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AWARENESS, UTILIZATION AND FACTORS ASSOCIATED WITH PERIODIC MEDICAL EXAMINATION AMONG ADULT PATIENTS ATTENDING A TERTIARY HOSPITAL IN NORTH-CENTRAL NIGERIA: AN ANALYTICAL CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Periodic medical examination (PME) offers opportunities for risk assessment, health promotion and evidence-based preventive care, yet utilization remains suboptimal in many low- and middle-income settings. This study assessed awareness, utilization and factors associated with PME among adult patients attending a tertiary hospital in North-Central Nigeria.

Methods: An analytical cross-sectional study was conducted among adults attending the General Outpatient Clinic of Federal Medical Centre, Makurdi. Of 250 clients screened, 40 were excluded (23 had incomplete information and 17 were aged <18 years), leaving 210 participants for analysis. Systematic random sampling and a pretested interviewer-administered questionnaire were used. Associations with PME uptake were examined using chi-square tests and binary logistic regression; adjusted odds ratios (aORs), 95% confidence intervals (CIs) and p-values were reported.

Results: Of 210 respondents, 146 (69.5%) had heard of PME, 151 (71.9%) understood its purpose and 155 (73.8%) considered it necessary; however, only 93 (44.3%) had ever undergone PME. Lower uptake was independently associated with informal education versus tertiary education (aOR 0.21, 95% CI 0.06-0.75) and monthly income <NGN50,000 versus >NGN100,000 (aOR 0.19, 95% CI 0.06-0.57). Hospital-policy awareness (aOR 2.40, 95% CI 1.33-4.35), non-smoking (aOR 4.00, 95% CI 1.45-10.99) and sleep ≥6 hours/night (aOR 3.48, 95% CI 1.68-7.22) were positively associated with uptake.

Conclusion: PME awareness exceeded utilization. Socioeconomic circumstances, institutional awareness and selected health behaviours were associated with uptake. Integrating affordable, risk-appropriate preventive care into routine outpatient services may improve utilization.

Keywords: Periodic medical examination; Preventive health services; Routine medical check-up; Healthcare utilization; Outpatient care; Nigeria

1 INTRODUCTION

Non-communicable diseases (NCDs), including cardiovascular diseases, diabetes mellitus, cancers and chronic respiratory diseases, are major causes of morbidity, disability and premature mortality worldwide, with a disproportionate burden in low- and middle-income countries [1]. Many important risk factors, including hypertension and dysglycaemia, may remain clinically silent for years. Preventive encounters can therefore provide opportunities to identify risk, promote healthier behaviour and offer evidence-based screening before complications develop.

The World Health Organization (WHO) recommends integrating cost-effective NCD prevention, risk assessment, early diagnosis, treatment and referral into primary healthcare through interventions such as the WHO Package of Essential Noncommunicable Disease Interventions (WHO PEN) [2]. Depending on age, sex, history and risk, preventive care may include blood-pressure measurement, cardiovascular-risk assessment, diabetes screening, tobacco-use assessment, counselling, vaccination review and selected cancer screening.

Periodic medical examination (PME), also termed routine medical check-up, periodic health examination or general health check, can provide a structured opportunity for preventive care. It should not, however, be equated with indiscriminate annual laboratory testing of all asymptomatic adults. A Cochrane review found that broad general health checks did not materially reduce overall, cardiovascular or cancer mortality [3]. More recent reviews similarly emphasize that the value of preventive visits lies in delivery of recommended services, risk assessment and counselling rather than universal testing [4,5].

Despite increasing attention to prevention, utilization of routine health examinations remains inconsistent in Nigeria. Ilesanmi et al. described a marked knowledge-practice gap in a South-West Nigerian community [6], while Iloh et al. reported limited use of periodic health examinations among adults attending a tertiary general outpatient clinic in Eastern Nigeria [7]. Similar gaps have been documented among healthcare workers and health-sciences students, with cost, access and perceived need repeatedly identified as barriers [8-10].

Evidence from North-Central Nigeria is still limited. A recent community-based study in Apir, Makurdi reported relatively low participation in PME and identified socioeconomic and healthcare-related correlates [11]. International studies from Saudi Arabia and Vietnam also show that routine health-check behaviour varies with knowledge, socioeconomic position, perceived need and access to care [12-14]. Because hospital attendees may differ from community residents, setting-specific evidence is needed to guide preventive services in outpatient practice.

