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Implementation strategies and outcomes in the delivery of HIV test services (HTS) in community pharmacies in Nigeria

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Abstract

Background Studies have shown that training interventions fail when proper strategies are not in place for their implementation. The study described the implementation strategies used in the delivery of the HIV test services (HTS) and measured implementation outcomes in the delivery of the services.

Methods The study was conducted between August and November 2019 among 50 selected community pharmacies in Oyo State, Nigeria using a mixed-method quantitative and qualitative data survey design. The implementation strategies and activities used in the delivery of HTS in the pharmacies and during outreaches were described while both observational and survey methods were used to collect data. Implementation outcomes were measured and analysed in terms of penetration, adoption, acceptability, feasibility, fidelity, and appropriateness of the intervention.

Results Penetration among respondents was 90%. Acceptability of the HTS was high (77.3%) among clients 20–49 years of age with 919 clients participating in the HIV screening. While 919 HIV tests were conducted, only 19 (2.1%) were positive. Adherence to the protocol of delivery of HTS (fidelity) indicated that all the respondents conducted rapid HIV testing, pre-testing counselling (43, 95.6%), post-testing counselling (40, 88.9%), and provision of confidential test results (39, 86.7%). Respondents' responsiveness indicated that 23 (51.1%) of the respondents could use up to 80% and above of the test strips given within the period. Researchers' observations showed respondents' ability to perform the tests as intended with little challenges. Participants felt that rendering the services was an interesting experience, and fulfilling, and allowed them to improve on their professional deliverables and practice. It also showcased the relevance of pharmacists in rendering HTS, creating awareness of the menace of HIV/AIDS, and helping people to stop the spread.

Conclusion The study showed that HTS is acceptable, appropriate, feasible, and easy to adopt in community pharmacies and penetration was high. For sustainability, community pharmacists should be well remunerated, and need for an established policy to include this scope in community pharmacy practice.

Keywords Implementation strategies, Implementation outcomes, Community pharmacists, HIV test services

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Introduction

The World Health Organization (WHO) and the Joint United Nations Programme on Human Immunodeficiency Virus (HIV) / Acquired Immunodeficiency Syndrome (AIDS), (UNAIDS) endorsed a declaration for every individual around the world to have the right of entry to the knowledge of their HIV status [1]. HIV testing is an efficacious intervention in the achievement of 90-90-90 goals put forward by the 2016 Political Declaration of the United Nations on ending AIDS and this depended heavily on enhanced access to testing services for HIV as well as actual uptake of these tests [2]. The ultimate goal of an HIV intervention programme is to achieve viral suppression for people living with HIV. This requires prompt diagnosis, timely commencement of antiretroviral therapy (ART), continuous engagement with medical services as well as strict adherence to medication plans for people living with HIV/AIDS (PLWH) [3].

Worldwide, about 61% of all PLWH live in ten (10) countries including Nigeria [4] which ranks third among countries with the highest burden of HIV infection in the world [5]. In terms of new infections, the country also ranks among those with the highest infection rates in sub-Saharan Africa [6]. In 2019, Nigeria accounted for nearly 70% of all new infections in West and Central Africa [7]. The WHO, in the strategic document for combating HIV, expects community pharmacists to continue to provide HIV/AIDS services in primary healthcare settings and to the immediate communities where they operate. The expectation is that community pharmacies will provide HIV testing, prevention, and treatment services to improve health outcomes [8]. This will promote the practice of community-focused ART services as a means of a universal strategy to end HIV/AIDS by 2030 [9]. The plan is to scale up current frameworks for high-quality HIV prevention and interventions such as effective treatment of HIV, prevention of transmission from mothers to their children, as well as other important activities such as the expansion of counselling services, testing, and Tuberculosis (TB)/HIV integrated service delivery. These are critical steps in ending the surge of HIV and community pharmacists are viewed as occupying a vantage position to contribute to these efforts to bring them to pass.

Community pharmacy also known as retail pharmacy is the area of pharmacy practice that is being practised in the community environment and provides pharmaceutical and cognitive services to a specific community they serve. It consists of both independent pharmacies which are single stores owned by a person and chain pharmacies of four or more pharmacies [10, 11]. Community pharmacists are regarded as the most accessible healthcare professionals to the public and have thorough knowledge

of all medications including prescription drugs and non-prescription products, and are able to meet patient's needs by assuring the proper use of all drugs and related products [12]. Today, community pharmacists have been engaging in the provision of a variety of extended services including health promotion services like smoking cessation, physical health services, advice on sexual matters; point-of-care services including screening for blood pressure, blood sugar, rapid diagnostic tests for malaria, pregnancy test, HIV test services; vaccination services, monitoring of patient medication, among others [13, 14]. In Nigeria, studies have shown that community pharmacies like in other parts of the world have demonstrated their ability in these areas with evidence of their provision of primary healthcare (PHC) services [15–18].

Implementation strategies have been defined as methods to enhance the adoption, implementation, and sustainability of a policy or intervention [19, 20]. Implementation strategy-related efforts must be assessed when evaluating implementation hence, implementation outcomes serve as necessary preconditions for attaining subsequent desired changes in clinical or service outcomes [19].

Implementation outcomes have been defined as the effects of thoughtful and purposive actions to implement new practices, services, or treatments [19]. These outcomes can perform these three basic roles; they can serve as measures of the implementation success, as immediate indicators of implementation processes, and serve as intermediate outcomes to service system or clinical outcomes in treatment effectiveness and quality of care research [20]. Different indicators used in measuring implementation outcomes include penetration, adoption, acceptability, appropriateness, implementation cost, feasibility, fidelity, and sustainability [21, 22].

Penetration defines how a practice or service can be integrated within a service system, its subsystems, or an organisation [23]. Stiles et al's concept [23] calculated service penetration using service recipients, by dividing the number of qualified persons who use a service by the total number of persons qualified and expected to use the service. Also, Rabin et al's belief of niche saturation penetration was calculated by dividing the number of providers who deliver a given service or treatment by the total number of providers trained and expected to deliver the service [24].

Adoption is the intention, original decision, or action to try or employ an innovation or evidence-based practice. Adoption, also known as "uptake" of intervention consists of behavioural change results that lead to the full use of an innovation, which may consist of an idea, a practice, or an object and may be known as an intervention product [25]. Adoption, in compliance with the study of Rabin et al. [24] and Rye and Kimberly studies

[26] could be measured from the perspective of the provider or organization. It is the total buy-in and continued use of the solution by its users.

Acceptability can be defined as a given service, practice, treatment, or innovation that is agreeable, palatable, or satisfactory among implementation stakeholders [27]. Based on stakeholder's knowledge of or direct experience, different scopes of services or treatment such as their content, complexity, or comfort are ways in which acceptability can be assessed.

While **fidelity** is the totality to which an innovation, service, or practice was implemented as recommended in the original procedure or as it was planned by the program or service developers [24, 28], it is measured by making a comparative analysis of the original evidence-based intervention and the implemented intervention in terms of adherence to the program procedure, dose or amount of program delivered, and quality of program delivery. Other implementation fidelity scopes identified by literature include participant involvement or responsiveness, program component differentiation, and exposure to the intervention [29, 30].

The theory behind **feasibility** explains the success rate of an innovation or practice and it is a reflection of poor recruitment, retention, or participation rates. Feasibility measures the extent to which an innovation, a new service, or a treatment can be successfully carried out, used, delivered, or within a given organisation or setting [31].

