

Availability and Functionality of Infection Prevention and Control Systems in Health Facilities Providing TB and COVID-19 Services in Plateau State, Nigeria

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Abstract Nigeria continues to face the challenge of emerging and resurgence infectious diseases, including tuberculosis (TB) and coronavirus disease 2019 (COVID-19). Healthcare facilities can inadvertently facilitate transmission of these pathogens due to frequent interactions among patients, visitors, and healthcare workers. Strengthening infection prevention and control (IPC) systems is therefore essential to improve health system resilience and advance progress toward universal health coverage. This cross-sectional facility-based study assessed the status of IPC programmes using the World Health Organization Infection Prevention and Control Assessment Framework (IPCAF). Trained field staff administered the IPCAF tool across selected health facilities to evaluate performance across the core components of IPC programmes. Data collected from each facility were compiled in Microsoft Excel and analyzed using IBM SPSS version 25. We assessed a total of thirty health facilities. Overall IPC performance was predominantly at the basic level, with an average score of 41.5%. Some facilities demonstrated intermediate capacity in specific areas such as staffing and infrastructure; however, none achieved an advanced level of IPC performance. These findings highlight significant gaps in IPC implementation across the assessed facilities. Strengthening IPC policies, systems, and institutional capacity is therefore critical. National disease control programmes should prioritize targeted interventions to improve and sustain IPC practices across healthcare facilities in order to reduce the risk of healthcare-associated transmission of infectious diseases.

Keywords COVID-19, IPC, Nigeria, Plateau State, Tuberculosis, World Health Organization Infection Prevention Assessment Framework.

Introduction

Nigeria, like many countries, faced the concurrent burden of tuberculosis (TB) and COVID-19 between 2020 and 2023. Both are transmitted primarily through airborne or respiratory droplets and contribute substantially to morbidity and mortality [1, 21]. The overlap in transmission dynamics underscores the critical importance of robust infection prevention and control (IPC) systems. Effective implementation of IPC measures is central to reducing transmission in healthcare facilities and other congregate settings [7]. IPC frameworks guide health institutions in adopting proactive, evidence-based strategies to interrupt the spread of infectious pathogens [27].

These strategies include administrative, environmental, and personal protective interventions aimed at minimizing transmission of *Mycobacterium tuberculosis* and other respiratory pathogens [9]. Beyond TB and COVID-19, IPC practices also play a broader role in preventing healthcare-associated infections, strengthening laboratory biosafety, limiting antimicrobial resistance, and improving preparedness for emerging and re-emerging infectious diseases [6, 11]. Strengthened IPC systems therefore represent a foundational component of resilient health systems and epidemic preparedness [12, 26].

The global health landscape is increasingly shaped by emerging and re-emerging infectious diseases [2, 10]. Tuberculosis (TB), a longstanding infectious disease, continues to persist and re-emerge in various forms, including drug-resistant strains [5]. More recently, coronavirus disease 2019 (COVID-19), first identified in Wuhan, China, has further underscored health systems' vulnerability to novel respiratory pathogens [13]. Both TB/MDR and COVID-19 primarily affect the respiratory system and are associated with substantial morbidity and mortality worldwide [3, 11].

Inadequate infection prevention and control (IPC) practices contribute significantly to the transmission of these infections, particularly within healthcare settings [8]. Although IPC is widely recognized as a core health system strengthening strategy, global evidence indicates persistent gaps in its implementation across countries and income levels [22]. Barriers to effective IPC adherence include organizational constraints, environmental limitations, and individual factors among health workers. In Nigeria, previous assessments have similarly documented suboptimal implementation of IPC measures across different tiers of healthcare delivery [14].