This study therefore assessed awareness, knowledge and utilization of PME, described reported barriers, and examined sociodemographic, institutional, medical and lifestyle factors associated with PME uptake among adult patients attending the General Outpatient Clinic of a tertiary hospital in Benue State, North-Central Nigeria.

1.1 Study Objectives

- determine the level of awareness and knowledge of PME among adult outpatient attendees;
- determine the proportion who had previously undergone PME and describe patterns of utilization;
- identify reported barriers to PME utilization; and
- examine sociodemographic, knowledge-related, institutional, medical, and lifestyle factors associated with PME uptake.

2 MATERIALS AND METHODS

2.1 Study design and setting

This hospital-based analytical cross-sectional study was conducted from June to September 2023 at the General Outpatient Clinic (GOPC) of Federal Medical Centre, Makurdi, Benue State, North-Central Nigeria, a tertiary referral facility serving Benue State and neighbouring areas.

2.2 Study population, eligibility and participant flow

The source population comprised GOPC attendees during the study period. Adults aged ≥ 18 years who provided informed consent were eligible; those aged < 18 years were excluded. Of 250 clients screened, 23 with incomplete information and 17 aged < 18 years were excluded, leaving 210 participants for analysis.

2.3 Sample-size determination

The minimum sample size was determined using the Cochran formula for single proportion for cross-sectional studies:

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

Where:

- n = minimum sample size
- Z = standard normal deviate at 95% confidence interval = 1.96
- p = prevalence of periodic medical examination
- $q = 1 - p$
- d = level of precision = 5% = 0.05

Prevalence of 20.5% for periodic medical examination among adults was used from a previous study in South-West Nigeria [6].

Therefore:

- $n = 1.96^2 \times 0.205 \times 0.795 / 0.05^2$
- $n = 3.8416 \times 0.1629 / 0.0025$
- $n = 227$

Adjusting for 10% non-response rate:

- $n = 227 + 23 = 250$

2.4 Sampling technique

Systematic random sampling was used. Approximately 1,500 patients attended the GOPC monthly; with a target sample of 250, the sampling interval was six. One of the first six eligible attendees each study day was selected by simple random balloting, after which every sixth eligible attendee was approached until recruitment was completed.

2.5 Data-collection instrument and procedure

Trained study personnel administered a pretested structured questionnaire covering sociodemographic characteristics; PME awareness, knowledge, uptake and barriers; hospital-policy awareness; chronic-disease history; smoking; alcohol use; exercise; and sleep duration. Completed questionnaires were checked for completeness and internal consistency before data entry.

2.6 Outcome and explanatory variables

The primary outcome was self-reported previous PME uptake (yes/no). Explanatory variables were age, sex, marital status, religion, ethnicity, education, occupation, income, PME awareness and knowledge, perceived necessity, hospital-policy awareness, family and personal chronic-disease history, smoking, alcohol use, exercise and sleep duration.

2.7 Statistical analysis

Data were analysed using IBM SPSS Statistics version 25.0. Categorical variables were summarized as frequencies and percentages. For multiple-response items, the applicable denominator was stated. Pearson's chi-square test assessed bivariate associations with PME uptake. Binary logistic regression estimated adjusted associations, reported as adjusted odds ratios (aORs), 95% confidence intervals (CIs) and two-sided p-values; $p < 0.05$ indicated statistical significance. Because uptake was common (44.3%), odds ratios were interpreted as odds ratios rather than risk or prevalence ratios.

2.8 Bias and reporting

Systematic sampling and standardized questionnaire administration were used to limit selection and interviewer variability. Self-reported PME and lifestyle measures remained susceptible to recall and social-desirability bias, and the

tertiary outpatient setting limits population generalizability. Reporting followed STROBE recommendations for cross-sectional studies [15].

2.9 Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee of Federal Medical Centre, Makurdi. All participants provided informed consent, and confidentiality was maintained throughout the study.

3 RESULTS

3.1 Participant flow

Of 250 clients screened, 40 (16.0%) were excluded: 23 (9.2% of those screened) had incomplete information and 17 (6.8%) were younger than 18 years. The remaining 210 eligible adults constituted the final analytical sample. All 210 had data for the primary outcome; 93 (44.3%) reported previous PME and 117 (55.7%) reported no previous PME (Figure 1).