According to Proctor et al. [19], **appropriateness** is the apparent fitness, the relevancy, or compatibility of an innovation, evidence-based practice, or service for a given provider, consumer, or practice setting. It also includes how fit an innovation is to address a particular issue or problem. **Implementation cost** is the cost effect of an implementation effort. The costs can be varied according to three components; the costs of treatment or service delivered; costs of implementation strategy; and cost, including overheads of delivering in a particular setting [32].

Sustainability is the degree to which a newly implemented treatment is retained or entrenched within a service setting's ongoing, stable operations. The integration of a given program within an organization's culture through policies and practices, and distinguishes three phases that determine institutionalization; passage (a single event such as the transition from temporary to permanent funding), cycle or routine (i.e., repetitive reinforcement of the importance of the evidence-based intervention through including it into organizational or community procedures and behaviours, such as the annual budget and evaluation criteria), and niche saturation (the extent to which an evidence-based intervention is integrated into all subsystems of an organization [24].

In earlier studies by the researchers, the baseline assessment of community pharmacists' involvement in HIV testing services (HTS) and ARV medication therapy management (MTM) was conducted [33] while a training intervention was developed and delivered for the same respondents to improve the services provided [34]. However, studies showed that training interventions fail when proper strategies are not in place for their implementation, and intervention or treatment will not be effective if it is not well implemented. Successful implementation strategies have been identified in a review as ways to improve health service delivery [35]. For the training intervention to achieve its objective, different implementation strategies were put in place to ensure the delivery of HIV test services in the pharmacies. This study described the implementation strategies used in the delivery of HIV test services in community pharmacies and measured implementation outcomes in the delivery of the services. The outcomes were measured in terms of penetration, adoption, acceptability, feasibility, fidelity, and appropriateness.

Research methods

Research design

The research used a mixed-method of quantitative and qualitative data survey design methods and was conducted between August and November 2019 among registered community pharmacies in Oyo State, Nigeria. The qualitative research approach used was action research and observational methods. Action research involves the collaboration of both the researchers and participants and where theory is linked to practice to drive change. The study followed an intervention training program in HIV/AIDS services delivered to fifty (50) community pharmacists. It involved the implementation and monitoring of the services in the selected community pharmacies and was done within four months.

Study area

Oyo State, Nigeria is located in the South-West geopolitical zone of Nigeria and it's the 6th most populous state in Nigeria with an estimate of about eight million in 2022 [36]. It consists of 33 Local Governments and 29 Local Council Development Areas. Its capital is Ibadan, the third most populous city in the country and formerly the second most populous city in Africa [37].

About 4% of community pharmacists in Nigeria are located and practice in Oyo State [38]. Previous studies have shown that these community pharmacists are very proactive, always eager to extend their practices in the State, and are involved in health promotion services including point-of-care, and are ready to be included in PHC services [33, 39]. They also have adequate and existing facilities to deliver HTS.

Study participants, sample size determination, and Sampling

The study participants are 50 registered community pharmacists in Oyo State. They include community pharmacists who had earlier been involved in the baseline assessment and were also trained in HTS [33, 34]. With the use of a multi-stage sampling method, 100 community pharmacists were surveyed at baseline assessment of community pharmacies' involvement in HIV/AIDS services [33]. Out of these, 70 community pharmacist respondents were selected to participate in the HTS training intervention program [34]. At the end of the training, fifty (50) community pharmacists who participated in the HIV/AIDS training program constituted the sample size of this study.

Description of the implementation strategies and monitoring of the services

The delivery of the HTS by the community pharmacist participants commenced immediately at the community pharmacies after the training intervention program. Details of the activities have been published [34]. Implementation materials were received from donors including the master trainers' health institution, Local Agency for Control of AIDS (LACA) centres in the State, the State Ministry of Health (MoH) and individual community pharmacist support, and Accucheck/Roche.

At the end of the training, the following items were distributed free to all participants to equip them to offer the services:

- Documentation forms for HTS including HTS client intake form, HTS monthly summary form, HIV testing service register, HTS referral form, HCT outreach service register, etc.
- Handbills and banners, are to be placed at the pharmacies for clients' awareness of the services.
- HIV test kit including twenty-five (25) HIV test strips, capillary tubes, lancet, and buffer for the test.
- Male condoms as incentives for clients.
- Family planning pills for female clients containing 0.5 mg of Lynestrenol for breastfeeding mothers, another one containing one beige tablet of Levonorgestrel 0.15 mg and ethinylestradiol 0.03 mg, and one tablet of Ferrous fumerate 75 mg.

Community pharmacist participants made commitments at the end of the training to deliver the services as free-for-service for the period in their pharmacies and were given blood glucose monitors by Accucheck/Roche as an incentive for their participation. Each of the participants was expected to use up the 25 HIV test strips given to them within the implementation period of four months.

Clients' awareness of the services commenced with the mounting of the banners at the entrance of the pharmacies indicating that HTS, including blood pressure and blood sugar screenings, are being provided on the premises. At the pharmacists' points were pockets of handbills placed to further indicate the services provided and to call the attention of the clients that walked in into the pharmacy. Furthermore, handbills were given to the client as an invitation to participate in the HTS. Some of the pharmacies organised health outreaches to include point-of-care testing services including screening for blood pressure, blood sugar, cholesterol, and HTS as earlier encouraged during the training. The targets for the outreaches depend on the community and the pharmacists' discretion. The community pharmacists also documented all activities for all clients attended to, both for counseling and provision of HTS. Clients who tested positive for HIV were referred to government health facilities closest to them for follow-up. Linkages with HIV health facilities were established with a tertiary hospital for referral purposes for HIV-positive patients and a few health centres.

The researcher who facilitated the program monitored the community pharmacist respondents on their premises to ensure that HTS was carried out as intended and to attend to all challenges encountered in the field. The monitoring activities included visits to the pharmacies to ensure that the banners were properly displayed in front of every pharmacy to catch the attention of clients, attendance at outreaches to capture activities conducted, and observing the conduct and general coverage of activities at each pharmacy. The monitoring of the activities was further done through effectively communicating with the participants through phone calls and text messages in the WhatsApp platform dedicated to the purpose. It also included encouraging the participants to conduct the tests and ensure proper documentation of the activities using the forms earlier given, attending to their queries for further explanations on the conduct of the test and documentation.

Some of the participants requested more HIV test kits after they used up the number given either for health outreaches or normal conduct in their pharmacies and these were refilled as needed by the researchers. Test strips were redistributed among pharmacies by the researcher who continued to monitor use in all the premises. A few of the strips expired in October 2019 while the remaining expired in February 2020. The researchers also collaborated with the participants in linking the HIV-positive clients for confirmatory tests at healthcare facilities and in the follow-up of HIV-positive clients who were referred to healthcare facilities.

At the end of each month, the facilitator and research assistants collated documented forms from all the respondent pharmacies, received summary reports of

HTS from community pharmacists every second day of the month, and submitted monthly reports as scheduled to the supervising government hospital HIV clinic.

Conduct of the screening exercise

The HIV rapid test kit (Determine™) was used for the HIV test procedure. The screening procedure involved the pulling off of the protective foil cover on the test strip and sterilization of the clients' thumb using an alcohol swab (or cotton wool moistened in methylated spirit). The sterilised area of the thumb was then pierced with a lancet, and a capillary tube was used to draw the required volume of blood (0.1 ml). The blood sample was introduced directly into the absorbent pad on the strip. A drop of buffer (0.85% saline) was added, and the result read after 10 to 15 min. Clients were also offered free blood pressure and blood sugar screening services, and free condoms and contraceptives as incentives for their participation [34].

