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Research Article

Assessment of Sexually Transmitted Infections Surveillance System in Iraq

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ABSTRACT

Background: Sexually transmitted infections (STIs) continue to pose significant public health challenges worldwide. This study aimed to assess the STI surveillance system in Iraq, including the Kurdistan Region, to identify gaps and areas for improvement.

Subjects and Methods: A cross-sectional study was conducted from March 12 to October 1, 2023. A total of 116 health facilities (HFs), including HIV control sections, Primary Health Care Centers (PHCCs), and hospitals, across 20 Directorates of Health (DOH) were included in the assessment. A structured questionnaire was developed by the researchers and administered through interviews. The questionnaire collected demographic, surveillance data, and service characteristics.

Results: The study assessed 116 HFs, comprising 345 units (surveillance, clinic, and laboratory (Lab)). Most peripheral-level surveillance units faced significant shortages in logistical resources. The timely submission of STI reports to the next health level was below the 85% target across all health levels. HIV control sections investigated 35% of reported cases, of which 35% had complete data. Data cleaning processes were completed by 11% of PHCCs and 0% of hospitals. National STI guidelines were in 50% of PHCCs and 35% of hospitals. The percentage of diagnosed cases meeting the definitions was 36% in PHCCs and 30% in hospitals. STI records were found in 80% of PHCCs and 45% of hospitals. Syphilis testing was available in 47% of PHCCs and 29% of hospitals.

Conclusions: The STIs surveillance system at both peripheral and intermediate levels is inadequately managed, with significant gaps in resource allocation, training, and data management.

Introduction

STIs remain a significant global public health challenge, contributing to considerable morbidity and mortality in both developing and developed countries. STIs negatively impact the quality of life, reproductive health, and child health, while also playing a critical role in the transmission of HIV. Additionally, they impose a substantial economic burden at both national and individual levels [1-6].

Over 1 million STIs are acquired worldwide each day. In 2020, the WHO estimated 374 million new infections in those aged 15–49 with the main STIs: chlamydia, gonorrhea, syphilis, and trichomoniasis. In 2022, 1.1 million pregnant women were infected with syphilis, causing over 390,000 adverse birth outcomes. Additionally, more than 500 million people aged 15–49 have herpes simplex infections, and the human papillomavirus causes over 311,000 cervical cancer deaths annually. [7]

In Iraq, STI incidence remains a public health concern. In 2023, an estimated 72625 new infections among those aged 15 to 49 were reported, which included gonorrhea (208 cases), syphilis (1,501 cases), and trichomoniasis (5,014 cases). Additionally, viral STIs such as genital herpes (671 cases) and genital warts (1,304 cases) were documented. [8].

STI surveillance plays a crucial role in monitoring sexual transmission trends and guiding public health interventions. More than 30 bacterial, viral, and parasitic pathogens are known to cause STIs, primarily transmitted through vaginal, anal, or oral sex. Some STIs can also be transmitted non-sexually, including from mother to child during pregnancy or childbirth, through blood transfusions, or via shared needles [1,2,9].

Effective STIs prevention and control programs rely on high-quality surveillance data. Surveillance system evaluation is a fundamental public health function, aimed at improving data quality, enhancing service provision, and ensuring that findings inform future surveillance activities [11-14]. This study aims to assess the STIs surveillance system in Iraq, including the Kurdistan Region, to identify strengths, challenges, and opportunities for improvement.

Subjects and Methods

A descriptive cross-sectional study was conducted from March 12 to October 1, 2023, across twenty DOH in eighteen Iraqi governorates. A multi-stage stratified sampling approach was employed for each DOH. In the final stage, six HFs were selected from each DOH using simple random sampling (lottery method). These included one HIV control section, one hospital, and four PHCCs. An exception was made for Medical City, where only one HIV control section and one hospital were selected, as it lacks health districts or PHCCs. Additionally, some hospitals included consultant clinics in dermatology, gynecology, urology, and pediatrics, depending on availability. The sampling framework is illustrated in Figure 1.

