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COMMUNITY PHARMACY-BASED SCREENING AND HEALTH EDUCATION FOR HYPERTENSION AND DIABETES: A PUBLIC HEALTH STRATEGY FOR PRIMARY CARE IN SOUTHEASTERN NIGERIA

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ABSTRACT

Background: Non-communicable diseases, especially hypertension and type 2 diabetes mellitus, are responsible for a rising proportion of adult illness and death in sub-Saharan Africa. In Nigeria, weak primary healthcare systems, long hospital wait times, and direct out-of-pocket expenses limit early screening and routine monitoring. Community pharmacies are accessible retail locations where staff interact with the public daily, making them practical points for health checks and disease prevention education.

Objective: This study evaluated the detection rates, clinical findings, and referral outcomes of community pharmacy-based point-of-care screening and structured health education for hypertension and diabetes in Imo State, Southeastern Nigeria.

Methods: A descriptive cross-sectional survey was conducted across 16 registered community pharmacies in urban and semi-urban sections of Owerri, Imo State, between January and May 2026. A total of 400 adult clients visiting pharmacies for retail purchases, consultations, or voluntary checks were enrolled through systematic sampling. Seated blood pressure (BP) and capillary blood glucose (CBG) were measured using calibrated digital sphygmomanometers and point-of-care glucometers. Structured questionnaires gathered data on demographics, physical activity, dietary salt, and family medical history. Participants with high readings received a 10-minute lifestyle counseling session and written referral forms to local medical facilities, with referral completion verified via telephone follow-up at 4 weeks. Multivariable logistic regression identified independent predictors of newly detected cardiometabolic risks.

Results: The mean age of participants was 44.8 +/- 13.2 years (53.5% female). Among screened clients with no prior clinical diagnosis, 29.8% (n = 119) had elevated blood pressure (>= 140/90 mmHg) and 14.3% (n = 57) had impaired fasting glucose or random capillary glucose suggestive of diabetes (>= 200 mg/dL). Both elevated blood pressure and high blood glucose occurred in 7.8% (n = 31) of clients. Frequent table salt addition (AOR = 2.41, 95% CI: 1.48-3.92), sedentary lifestyle (AOR = 1.95, 95% CI: 1.21-3.14), and age over 45 years (AOR = 3.12, 95% CI: 1.96-4.97) were

significant independent predictors of elevated blood pressure. At 4 weeks, 58.0% of referred clients had visited a hospital or primary health center for medical evaluation.

Conclusion: Community pharmacies provide an accessible venue for the early identification of undiagnosed hypertension and diabetes in urban and semi-urban Nigerian communities. Incorporating pharmacy point-of-care checks and lifestyle counseling into primary healthcare strategies can improve early diagnosis and support timely management of non-communicable diseases.

Keywords: Blood glucose; Blood pressure; Community pharmacy; Diabetes mellitus; Health education; Hypertension; Imo State; Primary healthcare; Public health screening.

1 INTRODUCTION

Cardiovascular diseases and type 2 diabetes mellitus represent a serious public health challenge in sub-Saharan Africa [1, 2]. In Nigeria, demographic shifts, rapid urban expansion, reduced physical activity, and higher consumption of processed foods rich in sodium and refined carbohydrates have increased the incidence of chronic non-communicable diseases [1-3]. National systematic reviews estimate hypertension prevalence among Nigerian adults between 28.9% and 38.0%, with more than half of affected persons unaware of their condition until complications such as stroke, heart failure, or kidney damage develop [1, 3]. Diabetes mellitus follows a similar pattern, with population prevalence estimates around 5.8% and high rates of undetected hyperglycemia in both rural and urban areas [2, 4]. Cardiovascular disorders now constitute a leading cause of premature adult mortality across the African continent [18].