Healthcare facilities are high-risk environments for respiratory infection transmission because of frequent interactions among patients, visitors, and health workers [16, 18]. TB, caused by the *Mycobacterium tuberculosis* complex, and COVID-19, caused by SARS-CoV-2, exemplify pathogens that can spread efficiently in such settings [15, 17]. Strengthening IPC systems is therefore critical not only to mitigate TB and COVID-19 transmission, but also to address healthcare-associated infections, antimicrobial resistance, and future public health threats, in line with the International Health Regulations [24].

This study therefore undertook a rapid appraisal of IPC practices across primary, secondary, and tertiary health facilities in Plateau State, Nigeria. Plateau State was purposively selected due to its experience with both TB and COVID-19. The objectives were to:

1. Assess the status of IPC core components across levels of care.
2. Identify strengths and gaps in implementation.
3. Generate aggregate weighted performance scores and classify facilities according to World Health Organization IPC performance categories (inadequate, basic, intermediate, or advanced).

4. Propose context-specific recommendations [25].

Methodology

Setting and Study Population

Plateau State is located in North Central Nigeria with a projected population of 5,273,387 (WHO State Office, 2026) and a total land mass of 8,000 square kilometers. The State is divided into 17 Local Government Areas (LGAs), which are further grouped into three senatorial districts, namely, Plateau North, Plateau Central and Plateau South for the purpose of political representation in the upper chamber in the Nigerian National Assembly.

Health care services are delivered through a network of 724 public and 556 registered private health facilities. The former comprises 696 primary health care facilities, 26 secondary and 2 tertiary hospitals, while the private facilities include 484 PHC facilities, 70 secondary and 2 tertiary hospitals. In all, 31 health facilities met the selection criteria: 6 primary health facilities; 21 secondary and all four tertiary health facilities in the state. However, one secondary facility (i.e., Nigeria Air Force Hospital, Jos) did not participate because the authority did not grant permission. These facilities were spread across the LGAs as follows, as shown in Figure 1 below.