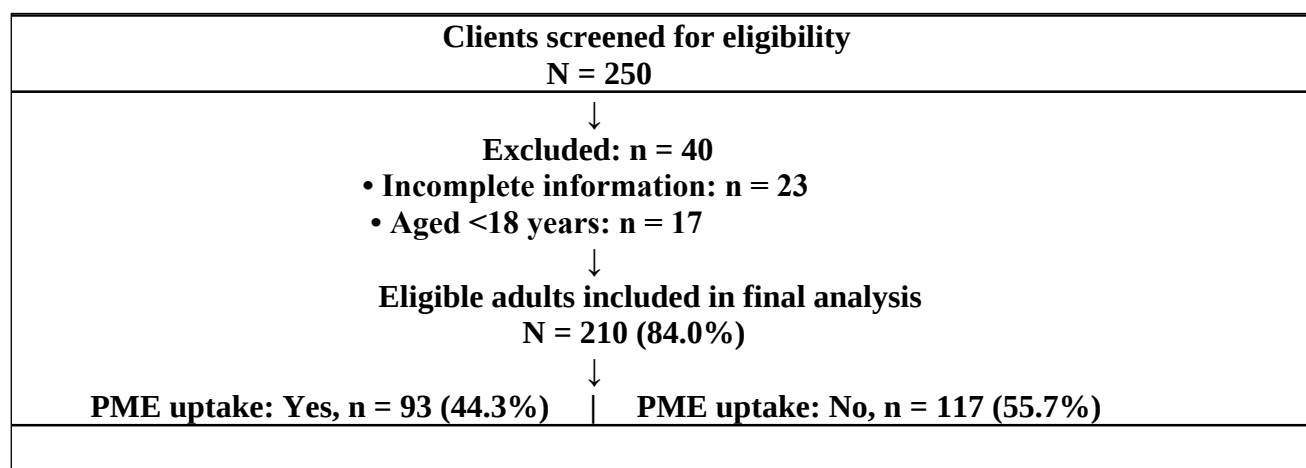


Figure 1: STROBE participant-flow diagram

3.2 Sociodemographic characteristics

Participants aged 40-59 years formed the largest age group (42.4%). Males accounted for 56.7%, 66.7% were married and 75.2% were Christian. Tiv respondents constituted 52.4%. Tertiary education was reported by 32.4%, while civil servants were the largest occupational group (35.7%). Just over half (51.0%) reported monthly income below NGN50,000 (Table 1).

Table 1: Sociodemographic characteristics of respondents (N=210)

Characteristic	Category	N	%
Age group, years	<20	21	10.0
	20-39	58	27.6
	40-59	89	42.4
	>=60	42	20.0
Sex	Male	119	56.7
	Female	91	43.3
Marital status	Single	52	24.8
	Married	140	66.7
	Divorced/separated/widowed	18	8.5
Religion	Christianity	158	75.2
	Islam	28	13.3

	Traditional/other	24	11.5
Ethnicity	Tiv	110	52.4
	Idoma	38	18.1
	Igede	19	9.0
	Hausa/Igbo/Yoruba/other	43	20.5
Educational level	Informal	41	19.5
	Primary	42	20.0
	Secondary	59	28.1
	Tertiary	68	32.4
Occupation	Civil servant	75	35.7
	Trading	36	17.1
	Farming	49	23.3
	Student/unemployed/other	50	23.9
Monthly income (NGN)	<50,000	107	51.0
	50,000-100,000	72	34.3
	>100,000	26	12.3
	None/unspecified	5	2.4

Note: Percentages are calculated using N=210. NGN, Nigerian naira.

3.3 Knowledge and awareness of PME

Overall, 146 respondents (69.5%) had heard of PME, 151 (71.9%) correctly understood its broad purpose and 155 (73.8%) considered it necessary. Among those aware of PME, 49.3% believed it should be undertaken while healthy, whereas 21.9% associated it with illness and 28.8% did not know. Only 77 respondents (36.7%) were aware of a hospital PME policy. Blood-pressure measurement, blood-glucose testing and general examination were among the most frequently recognized components (Table 2).