Study instrument

To measure the implementation outcomes, we used the information received from the client's documentation during test services, questionnaires from the pharmacist participants, and the facilitator's observation during the implementation process.

The documented forms which are hard copies formed a major part of the study instrument where participants filled the forms following the information required. Information from the "HIV Testing Services: Client Intake Form" includes the age and gender of the clients, the date the test was performed, the results of the test, the date the result was delivered to the client, and pre-and post-counselling delivered to the clients among others. Others include Referral forms for HIV-positive clients for linkage to health facilities and further confirmatory tests and treatment. Others include the Outreach summary form and HTS monthly summary Form report which summarises the clients' information including age range, sex, total of tests performed, and number of positive and negative clients. All documented information received from the clients was kept in privacy with the pharmacists until transferred to the facilitator.

Google form of a questionnaire consisting of ten (10) semi-structured, open-ended questions was administered to the participants at the end of the 4th month after implementation. The questionnaire used was developed for this study with expert knowledge of the researchers (as attached) but found its root in the baseline assessment study earlier published [33] as it tends to implement the HTS after training intervention [34]. Section A consists of the socio-demographic characteristics of the respondent community pharmacists in terms of sex, qualifications, years of practice as a pharmacist (post-graduation),

and position in the pharmacy. Section B consists of 8 questions to obtain the types of HTS provided such as screening services, pre-and post-counselling tests, and referral services among others. Other Sections requested to know the participants' perception and relevance of the HTS in their practice, their feelings about their involvement with the HTS activities, and challenges encountered with the delivery of the services. 'Yes' and 'No' responses were received based on the type of services provided while respondents' perceptions and challenges about the services were received as open-ended responses.

The researcher and facilitator also captured their observations in text, video, and pictorial.

Indicators for implementation outcome measures

The indicators used to measure the implementation outcomes and monitoring activities of the intervention were as follows:

- **Penetration:** This is the proportion of the community pharmacists recruited and participated in the delivery of the HIV test services. Penetration was calculated in terms of the number of community pharmacists who deliver the HIV test services, divided by the total number of community pharmacists trained and expected to deliver the service.
- **Adoption of the intervention:** we earlier measured the intention of the community pharmacists to adopt the HTS in their pharmacies and their initial decision to participate in the HTS. The responses of the participants' post-training were used to capture this indicator and were presented [34].
- **Acceptability of the intervention:** this was measured by the clients' participation in HTS in community pharmacies among all age groups and gender distribution, and the number of clients who were tested at the pharmacies during implementation.
- **Fidelity of the intervention:** we measured the adherence to the protocol of delivery of HTS as intended through the type of services provided; participants' responsiveness or involvement was measured by the number of tests performed categorisation; The quality of HTS delivered as intended was subjective to the researchers'/ facilitator's assessment through direct observation during the visits to the premises, participation in some of the outreaches conducted by some community pharmacies and pictorial reports sent to the facilitator.
- **Feasibility:** we measured the success rate of HTS in community pharmacies in terms of recruitment, retention, and participation of the community pharmacists in the intervention. We also measured

the recognition of community pharmacies as providers of HIV service centres based on the number of HIV tests service delivered to clients.

- Appropriateness of the intervention: we measured the self-perception of community pharmacists about the relevance of providing HTS on their premises and compatibility with their services.

Data collection procedure

The documented forms and summary reports generated were part of the data collected. The community pharmacist participants used the designed forms for HTS by filling the forms for each client attended to. They also made monthly submissions of reports with the use of designed forms for HTS as required. The researcher/facilitator and the assistants collected filled forms and reports from participants during the visit to some premises, some of the respondents brought the generated reports to the office of the researcher. Some of the respondents based outside the State capital where the researcher was based scan such copies and forward them to WhatsApp of the researcher. The facilitator sent submission reminders to the respondents through phone calls and text messages towards the end of each month to facilitate the collation and submission of the report to the main health-care facility by the 3rd day of each month. Regular tests and outreaches conducted by community pharmacies were collated, summarised, and submitted to the Master trainer at the main healthcare facility, and for research purposes.

Observations during the outreaches and unplanned visits to the pharmacies were captured by recording what was seen and heard and with pictorial and video coverages. One-on-one conversation with the participants was also done on their observation of the program and such were recorded by the researchers and their assistants while others sent their comments on the WhatsApp platform created for the participants. Such comments included their feelings and challenges about the program.

The survey questionnaire was through Google form sent to both the group platform and individual participants through their WhatsApp numbers. Responses were followed up until all of them responded and submitted the completed questionnaire within a one-to-two-week period.

Data analysis

The summary reports were collated, entered into an Excel spreadsheet, and later exported into SPSS version 23. Simple descriptive statistics such as frequency and percentage were used to analyse the reports. The results were also presented in the form of a bar chart. Content analysis was used to present the perception and

challenges of the respondents on the HTS delivered. This was done by describing and categorizing common words, phrases, and ideas. The researchers also studied the environment and circumstances of the pharmacies during their visits to make relevant observations.

Results

Summary of activities engaged in the pharmacies.

- Mounting of a banner at the entrance of the pharmacy that indicated the provision of HTS in the pharmacy.
- Display of handbills at the pharmacy for walk-in clients' attention.
- Handover of handbills to the client for an invitation to participate in the HTS.
- Testing of willing clients in HTS after counselling procedures.
- Pre- and post-testing counselling.
- Organisation of health outreaches by the pharmacies to include point-of-care HTS. Some of these were conducted in the pharmacy environment while others were taken to designated locations like the mechanic village to capture the artisans.
- Documentation of all activities at the pharmacy and the outreach stations.
- Referral of positive clients to healthcare facility for follow-up.
- Provision of ARV/MTM services.

Penetration of the intervention

At the end of the implementation and monitoring period, 45 community pharmacists participated in the delivery of the HTS out of 50 trained participants, given a response rate of 90%. The five who opted out and returned the test kits gave different reasons ranging from being on maternity leave to not being available due to other commitments.

Table 1 shows the socio-demographic characteristics of the community pharmacist respondents involved in the implementation programme. Twenty-nine (29, 64.4%) were male while 16 (35.6%) were female. Most of them (44, 97.8%) had B. Pharm degree, within 1–10 years post-graduation (20, 44.4%) and were superintendent pharmacists (35, 77.8%).

Adoption of the intervention

Intention to adopt the HTS was the outcome of the pharmacists' decision to participate in the training [33], their agreement that the training was sufficient for them to carry out the services and that the information provided would be useful in practice. They further made the commitment to deliver the HTS in their pharmacies [34].