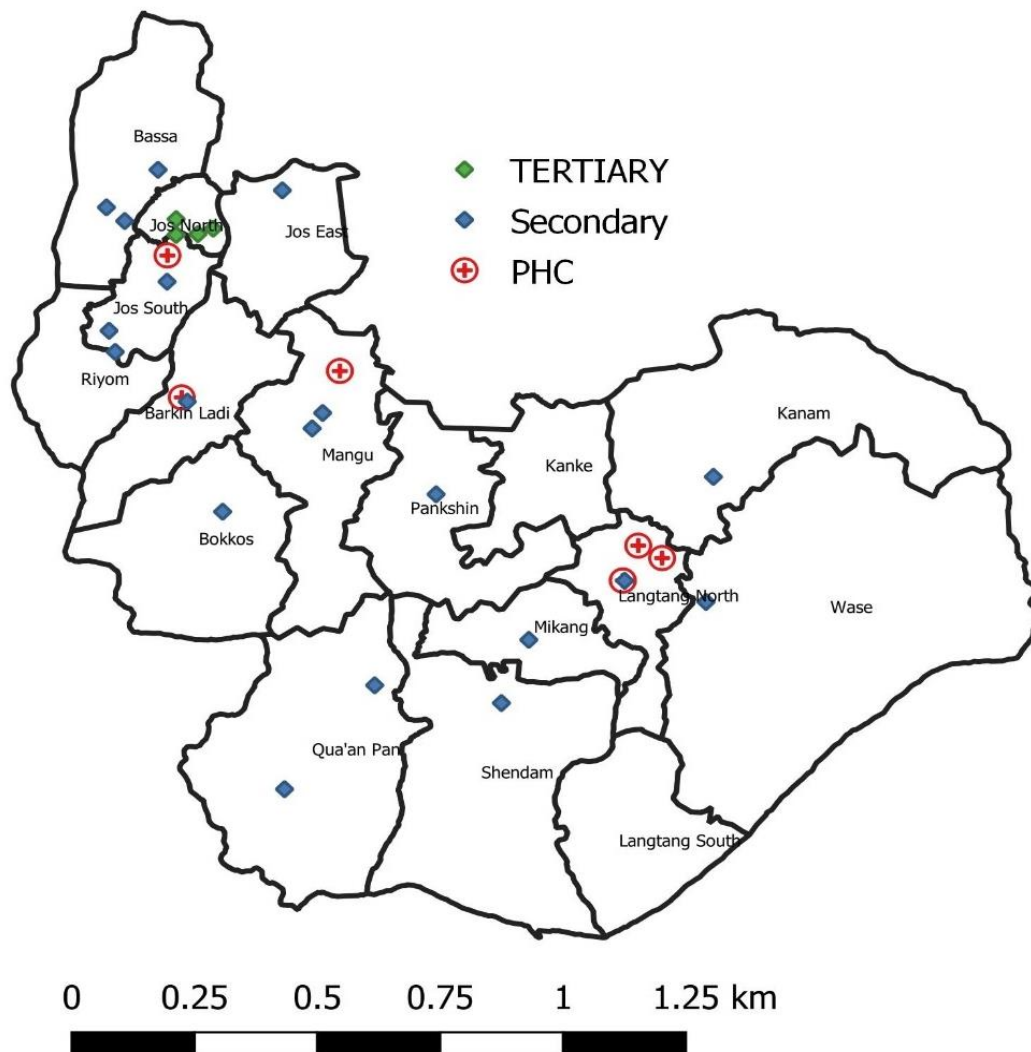


Figure 1. Map of Plateau State Showing the Local Government Areas (LGAs) and the Spatial Distribution of Selected Health Facilities in the LGAs

Source: Extract from Dr Samuel Ogiri Ogiri, PhD Dissertation, 2026 [23].

Research Design

The study was a descriptive cross-sectional study. The WHO Infection Prevention and Control Assessment tool at the health facility level (IPCAF), a structured and closed-format questionnaire, was administered to the IPC staff in the selected facilities along the eight core components of the WHO IPC programmes, comprising: IPC guidelines; IPC education and training; healthcare-associated infection surveillance; multi-modal strategies; monitoring/audit of IPC practices and feedback; workload, staffing and bed occupancy; and built environment, materials and equipment for IPC and a total of 81 indicators [25].

Exclusion/ Inclusion Criteria

Health facilities were purposively selected based on the provision of both TB and COVID-19 services; co-location of IPC measures with either focal persons and/or committees was also considered. A total of thirty-one health facilities met the inclusion criteria. Facilities that met the inclusion criteria but could not obtain ethical clearance from management were excluded.

Comparative Statistical Analysis

This study employed Analysis of Variance (ANOVA) to determine whether significant differences existed among PHFs, SHFs, and THFs across the IPC core components. These results provided statistical validation of performance disparities between facility levels, particularly in programme-related components such as the IPC programme, guidelines, and education and training. The statistical testing notation can be described as follows:

Let the average IPC (Infection Prevention and Control) performance scores for the three types of healthcare facilities be:

$\bar{X}_{1i}$: mean IPC score for

Primary Health Facilities (PHFs)

$\bar{X}_{2i}$ = mean IPC score

for Secondary Health Facilities (SHFs)

$\bar{X}_{3i}$ = mean IPC score for

Tertiary Health Facilities (THFs)

Their corresponding population means are denoted by: μ_1, μ_2, μ_3

To test whether IPC performance differs significantly across facility types, the hypotheses were stated as:

$$H_0: \mu_1 = \mu_2 = \mu_3$$

$$H_1: \text{At least one } \mu_i \neq \mu_j \text{ for some } i \neq j$$

ANOVA Test Statistic

The one-way ANOVA F-statistic was calculated as:

$$F_{cal} = \frac{MS_B}{MS_W} = \frac{SS_B / (k - 1)}{SS_W / (N - k)}$$

where:

- SS_B : between-group sum of squares (variation between facility types),
- SS_W : within-group sum of squares (variation within each facility type),
- k : number of facility groups here, ($k = 3$),
- N : total number of observations.