Table 2: Knowledge and awareness of periodic medical examination (N=210)

Variable	Response	N	%
Heard of PME	Yes	146	69.5
	No	64	30.5
Sources of information*	Friends	79	20.8
	Hospital	78	20.5
	Radio	58	15.3
	Family	58	15.3
	Television/print/social media/school	107	28.1
Correct understanding of PME	Yes	151	71.9
	No/don't know	59	28.1
Perceived necessity of PME	Yes	155	73.8
	No	55	26.2
Specific PME known*	Blood-pressure check	107	22.6
	Blood-glucose check	103	21.8
	General examination	97	20.5

	Cancer/eye/dental/infection screening	166	35.1
When should PME be done?†	When healthy	72	49.3
	During illness	32	21.9
	Don't know	42	28.8
Awareness of hospital PME policy	Yes	77	36.7
	No	133	63.3

Note: PME, periodic medical examination. *Multiple-response items; percentages for sources of information and specific PME known are based on the total responses recorded. †Timing question was answered by respondents who had heard of PME.

3.4 Uptake and practice of PME

Ninety-three respondents (44.3%) had previously undergone PME. Among these, 39 (42.0%) reported twice-yearly examinations and 39 (42.0%) reported annual examinations; 58 (62.4%) had undergone their most recent PME within the preceding year. Among 187 recorded barrier responses, lack of awareness accounted for 34.8%, financial cost 24.6%, the perception of being healthy/not sick 17.1%, and time constraints, fear or other reasons 23.5% (Table 3).

Table 3: Uptake and practice patterns of periodic medical examination

Variable	Category	N	%
Ever had PME (N=210)	Yes	93	44.3
	No	117	55.7
Frequency among PME users (n=93)	Twice yearly	39	42.0
	Once yearly	39	42.0
	Less frequent/>1-year interval	15	16.0
Reasons for non-uptake*	Not aware	65	34.8
	Financial cost	46	24.6
	"I am not sick"	32	17.1
	No time/fear/other	44	23.5
Timing of last PME (n=93)	<1 year ago	58	62.4
	1-2 years ago	13	14.0
	>2 years ago/unsure	22	23.6

Note: PME, periodic medical examination. *Multiple responses were permitted for barriers; percentages are based on 187 recorded barrier responses.

3.5 Medical history and lifestyle characteristics

A family history of chronic disease was reported by 47.6% of participants and a personal history by 34.3%. Cigarette smoking was reported by 11.0%, alcohol consumption by 33.8% and regular exercise by 23.8%. Most respondents (71.9%) reported sleeping at least six hours per night (Table 4).

Table 4: Medical history and lifestyle characteristics (N=210)

Characteristic	Response	N	%
Family history of chronic illness	Yes	100	47.6
	No/don't know	110	52.4
Personal history of chronic illness	Yes	72	34.3
	No/don't know	138	65.7
Cigarette smoking	Yes	23	11.0
	No	187	89.0
Alcohol consumption	Yes	71	33.8
	No	139	66.2
Regular exercise	Yes	50	23.8
	No	160	76.2
Sleep ≥ 6 hours/night	Yes	151	71.9
	No	59	28.1

Note: Percentages are calculated using N=210.

3.6 Sociodemographic factors associated with PME uptake

Religion, educational attainment, occupation and monthly income were significantly associated with PME uptake in bivariate analysis. Uptake increased from 17.1% among participants with informal education to 76.5% among those with tertiary education ($\chi^2=48.302$, $p<0.001$). Similarly, 21.5% of those earning <NGN50,000 had undergone PME compared with 76.9% of those earning >NGN100,000 ($\chi^2=47.109$, $p<0.001$). Civil servants had higher uptake (66.7%) than traders (33.3%) and farmers (20.4%). Age and sex were not significantly associated with uptake (Table 5).

Table 5: Bivariate association between sociodemographic characteristics and PME uptake (N=210)

Characteristic	Category	PME Yes n (%)	PME No n (%)	chi-square	df	p-value
Age, years	<20	9 (42.9)	12 (57.1)	2.595	3	0.458
	20-39	23 (39.7)	35 (60.3)			
	40-59	45 (50.6)	44 (49.4)			
	≥ 60	16 (38.1)	26 (61.9)			
Sex	Male	51 (42.9)	68 (57.1)	0.227	1	0.634
	Female	42 (46.2)	49 (53.8)			
Religion	Christianity	81 (51.3)	77 (48.7)	14.621	2	0.001
	Islam	9 (32.1)	19 (67.9)			
	Traditional/other	3 (12.5)	21 (87.5)			
Educational level	Informal	7 (17.1)	34 (82.9)	48.302	3	<0.001
	Primary	10 (23.8)	32 (76.2)			
	Secondary	24 (40.7)	35 (59.3)			
	Tertiary	52 (76.5)	16 (23.5)			
Occupation	Civil servant	50 (66.7)	25 (33.3)	28.405	3	<0.001
	Trading	12 (33.3)	24 (66.7)			
	Farming	10 (20.4)	39 (79.6)			
	Student/other	21 (42.0)	29 (58.0)			

