokeless tobacco is consequently limited.

Ukpo community in Dunukofia Local Government Area of Anambra State is a rural community in South-Eastern Nigeria in which tobacco use occurs within a distinct social and cultural context. Establishing the magnitude and characteristics of smokeless tobacco use in this setting may provide useful evidence for community-level tobacco prevention and cessation interventions.

Therefore, this study assessed the prevalence, patterns of use, perceptions, and factors associated with smokeless tobacco use among respondents in Ukpo community, Dunukofia Local Government Area, Anambra State, South-Eastern Nigeria. Specifically, the study examined the forms and frequency of

smokeless tobacco use, reasons for use, exposure to tobacco use among household members and peers, perceptions of smokeless tobacco, and sociodemographic factors associated with its use.

Methods

Study design

A household-based simple random sampling and cross-sectional study was conducted to assess the prevalence, patterns, perceptions, and factors associated with smokeless tobacco use among residents of Ukpo community, Dunukofia Local Government Area, Anambra State, South-Eastern Nigeria.

Study setting

Ukpo is one of the six communities in Dunukofia Local Government Area of Anambra State, Nigeria. The Local Government Area was created from the former Njikoka Local Government Area in 1986 and is located in the central senatorial district of Anambra State.

Ukpo is predominantly a rural community with a reported population of approximately 25,210. The population includes children under one year of age, children under five years of age, and women of reproductive age. The community has three health facilities. The major occupations of residents include trading and subsistence farming, with some residents engaged in civil service and other occupations.

Study population

The study population comprised household residents of Ukpo community who were available during the study period and met the eligibility criteria.

The inclusion criteria were an available male or female household member who was willing to participate and who provided informed consent. Individuals who were absent at the time of data collection and non-household members were excluded.

Sample size determination

The minimum sample size was calculated using the appropriate formula for estimating a population proportion in a cross-sectional study:

$n = Z^2pq / d^2$

Where:

- n = required sample size
- Z = standard normal deviate at the desired confidence level. For a 95% confidence level, Z = 1.96
- p = Where p is the prevalence or proportion, and is 0.5 since there is no known proportion because no previous study has been conducted
- q = 1 − p
- d = desired margin of error or level of precision, which is 0.5

$$n = \frac{1.962 \text{ xO.5x0.5}}{0.05 \text{ x } 0.05}$$

$$\frac{0.9604}{0.0025}$$

n=384.16

n= 384

A total of 490 respondents were ultimately included in the study.

Sampling procedure

A total of 490 households were selected from a list of households in the community using simple random sampling by balloting. One respondent was subsequently selected from each household.

Data collection instrument

Data were collected using an anonymous, structured, interviewer-administered questionnaire adapted from the Global Adult Tobacco Survey (GATS) instrument. The questionnaire was pre-tested, after which necessary modifications were made to improve its suitability for the study population.

The questionnaire contained 67 questions organised into five sections:

- Section A: sociodemographic characteristics;
- Section B: knowledge of smokeless tobacco use and its health effects;
- Section C: attitudes and perceptions regarding smokeless tobacco use;
- Section D: practices and patterns of smokeless tobacco use; and
- Section E: factors associated with smokeless tobacco use.

Data collection procedure

Interviewers were trained before commencement of data collection. Each eligible respondent was approached individually; the purpose of the study was explained, and informed consent was obtained before administration of the questionnaire.

The questionnaire was administered privately to respondents in their households. No identifying information was included in the questionnaire, thereby helping to maintain respondent confidentiality.

Study variables and operational definitions

The primary outcome was smokeless tobacco use.

For the analysis, tobacco-use history should be reported using clearly defined categories, including:

- ever smokeless tobacco use: having used any smokeless tobacco product at least once;
- current smokeless tobacco use: reported use at the time of the survey; and
- current daily use: reported use of smokeless tobacco every day at the time of the survey.

Smoked tobacco use and dual use should similarly be defined consistently throughout the manuscript.