Decision rule: At a 5% significance level i.e., $\alpha = 0.05$, if $F_{cal} > F_{tab}$, reject the null hypothesis H_0 otherwise fail to reject the H_0 . Alternatively, a result with $p < 0.05$ indicates that the difference in mean IPC performance across facility types is statistically significant

Sampling Techniques

Multistage sampling methods were adopted, using the three senatorial districts—Plateau North, Plateau Central, and Plateau South. Afterward, convenient sampling was used to select primary health facilities, and simple random sampling was used for secondary health facilities. All tertiary health facilities were included in the study except one where consent for ethical clearance was not obtained.

Data Collection/ Analysis

Trained field staff administered the IPCAF tool at each health facility, focusing on the core components of IPC programs. Data collected

from each facility were entered into a database and analyzed using IBM SPSS version 25. Deployed IPCAF tools were pretested and validated before field application. Descriptive analysis tools were used to summarize and interpret facility-level data

Expected Output

The research will help to achieve the following:

1. Determine the status of IPC components at the different levels of health care, i.e., primary, secondary, and tertiary health facilities in Plateau State.
2. Identify performance and gaps in the implementation of each of the core components of IPC programmes in the health facilities.
3. Determine aggregate weighted performance scores for each facility and the proportion of health facilities that meet the WHO differentiated levels of IPC performance, namely, inadequate, basic, intermediate and/or advanced.
4. Make appropriate recommendations based on the findings from the research.

Results

Table 1, (23) indicates overall bed space, staff strength across facility categories and total thirty health facilities assessed across Plateau State, comprising 6 (20%) Primary Health Facilities (PHFs), 20 (67%) Secondary Health Facilities (SHFs), and 4 (13%) Tertiary Health Facilities (THFs). PHFs had a total combined number of 91 (5%) beds and 62 staff, secondary facilities had the largest bed capacity (1,096 beds, 60%) and 480 staff, and tertiary facilities reported 648 (35%) beds and the largest workforce (721 staff). The distribution reflects the dominance of SHFs (67%) in the sample, followed by PHFs (20%) and THFs (13%). The number of bed spaces aligns generally with the scope and complexity of services delivered by the various tiers of health and clinical services with the PHC being relatively smaller than the secondary and thence to the tertiary facilities. Similarly, the human resource distribution as captured in table 3 shows that the tertiary health facilities have higher numerical and skilled human resources because of the capacity of services they offer: this is coterminous with their role as referral centers for specialized and complex care.

Table 1. Summary of Participated Facilities

	PHFs	SHFs	THFs	Total of Beds
No. of Health facilities (%)	6 (20%)	20 (67%)	4 (13%)	
No. of beds in Male ward	39	379	359	784
No. of beds in Female ward	39	479	241	759
Total No. of Beds	91	1096	648	1835
Total No. of Staff	62	480	721	1,263

Source: Extract, Data Analysis from Dr Samuel Ogiri Ogiri, PhD Dissertation, 2026, [23].

Table 2 below presents (23), the distribution of bed spaces, staff strength, and IPC training status across the different wards of the PHFs, SHFs, and THFs. Overall, the PHFs had a total of 91 beds, with the medical ward (38 beds) and pediatric ward (29 beds) accounting for the majority of wards at PHFs. Isolation capacity was very limited, with only 5 beds distributed

across the six PHFs, while the surgical (6 beds), accident and emergency (9 beds), and obstetrics and gynecology wards (4 beds) had minimal representation. No psychiatric services were available at the PHFs.

At SHFs, The medical (461 beds) and surgical (258 beds) wards accounted for the largest capacity, supported by 150 and 144

staff, respectively. Importantly, both wards had some IPC-trained personnel (56 and 52 staff), reflecting progress compared to Primary Health Facilities (PHFs). Isolation wards were also present, with 63 beds and 33 staff, of whom 11 were trained in IPC. Pediatric wards (120 beds, 68 staff) reported a relatively stronger IPC coverage, with 43 trained staff, while obstetrics and gynecology wards (160 beds, 54 staff) had 15 trained staff.

