ORIGINAL RESEARCH

IMPLEMENTATION OF INTEGRATED DISEASE (COMMUNICABLE & NON-COMMUNICABLE) SCREENING SERVICES IN FIVE HIGH-VOLUME HEALTH FACILITIES IN RIVERS STATE

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Owhonda Golden[1], Olupitan Olayemi[2], Aaron Wali Ihuoma[3], Eze-Emiri Chidima[1,3*], Edewor Ufuoma[1], Owhonda Michelle[1], Kumtap Unique[2], Nwadiuto Ifeoma[1], Oris-Onyiri Victor[1], Aaron Friday[4], Ogbonda Bright[1], Mensah Charles[2]

[1]Department of Public health and Disease Control Services, Rivers State Ministry of Health
[2] Institute of Human Virology, Nigeria Department of Community Health Rivers State University
[3] Department of Epidemiology School of Public Health, University of Port Harcourt.
[4] Rivers State University

***Correspondence:** Eze-Emiri, C.; **Email:** chidinma_eze-emiri@uniport.edu.ng

Abstract

Introduction: Common communicable diseases make the double burden of disease in sub-Saharan Africa an issue of public health interest, especially in the possibility of their existence as co-morbidities. Access to testing services is an essential first step in the care cascade to improving health outcomes while screening seamlessly, stigma-free and contemporaneously at initial clinical encounters. This study aims to show the implementation of integrated disease (communicable and non-communicable) screening services at selected high-volume health facilities in Rivers State.

Methods: Implementation science (cross-sectional descriptive) research that considered novel evidence-based strategies to promote the integrated disease screening services in five selected high-volume facilities in Rivers State from 1st January 2022 to 30th June 2022. An integrated Risk Stratification Tool (iRST) for COVID-19, HIV, and Tuberculosis was used as well as screening for hypertension, diabetes, and obesity.

Result: Clinic attendance for six months was 35,130. Patients who had blood pressure, blood glucose and BMI checks were 30,836, 21,791, and 10,461 respectively. The number of patients comments tested with confirmed elevated values was 5057 (16.4%) for blood pressure; 2033 (9.3%) for blood sugar, and 210 (2%) patients with abnormal BMI. About 1.1%, 1.7% and 1.2 % were newly diagnosed with hypertension, diabetes, and obesity, respectively. Thirty-six patients had co-infections from COVID, HIV, and TB. Of those eligible for vaccination, 19,859(53.7%) got vaccinated.

Conclusion: Simultaneously testing for common diseases (communicable and communicable) was achievable in clinical settings. It can aid the early diagnosis of diseases and, consequently, lead to early treatment interventions, especially in co-infected patients. This can produce better health outcomes, reduce the disease burden, and engender system resilience.

Key words: Non-communicable diseases, non-communicable disease, integrated disease screening

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INTRODUCTION

The need for simplified screening of common communicable and non-communicable disease entities cannot be overemphasized. The burden of COVID-19, human immunodeficiency virus (HIV), and tuberculosis (TB) is a global public health concern, especially in countries with a high burden of HIV and TB[1]. The spread of COVID-19 among People Living with HIV/AIDS (PLHIV) and TB patients poses a novel challenge in health service delivery. TB is the commonest cause of death in PLHIV.[2]. Globally, about 37.47 million people are living with HIV,[3] and are 18 times more likely to be infected with TB than people who are HIV negative.[4] In 2020, about 214,000 people died of HIV-associated TB[4]. The Population affected with HIV/TB is at increased risk of COVID-19 infection.[5]. This may result in HIV/AIDS, TB, and COVID-19 co-infection or multiple pathogenic infections in a single individual. The coronavirus, HIV, and TB syndemic could pose a challenge in COVID-19/TB diagnosis because of the similarity in clinical presentation. There is also difficulty in the clinical management of patients coinfected with COVID-19/HIV/TB in any possible combination. For instance, COVID-19 pulmonary fibrosis may rapidly increase TB incidence.[6,7]. Active and latent TB have been shown in a case-control study to increase the progression and severity of COVID-19 disease.[8]. Therefore, patients who come down with COVID-19 should be screened for TB.[8]. A meta-analysis of COVID-19/TB/HIV infection showed that HIV patients with current TB infection were more susceptible to COVID-19 than HIV patients who do not have TB[1]. Also, COVID-19/TB coinfection had an increased risk of disease severity than people with COVID-19 infection alone.[1]. Human coronavirus lower respiratory tract disease has been implicated with a high rate of mortality in immunocompromised persons.[9,10]. Studies have shown that the risk of death in COVID-19 patients with tuberculosis was 2.17 times higher than in those without. The risk of recovery in COVID-19 patients with tuberculosis was 25% lower than in those without. Similarly, time-to-death was significantly shorter and time-to-recovery significantly longer in patients with tuberculosis.[11] Also, among the general population, age, sex, and comorbidities such as diabetes, obesity, and hypertension were associated with an increased risk of worse prognoses for COVID-19.[12].

Accessibility of diagnostic testing for COVID-19, tuberculosis, and HIV is an essential first step in the care cascade to reduce the transmission of these diseases and appropriately manage those infected by them. Thus, a justification exists for improving access to testing for COVID-19, TB, and HIV through the implementation of integrated testing, particularly in countries with a high burden of tuberculosis, to reduce the effect of the ongoing pandemic on tuberculosis and HIV services and to detect people who may be at a higher risk from these diseases[13].