The explanatory variables included sociodemographic characteristics, including age, sex, marital status, educational attainment, occupation, and other characteristics assessed by the questionnaire. Other variables included household and peer exposure, reasons for use, willingness to quit, and perceptions of smokeless tobacco.

Quality assurance

The questionnaire was pre-tested before the main survey, and modifications were made based on the pre-test findings. Data collectors were trained before fieldwork to promote consistent administration of the questionnaire.

The final manuscript should provide additional details about the location and size of the pre-test, the procedures used to assess the clarity and reliability of the questionnaire, and whether any translated version was used, if these details are available from the study records.

Ethical considerations

The ethical review board of University of Lagos Teaching Hospital approved the study in accordance with the Declaration of Helsinki, and the study also obtained permission from the community's traditional leadership. Participants provided individual informed consent before the questionnaire was administered.

Confidentiality was maintained by restricting access to completed questionnaires and by ensuring that information could not be directly linked to individual respondents. Participation was voluntary, and efforts were made to minimise any potential harm to participants.

Ethical Issues

Confidentiality: The data collection tool (questionnaire) did not include self-identifying characteristics such as participant's name and contacts.

Informed consent: Participants were informed of the purpose of the study and their roles and rights as participants. Their consent to participate was sought and documented using an informed consent form. A space was provided for signature or thumb print which was witnessed by another person.

Voluntary Participation: Participation was voluntary and respondents were informed that they can withdraw from the study at any stage if they wish, without any consequence to them.

Non-maleficence

Efforts were made to ensure that no harm was done to them.

Beneficence

Efforts were made to balance the benefits of treatment against the risks and costs involved. Respondents identified as smokeless tobacco users received health education concerning tobacco use, while participants considered to be at moderate or high risk were counselled on appropriate lifestyle modification.

Right of decline

Respondents were informed that participation in the study is voluntary, that refusal will not affect their relationship with the healthcare provider, and that they are free to withdraw from the study at any time.

Statistical analysis

Data were analysed using Epi Info version 3.5. Descriptive statistics were used to summarise participants' sociodemographic characteristics, tobacco-use patterns, perceptions and reported reasons for use. Categorical variables were presented as frequencies and percentages.

Associations between categorical variables were assessed using the chi-square test or Fisher's exact test, where appropriate. Multivariable logistic regression was used to examine factors independently associated with ever use of smokeless tobacco. Results from logistic regression should be reported as odds ratios (ORs) or adjusted odds ratios (aORs), as appropriate, with corresponding 95% confidence intervals (CIs).

A two-sided P-value <0.05 was considered statistically significant.

Results

Table 1: Socio-demographic characteristics of respondents

VARIABLES	FREQUENCY (n=490)	PERCENTAGE (%)
Age (yrs)		
11-20	28	5.7
21-30	105	21.4
31-40	126	25.7
41-50	97	19.8
51-60	76	15.5
61-70	41	8.4
71-80	11	2.2
81-100	6	1.2
		Mean and Std. Deviation42.18+15.412
Sex		
Male	300	61.2
Female	190	38.8
MaritalStatus		
Single	160	32.7
Married	276	56.3
Divorced	7	1.4
Widowed	43	8.8
Separated	4	.8
Religion		
Christian	473	96.5
Islam	16	3.3
Others	1	.2
Ethnicity		
Igbo	459	93.7
Yoruba	18	3.7
Hausa	13	2.7
Occupation		
Employed	271	55.3
Not employed	219	44.7

Education		
primary level	110	22.4
secondary level	223	45.5
tertiary level	93	19.0
No formal education	64	13.1
Total	490	100.0

Table 1 shows that the 490 respondents had a mean age of 42.18 ± 15.412 years, with the largest proportion aged 31–40 years (25.7%). Males constituted 61.2% of the respondents, while females accounted for 38.8%. Most respondents were married (56.3%), Christian (96.5%), and of Igbo ethnicity (93.7%). More than half were employed (55.3%), while secondary education was the most common educational level (45.5%).