Table 1 Sociodemographic characteristics of the respondents involved in HIV/AIDS services post-training

Variable	Frequency <i>n</i> = 45	%
Sex		
Male	29	64.4
Female	16	35.6
Qualification		
B.Pharm.	44	97.8
M.Sc./M.Pharm.	5	11.1
Pharm. D	3	6.7
FPCPharm.	3	6.7
Ph.D	0	0
Years of practice (post-graduation)		
1–10	20	44.4
11–20	11	24.4
21–30	3	6.7
31–40	9	20.0
41+	2	4.4
Position of respondent in the pharmacy		
	Frequency <i>N</i> = 45	%
Superintendent pharmacist (SP)	35	77.8
Locum	0	0.0
Full time (not SP)	10	22.2

Table 2 Characteristics of clients screened for HIV between August and November 2019

Age range	Male No.	Female No.	Total No. (%)
1–9	2	0	2 (0.2)
10–19	13	29	42 (4.6)
20–29	150	167	317 (34.5)
30–39	120	117	237 (25.8)
40–49	77	79	156 (17.0)
50–64	70	55	125 (13.6)
65+	18	22	40 (4.4)
	450 (49.0)	469 (51.0)	919

Acceptability of the intervention

A total of 919 clients participated in the HTS. Table 2 shows the characteristics of clients and acceptability among gender and age differences within the period. More females (469, 51%) than males (450, 49%) participated. Most of the clients were within the age range of 20–29 years (317, 34.5%), followed by 30–39 years (237, 25.7%) and 40–49 years (156, 17.0%) while the least participants were children in the age range of 1–9 years (2, 0.2%).

Feasibility of the intervention

Seventy (70) community pharmacists were recruited for the delivery of HTS, 50 were retained after training and 45 community pharmacists participated in the intervention services. This indicates a success rate of 64.3% of the intervention.

The feasibility of the intervention is further presented in the flow of the implementation process and activities performed during the delivery period by the respondents (Fig. 1). A total of 919 HIV tests were conducted for the same number of clients whereby 754 tests (82%) were done during regular working hours and 165 tests (18%) during health outreaches organized by four premises. In all, 19 (2.1%) of the clients tested were HIV positive.

Figure 2 also shows the monthly representation of the HTS delivered by the community pharmacists. It also showed the number of positive and negative tests conducted within each month. September had the highest number of tests conducted (371 tests, 40.4%) with 6 positive HIV tests recorded in September and October respectively. The lowest number of tests were conducted in November (117 tests, 12.7%) with only two positive HIV test results.

Furthermore, the frequency of HTS performed per month by respondents is as shown in Table 3. In the second month of delivery of service (i.e. September), 36 (80%) participants performed 371 tests while the lowest number of 117 tests were performed in the 4th and last month (i.e. November) by 22 (48.9%) of the respondents. Hence the average monthly test performed by a pharmacy was lowest in November (i.e. 5.3). The total number of clients screened per pharmacy in the 45 pharmacies within the four months was 20.4 with an average of 5.1 in a month.

Fidelity of the intervention

Adherence to protocol and the types of HTS services delivered by participants in their pharmacies are shown in Table 4. All the respondents were involved in HIV testing. Pre-testing counselling was done by 43 (95.6%) participants, post-testing counselling by 40 (88.9%), and provision of confidential test results by 39 (86.7%).

Participants’ responsiveness is further shown in Fig. 1. While the respondents were expected to use up the 25 strips delivered to them within the implementation period, only 23 (51.1%) of the respondents used up 20 test strips (80%) and above within the period.

Facilitator’s observations

All participants sent pictorials of the placement of banners at the entrances of their pharmacies and pictures taken during the outreaches and normal activities in their pharmacies. Facilitators assessed the delivery of the HTS through observation during their visits to the pharmacies and participation in some of the outreaches conducted by the pharmacies. Some of the observations of the facilitators include:

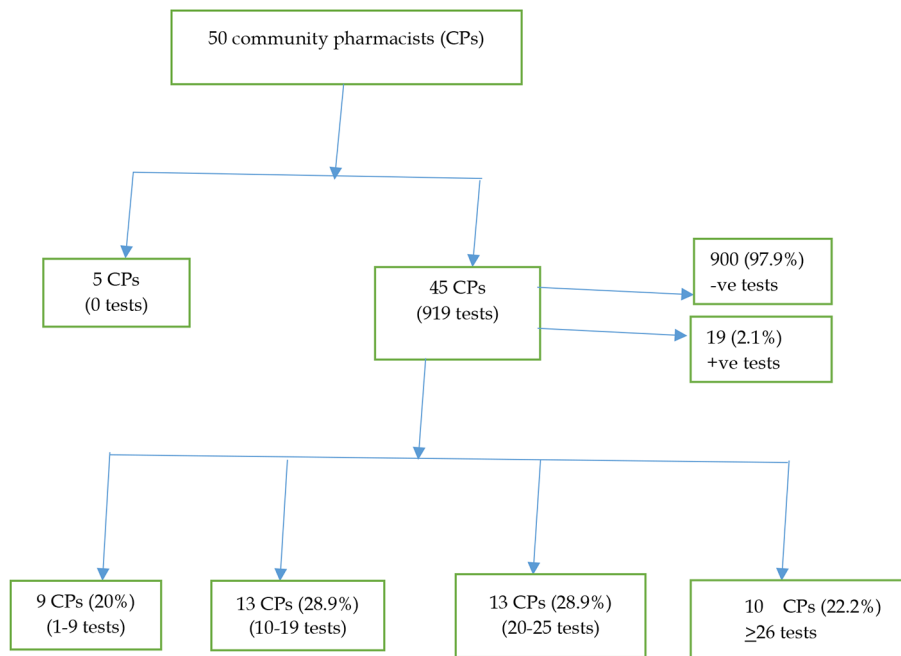


Fig. 1 Flow chart of the delivery of HIV tests by community pharmacist respondents. The flow chart shows the implementation process and activities performed during the delivery period by the respondents where 45 community pharmacists were involved in the delivery of the HIV tests. It shows a total number of 919 HIV tests conducted with 900 negative and 19 positive results. Nine community pharmacists (CPs) performed 1–9 tests; 13 CPs performed 10–19 and 20–24 tests respectively; and 10 CPs performed 26 and above tests

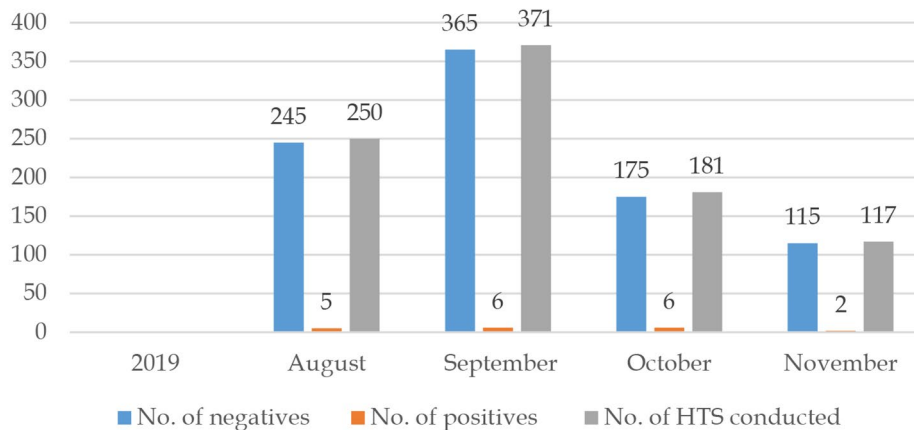


Fig. 2 Delivery of HIV tests by community pharmacists from August to November 2019. Shows the delivery of HIV tests by 45 CPs from August to November 2019. With a total of 250 tests performed in August, 5 were positive while 245 were negative. In September, out of 371 tests performed, 365 were negative and 6 were positive. In October, 181 clients were screened; 171 were negative and 6 were positive. Lastly, in November, out of 117 screened clients for HIV, 2 were positive and 115 were negative

Table 3 Frequency of HIV tests performed by community pharmacies between August and November 2019