For THFs, Medical wards accounted for the largest capacity, with 225 beds and 186 staff, including 48 trained in IPC. Surgical wards (116 beds, 119 staff) and obstetrics and gynecology wards (93 beds, 152 staff) also represented major service areas, though IPC training coverage remained limited, with only 8 and 16 trained staff respectively. Pediatric wards (87 beds, 126 staff) revealed critical vulnerability, with only one staff member trained in IPC despite the large patient base. Isolation wards (35 beds, 30 staff) had six trained staff, showing modest preparedness for managing infectious cases. Accident and Emergency (A&E) wards (46 beds, 107 staff) had no IPC-trained staff, representing a major risk given the high turnover of emergency cases. Psychiatric wards (46 beds, 1 staff) also lacked any IPC-trained personnel.

In terms of staffing, the medical ward had the largest number of personnel (43 staff), followed by pediatrics (16 staff). However, across all wards, no staff had received any training on infection prevention and control (IPC). This represents a significant performance gap with regards to the WHO minimum requirements, which emphasize the need for all health

workers to receive basic IPC training [27]. The absence of trained personnel, particularly in high-risk areas such as emergency, surgical, and isolation wards, underscores the vulnerability of PHFs in preventing healthcare-associated infections (HAIs) and other highly infectious and epidemic diseases [26].

SHFs by contrast, psychiatric wards (24 beds, 6 staff) had no IPC-trained personnel, representing a significant gap in mental health service readiness. Accident and Emergency (A&E) wards, despite being critical entry points, had only 10 beds and 25 staff, with 12 trained in IPC. Overall, while SHFs demonstrated better infrastructure and higher levels of IPC training compared to PHFs, coverage remained uneven, with notable weaknesses in psychiatric, isolation, and emergency services.

Table 3 below shows that IPC training coverage was uneven across wards and remained insufficient. While SHFs recorded the highest absolute number of trained staff (189), this represented only about 39% of their workforce. THFs, despite having the largest staff numbers, had only 79 IPC-trained personnel (11%), with entire units such as Accident & Emergency and psychiatry lacking trained staff. PHFs had no trained personnel in any ward. These findings underscore that training has not kept pace with infrastructural and staffing growth, leaving significant gaps in IPC readiness, particularly at the frontline level.

Still, Table 3 (23) shows a consistent gradient of improvement in average IPC component scores across facility levels.

Table 2. Health Facility Bed Capacity and IPC Training by Ward

Ward	PHF Male Beds	PHF Female Beds	PHF Total Beds	PHF Staff	PHF IPC Trained	SHF Male Beds	SHF Female Beds	SHF Total Beds	SHF Staff	SHF IPC Trained	THF Male Beds	THF Female Beds	THF Total Beds	THF Staff	THF IPC Trained
Isolation Ward	1	2	5	0	0	48	44	63	33	11	25	14	35	30	6
Surgical	3	3	6	0	0	120	133	258	144	52	82	64	116	119	8
Medical	20	18	38	43	0	174	243	461	150	56	137	118	225	186	48
Psychiatric	0	0	0	0	0	6	4	24	6	0	0	0	46	1	0
Pediatric Ward	8	10	29	16	0	16	21	120	68	43	72	6	87	126	1
Obstetrics & Gynaecology	0	4	4	3	0	15	34	160	54	15	30	36	93	152	16
Accident & Emergency	7	2	9	0	0	0	0	10	25	12	13	3	46	107	0

Source: Extract, Data Analysis from Dr Saamuel Ogiri Ogiri, PhD Dissertation, 2026