Table 2: Knowledge of smokeless tobacco

Variables	Frequency (n=490)	Percentage (%)
Ever heard about Smokeless tobacco		
Yes	384	78.4
No	36	7.3
Don’t know	70	14.3
Using smokeless tobacco is dangerous to your health		
Yes	292	59.6
No	80	16.3
Don’t know	118	24.1
Dangers of smokeless tobacco use increase with dose (number of times used		
Yes	241	49.2
No	72	14.7
Don’t know	177	36.1
The dangers of smokeless tobacco use increase with the number of years a person uses it		
Yes	232	47.3
No	81	16.5
Don’t know	177	36.1
The dangers of smokeless tobacco use increase with the amount of smokeless tobacco used		
Yes	233	47.6
No	77	15.7
Don’t know	180	36.7
Using smokeless tobacco increases athletic performance		
Yes	100	20.4
No	148	30.2
Don’t know	242	49.4
Smokeless tobacco is safe to use if used only for a few years		
Yes	156	31.8
No	126	25.7
Don’t know	208	42.4

Smokeless tobacco is safer to use than cigarettes		
Yes	254	51.8
No	52	10.6
Don’t know	184	37.6

Table 2 shows that 384 (78.4%) respondents had heard about smokeless tobacco, while 292 (59.6%) recognised that its use is dangerous to health. Approximately half believed that its dangers increase with dose (49.2%), years of use (47.3%), and amount used (47.6%). However, substantial proportions were uncertain about several health-related aspects, including whether smokeless tobacco increases athletic performance (49.4%), is safe when used for only a few years (42.4%), and is safer than cigarettes (37.6%).

Table 3: Knowledge of health risks associated with smokeless tobacco use

Variables	Frequency	Percentage (%)
Throat cancer	97	19.8
Stroke (blood clots in the brain) that may cause paralysis	109	22.2
Heart attack	189	38.6
Lung cancer	133	27.1
Bladder cancer	49	10.0
Low birth weight in infants of mothers who use smokeless tobacco	83	16.9
Mouth cancer	126	25.7
Stomach cancer	91	18.6
Tooth decay	250	51.0
Diabetes	21	4.3
Peptic ulcer	40	8.2

Table 3 shows that tooth decay was the most frequently recognised health risk associated with smokeless tobacco use, reported by 250 (51.0%) respondents. Heart attack was recognised by 189 (38.6%), followed by lung cancer (27.1%) and mouth cancer (25.7%). Awareness was lowest for diabetes, reported by only 21 (4.3%) respondents, followed by peptic ulcer (8.2%) and bladder cancer (10.0%).

Table 4: Knowledge of the respondents concerning smokeless tobacco

	knowledge of smokeless tobacco		Total	X^2	P-value
Variables	Poor	Good			
Age (yrs)					
11-20	27(96.4)	1(3.6)	28	83.271	0.000
21-30	79(75.2)	26(24.8)	105		
31-40	66(52.4)	60(47.6)	126		
41-50	52(53.6)	45(46.4)	97		
51-60	72(94.7)	4(5.3)	76		
61-70	38(92.7)	3(7.3)	41		
71-80	11(100.0)	0(0.0)	11		
81-100	6(100.0)	0(0.0)	6		
sex					
Male	216(72.0)	84(28.0)	300	0.051	0.821
Female	135(71.1)	55(28.9)	190		
Marital Status					
Single	112(70.0)	48(30.0)	160	3.558	0.469
Married	205(74.3)	71(25.7)	276		
Divorced	4(57.1)	3(42.9)	7		
Widowed	27(62.8)	16(37.2)	43		
Separated	3(75.0)	1(25.0)	4		
Religion					
Christian	336(71.0)	137(29.0)	473	2.461	0.292
Islam	14(87.5)	2(12.5)	16		
Others	1(100.0)	0(0.0)	1		
Ethnicity					
Igbo	335(73.0)	124(27.0)	459	18.528	0.000
Yoruba	5(27.8)	13(72.2)	18		
Hausa	11(84.6)	2(15.4)	13		
Occupation					
Employed	170(62.7)	101(37.3)	271	23.647	0.000
Not employed	181(82.6)	38(17.4)	219		