The public primary healthcare system in Nigeria faces resource constraints that restrict routine screening for chronic conditions. Public primary health centers often face staff shortages, inadequate supplies, and lack functional diagnostic tools, leading patients to seek care at secondary and tertiary hospitals [5, 6]. Long travel distances, hospital waiting times, and user fees create financial barriers that discourage asymptomatic people from attending formal clinics for preventive checkups [5, 6]. Because of these structural gaps, most individuals with early hypertension or high blood sugar remain undiagnosed within their communities [1, 3, 11].

Community pharmacies and licensed medicine retailers represent an underused resource in public health delivery. As private retail outlets situated within residential and commercial neighborhoods, pharmacies are often the first point of contact for community members seeking minor ailment treatment, prescription refills, and over-the-counter drugs [7, 17]. Pharmacy staff possess medical knowledge, interact regularly with clients, and enjoy high levels of community trust [7, 9, 10]. When equipped with standard point-of-care tools, such as digital blood pressure monitors and blood glucose meters, community pharmacy teams can conduct rapid health screenings, provide lifestyle education, and direct at-risk clients to government health centers [8, 10].

International studies show that community pharmacy screening programs detect hidden chronic conditions and improve population health outcomes [8, 10]. In Nigeria, however, community pharmacies and patent medicine vendors have primarily operated as commercial drug dispensing points rather than active sites for disease screening or referral coordination [7, 9, 16, 17]. Most counter transactions remain limited to basic product sales, missing opportunities for early chronic disease prevention [9, 16]. Data examining pharmacy-based screening yields, client risk profiles, and referral completion rates in Southeastern Nigeria remain limited [11, 14]. This study evaluates the results of community pharmacy-based point-of-care screening and structured health education for hypertension and diabetes in Owerri, Imo State, assessing its practical application as a primary healthcare detection strategy.

2 MATERIAL AND METHODS

2.1 Study Setting and Design

This descriptive, facility-based cross-sectional study was conducted between January and May 2026 across 16 registered community pharmacies located in Owerri Municipal, Owerri North, and Owerri West Local Government Areas of Imo State, Nigeria. Owerri is the commercial center of Imo State, with a population engaged in trade, civil service, small-scale enterprises, and transportation [20]. Participating pharmacies were selected based on having a registered supervising pharmacist, a quiet counseling area, and a daily flow of at least 50 adult patrons.

2.2 Study Population and Eligibility Criteria

The study population consisted of adult residents aged 18 years and older visiting the selected pharmacies during the study period. Inclusion criteria included individuals seeking over-the-counter medications, prescription refills, general health information, or voluntary screening. Exclusion criteria were individuals under 18 years of age, pregnant women

(to avoid confounding by gestational hypertension or gestational diabetes), individuals with medical emergencies requiring immediate clinical transfer, and individuals who declined to participate.

2.3 Sample Size Determination

The sample size was calculated using the Cochran formula for single proportions: n = (Z^2 * p * (1 - p)) / d^2, where Z = 1.96 (standard normal value for a 95% confidence level), p = 0.35 (estimated proportion of adult hypertension and cardiometabolic risk in urban Southeastern Nigeria, based on regional studies [1, 3, 11]), and d = 0.05 (margin of error). The formula yielded a baseline sample size of 350. To account for potential non-response, recording errors, and loss to follow-up during telephone verification, the sample size was rounded up to 400 participants. A systematic sampling approach was used across the 16 pharmacies, enrolling an average of 25 consecutive eligible adult clients per pharmacy during operational hours (09:00 to 18:00).

2.4 Screening Protocols and Data Collection Procedures

Screening was carried out by trained public health researchers working with resident pharmacy staff at dedicated, quiet consultation desks. Blood pressure was taken using a calibrated digital upper-arm monitor (Omron M3 Comfort, Omron Healthcare, Kyoto, Japan) with an appropriately sized cuff. Clients rested seated with back support for at least 5 minutes before measurement. Two readings were recorded at a 2-minute interval on the left arm. If the readings differed by more than 5 mmHg, a third reading was taken, and the average was recorded. Hypertension was defined according to International Society of Hypertension criteria as systolic blood pressure (SBP) >= 140 mmHg and/or diastolic blood pressure (DBP) >= 90 mmHg, or confirmed current use of prescribed antihypertensive drugs [12].