According to the World Health Organization, Healthcare service integration is an approach to providing and addressing the diverse interrelated health needs of patients and a strategy for strengthening health systems.[14]. In responding to the provision of care that a patient may need, healthcare services should be seamless, effective, and efficient. Integrated health services continually improve and advance the quality of care received by the patient, improve safety, and reduce both inequities in healthcare service delivery and the unnecessary use of healthcare resources.[15]. Although integrated healthcare services have wide support, experience has shown that it is difficult to deliver in complex settings, especially in those with limited resources.[15]. Different ways of integrating healthcare services have been explored, and the benefits derived have made it important in the healthcare system.[15]. HIV-TB-COVID-19 integration can be done in a continuum from referral between services to intensifying co-infection screening to full-service integration in one location provided by a composite health team. This efficiently reduces the four "D"s of program cascade: "duplication, distortion, disruption, and distraction"[16]. Integrated TB/HIV service delivery has been shown to have improved treatment outcomes for patients with TB/HIV coinfection.[16,17,18]. This study aimed to describe the implementation of integrated disease screening services in the selected high-volume facilities in Rivers State

MATERIALS AND METHODS

Study Area: Rivers State

Rivers State is located in the South-South geopolitical region of Nigeria, referred to as the Niger Delta Area, with an estimated population of 7,303,924 by 2016[19]. The State comprises 23 Local Government Areas and 319 political wards. Port Harcourt is the State capital. The State is comprised of many heterogeneous ethnic and linguistic tribes. In 2020, there were 408 public health facilities and 147 registered private health facilities in the State. PEPFAR supports about 116 health facilities to deliver comprehensive HIV services in the State. There are about 641 TB Directly Observed Treatment sites in the State. COVID-19 PCR sample collection is carried out at two public testing facilities (Yakubu Gowon Stadium, Mini Isolation centre), four corporate containment sites (Shell Petroleum Development Company, Nigeria Liquefied Natural Gas, Indorama, and Total E&P Nigeria Limited), and Five Private laboratories (Medbury, Everight, Diagnostic, DDW and DNA laboratories).

Study Design: This is retrospective descriptive cross-sectional study which described the implementation of evidence-based intervention services that promote screening services for communicable diseases such as COVID-19, TB, and HIV/AIDS. of integrated disease control services in the selected high-volume facilities in Rivers State.

Study population: The study population were patients attending the General Outpatient clinics (GOPC) and Medical Outpatient clinics (MOPC), including the anti-retroviral therapy (ART) clinics. All consenting patients who came to these clinics were screened for the disease conditions listed in the protocol of the integrated disease control program within the period of study of six months.

Site Selection: According to the ranking by the District Health Information System (DHIS) for 2020, the following high-volume outpatient facilities were selected for the implementation of an integrated disease services delivery program: University of Port Harcourt Teaching Hospital, the Rivers State University Teaching Hospital, Zonal Hospital Bori, Zonal Hospital Ahoada, and Zonal Hospital Bonny.

Protocol and setting:

After a holistic desk review of population parameters, programme variables, and situation analysis, a protocol for the integrated disease screening was generated.

Advocacy visits were made to the management team of the selected facilities, State programme managers (tuberculosis, COVID-19, HIV and immunization), the Emergency Preparedness and Response (EPR) team of the Public Health Emergency Operations Centre (PHEOC), and the management staff of the State Ministry of Health.

In perceptions of the desired benefits of the novel screening programme, the Rivers State Government, in partnership with the United States Centres for Disease Control and Prevention (USCDC), and the State lead implementing partner for HIV services - the Institute of Human Virology of Nigeria (IHVN), the integrated disease screening for HIV was launched on the 26th of October 2021 but was actively operationalized at the facilities from the 1st January, 2022.

An orientation meeting was carried out for the team leads in the facilities involved in the TB/HIV/COVID care for their appreciation of the integrated disease services delivery programme. Their thoughts and inputs were articulated and incorporated into the protocol, especially the additional manpower concerns.

A collateral demand creation opportunity was identified for persons eligible for COVID-19 vaccines. Together, a work plan and Gantt chart for efficient delivery of integrated screening services were produced for program rollout. The screening process was domiciled at the out-patient triage stations of the selected facilities, the first clinical point of contact with new patients.

The outpatient triage stations were strengthened with the engagement of additional ad-hoc staffing, as necessary to have sufficient trained testers, Infection Prevention and Control (IPC) officers, and data clerks for adequate human resource complement needed for the services. An integrated Risk Stratification Tool (iRST) for COVID-19, HIV, and Tuberculosis was developed for the Integrated Disease Screening Programme (IDSP). This was adapted/compiled from the USCDC standard Risk stratification tool for HIV, the "TB suspect screening tool" of the National

Tuberculosis and Leprosy Control Programme (NTBLCP), as well as the case definition profile for suspected cases of COVID-19 from the approved Guideline for COVID-19 management released by the National Centre and Disease Control (NCDC), Nigeria. The iRST was classified into three sections (HIV, TB, and COVID-19 sections).

The tool, which was pretested at the Rivers State University Teaching Hospital (RSUTH) in October 2021, was administrable within one minute, and had minor modifications made to it to ensure easy administration and better time management when used in a busy clinic setting, even when administered by lay care providers. It was deployed on electronic tablets, which were programmed to automatically generate the patient's Body Mass Index (BMI) for the Integrated Disease Screening Programme (IDSP).

In the iRST, patients who answered" NO" to all questions on the iRST proceeded to see a doctor. However, those who answered "YES" to any question in the sections of the iRST were categorized as *suspect/at-risk patients* for the disease entity. They were then referred to the screening area for the corresponding disease (within the GOPD/MOPD/ART clinic) using the approved algorithm and standard Rapid Diagnostic Test for COVID-19 and HIV test services. TB suspects were sent to a cubicle for sputum production before seeing a clinician. The patients suspected of having COVID-19 were provided with an N95 respirator, while TB suspects received a surgical face mask in accordance with the prevailing IPC protocol before proceeding to see the doctor.