Education					
primary level	92(83.6)	18(16.4)	110	42.476	0.000
secondary level	153(68.6)	70(31.4)	223		
tertiary level	47(50.5)	46(49.5)	93		
No formal education	59(92.20	59(7.8)	64		

Table 4 shows variation in respondents' knowledge of smokeless tobacco across socio-demographic characteristics. The highest proportion of good knowledge was observed among respondents aged 31–40 years (47.6%), followed closely by those aged 41–50 years (46.4%). Good knowledge was similar among males (28.0%) and females (28.9%), with no significant association between sex and knowledge ($p = 0.821$). Significant associations were observed between knowledge and age, ethnicity, occupation, and educational level ($p < 0.001$ for each), whereas marital status and religion were not significantly associated with knowledge.

Table 5: Attitude towards smokeless tobacco use

Variables	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Smokeless tobacco use is enjoyable.	331	43.4	130	17.0	74	9.7	126	16.5	102	13.4
People use smokeless tobacco just to show they are now elders in the community.	332	43.5	221	29.0	50	6.6	128	16.8	32	4.2
Smokeless tobacco use makes a person relaxed.	270	35.4	172	22.5	98	12.8	157	20.6	66	8.7
Smokeless tobacco use makes the person look dirty.	240	31.5	200	26.2	38	5.0	161	21.1	124	16.3
Smokeless tobacco use increases the person's confidence during social gathering in the community.	299	39.2	216	28.3	61	8.0	144	18.9	43	5.6
Smokeless tobacco use is a waste of money.	64	8.4	158	20.7	53	6.9	307	40.2	181	23.7
Smokeless tobacco use makes you relieve life stresses.	223	29.2	175	22.9	83	10.9	208	27.3	74	9.7
Smokeless tobacco use is dangerous to your health.	48	6.3	121	15.9	69	9.0	262	34.3	263	34.5
Sales of Smokeless tobacco should be restricted to people less than 18 years.	65	8.5	92	12.1	82	10.7	361	47.3	163	21.4
Smokeless tobacco use gives users bad breath.	98	12.8	164	21.5	105	13.8	235	30.8	161	21.1
Smokeless tobacco users are more likely to die from heart disease than non-users.	101	13.2	123	16.1	97	12.7	304	39.8	138	18.1
It is acceptable to use Smokeless tobacco in my community.	203	26.6	84	11.0	104	13.6	309	40.5	63	8.3
Sharing Smokeless tobacco products can act as kola during traditional ceremonies.	207	27.1	66	8.7	71	9.3	331	43.4	88	11.5
Using Smokeless tobacco is a way of promoting friendship among people.	250	32.8	159	20.8	86	11.3	203	26.6	65	8.5
Smokeless tobacco use should be prohibited.	231	30.3	104	13.6	66	8.7	175	22.9	187	24.5
People who use smokeless tobacco need to stop	55	7.2	124	16.3	56	7.3	365	47.8	163	21.4

It right to use smokeless tobacco in front of children	280	36.7	243	31.8	71	9.3	115	15.1	54	7.1
It is safe to use Smokeless tobacco as long as you do not get into the habit	234	30.7	150	19.7	112	14.7	229	30.0	38	5.0

Table 5 shows mixed attitudes towards smokeless tobacco use. A substantial proportion of respondents strongly agreed that smokeless tobacco is dangerous to health (34.5%) and agreed that its sale should be restricted to persons below 18 years (47.3%). Conversely, 43.4% strongly disagreed that smokeless tobacco use is enjoyable, while 32.8% strongly disagreed that its use promotes friendship. Regarding use in front of children, 36.7% strongly disagreed and 31.8% disagreed. These findings indicate that respondents expressed both favourable and unfavourable attitudes towards different aspects of smokeless tobacco use.