Monthly income (NGN)	<50,000	23 (21.5)	84 (78.5)	47.109	3	<0.001
	50,000-100,000	47 (65.3)	25 (34.7)			
	>100,000	20 (76.9)	6 (23.1)			
	None/unspecified	3 (60.0)	2 (40.0)			

Note: Row percentages are shown for PME uptake. χ^2 , Pearson chi-square statistic. Statistical significance was set at $p < 0.05$.

3.7 Knowledge and institutional factors associated with PME uptake

PME awareness and knowledge showed strong bivariate associations with practice. Uptake was 60.3% among participants who had heard of PME versus 7.8% among those who had not ($\chi^2=49.632$, $p < 0.001$). Uptake was also higher among respondents with correct understanding (57.0% vs 11.9%; $\chi^2=34.956$, $p < 0.001$), those who considered PME necessary (58.1% vs 5.5%; $\chi^2=45.539$, $p < 0.001$), and those aware of hospital PME policy (66.2% vs 31.6%; $\chi^2=23.737$, $p < 0.001$) (Table 6).

Table 6: Bivariate association between PME knowledge, policy awareness and PME uptake (N=210)

Variable	Category	PME Yes n (%)	PME No n (%)	chi-square	df	p-value
Heard of PME	Yes	88 (60.3)	58 (39.7)	49.632	1	<0.001
	No	5 (7.8)	59 (92.2)			
Correct understanding	Yes	86 (57.0)	65 (43.0)	34.956	1	<0.001
	No/don't know	7 (11.9)	52 (88.1)			
Think PME necessary	Yes	90 (58.1)	65 (41.9)	45.539	1	<0.001
	No	3 (5.5)	52 (94.5)			
Aware of hospital PME policy	Yes	51 (66.2)	26 (33.8)	23.737	1	<0.001
	No	42 (31.6)	91 (68.4)			
	No	42 (31.6)	91 (68.4)			

Note: Row percentages are shown for PME uptake. PME, periodic medical examination; χ^2 , Pearson chi-square statistic. Statistical significance was set at $p < 0.05$.

3.8 Medical and lifestyle factors associated with PME uptake

Table 7: Bivariate association between medical/lifestyle characteristics and PME uptake (N=210)

Variable	Category	PME Yes n (%)	PME No n (%)	chi-square	df	p-value
Family history of chronic disease	Yes	58 (58.0)	42 (42.0)	14.553	1	<0.001
	No/don't know	35 (31.8)	75 (68.2)			
Personal history of chronic disease	Yes	45 (62.5)	27 (37.5)	14.732	1	<0.001
	No/don't know	48 (34.8)	90 (65.2)			
Cigarette smoking	Yes	4 (17.4)	19 (82.6)	7.572	1	0.006
	No	89 (47.6)	98 (52.4)			
Alcohol intake	Yes	35 (49.3)	36 (50.7)	1.091	1	0.296

	No	58 (41.7)	81 (58.3)			
Regular exercise	Yes	25 (50.0)	25 (50.0)	0.868	1	0.351
	No	68 (42.5)	92 (57.5)			
Sleep ≥ 6 hours/night	Yes	78 (51.7)	73 (48.3)	11.831	1	0.001
	No	15 (25.4)	44 (74.6)			

Note: Row percentages are shown for PME uptake. χ^2 , Pearson chi-square statistic. Statistical significance was set at $p < 0.05$.

Family history and personal history of chronic disease were associated with PME uptake in bivariate analysis. Uptake was 58.0% among respondents with a family history versus 31.8% among those without or unsure ($\chi^2=14.553$, $p < 0.001$), and 62.5% among those with a personal history versus 34.8% among those without or unsure ($\chi^2=14.732$, $p < 0.001$). Only 17.4% of smokers had undergone PME compared with 47.6% of non-smokers ($\chi^2=7.572$, $p=0.006$). Sleeping at least six hours nightly was also associated with greater uptake (51.7% vs 25.4%; $\chi^2=11.831$, $p=0.001$), whereas alcohol intake and regular exercise were not significantly associated (Table 7).