1. **Programme-related components:** IPC programme (12.5% → 38.1% → 68.0%), IPC guidelines (10.8% → 49.4% → 70.0%), education and training (6.7% → 33.5% → 56.3%), and multimodal strategies (11.7% → 26.3% → 51.3%) all improved steadily from PHFs to SHFs to THFs. This indicates progressive institutionalization of IPC systems with increasing facility complexity. The ANOVA test result for IPC programme ($p = .0001 < 0.01$) confirms that the differences across the three levels are statistically significant.
2. **Surveillance-related components:** HAI surveillance showed comparable results at PHFs (45.0%) and SHFs (41.3%), with stronger performance at THFs (57.0%). This suggests that surveillance systems are functional but remain underdeveloped at lower tiers.
3. **Monitoring and audits:** This remained the weakest domain across all tiers, with PHFs (10.0%) and SHFs (33.6%) scoring poorly, and THFs (28.8%) performing only marginally better. These results reflect a system-wide gap in quality assurance and accountability.
4. **Structural components:** Workload, staffing, and bed occupancy improved

steadily (48.3% → 58.8% → 67.8%), as did built environment, materials, and equipment (52.3% → 54.7% → 64.4%). These findings indicate that structural readiness is progressively stronger at higher levels but is not effectively leveraged due to weak training and monitoring.

The study further shows (23) that the weighted performance classifications are as follows:

1. PHFs were predominantly rated inadequate, with minimal progress in surveillance, staffing, and infrastructure, and total absence of training and programme systems.
2. SHFs performed mostly at the basic level, with moderate gains in guidelines, training, and surveillance, and intermediate performance in staffing and infrastructure.
3. THFs achieved largely intermediate performance, with improvements across programme, guidelines, training, surveillance, and infrastructure. However, monitoring and audits with feedback remained only at the basic level.

This tiered pattern confirms clear progression: PHFs (inadequate) → SHFs (basic) → THFs (intermediate), but none attained the advanced level required by WHO.

Table 3. Average IPC Component Scores across the PHFs, SHFs, and THFs

	PHFs	SHFs	THFs	Anova P-value
1. IPC programme	12.5	38.1	68.0	0.0001 < 0.01
2. IPC guidelines	10.8	49.4	70.0	
3. IPC education and training	6.7	33.5	56.3	
4. HAI surveillance	45.0	41.3	57.0	
5. Multimodal strategies	11.7	26.3	51.3	
6. Monitoring/audits of IPC practices and feedback	10.0	33.6	28.8	
7. Workload, staffing and bed occupancy	48.3	58.8	67.8	
8. Built environment, materials, and equipment for IPC at the facility level	52.3	54.7	64.4	

Source: Extract, Data Analysis from Dr Samuel Ogiri Ogiri, PhD Dissertation, 2026, [23].

Discussions

Infection Prevention and Control constitute evidence-based policies and practices to minimize infection transmission in the community and in health care settings [19]. These guidelines focus mainly on the hierarchy of IPC: administrative, engineering, and personal protection [20]. However, in light of emerging and re-emerging epidemics, pandemics, and the need for a more effective response to healthcare-associated infections and antimicrobial resistance (AMR), WHO introduced and updated guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level [10, 24].

As described earlier, this tool provides a standardized format, which has been validated and proved reliable for the assessment of a complex intervention like the WHO IPC core components and has become an effective tool for the improvement of IPCAF at the health facility levels. Again, the IPCAF tool was successfully used at the global, national and health facility levels with robust outcomes [25]. In the light of the foregoing, the IPCAF tool was adopted for our study and to the best of knowledge and understanding, neither this tool nor this type of study have conducted in any health facility in Plateau State.