Table 6: Attitude scores of the respondents towards smokeless tobacco

Variables	Negative n (%)	Positive n (%)	Total	χ^2	P-value
Age (years)					
11–20	6 (21.4)	22 (78.6)	28	37.002	0.000
21–30	36 (34.3)	69 (65.7)	105		
31–40	42 (33.3)	84 (66.7)	126		
41–50	61 (62.9)	36 (37.1)	97		
51–60	42 (55.3)	34 (44.7)	76		
61–70	22 (53.7)	19 (46.3)	41		
71–80	7 (63.6)	4 (36.4)	11		
81–100	2 (33.3)	4 (66.7)	6		
Sex					
Male	148 (49.3)	152 (50.7)	300	7.349	0.007
Female	70 (36.8)	120 (63.2)	190		
Marital status					
Single	53 (33.1)	107 (66.9)	160	39.961	0.000
Married	122 (44.2)	154 (55.8)	276		
Divorced	3 (42.9)	4 (57.1)	7		
Widowed	37 (86.0)	6 (14.0)	43		
Separated	3 (75.0)	1 (25.0)	4		
Religion					
Christian	211 (44.6)	262 (55.4)	473	1.567	0.457
Islam	6 (37.5)	10 (62.5)	16		
Others	1 (100.0)	0 (0.0)	1		
Ethnicity					
Igbo	201 (43.8)	258 (56.2)	459	6.687	0.035
Yoruba	13 (72.2)	5 (27.8)	18		
Hausa	4 (30.8)	9 (69.2)	13		

Occupation					
Employed	88 (32.5)	183 (67.5)	271	35.458	0.000
Not employed	130 (59.4)	89 (40.6)	219		
Education					
Primary level	71 (64.5)	39 (35.5)	110	31.788	0.000
Secondary level	88 (39.5)	135 (60.5)	223		
Tertiary level	26 (28.0)	67 (72.0)	93		
No formal education	33 (51.6)	31 (48.4)	64		

Table 6 shows that positive attitudes towards smokeless tobacco were reported by 66.7% of respondents aged 31–40 years, 65.7% of those aged 21–30 years, and 63.2% of females. Positive attitude was also reported by 66.9% of single respondents, 67.5% of employed respondents, and 72.0% of respondents with tertiary education. Statistically significant associations were observed between attitude and age, sex, marital status, ethnicity, occupation, and education ($p < 0.05$), while religion was not significantly associated with attitude ($p = 0.457$).

Table 7: Prevalence and types of tobacco use among respondents

	Frequency	Percentage (%)
Ever used any form of smokeless tobacco product		
Yes	210	42.9
No	280	57.1
Total	490	100.0
Types of smokeless tobacco ever used (n=210)		
Moist Snuff	33	15.7
Dry Snuff	155	73.8
Snus	1	0.5
Others	21	10.0
Ever used any form of smoked tobacco product		
Yes	116	23.7
No	374	76.3
Total	490	100.0
Form of smoked tobacco ever used		
Cigarette	93	80.2
Hand rolled tobacco	35	30.2
Cigar	8	6.9
Ever used smokeless and smoked tobacco products		
Yes	101	20.6
No	389	79.4
Total	490	100.0

Table 7 shows that 210 (42.9%) of the 490 respondents had ever used smokeless tobacco, while 116 (23.7%) had ever used smoked tobacco. Among respondents who had ever used smokeless tobacco, dry snuff was the most commonly reported type (73.8%), followed by moist snuff (15.7%). Among those who had ever used smoked tobacco, cigarette use was most common (80.2%), followed by hand-rolled tobacco (30.2%) and cigar use (6.9%). Overall, 101 (20.6%) respondents reported having used both smokeless and smoked tobacco products.

Table 8: Use of smokeless tobacco by close relations and reasons for use by users

Household use smokeless tobacco (n=210)		
Yes	57	27.1
No	75	35.7
Don’t know	78	37.1
Any close friends use smokeless tobacco		
Yes	87	41.4
No	40	19.0
Don’t know	83	39.5
Reasons for smokeless tobacco use (n=188)		
Social acceptance	98	52.1
Pleasure	105	55.9
Stress	115	61.2
Anxiety	103	54.8
Treat dental caries	75	39.9
Cold weather	122	64.9
Role model	59	31.4
Boost confidence	93	49.5
Own will	105	55.9
Pear pressure	26	13.8