Blood glucose was measured using a point-of-care glucometer (Accu-Chek Active, Roche Diagnostics, Mannheim, Germany) with blood obtained from an aseptic finger prick. Fasting status was verified: fasting was defined as no caloric intake for at least 8 hours, while all other tests were classified as random. In line with standard diagnostic thresholds, suspected diabetes was defined as a fasting capillary blood glucose >= 126 mg/dL (7.0 mmol/L) or a random capillary blood glucose >= 200 mg/dL (11.1 mmol/L), while impaired fasting glucose was defined as fasting values between 100 mg/dL and 125 mg/dL [13].

An interviewer-administered questionnaire collected sociodemographic details (age, sex, marital status, education, occupation), behavioral lifestyle factors (tobacco use, alcohol consumption, discretionary table salt use, physical activity), family history of chronic illness, and previous screening history [19, 20].

Each client received a 10-minute structured health education briefing supported by an informational flyer. The session focused on reducing dietary salt, increasing fiber intake, completing at least 150 minutes of moderate exercise weekly, smoking cessation, and the asymptomatic nature of high blood pressure [5, 12, 19]. Participants with elevated blood pressure or abnormal glucose levels were given a written referral form stating their clinical values and directing them to a primary health center or the Federal University Teaching Hospital, Owerri. Phone numbers were recorded, and participants were contacted at 4 weeks post-screening to check referral attendance.

2.5 Data Analysis

Data were audited and analyzed using SPSS Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were calculated for demographic and clinical variables. Categorical variables were compared using Pearson Chi-square (x^2) tests. Variables with an association at $p < 0.10$ in bivariate screening were entered into a multivariable binary logistic regression model to identify independent predictors of newly detected elevated blood pressure. Adjusted Odds Ratios (AOR) and 95% Confidence Intervals (CI) were computed, with statistical significance set at $p < 0.05$.

2.6 Ethical Considerations

Ethical approval was granted by the Health Research Ethics Committee of Imo State University, Owerri. Written or thumb-printed informed consent was obtained from each participant before questionnaire administration and clinical testing. Participants were informed that screening was voluntary and that participation would not affect their regular pharmacy transactions.

3 RESULTS

3.1 Sociodemographic Profile of Participants

The final study cohort comprised 400 adult participants across the 16 community pharmacies. The mean age was 44.8 +/- 13.2 years (range: 18 to 76 years). Females represented 53.5% (n = 214) of the sample. Secondary and tertiary

education graduates accounted for 41.5% and 38.8% of participants, respectively. Commercial traders made up 37.8% of the sample, followed by civil servants (25.5%) and artisans or transport workers (19.2%). More than half (55.5%) of the participants had not had their blood pressure or blood glucose checked in the preceding 12 months.

Table 1: Sociodemographic Profile and Screening History of Participants (N = 400)

Variable	Frequency (n)	Percentage (%)
Age Category: 18 - 30 years	64	16.0%
Age Category: 31 - 45 years	158	39.5%
Age Category: 46 - 60 years	122	30.5%
Age Category: > 60 years	56	14.0%
Sex: Male	186	46.5%
Sex: Female	214	53.5%
Marital Status: Single	88	22.0%
Marital Status: Married	276	69.0%
Marital Status: Widowed / Divorced	36	9.0%
Educational Attainment: No Formal Schooling	21	5.2%
Educational Attainment: Primary School Completed	58	14.5%
Educational Attainment: Secondary School Completed	166	41.5%
Educational Attainment: Tertiary Education Completed	155	38.8%
Occupational Group: Civil / Public Servant	102	25.5%
Occupational Group: Commercial Trader / Merchant	151	37.8%
Occupational Group: Artisan / Transporter	77	19.2%
Occupational Group: Student / Unemployed	42	10.5%
Occupational Group: Retiree	28	7.0%
Prior Screening (Past 12 Mo): Regular Checks	82	20.5%
Prior Screening (Past 12 Mo): Single / Irregular Check	96	24.0%
Prior Screening (Past 12 Mo): No Screening in Past 12 Months	222	55.5%