General training for all staff involved in the five facilities was conducted in December 2021 to enable good capacity for seamless, no-stigma integrated disease screening services. This included training on *no-stigma* service delivery, infection prevention & control (IPC) protocols, patient flow, program variables, expectation (output, outcome and impact), management of common scenarios of patient screening, and data quality assurance.

The facility triage sites had minor structural modifications/upgrades to improve patient flow systems (see Fig. 1). Additional computers were also deployed to these sites to strengthen data management. Sphygmomanometers and glucometers were tested and calibrated for use, while required accessories and consumables for the disease screening exercise were provided by the logistics unit of the program. The integrated disease control programme relied on the facilities' weighing scales and stadiometers, which were already available at the sites, while COVID vaccination sites were established within each of the selected facilities in collaboration with the State immunization programme.

The programme officially commenced on 1st January 2022. A weekly site review programme meeting was instituted at the facilities, while a State Technical Working Group (TWG) was inaugurated for monthly review meetings and integrated supportive supervision in the first six months of the roll-out. During these visits, the supervisors use a checklist to review patient flow, screening/testing processes, data transmission, and facility IPC protocol at the triage points of implementation in line with the developed protocol (see Fig. 2). More so, the triage nurses were mentored to implement the required stigma free IPC standards in line with the standard protocols, especially the appropriate use of medical masks, and ensure demand creation for COVID-19 vaccination for the unimmunized and those due for the second doses.

In essence, the IDSP covered a one-stop triage point stigma free screening for common diseases within the local public health space around enabling quick decisions for the status of patients on communicable diseases (TB/HIV/COVID-19 using an Integrated Risk Stratification Tool which measures patients risk by asking questions around risky behavior and pathognomonic syptoms for screening, as well as patients status on the common non-communicable diseases as Hypertension and Diabetes using blood sugar level, Blood pressure measurements of sphygmomanometer and glucometer medical equipment respectively available at these points. These ensured that all patients, having visited the medical facility, knew their status for these common diseases, and also prevented nosocomial spread of undiagnosed infections at the treatment facility and overall had the potential of improving the quality of care for co-infected patients from their initial clinic encounter. At all triage stations where IDCP was offered, patients' consent

was necessary for implementation. ***(POS – Positive; NEG – Negative; RESP – respirator)***

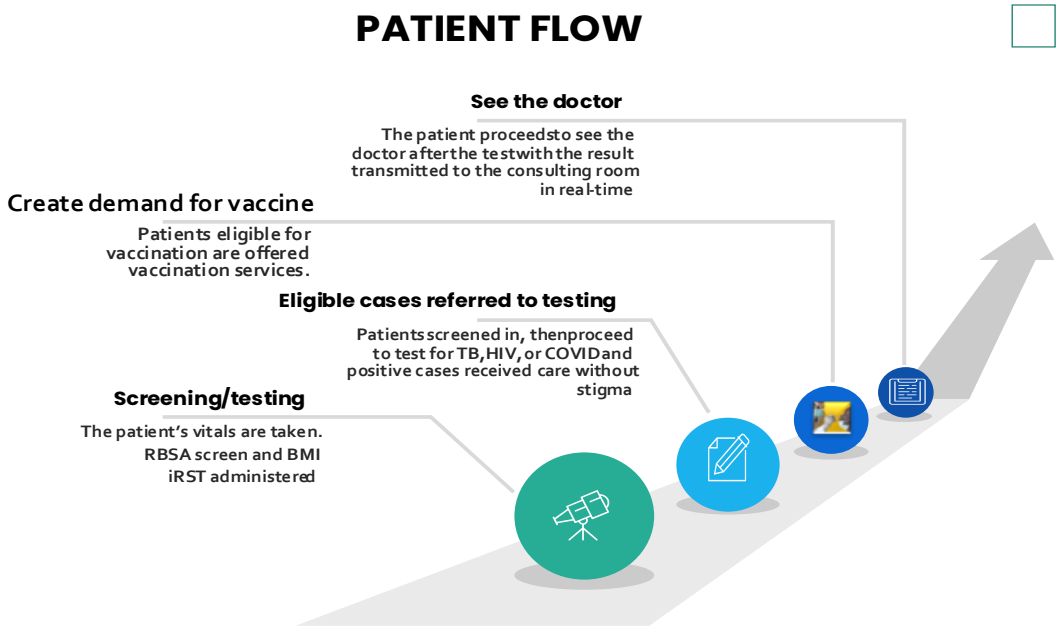

Figure 1: An illustration of patient flow in the integrated disease screening programme