Smoking guardian	20	10.6
Smoking parents	41	21.8
Makes me physically active	106	56.4
Alternative to smoking	62	33.0
For cultural reasons	36	19.1
It is used in my tribe	20	10.6
Because i can afford it	57	30.3

Table 8 shows that 57 (27.1%) of ever-users reported smokeless tobacco use among household members, while 87 (41.4%) reported use among close friends. The most frequently reported reasons for smokeless tobacco use were cold weather (64.9%), stress (61.2%), physical activity (56.4%), pleasure (55.9%), own will (55.9%), anxiety (54.8%), and social acceptance (52.1%). These findings indicate that both social and perceived personal benefits were reported as reasons for smokeless tobacco use.

Discussion

This study assessed the prevalence, patterns, perceptions, and factors associated with smokeless tobacco use among respondents in Ukpo community, Dunukofia Local Government Area, Anambra State. The findings demonstrate that smokeless tobacco use constitutes an important tobacco-related behaviour in the study population. Of the 490 respondents, 210 (42.9%) reported ever having used smokeless tobacco. This proportion indicates substantial exposure to smokeless tobacco within the community and supports the need for greater attention to forms of tobacco consumption beyond conventional cigarette smoking. Prevalence in this study is higher than the prevalence from the GATS study, which showed that 1.9% of Nigerian adults were current users of smokeless tobacco products. Prevalence was also higher than the prevalence of use, which varies from the highest of 22.7 in Sierra Leone, followed by DRC at 20.8%, to as low as 5.1 in Cameroon and 5.6 in Côte d'Ivoire. Prevalence from this study was also higher than the prevalence of lifetime use of smokeless tobacco, which was 19.1% in the United States of America (USA), 8% in Canada(8) and the adult prevalence of Smokeless tobacco use in India, which is 25.9%(9).

The predominance of dry snuff among ever users is an important finding. Among the 210 respondents who reported ever using smokeless tobacco, 155 (73.8%) used dry snuff, while moist snuff accounted for 15.7% and other products constituted smaller proportions. The prominence of dry snuff may reflect the traditional availability and familiarity of snuff within South-Eastern Nigerian communities. The finding is also consistent with the study setting, where smokeless tobacco has historically been incorporated into certain social and cultural practices. Consequently, tobacco-control strategies in such communities need to recognise locally available forms of tobacco rather than focusing exclusively on cigarettes. This finding is in agreement with the GATS report, which showed that in Nigeria, 0.8% used snuff by mouth; 1.6% used snuff by nose; and 0.2% used other types of smokeless tobacco products.(10). GATS study also showed that, among Nigerian men, 2.9% used any smokeless tobacco product; 1.1% % used snuff by mouth; 2.8% used snuff by nose; and 0.3% used other types of smokeless tobacco, while among Nigerian women, 0.9% used any smokeless tobacco product; 0.6% used snuff by mouth; 0.5% used snuff by nose; and 0.2% used other types of smokeless tobacco(10).

This pattern is consistent with the findings from this study. Findings from this study are, however, in contrast to findings from other studies, which showed that chewing tobacco is common among the Bangladeshi community, where 19% of Bangladeshi men and 26% of Bangladeshi women use chewing tobacco, and in India, Smokeless tobacco is consumed predominantly by chewing in the form of pan(11).

The frequency of use further demonstrates the importance of the problem. Among ever users, 129 (61.4%) were daily users, 59 (28.1%) used smokeless tobacco less than daily, while 22 (10.5%) were not current users. The relatively large proportion of daily users suggests that smokeless tobacco use may represent an established behavioural pattern rather than occasional experimentation for many respondents. Regular exposure may also make cessation more challenging, particularly where tobacco use is supported by social acceptance or perceived personal benefits.

The study also identified considerable overlap between smokeless and smoked tobacco use. Although 116 (23.7%) respondents reported ever using smoked tobacco, 101 (20.6%) reported having used both smoked and smokeless tobacco. This pattern is relevant because individuals who use more than one tobacco product may require cessation interventions that address their complete tobacco-use history rather than focusing on a single product. The coexistence of smoked and smokeless tobacco use also indicates that smokeless tobacco should not necessarily be viewed as a substitute behaviour occurring independently of cigarette or other smoked tobacco use.