Month 2019	No. of community pharmacies respondents N= 45 (%)	No. of HIV tests performed/ month (%)	Average monthly tests performed/ pharmacy
August	30 (66.7)	250 (27.2)	8.3
September	36(80.0)	371 (40.4)	10.3
October	30(66.7)	181 (19.7)	6.0
November	22(48.9)	117 (12.7)	5.3
Total /average		919	20.4

Table 4 Type of HIV services provided in community pharmacies by the respondents

HIV Testing Services (HTS) provided in community pharmacies	Frequency N=45	%
Rapid HIV testing	45	100.0
Stocking of HIV test kits	16	35.6
HIV pre- testing counselling	43	95.6
HIV post- testing counselling	40	88.9
Provision of patient/ client with confidential test result	39	86.7
Linkage to confirmatory HIV test services	35	77.8
Referral of known HIV patient to Physician / health centre for HIV clinical care and support services	37	82.2
Referral of patient for HIV counselling	34	75.6

- All the pharmacies were asked to send a pictorial of the placement of the banners in front of their pharmacies and this was done.
- Some of the banners were not well placed in conspicuous places in front of the pharmacies and this was called to the attention of the pharmacists for correction.
- There was a high turnout of members of the community during outreaches. Some of these pharmacies had been engaged in outreaches on point-of-care services on screening for blood pressure and blood sugar in the past.
- Some of the outreaches were centred on a specific group of people in the community e.g. done at the mechanic village.
- Another outreach was done in collaboration with oral health education where the community pharmacist invited a dentist and a company producing toothpaste. Community members were taught how to brush their teeth and were given free samples of toothpaste. This attracted more participants at the outreach.
- Some pharmacies were able to attract large numbers of their clients to participate in the screening exercise during regular services at their pharmacy while some could not.
- In some of the pharmacies visited pharmacists had to be encouraged to continue to introduce the service to their clients for participation.

Appropriateness of the intervention

Participants' self-perfection and feelings about the services were freely captured in their comments about the delivery of the HTS. Many of the respondents consent to the acceptability and appropriateness of the intervention in their pharmacies as follows:

- "It was an interesting experience, happy rendering services, and I felt fulfilled and satisfied with it."*

- "The service gave me the opportunity to improve on my professional deliverable."*
- "It is good service added to community pharmacy practice"*.
- "The training has been helpful and has broadened my professional competency, raised my consciousness, and improved my practice"*.

while others commented that:

- "The service had showcased the relevance of pharmacists in rendering HIV services"*.
- "This service had given me an opportunity to create awareness on the menace of HIV/AIDS and helped people to stop the spread"*.
- "It has strengthened pharmacy as the first point of call as PHC provider"*.
- "It had increased my interaction with patients"*.

Respondents also noted implementation challenges in the delivery of the HTS in community pharmacies. Some of their observation and comments include:

- More test kits should be made available at the pharmacy
- Financial compensation is required for time spent
- I feel the elites do not want to come to the pharmacy for testing

Respondents' suggestions include timely provision of material for testing e.g. kits, promotion materials, documentation forms, compensation and remuneration for healthcare providers, more community awareness, and more personnel to deliver services, among others.

Discussion

In this study, we described the implementation strategies used in the delivery of HIV test services (HTS) in community pharmacies in Oyo State, Nigeria while the researchers monitored the delivery of the services during four months after the intervention training was delivered to the participants. We also measured implementation outcomes in the delivery of the services within the period. This is to confirm if the community pharmacist's delivery of HTS can result in the inclusion of such services in community pharmacy services in Nigeria and eventually facilitate the achievement of UN goals of eradicating HIV/AIDS by 2030.

The response rate/ penetration was high with 90% participation in the HIV test services. This is similar to a study conducted in Caribbean Region by Hiner et al., [40] which showed that almost 65% of trained voluntary counselling testing (VCT) providers in clinical skills were confirmed as providing VCT services.

The outcome measure for the HIV test services was the number of HIV tests performed and the result was similar to studies of Weidle et al., [41] and Darin et al. [42]. The overall average number of clients screened per pharmacy was similar to Klepser et al.'s study [43]. Also, the percentage of HIV-positive clients was similar to previous studies [42, 44].

Acceptability has been closely linked with positive patient relationships, pharmacist comfort with consultation, and confidentiality [45, 46]. Client's acceptance of HTS in community pharmacies was measured during baseline assessment of HTS in community pharmacies and reported in an earlier published article that showed that about 77% of the clients surveyed were willing to participate in HIV screening in a community pharmacy [33]. The participation of clients in HTS during the implementation stage showed that clients' participation was well spread among all age groups, especially for those aged 25 to 49 years. This is similar to the result of the point-of-care test users conducted by Figueira et al. [46] where the mean age of 35 (± 13.0) years was obtained. Also, most of the clients screened were female in compliance with the baseline assessment study [33] which revealed that females visit the pharmacies more than male clients.

Adoption of an intervention can be affected by the availability of resources, level of expertise, and commitment to the program [47]. A study using diffusion of innovation theory in the adoption of services recognised that early adopters and skilled people do participate as role models in helping others to complete the recommended practice or service [48]. Furthermore, a study had shown that factors that favoured adoption can be due to participants' trust in the intervention facilitator, organisation of the intervention, unity of the activities, and ownership and active participation of recognised and influential persons [49]. Participants' adoption of the service was linked to their agreement with the sufficiency of the training in carrying out the HTS, their high spirit and commitment to participation at the end of the training, active participation of recognised and respected community pharmacists during training intervention [34], and the involvement of the facilitators in the implementation activities with supportive supervision and monitoring of the activities.

Most of the participants provided rapid HIV testing, pre-testing counselling, post-testing counselling, and confidential test results. This is also related to the previous studies where pharmacists felt prepared, confident, and expressed professional satisfaction with offering HIV point-of-care testing (POCT) [50]. Even though all the participants at the training agreed that the content of the training had given them new ideas and viewpoints about the HTS as well as sufficient for them to carry out

the HTS [34], five out of the 50 trained community pharmacists did not adopt the services. Among the 45 adopters, the low level of participation in HTS by some of the respondents (22, 48.9%) may be due to lack of commitment, low turnout of eligible clients in some pharmacies, or pharmacist's expertise with the inability to convince a client to participate [47].

Community pharmacy has been identified as the first port of call and community pharmacists as the most accessible healthcare providers for healthcare services in the community and has been suggested as an important addition to the HIV testing locations [51–53]. To be relevant as a community pharmacist in this century, provision of health promotion, point-of-care, and primary healthcare services are important in a pharmacy outlet [16, 54]. Previous studies have established that community pharmacists are providing immunizations and point-of-care testing services as part of their extended roles including blood pressure, blood sugar, and cholesterol screening services and HTS [14, 55, 56]. Studies also showed that pharmacist-provided HIV POCT may overcome testing barriers, including privacy concerns, testing wait times, and improved accessibility [50]. The participants' self-perception and feelings as reported in this study about the service they provided corroborated this.

Participants felt that offering HTS was fulfilling and satisfying, being a good service added to their practice and showcased the relevance of pharmacists in rendering HIV services. This complies with Ryder et al.'s study [45] where most participants felt that offering HIV testing was a reasonable addition to the evolving role of the community pharmacist and Darin *et al.*'s study [42] where pharmacists felt comfortable performing HIV testing. Respondents also appreciated that more clients in the community were tested, and knew their status which opened an avenue for further consultation about the test results and facilitated linkage to care. Hence, the HTS can be said to be compatible with community pharmacy service settings, suitable and fit into their practice as well as fit to address the knowledge of HIV status of the community where the pharmacy exists.