Facility Selection and Characterization

The study was a cross-sectional study conducted in 30 health care facilities across Plateau State in North Central Nigeria. These facilities comprised of 6 primary care facilities (4 public and 2 faith-based), 20 secondary health facilities (a military and non-governmental, 5 faith-based and 13 public cottage/general hospitals) and all the four tertiary health facilities (2 public and 2 faith-based). The status of implementation of IPC programmes across these facilities seems to vary with the functional and infrastructural capacities of these facilities. The distribution reflects the dominance of SHFs (67%) in the

sample, followed by PHFs (20%) and THFs (13%). Compared to the other levels of health care, the scope of services, including the co-location of IPC programmes, was limited to the six primary health care facilities selected; hence, the few PHCs involved in the assessment. More so, any attempt to balance the number of health facilities will introduce bias because the inclusion criterion was quite specific. The tertiary health facilities are the apex of care and usually more expansive in the provision of diagnostic and clinical services hence their limited number compared to the primary and secondary health facilities [4]. However, all the four tertiary facilities in the States were selected

Availability and Functionality IPC Programme Implementation across the PHF, SHF, and THF in Plateau State, Nigeria

The overall analysis reveals that IPC implementation in Plateau State is characterized by a structural-functional imbalance. While the state has moderate infrastructure, adequate bed distribution, and relatively sufficient staffing, these advantages are undermined by limited IPC training, weak programme structures, underdeveloped multimodal strategies, and the absence of monitoring and auditing mechanisms [25].

In effect, IPC performance across the state remains largely at the basic level, with isolated intermediate strengths in staffing and infrastructure. No facility level or IPC domain has attained advanced performance. This underscores the urgent need for state-wide interventions to:

1. Expand IPC training coverage across all cadres, especially in high-risk units.
2. Institutionalize functional IPC programmes and ensure dissemination of guidelines.
3. Strengthen multimodal strategies to embed sustainable practices.

4. Establish robust monitoring, audit, and feedback systems to support continuous quality improvement.

Primary Health Facilities (PHFs) in Plateau State are critically underprepared to implement infection prevention and control (IPC) in line with WHO minimum requirements. Bed and staffing capacities are modest, with most resources concentrated in medical and pediatric wards, while isolation, surgical, emergency, and obstetric services remain poorly equipped. Crucially, none of the staff across all wards had received IPC training, representing a major gap in compliance, and leaving both patients and healthcare workers exposed to preventable risks of healthcare-associated infections [25].

The weighted performance scores further reveal that the majority of IPC components, namely IPC programme, guidelines, education and training, multimodal strategies, and monitoring/audits, are at inadequate levels, confirming the absence of functional programmes, structured guidelines, and institutionalized systems [25]. Two components, HAI surveillance and workload/staffing/bed occupancy, attained only basic performance, suggesting that rudimentary systems exist but remain underdeveloped and inconsistently applied. Only the built environment, materials, and equipment reached the intermediate level, reflecting some infrastructural readiness that, however, cannot substitute for the absence of functional systems and capacity-building [25].

Overall, these results highlight a profound imbalance between structural resources and functional IPC implementation at the PHF level. While some infrastructure and staffing capacity exist, a lack of trained personnel, institutional programmes, and systematic monitoring means PHFs cannot deliver safe and effective IPC [25]. This underscores the urgent need to strengthen IPC governance, provide structured staff training, disseminate guidelines, and establish routine monitoring mechanisms in order to reduce HAIs and

enhance outbreak preparedness at the primary healthcare level in Plateau State.

The weighted performance scores for secondary health facilities (SHFs), illustrate the overall status of IPC implementation. Six of the eight IPC core components, namely IPC programme, guidelines, education and training, HAI surveillance, multimodal strategies, and monitoring/audits, were rated at the basic level, indicating that minimum systems are in place but remain underdeveloped [25]. Only two components, workload/staffing/bed occupancy and built environment, materials, and equipment, reached the intermediate level, reflecting moderate strength in infrastructure and staff resources. None of the components achieved the advanced level of performance.