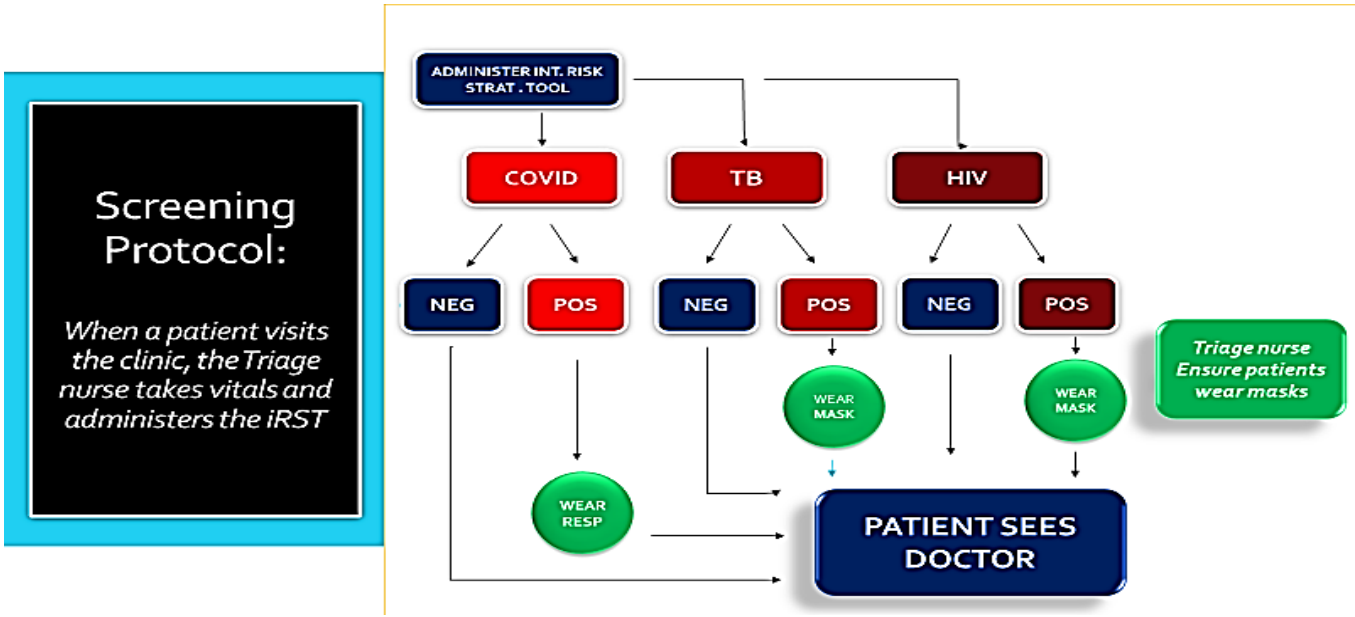

Figure 2: An illustration of the Infectious Disease Screening Protocol

Patient flow in the integrated disease screening programme:

The patients, upon arrival at the General Outpatient Clinic (GOPC), Medical Outpatient Clinic (MOPC), or Anti-retroviral Treatment clinic (ART clinic), first received a general health talk and counselling at the triage points where the integrated Risk Stratification Tool (iRST) for COVID-19, HIV, and Tuberculosis was administered. The patient's vital signs (Blood pressure measurement, Weight, and Temperature) and blood sugar measurements were routinely taken at this point. Among patients referred for testing, those who test positive for HIV were counselled and initiated (same day) according to the National Guidelines for HIV Treatment, Care, and Support. The patients referred for Tuberculosis (TB) testing went to the sputum collection area, where their sputum was taken for the GeneXpert study. The patients who met the criteria for "suspected cases" of COVID-19 screening and were referred to the COVID-19 testing points, where their blood samples were tested using the NCDC-approved Rapid Diagnostic Test Kit for COVID-19 (SD-Biosensor brand was provided).

The testing points are located around the triage points and screened from visualization to maintain patients' privacy and confidentiality. The clinician, after assessment, considered options of home and facility management for positive cases of COVID-19, while those who were HIV positive or had presumptive Tuberculosis were enrolled into the respective treatment programmes. The Public Health Emergency Operation Centre (PHEOC) received data from these screening sites in real time and followed up on patient tracking for the period of surveillance for COVID-19 cases. Patients eligible for COVID-19 vaccination were offered voluntary referral services with escort to facilitate service uptake at the vaccination points within the facility. The patients benefited from screening for the common Non-Communicable Diseases (NCD) was done by screening for blood sugar (RBS < 11.1mmol/l), BMI (<18.5>24.9kg/m^2), and blood pressure levels (<70/50mmHg>140/90mmHg). Patients with increased blood pressure, abnormal BMI, or elevated blood sugar (beyond normal) received further medical care for these conditions or referral for further specialist care. They were often managed by responsible departments within the facilities. For the latter cases, the blood pressure measurements were repeated for confirmation, and the blood sugar measurements were repeated in accordance with extant guidelines for management of non-communicable disease in consonance with the facility protocol. Only after confirmation were medications administered.

The data from the IDSP were documented and transmitted electronically to the consulting room for the clinician's knowledge, in accordance with confidentiality. The integrated disease screening had additional benefits of electronic data transmission of screening results through the facility's Electronic Medical Record system to the attending clinician in real-time, such that the clinician had patients' test results for (HIV, COVID-19, Blood pressure measurement, Blood sugar and BMI) at the time of consultation while suspected TB cases were also categorized for quick referral to the DOTS (Directly Observed Treatment Short Course) clinic. All data was transmitted to various programme reporting platforms, IDSR (Surveillance, Outbreak Response Management, and Analysis System - SORMAS) and DHIS. The data from the screening at these sites were to be extracted, categorized, and analyzed for the positivity rate and other variables at the facility level, programme and State level of the condition as surveillance for the measured diseases and co-morbidities and program reviews by the State Technical Working Group. The TWG makes informed recommendations to the State health management team led by the Hon Commissioner for Health for policy regarding the disease entities.

Data Analysis: Data for the study covered a period of six months of active operation (from 1st January 2022 to 30th June 2022). Data was collected by trained data officers at sites and exported into the SORMAS (COVID-19 data) and DHIS platform. Six-month program data from the platforms (DHIS and SORMAS) were then exported to SPSS for analysis. Variables were analysed by simple descriptive statistics, frequencies (curves and histograms), and percentages for illative inferences around indicators of interest.