One of the goals of our study was to find ways in which community pharmacy services can be designed to contribute more effectively towards the realisation of strategies of both the International Pharmaceutical Federation (FIP) and WHO on improving care for HIV/AIDS patients [2, 57–62]. Findings from our previous study showed that some community pharmacy clients had earlier expressed the view that community pharmacists were their healthcare providers and had already accessed screening services for HIV in some community pharmacies [34]. The **feasibility** of screening services in community pharmacies was affirmed by this study, in agreement with similar, previous studies [39, 43, 46, 63]. Clients'

responses to pharmacy-based screening were high and customers were in favour of accessing screening services in community pharmacies [64, 65].

The study by Weidle et al. [41] measured the **success rate** of delivery POCT in community pharmacies and retail clinics where 21 participating sites administered 1,540 HIV tests, with 1,087 conducted onsite during regular working hours and 453 during outreaches. Also, the outcome of Center for Disease Control and Prevention (CDC)-funded feasibility study offering rapid, POCT in community pharmacies and retail clinics, revealed that pharmacies and retail clinics represent a vast, largely untapped potential for the delivery of HIV testing in settings that are more accessible and, for some people, less stigmatizing than traditional testing [52]. These outcomes are related to our study. The success rate of the delivery of HTS by participants made the intervention implementable, possible, and doable.

Fidelity, as in this study is the ability of the community pharmacists to deliver the services as intended and submit the reports as prescribed in the protocol for the HTS. The study by Beardsell and Coyle [66] identified that the quality of HIV testing can be assessed through the process elements of HIV testing. These were identified as making a decision to be tested, accessing testing services, test counselling, and waiting for the test result. Even though all the respondents participated in the HIV screening, the protocol for the delivery of the HTS cannot be said to be completely adhered to because responses did not show 100% compliance in terms of the pre-and post-counselling tests and provision of confidential test results.

The quality of service delivered as intended was subjective to the facilitators' assessment. No serious challenges were encountered by any of the participants during the screening services as all were resolved through phone calls. Few delays in the submission of reports were observed and could not be captured in the summary reports submitted.

Responses to the challenges to the delivery of HTS were similar to those of previous studies where respondents stated that staffing issues, pharmacists' remuneration, and integration with existing healthcare systems were some of the factors that affect the delivery of HTS [67, 68]. Others include timely provision of material for testing, and more community awareness, among others. Respondents, therefore, suggested that the government and policymakers should include HTS in community pharmacy training and practice as well as the pharmacy curriculum. They also solicited for inclusion of community pharmacies as part of the PHC centre to tackle the scourge to meet up with the UN goals to increase more personnel to deliver the services. Timely provision of materials for testing and funding of the system to ensure

continuity and sustainability of the services is critical as respondents wished to continue the service even after the end of the project and were already liaising with the Local Agency for Control of AIDS (LACA) managers in their local government areas through the facilitators, like in Weidle et al. study [41].

Limitations of the study

The clients screened were not surveyed during the implementation stage to evaluate their attitude towards the services offered. Due to the researcher's primary role in analyzing and interpreting data, especially during the observation, interpretations of the same data can vary greatly and hence may not easily be replicated. Also, the study was conducted in one state out of 36 states in Nigeria may affect the generalisability of the study.

Conclusion

This study described the implementation strategies used in the delivery of HTS in community pharmacies and also measured the implementation outcomes in the delivery of the service by community pharmacists within the period. The delivery of HTS in community pharmacies showed the increased relevance of community pharmacists in healthcare settings and their ability to be designated as PHC centres. The study showed that HTS is acceptable, appropriate, feasible, and easy to adopt in community pharmacy settings and penetration was high. For sustainability of the delivery of HIV test services in community pharmacies, community pharmacists should be well remunerated and there should be establishment of policy to include this scope in community pharmacy practice. Further studies will do a comparative analysis of the delivery of HIV/AIDS services in community pharmacies among the same respondents before and after the training and implementation stage.

Abbreviations

WHO	World Health Organization
UNAIDS	United Nations Programme on HIV/AIDS
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
PLWH	People living with HIV/AIDS
MTM	Medication Therapy Management
HTS	HIV Testing Services
POCT	point-of-Care Testing
FIP	International Pharmaceutical Federation
CDC	Center for Disease Control and Prevention
VCT	Voluntary Counselling Testing
LACA	Local Agency for Control of AIDS

Supplementary Information

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Supplementary Material 1

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Author contributions

Concept – Y.O.O.; Design – Y.O.O., W.O.E.; Supervision – Y.O.O., W.O.E.; Resource – Y.O.O.; Materials – Y.O.O.; Data Collection &/or Processing - Y.O.O.; Analysis &/or Interpretation - Y.O.O., W.O.E.; Literature Search – Y.O.O., W.O.E.; Writing original draft – Y.O.O.; Critical Review and editing –Y.O.O., W.O.E.

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Data availability

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Declarations

Ethical approval and consent to participate

We followed the scientific requirements and research protocols for human subjects' recruitments in accordance with the Declaration of Helsinki. The Oyo State Research Ethical Review Committee, Ministry of Health, gave ethical clearance (Reference no. AD13/479/1240 of April 30, 2019) for the study. Clients recruited for the HTS also gave their consents and this was documented by all community pharmacists before proceeding for pre-HTS counselling. Informed consent was sought from the community pharmacists participated in the study and who filled the questionnaire through writing by signing the consent form attached to the questionnaire.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