3.9 Multivariable logistic regression

In the reported multivariable model, educational attainment, monthly income, hospital-policy awareness, smoking status and sleep duration were independently associated with PME uptake. Compared with tertiary education, informal education was associated with lower odds of uptake (aOR 0.21, 95% CI 0.06–0.75; $p=0.016$), as was secondary education (aOR 0.35, 95% CI 0.15–0.83; $p=0.017$). Monthly income $< \text{NGN}50,000$ was associated with lower odds than $> \text{NGN}100,000$ (aOR 0.19, 95% CI 0.06–0.57; $p=0.003$). Awareness of the hospital PME policy was associated with higher odds of uptake (aOR 2.40, 95% CI 1.33–4.35; $p=0.004$), as were non-smoking (aOR 4.00, 95% CI 1.45–10.99; $p=0.007$) and sleeping ≥ 6 hours/night (aOR 3.48, 95% CI 1.68–7.22; $p=0.001$). The comparatively wide CI for smoking indicates limited precision (Table 8).

Table 8: Multivariable logistic regression of factors associated with PME uptake

Predictor	Category	aOR	95% CI	p-value
Educational level	Informal	0.21	0.06–0.75	0.016
	Primary	0.56	0.21–1.52	0.258
	Secondary	0.35	0.15–0.83	0.017
	Tertiary	Reference	-	-
Monthly income (NGN)	$< 50,000$	0.19	0.06–0.57	0.003
	50,000–100,000	0.93	0.35–2.52	0.899
	$> 100,000$	Reference	-	-
Hospital PME policy awareness	Yes	2.40	1.33–4.35	0.004
	No	Reference	-	-
Cigarette smoking	Non-smoker	4.00	1.45–10.99	0.007
	Smoker	Reference	-	-
Sleep ≥ 6 hours/night	Yes	3.48	1.68–7.22	0.001
	No	Reference	-	-

Note: aOR, adjusted odds ratio; CI, confidence interval; PME, periodic medical examination. Reference categories are shown explicitly. Statistical significance was set at $p < 0.05$.

4 DISCUSSION

This study found a clear awareness-utilization gap in PME among adults attending a tertiary outpatient clinic in North-Central Nigeria. Although 69.5% had heard of PME, 71.9% understood its purpose and 73.8% considered it necessary, only 44.3% had ever undergone PME. In the adjusted model, lower educational attainment and lower income were associated with reduced uptake, whereas awareness of hospital PME policy, non-smoking and sleep of at least six hours nightly were associated with higher uptake. These findings indicate that knowledge alone does not fully explain preventive healthcare use; socioeconomic capacity, institutional exposure and broader health behaviours also matter.

The 44.3% uptake aligns with Nigerian evidence showing that preventive-health knowledge does not consistently translate into practice. Studies from South-West and Eastern Nigeria, as well as among healthcare workers and health-sciences students, have reported limited uptake and barriers including cost and access [6-10].

A particularly relevant comparator is the community-based study from Apir, Makurdi, which reported lower participation in PME [11]. The higher uptake in the present hospital sample is plausible because participants were already engaged with formal healthcare and may have had more exposure to clinicians, health information and screening opportunities. This contrast also illustrates why the current 44.3% estimate should not be interpreted as the prevalence of PME use in Benue State or North-Central Nigeria. Hospital-based estimates reflect a selected healthcare-seeking population.

International studies from Saudi Arabia and Vietnam similarly report socioeconomic and behavioural variation in routine health-check attendance [12-14]. Direct percentage comparisons are limited by differences in definitions, financing, sampling and study populations, but the findings consistently indicate that preventive-care use reflects both individual and structural factors.

Income showed an independent gradient: respondents earning <NGN50,000 monthly had substantially lower odds of PME than those earning >NGN100,000. This accords with financial cost being one of the most frequently reported barriers and with Nigerian studies identifying affordability as a constraint [9,10]. Out-of-pocket expenditure can displace other household needs and discourage asymptomatic individuals from paying for preventive services [16]. Sustainable NCD responses therefore require financial protection and prepayment mechanisms, not awareness campaigns alone [17]. Integrating appropriate preventive assessment into routine insured outpatient encounters may reduce the additional cost and inconvenience of separate check-up visits.