Perceptions concerning the safety of smokeless tobacco are particularly important. More than half of the respondents who reported the relevant perception, 254 (51.8%), considered smokeless tobacco safer than cigarettes. This perception may contribute to continued use by reducing the perceived urgency of cessation. The finding is important because the manuscript also demonstrates gaps in knowledge concerning specific health risks. Although tooth decay was recognised by 51.0% of respondents and heart attack by 38.6%, substantially smaller proportions identified several other potential health risks. This pattern suggests that general awareness that tobacco may be harmful does

not necessarily translate into comprehensive knowledge of the health consequences of smokeless tobacco. A study in Northern Nigeria also revealed that 89.5% believed that smokeless tobacco was not harmful to their health(2). Perception of the risk of smokeless tobacco compared to smoked tobacco is slightly lower than in another study in the USA, where researchers found 52.7% of high school seniors perceived an equal risk of harm from using cigarettes or smokeless tobacco, 41.3% believed cigarettes were more harmful, and 6.1% believed smokeless tobacco was more harmful(12). A study in India showed that more than 82.73% of subjects did not know that smokeless tobacco is as hazardous as smoking(13).

The findings concerning attitudes were mixed. Respondents expressed recognition of some harmful consequences and support for selected control measures, including restriction of sales to persons below 18 years. At the same time, perceptions concerning social acceptability, stress relief, relaxation, confidence, and other perceived benefits remained evident. Such mixed attitudes are important because tobacco behaviour is influenced not only by knowledge of health risks but also by perceived social and personal benefits. Health education programmes should therefore address both misconceptions concerning safety and the perceived advantages that may reinforce continued use.

Social exposure was another important feature of the findings. Among ever users, 87 (41.4%) reported that close friends used smokeless tobacco, while 57 (27.1%) reported use by household members. The most frequently reported reasons for use included cold weather, stress, physical activity, pleasure, personal choice, anxiety, and social acceptance. These findings suggest that smokeless tobacco use occurs within a broader social environment. Peer and household influences may therefore contribute to initiation, normalisation and continuation of use.

This finding is in agreement to the findings from the study in the study in Northern Nigeria, where social acceptance was the most common reason for using smokeless tobacco smoking. The study also revealed a strong association between ever use of smokeless tobacco and independent determinants like male gender, lower educational attainment, and lower socioeconomic class(2). Our findings are

also in agreement with the study in the USA, where the strongest predictors for all groups were peers' use of smokeless tobacco as well as previous use of alcoholic beverages and tobacco

Similar reasons for use of smokeless tobacco were reported among school children in a selected district of Dehradun, where twenty-one percent of the children mentioned peer pressure as the main reason for initiation of consuming tobacco, although other reasons such as enjoyment (30.3%) and curiosity (26.1%) were the two major factors that prompted the consumption of tobacco amongst adolescent children. The paper also reported that, for whites, the strongest predictor of the amount of smokeless tobacco used was peers' use of smokeless tobacco(14). In the UK reports, many peers used smokeless tobacco, while other reasons for use by South Asians of Bangladeshi heritage within the UK were tradition and cultural heritage, as well as using smokeless tobacco as part of a habitual practice that has a deeply rooted social component. Evidence indicated that it is simply a habit and part of a daily routine. Therefore, habits could lead to addiction, and this was noted as a reason for chewing in 14% of a Bangladeshi sample in Tower Hamlets.