Indicators for consideration:

$$confirmation\ rate, \% = \frac{number\ of\ confirmed\ cases}{total\ number\ with\ elevated\ values} \times 100$$

$$Rate\ of\ persons\ already\ on\ treatment\ (known\ cases) = \frac{number\ of\ confirmed\ cases\ on\ treatment}{total\ number\ of\ confirmed\ cases} \times 100$$

$$Treatment\ linkage\ Rate - New\ cases = \frac{number\ of\ newly\ confirmed\ cases\ placed\ on\ treatment}{total\ number\ of\ newly\ confirmed\ cases} \times 100$$

$$vaccination\ rate = \frac{total\ number\ of\ vaccinated\ persons}{total\ number\ eligible\ for\ vaccination} \times 100$$

$$positivity\ rate = \frac{total\ number\ of\ persons\ that\ tested\ positive}{total\ number\ of\ persons\ tested} \times 100$$

Definitions:

For Non-Communicable Diseases (NCD), abnormal Random Blood sugar (RBS) was considered as >11.1mmol/l, while abnormal BMI was considered as beyond the range of 18.5kg/m^2 - 24.9kg/m^2 and abnormal blood pressure levels were also considered as beyond the range of 70/50mmHg - 140/90mmHg.

RESULTS

1. Sociodemographic

Total clinic attendance for the period of six months was 35130 (43.6% of the attendants were males and 56.4% were females). Patients who had blood pressure checks were 30836 (41.7% of whom were males and 58.3% were females). A total of 21791 patients had their blood sugar checked (42.3% were males and 57.7% were females), while 10461 patients had their BMI checked (39.7% were males and 60.3% were females). The number of patients tested and found to have abnormal values were 5057 (16.4%) for blood pressure; 2033 (9.3%) for blood sugar, and 210 (2%) patients with abnormal BMI.

Out of the total clinic attendees, 87.8% were screened to determine their blood pressure, 62.0% were screened to determine their random blood sugar level, and 29.8% were screened to determine their body mass index. Patients with confirmed diagnoses already on treatment were 93.6% (4731) for hypertensives, and 81.8% (1663) for diabetics.

2. Indicators for the non-communicable diseases.

Table 1: Integrated Disease Screening: Programme Monitoring Indicators for Non-Communicable Diseases by Gender

Indicator	BLOOD PRESSURE			BLOOD SUGAR			BODY MASS INDEX		
	Male (n,%)	Female (n,%)	Total (n,%)	Male (n,%)	Female (n,%)	Total (n,%)	Male (n,%)	Female (n,%)	Total (n,%)
Number of clinic attendances	15327 (43.6)	19803 (56.7)	**35130 (100)**	15327 (43.6)	19803 (56.4)	**35130 (100)**	15327 (43.6)	19803 (56.4)	**35130 (100)**
Number of clients tested	12849 (41.7)	17987 (58.3)	**30836 (100)**	9223 (42.3)	12568 (57.7)	**21791 (100)**	4155 (39.7)	6306 (60.3)	**10461 (100)**
Number with Elevated Values	3988 (40.1)	5959 (59.9)	**9947 (100)**	2307 (44.5)	2881 (55.5)	**5188 (100)**	548 (39.1)	854 (60.9)	**1402 (100)**
Number of Elevated Values Confirmed	2085 (41.2)	2972 (58.8)	**5057 (100)**	998 (49.1)	1035 (50.9)	**2033 (100)**	96 (45.7)	114 (54.3)	**210 (100)**
Number Confirmed on Treatment*	1973 (41.7)	2758 (58.3)	**4731 (100)**	828 (49.8)	835 (50.2)	**1663 (100)**	0 (0.0)	0 0.0)	**0 (100)**
Number Confirmed not on Treatment*	112 (34.4)	214 (65.6)	**326 (100)**	170 (45.9)	200 (54.1)	**370 (100)**	90 (44.6)	112 (55.4)	**202 (100)**

*Hypertension and Diabetes Mellitus Treatment

Table 2: Indicators for Non-Communicable Disease by Gender

INDICATOR	BLOOD PRESSURE			BLOOD GLUCOSE			BODY MASS INDEX		
	Male	Female	Total*	Male	Female	Total*	Male	Female	To
Screening Rate, %	83.8	90.8	**87.8**	60.2	63.5	**62.0**	27.1	31.8	**29**
Confirmation Rate, %	52.3	49.9	**50.8**	43.3	35.9	**39.2**	17.5	13.3	**15**
Persons known to be on treatment, %	94.6	92.8	**93.6**	83.0	80.7	**81.8**	0	0	**0**
Treatment Linkage Rate- New cases %	100	100	**100**	100	100	**100**	93.8	98.2	**96**

Total* - fraction of total attendance who were tested for each category

Out of the population screened, 1.1% were newly diagnosed with high blood pressure and 1.7% with high blood sugar. The confirmation rate for cases with elevated values was 50.8% for blood pressure, 39.2% for blood sugar, and 15% for abnormal BMI. There was a 100% treatment linkage rate (completed diagnosis) for cases of elevated blood pressure and blood sugar, as shown in Table 2.

3. Blood pressure, Blood sugar, and BMI findings from the IDSP disaggregated by age

Figures 3, 4, and 5 depict the disaggregation of programme monitoring indicators for blood pressure, blood sugar, and body mass index, respectively, into age groups. There was a progressive increase in the number of patients with elevated values for both blood pressure and BMI as age increased; for blood sugar, a decline in the number of persons who had elevated levels was observed after age group >45-49years. New diagnoses were seen in persons aged 25 years and above for high blood pressure, 20 years and above for high blood sugar, and 30 years and above for abnormal high body mass index.