3.2 Prevalence of Elevated Blood Pressure and Hyperglycemia

Screening results indicated that 151 participants (37.8%) met the criteria for hypertension. Of these 151 individuals, 32 were aware of their diagnosis and taking medication, while 119 individuals (29.8% of the total cohort) represented newly detected, previously undiagnosed cases. Regarding blood glucose, 73 participants (18.3%) showed elevated readings. Known diabetic patients on treatment accounted for 16 cases, while 57 participants (14.3% of the total cohort) were newly identified with impaired fasting glucose (n = 38) or blood glucose levels suggestive of diabetes (n = 19). Both elevated blood pressure and abnormal glucose levels were detected together in 31 clients (7.8% of the total cohort).

Table 2: Clinical Screening Results and Detection Rates (N = 400)

Clinical Parameter / Status	Frequency (n)	Percentage (%)
Blood Pressure: Normal BP (< 120/80 mmHg)	142	35.5%
Blood Pressure: Prehypertension (120-139/80-89 mmHg)	107	26.7%
Blood Pressure: Stage 1 Hypertension (140-159/90-99 mmHg)	88	22.0%
Blood Pressure: Stage 2 Hypertension (>= 160/100 mmHg)	63	15.8%

Hypertension Status: Normotensive	249	62.2%
Hypertension Status: Known Hypertensive on Medication	32	8.0%
Hypertension Status: Newly Detected Elevated BP	119	29.8%
Blood Glucose: Normal Glucose Level	327	81.7%
Blood Glucose: Impaired Fasting Glucose (100-125 mg/dL)	38	9.5%
Blood Glucose: Suspected Undiagnosed Diabetes (>= 126 or >= 200)	19	4.8%
Blood Glucose: Known Diabetic on Treatment	16	4.0%
Combined Risk: Isolated Elevated BP Only	88	22.0%
Combined Risk: Isolated Hyperglycemia Only	26	6.5%
Combined Risk: Dual Elevated BP and Glucose	31	7.8%
Combined Risk: Normal on Both Parameters	255	63.7%

3.3 Lifestyle and Cardiometabolic Risk Factors

Assessment of lifestyle factors showed that 44.5% of respondents regularly added table salt to prepared meals. Insufficient physical activity (less than 150 minutes of exercise per week) was reported by 58.2% of participants. Tobacco use was recorded in 11.2% of the sample, while 34.0% reported regular alcohol consumption. Based on body mass index (BMI), 36.2% of participants were overweight (25.0 to 29.9 kg/m^2) and 22.8% were obese (>= 30.0 kg/m^2).

Table 3: Distribution of Lifestyle and Cardiometabolic Risk Factors (N = 400)

Risk Factor	Frequency (n)	Percentage (%)
Frequent Extra Table Salt Usage: Yes	178	44.5%
Frequent Extra Table Salt Usage: No	222	55.5%
Weekly Exercise Level: Sedentary (< 150 min/week)	233	58.2%
Weekly Exercise Level: Active (>= 150 min/week)	167	41.8%
Alcohol Consumption: Non-Drinker	184	46.0%
Alcohol Consumption: Occasional Consumer	80	20.0%
Alcohol Consumption: Regular Consumer (>= 3 days/week)	136	34.0%
Current Cigarette / Tobacco Use: Yes	45	11.2%
Current Cigarette / Tobacco Use: No	355	88.8%
Body Mass Index: Normal Weight (18.5 - 24.9 kg/m^2)	164	41.0%
Body Mass Index: Overweight (25.0 - 29.9 kg/m^2)	145	36.2%
Body Mass Index: Obese (>= 30.0 kg/m^2)	91	22.8%
Family History: Hypertension	168	42.0%
Family History: Diabetes Mellitus	94	23.5%
Family History: Stroke / Cardiovascular Event	52	13.0%