Stress-related motives deserve particular attention. In this study, stress relief was reported by 115 (61.2%) users, making it the most frequently reported reason for use. Other psychosocial reasons, including anxiety, pleasure, confidence, and social acceptance, were also commonly reported. These findings indicate that cessation programmes may need to go beyond simply communicating the health risks of tobacco. Interventions may be more relevant when they also address the circumstances in which tobacco is used and provide practical alternatives for coping with stress and other perceived benefits of tobacco use. This finding is in agreement with findings from South Asians who use paan to relieve stress, boredom, or relax, although traditional Hindu messages suggested that paan aids digestion, freshens the breath, and strengthens the heart. Twenty-two percent of Bangladeshi women from Yorkshire found chewing paan pleasant and refreshing, while 12% believed chewing had positive health benefits or could aid in digestion (11%), oral hygiene (20%), or help with pain (6%), as well as serve to make lips more attractive(15) **.**

The association between smokeless tobacco use and sociodemographic characteristics further demonstrates that tobacco use is not uniformly distributed within the population. The study identified significant associations involving age, sex, marital status, and educational attainment. The knowledge analysis also showed significant relationships with age, ethnicity, occupation, and education, whereas sex, marital status, and religion were not significantly associated with knowledge. Similarly, attitude differed significantly across several sociodemographic categories. These findings indicate that tobacco-control education should be appropriately targeted rather than delivered as a completely uniform intervention to all community members. These findings are similar to the findings in northern Nigeria, where a strong association was found between ever use of smokeless tobacco and independent determinants like male gender, lower educational attainment, and lower socioeconomic class(2).

The regression findings provide additional evidence that selected sociodemographic characteristics were independently associated with smokeless tobacco use. However, because this was a cross-sectional study, these associations should not be interpreted as demonstrating causation. In particular, the observed relationships indicate differences in the likelihood of reported tobacco use across categories but cannot establish temporal relationships between the characteristics and tobacco-use behaviour.

The study should also be interpreted in light of methodological limitations. Its cross-sectional design limits causal inference, while the use of self-reported tobacco-use information may introduce recall or social-desirability bias. The study was conducted in a single rural community, which may limit the extent to which the findings can be generalised to other communities in Anambra State or South-Eastern Nigeria. In addition, some questionnaire responses involved multiple-response options, meaning that percentages for individual reasons or forms of tobacco use should not be interpreted as mutually exclusive categories.

Overall, the findings demonstrate that smokeless tobacco use is an important community-level tobacco-control issue. The high prevalence of ever use, predominance of dry snuff, substantial daily

use, perception of relative safety, and strong social influences collectively indicate the need for interventions that combine risk communication, prevention, and cessation support. Community-specific strategies that recognise traditional patterns of snuff use and address social and perceived psychological reasons for tobacco consumption may be particularly relevant.

Conclusion

Smokeless tobacco use was common among respondents in the Ukpo community, with dry snuff being the predominant form of smokeless tobacco reported. A substantial proportion of ever users were daily users, while dual use of smoked and smokeless tobacco was also observed. Perceptions that smokeless tobacco is safer than cigarettes, together with incomplete knowledge of its health risks and the influence of peers, household members, stress, and social acceptance, may contribute to continued use. Significant associations were observed between smokeless tobacco use and selected sociodemographic characteristics, although the cross-sectional design does not permit causal conclusions. The findings underscore the need for community-specific tobacco-control interventions that combine accurate health education, prevention, risk communication, and accessible cessation support.

Recommendation

1. Community-based health education programmes should be strengthened to improve knowledge of the health risks associated with smokeless tobacco and to address the perception that it is safer than cigarettes.
2. Primary healthcare facilities and community health workers should incorporate routine identification, brief counselling, and cessation support for smokeless tobacco users into existing health services.

3. Tobacco-control interventions in rural communities should involve families, peer groups, community leaders and other relevant social networks to address the social and cultural factors that may encourage smokeless tobacco use.

4. Further multicentre longitudinal studies should be conducted across South-Eastern Nigeria to determine patterns of initiation, dependence, cessation and long-term health outcomes associated with smokeless tobacco use.

Declarations

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Ethics approval and consent to participate

Ethical clearance for this study was obtained from the Ethical Review Board of University of Lagos Teaching Hospital.

Written informed consent was obtained and confidentiality ensured.

Competing interests

The authors declare that they do not have any conflicts of interest.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request (druzochukwu01@gmail.com, dufuhsresearchgroup@gmail.com).

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Authors' contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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