- UNAIDS. Summary of the Declaration of Commitment on HIV/AIDS. 2002 https://www.unaids.org/sites/default/files/sub_landing/files/jc668-keeping-promise_en.pdf (accessed on November 15, 2018).
- WHO/UNAIDS Statement. WHO, UNAIDS statement on HIV testing services: new opportunities and ongoing challenges.2017. https://www.unaids.org/en/resources/presscentre/featurestories/2017/august/20170829_HIV-testing-services (accessed on November 15, 2018).
- UNAIDS. 2025 AIDS Target. https://www.unaids.org/sites/default/files/2025-AIDS-Targets_en.pdf (accessed on December 20, 2022).
- UNAIDS. The gap report 2014. Geneva: Joint United Nations Programme on HIV/AIDS. https://unaids-test.unaids.org/sites/default/files/unaids/contentassets/documents/unaidspublication/2014/UNAIDS_Gap_report_en.pdf (accessed on November 15, 2018).
- Nigeria HIV, AIDS. accessed on November 18, and. <https://www.unodc.org/nigeria/en/hiv-and-aids.html#:~:text=Nigeria%20ranks%20third%20among%20countries,in%20Nigeria%20as%20at%202018> (2023).
- National Agency for the Control of AIDS (NACA). 'National Strategic Framework on HIV and AIDS: 2017–2021' [pdf]. <https://naca.gov.ng/2013-national-hiv-validated-data-2-2/> (accessed on November 15, 2018).
- UNAIDS Data. 2020. https://www.unaids.org/sites/default/files/media_asset/2020_aids-data-book_en.pdf (accessed on December 20, 2022).
- Diaz-Cruz ES, Thompson S, Hawkins M, Zengotita-Borges R, Jefferson K. Leveraging expertise from Community resources to improve the role of the pharmacist in HIV Testing and Counseling. *Innov Pharm*. 2021;12(4):10–24926. Published 2021 Sep 22. <https://doi.org/10.24926/iip.v12i4.3918>.
- WHO 2017. END HIV/AIDS BY 2030 <https://iris.who.int/bitstream/handle/10665/259638/EndAIDS-eng.pdf?sequence=1&isAllowed=y#:~:text=Political%20commitment%20towards%20the%20HIV,HIV%20FAIDS%20epidemic%20by%202030>
- Ibrahim MIM. Chapter 18 - Assessment of Medication Dispensing and Extended Community Pharmacy Services, Editor(s): Mohamed Izham Mohamed Ibrahim, Albert I. Wertheimer, Zaheer-Ud-Din Babar, Social and Administrative Aspects of Pharmacy in Low- and Middle-Income Countries, Academic Press, 2018, Pages 295–309, ISBN 9780128112281, <https://doi.org/10.1016/B978-0-12-811228-1.00018-2>. (<https://www.sciencedirect.com/science/article/pii/B9780128112281000182>).
- American Pharmacists Association (APHA). 2013. Chain Community Pharmacy. https://aphanet.pharmacist.com/sites/default/files/Profile_06%20Chain%20pharmacy%20Final%20071713.pdf
- Valliant SN, Burbage SC, Pathak S, Urick BY. Pharmacists as accessible health care providers: quantifying the opportunity. *J Manag Care Spec Pharm*. 2022;28(1):85–90. <https://doi.org/10.18553/jmcp.2022.28.1.85>.
- Shirdel A, Pourreza A, Daemi A, Ahmadi B. Health-promoting services provided in pharmacies: a systematic review. *J Educ Health Promot*. 2021;10:234. https://doi.org/10.4103/jehp.jehp_1374_20. Published 2021 Jun 30.
- Goode JV, Owen J, Page A, Gatewood S. Community-based Pharmacy Practice Innovation and the role of the community-based pharmacist practitioner in the United States. *Pharm (Basel)*. 2019;7(3):106. <https://doi.org/10.3390/pharmacy7030106>. Published 2019 Aug 4.
- Bamgboye AO, Hassan IA, Fatoye EO, Ozulouho CC, Folami SO, Uwizeyimana T. Enhancing care transition performance of community pharmacies in Nigeria. *Health Sci Rep*. 2024;7(2):e1904. Published 2024 Feb 15. <https://doi.org/10.1002/hsr2.1904>
- Ihekoronye MR, Osemene KP. Evaluation of the participation of community pharmacists in Primary Healthcare Services in Nigeria: a mixed-method survey. *Int J Health Policy Manag*. 2022;11(6):829–39. <https://doi.org/10.34172/ijhpm.2020.224>. Published 2022 Jun 1.
- Oladapo RK, Oyetola AB. Cabenuva*: differentiated service delivery and the community pharmacists' roles in achieving UNAIDS 2030 target in Nigeria. *Pharm J*. 2021;29(8):815–9.
- Oseni Y. and ²Afolabi, M. Knowledge and involvement of community pharmacists in health promotion activities in Oyo State, Nigeria. *Niger J Pharm Sci*. 2018;17(2):36–47.
- Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunker A, Griffey R, Hensley M. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Health*. 2011;38(2):65–76. <https://doi.org/10.1007/s10488-010-0319-7>.
- Fernandez ME, Ten Hoor GA, van Lieshout S, et al. Implementation mapping: using intervention mapping to develop implementation strategies. *Front Public Health*. 2019;7:158. <https://doi.org/10.3389/fpubh.2019.00158>. Published 2019 Jun 18.
- Damschroder LJ, Reardon CM, Widerquist MAO, et al. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement Sci*. 2022;17:75. <https://doi.org/10.1186/s13012-022-01245-0>.
- Consolidated Framework for Implementation. Research (CFIR) <https://cfir-guide.org/constructs/>
- Stiles PG, Boothroyd RA, Snyder K, Zong X. Service penetration by persons with severe mental illness: how should it be measured? *J Behav Health Serv Res*. 2002;29(2):198–207. <https://doi.org/10.1007/BF02287706>.
- Rabin BA, Brownson RC, Haire-Joshu D, Kreuter MW, Weaver NL. A glossary for dissemination and implementation research in health. *J Public Health Manag Pract*. 2008;14(2):117–23. <https://doi.org/10.1097/01.PHH.0000311888.06252.bb>.
- Rogers EM. Diffusion of innovations fourth ed. New York: Free; 1995.
- Rye CB, Kimberly JR. The adoption of innovations by provider organizations in health care. *Med Care Res Rev*. 2007;64(3):235–78. <https://doi.org/10.1177/1077558707299865>.
- Davis F. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *Int J Man Mach Stud*. 1993;38:475–87. <https://doi.org/10.1006/imms.1993.1022>.
- Dusenbury L, Brannigan R, Falco M, Hansen WB. A review of research on fidelity of implementation: implications for drug abuse prevention in school settings. *Health Educ Res*. 2003;18(2):237–56. <https://doi.org/10.1093/her/18.2.237>.
- Mihalic S. The importance of implementation fidelity. *Emotional Behav Disorders Youth*. 2004;4(4):83–105. <https://www.incredibleyears.com/wp-content/uploads/fidelity-importance.pdf>.