3.4 Predictors of Newly Detected Elevated Blood Pressure

Multivariable binary logistic regression was performed on participants without a prior hypertension diagnosis (n = 368, excluding 32 known hypertensives). As presented in Table 4, age over 45 years tripled the odds of elevated blood pressure (AOR = 3.12, 95% CI: 1.96-4.97, p < 0.001). Frequent addition of table salt (AOR = 2.41, 95% CI: 1.48-3.92, p < 0.001), sedentary habits (AOR = 1.95, 95% CI: 1.21-3.14, p = 0.006), and obesity (AOR = 2.28, 95% CI: 1.35-3.86, p = 0.002) were significant independent predictors of elevated blood pressure.

Table 4: Multivariable Logistic Regression of Predictors of Newly Detected Elevated Blood Pressure (*p < 0.05)

Predictor Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Age Category: <= 45 years	1.00 (Reference)	-	-
Age Category: > 45 years	3.12	1.96 - 4.97	< 0.001*
Sex: Female	1.00 (Reference)	-	-
Sex: Male	1.34	0.85 - 2.12	0.210
Dietary Salt Addition: Rare / None	1.00 (Reference)	-	-
Dietary Salt Addition: Frequent / Regular	2.41	1.48 - 3.92	< 0.001*
Physical Exercise: Active (>= 150 min/week)	1.00 (Reference)	-	-
Physical Exercise: Sedentary / Insufficient	1.95	1.21 - 3.14	0.006*
Body Mass Index: Normal Weight (< 25.0 kg/m^2)	1.00 (Reference)	-	-
Body Mass Index: Overweight (25.0 - 29.9 kg/m^2)	1.56	0.94 - 2.58	0.084
Body Mass Index: Obese (>= 30.0 kg/m^2)	2.28	1.35 - 3.86	0.002*
Family History of Hypertension: No	1.00 (Reference)	-	-
Family History of Hypertension: Yes	1.82	1.12 - 2.95	0.015*

3.5 Referral Adherence and Follow-Up Findings

All 145 clients identified with newly detected high blood pressure, abnormal blood glucose, or both were issued clinical referral letters. At the 4-week follow-up call, 131 individuals were successfully reached (90.3% contact rate). Of these, 76 participants (58.0%) reported attending a primary health center, private clinic, or hospital for clinical evaluation. Among the 55 participants (42.0%) who did not attend a medical facility, the main reasons given were lack of time due to work (43.6%), concern over hospital consultation fees (32.7%), and feeling healthy with no noticeable symptoms (23.7%).

4 DISCUSSION

This study demonstrates that community pharmacies can serve as functional points for early detection of hypertension and diabetes in urban and semi-urban Southeastern Nigeria. Nearly 30 percent of evaluated clients had unrecorded elevated blood pressure, and over 14 percent had high capillary blood glucose readings. These numbers show that a substantial portion of the adult population lives with undetected cardiometabolic risks, consistent with previous studies across Nigeria reporting high levels of undiagnosed hypertension and diabetes [1-3, 11].

The high yield observed in this study supports findings from other developing settings. Community retail pharmacies offer easier access than hospital outpatient clinics, which often involve long waits and consultation charges [7, 8, 10]. Over half of our participants had not checked their blood pressure or blood glucose in the past year, reflecting low rates of routine preventive care in the community. While public health facilities often concentrate on infectious diseases such as malaria, tuberculosis, and viral infections, retail pharmacies offer a practical setting to reach asymptomatic people during everyday store visits [5, 6, 8, 18].