Only 36.7% of participants knew of a hospital PME policy, yet policy awareness was associated with more than twice the adjusted odds of uptake. This is potentially actionable: clinics can make preventive services more visible through clinician counselling, waiting-area education, appointment reminders and clear patient information. However, temporality cannot be established. Participants may have learned about the policy because they had already undergone PME, so reverse causation is possible. The association should not be presented as proof that policy awareness causes utilization.

Non-smokers had higher adjusted odds of PME than smokers. This may reflect clustering of health-promoting behaviours, whereby individuals who avoid smoking are also more likely to seek preventive care. However, only 23 participants reported smoking and the confidence interval was wide, so the magnitude of the association is imprecise. Similarly, sleeping at least six hours nightly was associated with greater PME uptake, but sleep may be a marker of occupation, socioeconomic circumstances, health status or lifestyle rather than an independent causal influence. These findings warrant cautious interpretation and replication in larger studies.

The results should also be interpreted within contemporary evidence on general health checks. Broad, indiscriminate check-up programmes have not consistently reduced mortality [3], and reviews favour targeted delivery of proven preventive services [4,5]. The implication is not that every asymptomatic adult requires an identical annual laboratory panel. Rather, routine outpatient contact should be used to assess individual risk and provide evidence-based interventions appropriate to age, sex, clinical history and risk profile. WHO PEN offers a practical framework for such NCD prevention in resource-constrained primary-care settings [2].

Implementation also depends on health-system capacity. WHO-PEN-related evidence from low- and middle-income countries identifies constraints in personnel, equipment, medicines, referral systems and organization [18-20]. Preventive-care pathways should therefore combine patient education and affordability with service readiness, follow-up and prioritization of cost-effective interventions.

This study has several strengths. It included a heterogeneous adult outpatient population rather than a single occupational group, assessed multiple domains of potential association, and used multivariable regression to distinguish crude from adjusted relationships. Participant flow and exclusions are explicitly reported, and all 210 included participants had primary-outcome data. Reporting was structured in accordance with STROBE [15].

5 CONCLUSION

Among adults attending this tertiary outpatient clinic, awareness and perceived value of PME were substantially higher than actual utilization. Fewer than half had ever undergone PME. Lower education and lower income were independently associated with reduced uptake, while hospital-policy awareness, non-smoking and longer sleep duration were associated with higher uptake. These associations should not be interpreted causally. Improving

preventive-care use will require more than information alone: services should be affordable, visible and integrated into routine outpatient care, with risk-appropriate screening and counselling rather than indiscriminate testing.

Limitations

Limitations are important. First, the cross-sectional design prevents determination of temporal sequence and causality. Second, PME use, chronic-disease history and lifestyle behaviours were self-reported and may be affected by recall or social-desirability bias. Third, recruitment from a tertiary GOPC introduces selection bias and limits generalizability to the wider community. Fourth, some categories were small, especially smokers, reducing precision. Fifth, residual confounding by health insurance, distance to care, frequency of healthcare contact, health literacy and comorbidity burden is possible. Finally, because PME uptake was common, adjusted odds ratios should not be interpreted as risk ratios or prevalence ratios.

Recommendations

- General outpatient services should integrate evidence-based preventive assessment and counselling into routine clinical encounters, using age-, sex- and risk-appropriate recommendations.
- Health education should explicitly address the misconception that medical assessment is needed only when symptoms are present and should be delivered in language accessible across educational groups.
- Hospitals should actively communicate available preventive services and relevant institutional policies through clinicians, patient-information materials and waiting-area education.
- Financial barriers should be reduced through insurance coverage, affordable preventive-service pathways and integration of indicated screening into existing outpatient visits.
- Future studies should use multicentre and community-based designs, larger samples and prospective approaches where temporality or causal pathways are of interest.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

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Disclosure of conflict of interest

The authors declare that they have no competing interests.

Statement of ethical approval

Ethical approval was obtained from the Health Research Ethics Committee of Federal Medical Centre, Makurdi.

Statement of informed consent

Informed consent was obtained from participants before enrolment.

Data availability

The dataset may be made available by the corresponding author on reasonable request, subject to institutional, ethical and confidentiality requirements.

Authors' contributions

All authors made substantial contributions to the conception and/or conduct of the study, interpretation of findings, manuscript revision and approval of the final version.

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