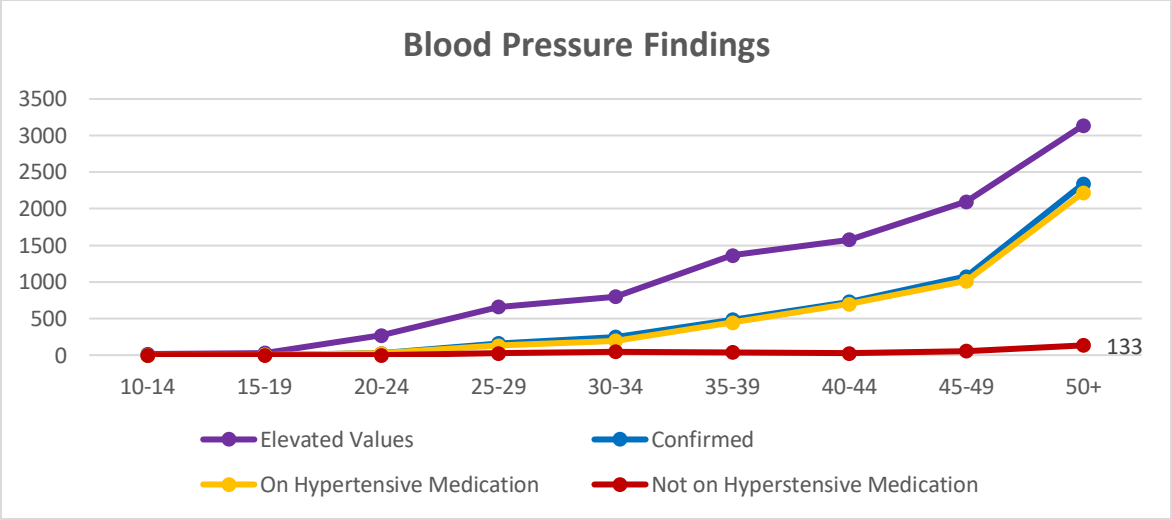

Figure 3: Programme Monitoring Indicators for Blood Pressure by Age Group

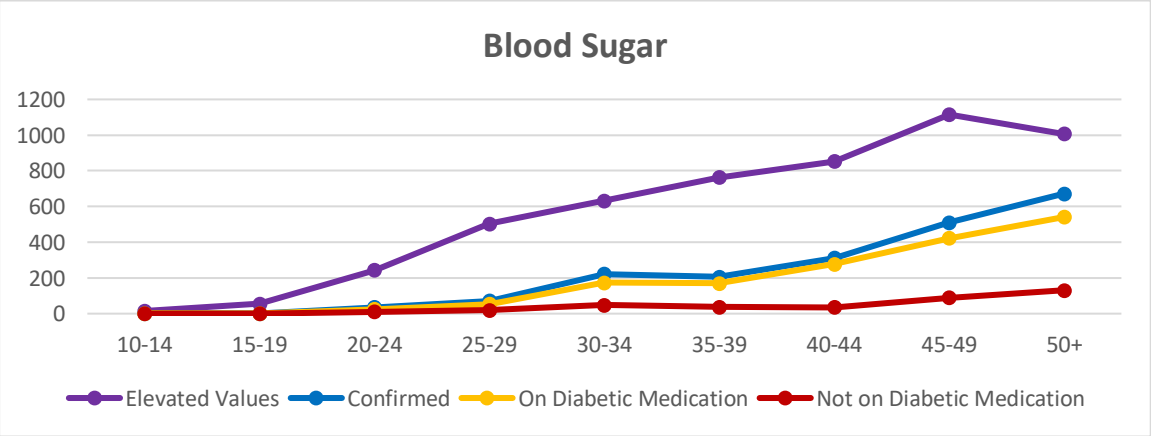

Figure 4. Programme Monitoring Indicators for Blood Sugar by Age Group

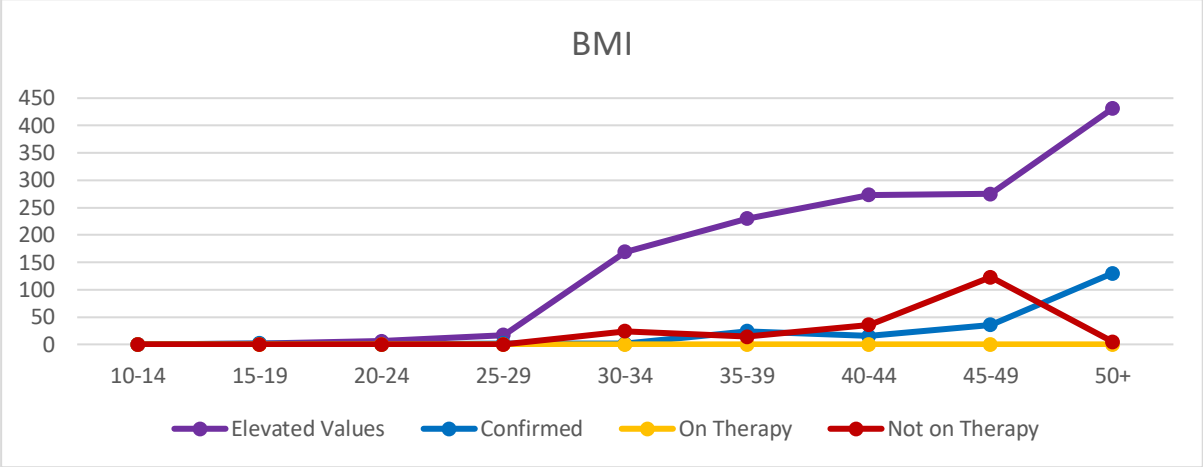

Figure 5: Programme Monitoring Indicators for Body Mass Index (BMI) by Age Group

4. Indicator rates for Communicable Disease

Table 3: Programme Monitoring Indicators for Communicable Disease by Gender

INDICATOR	COVID			HIV			TB		
	Male n(%)	**Female n(%)**	**Total n(%)**	**Male n(%)**	**Female n(%)**	**Total n(%)**	**Male n(%)**	**Female n(%)**	**Total n(%)**
Number of Clinic Attendances	12261 (34.0)	23802 (66.0)	**36063 (100)**	8889 (33.0)	18044 (67.0)	**26933 (100)**	12248 (34.0)	23802 (66.0)	**36050 (100)**
Number of Clients Screened	11533 (32.9)	23553 (67.1)	**35086 (100)**	12927 (48.0)	14006 (52.0)	**26933 (100)**	19745 (56.0)	15515 (44.0)	**35260 (100)**
Number Eligible for Testing	8842 (60.0)	5894 (40.0)	**14736 (100)**	4477 (49.9)	4499 (50.1)	**8976 (100)**	963 (51.0)	926 (49.0)	**1889 (100)**
Number Tested	6244 (45.0)	7630 (55.0)	**13874 (100)**	4457 (49.8)	4490 (50.2)	**8947 (100)**	775 (46.0)	911 (54.0)	**1686 (100)**
Number Positive	12 (40.0)	18 (60.0)	**30 (100)**	116 (53.5)	101 (46.5)	**217 (100)**	49 (55.1)	40 (44.9)	**89 (100)**