The results for SHFs show that facilities are better resourced and have made some progress in IPC implementation, particularly in medical, surgical, and pediatric wards. However, IPC performance remains concentrated at the basic level, with no component reaching advanced status [22]. Structural aspects such as infrastructure and staffing are moderately adequate, but functional dimensions, including programmes, guidelines, training, multimodal strategies, and monitoring, remain weak. This imbalance indicates that while SHFs have laid some foundations for IPC, they fall short of WHO's minimum requirements. Strengthening institutional frameworks, scaling up staff training, establishing systematic surveillance, and embedding multimodal strategies will be essential for achieving sustainable IPC practices at the secondary care level [25].

The weighted performance scores for tertiary health facilities (THFs) confirm that seven of the eight IPC components, including IPC programme, IPC guidelines, IPC education and training, HAI surveillance, multimodal strategies, workload/staffing, and built environment, achieved intermediate performance [25]. This shows that tertiary facilities have developed functional structures and systems but have not yet attained advanced

maturity. Monitoring and audits with feedback remained at the basic level, reflecting a lack of routine evaluation and systematic feedback mechanisms. Importantly, no component achieved advanced performance, underscoring that THFs are still below WHO's minimum benchmarks for IPC [25].

The results from the THFs demonstrate that tertiary facilities possess the high level of IPC readiness the tertiary health facilities in Plateau State. They are supported by stronger infrastructure, higher staffing levels, and partially institutionalized IPC programmes and guidelines [22]. However, the absence of widespread IPC training across wards, especially in Accident and Emergency, pediatric, and surgical services, represents a major gap [27]. While most IPC domains were rated as intermediate, the persistent weakness in monitoring and audits with feedback underscores the lack of continuous evaluation and corrective mechanisms. The absence of advanced performance across all components highlights that THFs, although better resourced, are still not fully compliant with WHO's minimum IPC standards [25]. To strengthen IPC implementation, tertiary facilities must expand staff training, consolidate surveillance systems, and institutionalize robust monitoring and feedback processes to ensure sustainable infection prevention and control [25].

Overall, Plateau State demonstrates incremental progress in IPC implementation but remains below WHO's minimum standards, highlighting critical areas for policy and programmatic strengthening.

Conclusions

This study is the first to assess the availability and functionality of IPC at the facility level in Plateau State. The study has helped to identify strengths, gaps, and opportunities for improvement. Patients' safety and quality of care continue to be affected by the growing burden of HAI and AMR. This can

hamper the achievement of Universal health coverage. There is a need to strengthen the development, enforcement, monitoring and leadership for IPC implementation, especially at the health facilities, by policymakers and decision-makers in health.

Conflict of Interest

The Authors declare that there is no conflict of interest.

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Ethical Approval

Ethical clearance was collected from the Ethical Review Board Plateau State Ministry of Health to cover the primary health care and secondary health facilities while the Ethical Review Boards of each of the four tertiary health facilities provided ethical clearance for the research. The tertiary health facilities include Bingham University Teaching Hospital (BUTH), Jos University Teaching Hospital (JUTH), Our Lady of Apostle (OLA) Specialist Hospital and Plateau State Specialist Hospital (PSSH), all located in Metropolitan Jos. The

Ethical Clearance from the Ministry of Health and Tertiary health facilities are all attached in.

Authors Contributions

Samuel Ogiri Ogiri conceptualized the study and developed the methodology. Data collection and analysis were conducted by Sunday Agbochenu Aboje, Shadrach Dimang, Gonen Lakda, and Emmanuel John Azi. Samuel Ogiri Ogiri prepared the original draft of the manuscript. Opeyemi Emmanuel contributed to manuscript review and editing. Olusoji Daniel and Amitabye Luximon-Ramma provided overall supervision. All authors

reviewed and approved the final version of the manuscript and agreed to be accountable for its content.

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Data Availability

The datasets generated and/or analysed during this study are available in the IPC Analysis workbook repository at: https://docs.google.com/spreadsheets/d/1WExOiKWrlsNrMMJoOi5GKjABOfjzC_E_/edit?gid=736495188#gid=736495188

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