Modifiable lifestyle factors were strongly linked to high blood pressure readings. Adding extra table salt to meals more than doubled the odds of elevated blood pressure (AOR = 2.41), in agreement with clinical evidence regarding sodium intake and vascular resistance [1, 12]. Sedentary routines and obesity were also significant independent predictors. Many commercial traders and artisans in Owerri remain seated at market stalls or in vehicles for long hours, limiting physical activity and encouraging reliance on salted, calorie-dense foods [2, 3, 20]. These findings indicate that pharmacy screening should be paired with practical lifestyle counseling rather than functioning solely as a testing station [8, 10, 19].

The 10-minute health education session was well received. Several clients noted that they felt fine and had assumed hypertension and diabetes always cause obvious symptoms such as severe headaches or dizziness [1, 14]. Providing clear verbal advice alongside illustrated flyers during the visit helped address these misconceptions and explained the value of dietary changes and regular physical activity [5, 8, 12].

Referral tracking showed both the strengths and challenges of community screening. A 4-week referral completion rate of 58.0% shows that more than half of the identified clients acted on the advice given by pharmacy staff. However, the 42.0% non-completion rate points to ongoing structural barriers: hospital user fees, busy work schedules, and the absence of physical pain [5, 6, 14]. Because these conditions are largely asymptomatic in their early stages, many clients prioritized their daily work over clinic visits [1, 15]. Improving care completion will require stronger direct communication channels between community pharmacies and local primary health centers, including standardized appointment scheduling and low-cost testing options [5, 8, 19].

This study has several operational limitations. Clinical measurements were based on a single screening visit, which does not constitute a formal diagnosis of hypertension or diabetes mellitus [12, 13]. Temporary factors such as recent physical exertion, anxiety, or caffeine intake may have caused transient blood pressure spikes. In addition, referral completion was verified through telephone interviews rather than by checking hospital records directly. Nevertheless, the screening results and follow-up attendance show that community pharmacies can play an active role in expanding primary health screening in Nigerian communities [7, 8, 17].

5 CONCLUSION

Community retail pharmacies in Southeastern Nigeria provide a practical venue for the early detection of hypertension and diabetes mellitus. Point-of-care checks identified high rates of undiagnosed cardiometabolic risk, with almost one-third of participants showing elevated blood pressure and one in seven showing abnormal blood glucose levels. Brief lifestyle counseling encouraged more than half of the referred clients to seek medical follow-up within 4 weeks. Including community pharmacies in primary healthcare strategies offers a practical, community-based approach to address the growing challenge of non-communicable diseases in Nigeria.

Recommendations

- **Include Community Pharmacies in National NCD Policies:** The Federal Ministry of Health and State Primary Healthcare Development Agencies should officially recognize community pharmacies as initial screening sites for hypertension and diabetes, supported by standardized testing and referral guidelines.
- **Train Pharmacy Personnel in Preventative Counseling:** Professional associations should provide regular training for community pharmacists and pharmacy assistants on point-of-care diagnostics, chronic disease risk factors, and patient lifestyle counseling.
- **Establish Coordinated Referral Pathways:** Health ministries should set up formal referral linkages between retail pharmacies and nearby primary health centers to track patient follow-up and support timely medical evaluation.
- **Subsidize Point-of-Care Testing Supplies:** Public health agencies and non-governmental partners should assist in lowering the cost of diagnostic consumables, such as blood glucose test strips and lancets, to make screening affordable for community members.
- **Promote Community Awareness on Asymptomatic Chronic Illness:** Public health authorities should carry out routine media and grassroots health education to explain that high blood pressure and diabetes often develop without symptoms, encouraging adults to take advantage of routine checks at local pharmacies.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The author declares that there are no financial, personal, or professional conflicts of interest associated with this research.

Statement of ethical approval

Ethical approval was granted by the Health Research Ethics Committee of Imo State University, Owerri, Imo State, Nigeria.

Statement of informed consent

Informed written or thumb-printed consent was obtained from all individual participants included in this study prior to questionnaire administration and clinical screening.

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