Previously Vaccinated	4967 (38.0)	8105 (62.0)	**13072 (100)**	-	-	-	-	-	-
Eligible for Vaccination	11718 (59.0)	8141 (41.0)	**19859 (100)**	-	-	-	-	-	-
Vaccinated	5337 (50.0)	5336 (50.0)	**10673 (100)**	-	-	-	-	-	-
Vaccination Rate (%)	(45.5)	(65.5)	**(53.7)**						

For COVID-19, 97.3% (35086) of the 36063 patients in attendance were screened, and 42% of them were eligible for testing; 35260 (97.8%) out of 36050 patients were screened for TB, and 5.4% of them were eligible for testing (presumptive TB). Of the 35086 patients screened for COVID-19, vaccination status for 3132 patients was unknown, and 13072 patients had received at least one COVID-19 vaccine; 19859 patients were eligible for vaccination, and 53.7% of them got vaccinated. All clinic attendees except those in the ART clinic (26933) were screened for HIV, and 33.3% were eligible for testing. See Table 3

4. Communicable Disease Indicators

4A. Testing rates and yield (COVID-19, TB and HIV)

Figure 6 shows the testing rates for COVID, HIV, and TB. Positivity rates were 0.22%, 2.43%, and 5.28% for COVID, HIV, and Presumptive TB, respectively.

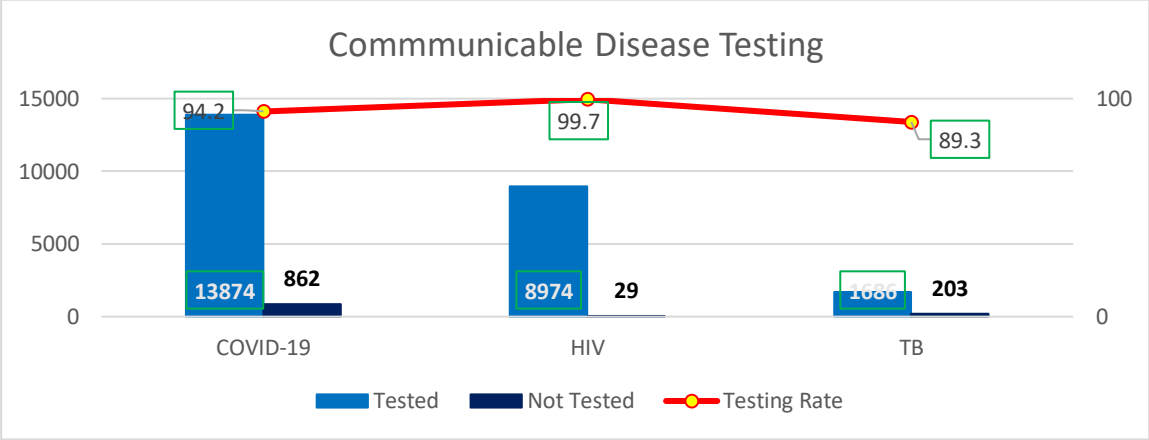

Figure 6: Testing rates for COVID, HIV, and TB

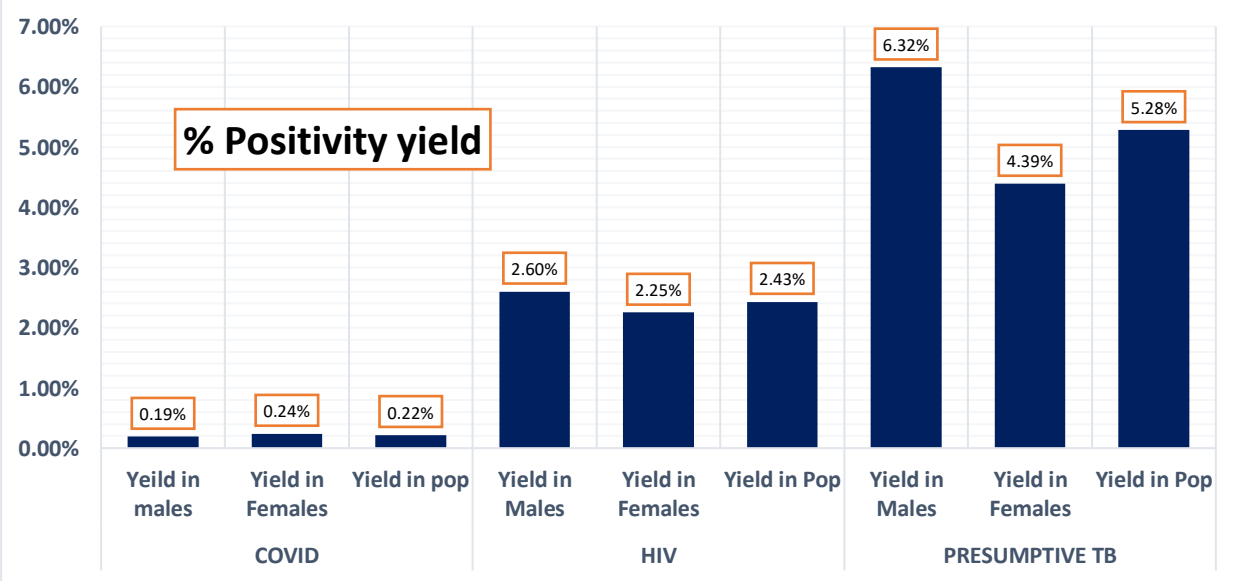

Figure 7: A component bar chart (showing gender disparity in each of the communicable diseases