30. Dane AV, Schneider BH. Program integrity in primary and early secondary prevention: are implementation effects out of control? *Clin Psychol Rev*. 1998;18(1):23–45. [https://doi.org/10.1016/s0272-7358\(97\)00043-3](https://doi.org/10.1016/s0272-7358(97)00043-3).
31. Karsh BT. Beyond usability: designing effective technology implementation systems to promote patient safety. *Qual Saf Health Care*. 2004;13(5):388–94. <https://doi.org/10.1136/qhc.13.5.388>.
32. Nilsen P, Birken SA, Handbook on Implementation Science. Edw Elgar Publishing, 29 May 2020 – Business & Economics – 576 pages
33. Oseni YO, Erhun WO. Assessing community pharmacists' involvement and clients' opinion of HIV/AIDS services in community pharmacies in Nigeria: a cross-sectional survey. *Int J STD AIDS*. 2021;32(6):538–50. <https://doi.org/10.1177/0956462420981527>.
34. Oseni YO, Erhun WO. Delivery of training in HIV/AIDS services among community pharmacists in Oyo State, Nigeria: an interventional study. *Malays J Pharm Sci*. 2023;21(2):13–28. <https://doi.org/10.21315/mjps2023.21.2.2>.
35. Peters, David, Tran, Nhan, Adam, Taghreed, Alliance for Health Policy and Systems Research & World Health Organization. (2013). Implementation research in health: a practical guide / edited by David Peters ... et al]. World Health Organization. <https://iris.who.int/handle/10665/91758>.
36. State O. Nigeria | Britannica. www.britannica.com. Archived from the original on 2023-04-05. Retrieved 2023-05-05. https://en.wikipedia.org/wiki/Oyo_State#cite_note-9
37. Oyo State Pacesetter State. About Oyo State. <https://old.oyostate.gov.ng/about-oyo-state/>
38. Pharmacists Council of Nigeria (PCN). 2018 Register. List of registered pharmacists and pharmaceutical premises as at December. Abuja; 2018.
39. Oseni YO, Afolabi MO. Knowledge and involvement of community pharmacists in health promotion activities in Oyo State, Nigeria. *Nigerian J Pharm Sci*. 2018;17(2):36–47.
40. Hiner CA, Mandel BG, Weaver MR, Bruce D, McLaughlin R, Anderson J. Effectiveness of a training-of-trainers model in a HIV counseling and testing program in the Caribbean Region. *Hum Resour Health* 7:11. Published 2009 Feb 17. <https://doi.org/10.1186/1478-4491-7-11>
41. Weidle P PJ, Lecher S, Botts LW, Jones L, Spach DH, Alvarez J, Jones R, Thomas V. HIV testing in community pharmacies and retail clinics: a model to expand access to screening for HIV infection. *J Am Pharm Assoc* (2003). 2014;54(5):486–92. <https://doi.org/10.1331/JAPhA.2014.14045>.
42. Darin KM, Klepser ME, Klepser DE, Klepser SA, Reeves A, Young M, Scarsi KK. Pharmacist-provided rapid HIV testing in two community pharmacies. *J Am Pharm Assoc* (2003). 2015;55(1):81–8. <https://doi.org/10.1331/JAPhA.2015.14070>.
43. Klepser DG, Klepser ME, Peters PJ, Hoover KW, Weidle PJ. Implementation and evaluation of a collaborative, pharmacy-based Hepatitis C and HIV Screening Program. *Prev Chronic Dis*. 2022;19:E83. <https://doi.org/10.5888/pcd19.220129>. Published 2022 Dec 8.
44. Kherghepoush S, McKeirnan KC. The role of community pharmacies in the HIV and HCV care continuum. *ERCSP*. 2023;9:100215. <https://doi.org/10.1016/j.rcsop.2022.100215>.
45. Ryder PT, Meyerson BE, Coy KC, von Hippel CD. Pharmacists' perspectives on HIV testing in community pharmacies. *J Am Pharm Assoc* (2003). 2013; 53(6):595–600. <https://doi.org/10.1331/JAPhA.2013.12240>
46. Figueira I, Teixeira I, Rodrigues AT, Gama A, Dias S. Point-of-care HIV and hepatitis screening in community pharmacies: a quantitative and qualitative study. *Int J Clin Pharm*. 2022;44(5):1158–68. <https://doi.org/10.1007/s11096-022-01444-1>.
47. Melbourne School of Population and Global Health. 3.2 What are implementation outcomes? <https://mspgh.unimelb.edu.au/centres-institutes/nossal-institute-for-global-health/implementation-science/how/step-3-evaluating/implementation-outcomes> (accessed on December 15, 2023).
48. Dearing JW, Cox JG. Diffusion of innovations theory, principles, and practice. *Health Affairs (Millwood)*. 2018;37(2):183–90. <https://doi.org/10.1377/hlthaff.2017.1104>.
49. Ntakarutimana A, Kagwiza JN, Bushajja E, Tumusiime DK, Ekane N, Schuller KA. Insights from the implementation and adoption of Community-Based Health interventions. *J Health Soc Behav*. 2021;15(1):61–75. <https://doi.org/10.5590/JSBHS.2021.15.1.04>.
50. Kelly DV, Kielly J, Hughes C, et al. Expanding access to HIV testing through Canadian community pharmacies: findings from the APPROACH study. *BMC Public Health*. 2020;20(1):639. <https://doi.org/10.1186/s12889-020-08719-0>. Published 2020 May 7.
51. World Health Organization (WHO). 'Community pharmacy' In: The Role of the Pharmacist in the Health Care System, WHO/PHARM/94.569. <http://apps.who.int/medicinedocs/en/d/Jh2995e/1.6.2.html#Jh2995e.1.6.2> (accessed on August 15, 2015).
52. CDC, Implementing. accessed on November 15, HIV Testing in Nonclinical Settings: A Guide For HIV Testing Providers. https://www.cdc.gov/hiv/pdf/testing/CDC_HIV_Implementing_HIV_Testing_in_Nonclinical_Settings.pdf (2018).
53. CDC. (2020) HIV testing in retail pharmacies. <https://www.cdc.gov/hiv/effective-interventions/diagnose/hiv-testing-in-retail-pharmacies?Sort=Title%3A%3Aasc&Intervention%20Name=HIV%20Testing%20in%20Retail%20Pharmacies> (accessed on November 15, 2018).
54. Oseni YO, Afolabi MO. Development and evaluation of health promotion training programme for community pharmacists in Oyo State, Nigeria. *Pedagogy Health Promot*. 2020;6(4):296–304. <https://doi.org/10.1177/2373379920918614>.
55. Kamps C. Practice spotlight: community pharmacy practice. *Pract Spotlight*. 2014;52(2):15–6. <https://www.michiganpharmacists.org/Portals/0/patients/communitypharmacy.pdf>.
56. Eddy E, Emmeline P, Alexander M. Community Pharmacists and Technicians: Impacting Public Health One Service at a Time. *Pharmacy Times* July 28, 2023. <https://www.pharmacytimes.com/view/community-pharmacists-and-technicians-impacting-public-health-one-service-at-a-time>
57. International Pharmaceutical Federation. World Health Organisation (FIP/WHO). The Role of the Pharmacist in the fight against The HIV/AIDS Pandemic. <https://www.fip.org/file/1563> (accessed on December 15, 2018).
58. International Pharmaceutical Federation (FIP). 2004 FIP statement of policy point of care testing in pharmacies. <https://www.fip.org/file/1500> (accessed on December 15, 2018).
59. UNAIDS. 90-90-90: an ambitious treatment target to help end the AIDS epidemic. Geneva: Joint United Nations Programme on HIV/AIDS; 2014. http://www.unaids.org/sites/default/files/media_asset/90-90-90_en_0.pdf.
60. WHO. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. 2nd ed. Geneva, Switzerland: WHO; 2016.
61. UNAIDS. (2017) 'Ending AIDS: Progress towards the 90-90-90 targets' https://www.unaids.org/en/resources/documents/2017/20170720_Global_AIDS_update_2017
62. International Pharmaceutical Federation FIP. (2022) HIV prevention, screening and management, A handbook for pharmacists. <https://www.fip.org/file/5342>
63. Adje DU, Oparah AC, Williams FE, Ezeagwuna OO. Assessment of point of care testing services in community pharmacies in Delta State, Nigeria. *J Sci Pract Pharm*. 2016;3(1):115–20. <https://doi.org/10.47227/jsppharm/v3i1.6>.
64. Walker R, Edwards C, editors. (2003) *Clinical Pharmacy and Therapeutics* (3rd Edition) London: Churchill Livingstone. Page. 937.
65. Ayorinde AA, Porteous T, Sharma P. Screening for major diseases in community pharmacies: a systematic review. *Int J Pharm Pract*. 2013;21(6):349–61. <https://doi.org/10.1111/jpp.12041>.
66. Beardsell S, Coyle A. A review of research on the nature and quality of HIV testing services: a proposal for process-based studies. *Soc Sci Med*. 1996;42(5):733–43. [https://doi.org/10.1016/0277-9536\(95\)00145-x](https://doi.org/10.1016/0277-9536(95)00145-x).
67. Kauffman Y, Nair V, Herist K, Thomas V, Weidle PJ. HIV medication therapy management services in community pharmacies. *J Am Pharm Assoc* (2003). 2012;52(6):e287–91. <https://doi.org/10.1331/JAPhA.2012.12063>.
68. McCree DH, Byrd KK, Johnston M, Gaines M, Weidle PJ. Roles for pharmacists in the ending the HIV Epidemic: a plan for America Initiative. *Public Health Rep*. 2020;135(5):547–54. <https://doi.org/10.1177/0033354920941184>.

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