4B. Coinfections

Table 4: Gender Disparity in Co-infections among COVID, HIV, and TB

Co-infections	Male, n (%)*	Female, n(%)*	Total, n(%)
TB / HIV	12 (33.3)	9 (25%)	**21 (5.8)**
COVID-19 / HIV	3 (8.3)	6 (1.7)	**9 (25%)**
COVID-19 / TB	2 (5.6)	1 (2.8)	**3 (8.3)**
TB / HIV / COVID-19	2 (5.6)	1 (2.8)	**3 (8.3)**
Total	**19 (52.8)**	**17 (47.2)**	**36 (100)**

***Percentage of column totals**

Thirty-six patients have co-infections from COVID, HIV, and TB. A total of 21 (5.8%) patients had TB/HIV co-infections, 9 (25%) patients had COVID/HIV co-infections, 3 (8.3%) had COVID/TB co-infections, and 3 (8.3%) persons had COVID/TB/HIV co-infections. The co-infections among COVID, HIV, and TB by sex are described on Table 4.

DISCUSSION

The study reported on the implementation of an integrated disease control intervention programme in Rivers State for a period of six months in five high-volume facilities by stakeholders, which focused on testing for elevated blood pressure, blood sugar, and body mass index, as well as screening for COVID, HIV, and TB. Elevated levels of blood pressure were confirmed in 50.8% patients tested; high blood sugar levels were confirmed in 39.2% patients tested; and 15% of patients tested were confirmed to have a high body mass index. Out of the population tested, 1.1% were newly diagnosed with high blood pressure, 1.7% with high blood sugar, and 2% with a high BMI. Positivity rates for COVID, HIV and TB were 0.22%, 2.43% and 5.28% respectively. These results highlight the burden of these diseases in the study area and the yield of the screening effort.[20] The need for continued surveillance to achieve better disease control cannot be overemphasized. All newly discovered cases following diagnostic confirmation were linked to the appropriate sector for treatment. Integrated disease screening and control services enable better quality of care, where patients benefit from diagnostic and treatment services for diseases which ordinarily may not have been discovered[14]. There was more female attendance in the facilities, but the confirmation rates and positivity rates were higher in males. This is indicative of a higher burden of the diseases among males, and this is in keeping with the male preponderance of some of these common diseases of interest. There was a disparity between attendance and screening services; this may have been a result of either the fast-track services in the ART outpatient clinics or the reported scarcity of NCD measuring equipment. While TB and HIV testing are routine services offered at these facilities, integrating COVID-19 screening services into the routine triage services at the outpatient clinics of these facilities was entirely novel. The yield from COVID-19 testing was 0.22% and these patients were managed in line with extant IPC protocol. Consequently,

this helped promote a reduction in nosocomial and healthcare worker infection. Therefore, IDCP expanded patient-centred service delivery for better outcomes, system resilience, and pandemic recovery. This was further exemplified by the collateral demand creation in 53% of patients who were eligible for vaccination[21]. The study remarkably illustrates the existence of co-infections in clinic attendees (COVID, HIV, and TB). TB/HIV coinfection was predominant, which is in keeping with the high burden of TB AND HIV in the locality. It further underpins the need for careful management of these patients in view of intersecting pathologies and better treatment outcomes [1,8 11]

Implementation science is fundamental to the design of successful interventions, and this study described the process of achieving an effective implementation of an integrated disease control program. This study, which included all persons visiting health facilities who consented to participation, gives a snapshot into the burden of illness in the study area and the necessity for targeted but efficiently integrated service delivery for better health outcomes. Though the study focuses on persons who visited the health facilities, the unrecognized disease burden in the community is still a subject of a blind spot in disease surveillance. There is thus a pressing need to actively extend these holistic intervention services to the people in order to achieve better population health.

CONCLUSION

Simultaneously testing for common diseases (infectious and non-infectious) is achievable in clinical settings. It can aid the early detection of diseases and, consequently, early treatment interventions. This study forms a knowledge product of possibilities and outcomes of integrated disease screening and the potential of reducing disease burden with better health outcomes. Integrated disease control can eventually prove to be a veritable strategy to enable system resilience and recovery from the pandemic and the control of diseases. It is recommended as a scalable intervention to cater for the double burden of common communicable and non-communicable diseases in the locality.

Ethics Approval: Permission for publication was obtained from the State AIDS/STI Control Programme and the Rivers State Ministry of Health Ethics Committee. This study was conducted in accordance with the ethical principles outlined in the guidelines stipulated by the Rivers State Ministry of Health Institutional Review Board/Ethics Committee. Data was managed anonymously and confidentially.

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Conflict of interest

The authors have declared no competing interests.

Data availability statement

Data is available upon reasonable request from the State AIDS/STI Control Programme of the Rivers State Ministry of Health.

Authors' contributions

EEC: Writing –Original draft and review, Data analysis and visualization; OGC: Conceptualization, Writing –Original Draft and Review. All authors read and gave final approval of the manuscript version submitted for publicaton.

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