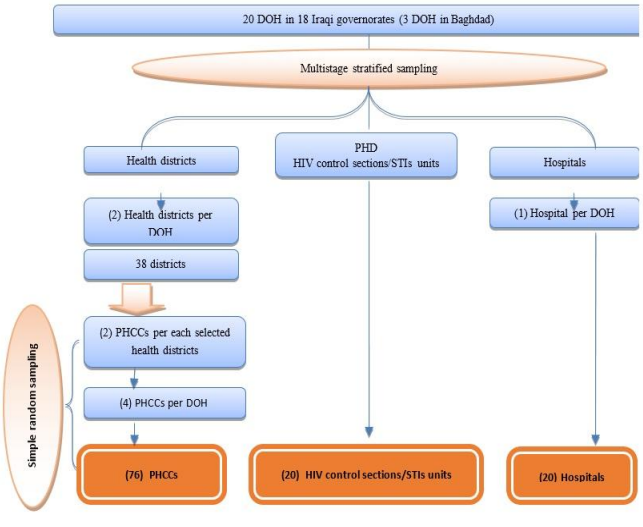

Figure 1: Health facilities sampling.

The surveillance and response system were assessed based on key components and elements, as outlined in Table 1.

Table 1: Components and Elements of the STI Surveillance and Response System

Components	Elements
Support Functions	Resources, Training, Guidelines/Standards
Core Functions	Case Detection, Case Registration, Case Confirmation, Reporting
Quality/Outputs	Completeness, Timeliness, Validity

A structured questionnaire was developed based on a comprehensive review of relevant literature, including guidelines from WHO, CDC, and ECDC. The questionnaire was refined to ensure its applicability to the Iraqi healthcare system and was subsequently reviewed and approved by the Public Health Scientific and Ethical Research Committee at the Ministry of Health (MOH). The questionnaire consisted of closed-ended structured questions designed to evaluate key components of the STIs surveillance system. It was categorized into three main sections: STI Surveillance Units, Clinical Units, and Lab. Units. These sections were designed to gather information from STI focal points, health care providers (HCPs), and Lab. staff (STI data providers). Data collection involved on-site visits and direct interviews, along with a review of STI-related health records of the last six months in 2022 by the epidemiology section at the public health department. To facilitate data collection, the questionnaire was digitized using Kobo Toolbox Humanitarian [10-16]. Testing the questionnaire project through conducting the pilot study, which was carried out through selecting one PHCC & hospital in Baghdad (not included in the sample), to assess the time required to fill out each questionnaire and any difficulty in the study

HFs and participants were selected through the local surveillance system at all levels, coordinated by the STIs unit. Additionally, the peripheral level, which includes STI services provided by HCPs, is considered a data source.

Ethical approval for this study was obtained from the Iraqi MOH (NO.1051 in 21.4.2025). An official letter was sent from the Public Health Directorate to all DOHs to support the implementation of the research.

Descriptive statistical analysis was performed using Microsoft Excel (version 2019). The analysis included frequency distributions, percentages, and means to summarize key findings

Results

According to the local surveillance system, there are three functional levels: Peripheral, Intermediate, and Central Level. In the HIV control sections of all DOHs, STI focal points manage STI services and surveillance systems by coordinating with representatives at PHCCs and hospitals. Surveillance unit reporting forms at each level are completed and submitted monthly. These reports are regularly maintained and updated in accordance with central-level requirements.

A total of 345 units across 116 HFs locations in Iraq, including 116 surveillance units and 229 health units (clinics and labs), successfully completed the questionnaire, as shown in Table 2.

Table 2: Classification of Health Facilities in Relation to STI Surveillance Systems in Iraq, 2022

Health Facilities	Number of Facilities	Health Units	Number of Units
HIV Control Sections	20	STI Surveillance Units	20
PHCCs	76	Surveillance Units*	76
		Clinic Units	76
		Laboratory Units	76
Hospitals	20	Surveillance Units**	20
		Clinic Units***	57
		Laboratory Units	20
Total	116 HFs		345 Units

*The surveillance unit in PHCCs represents the infectious disease unit.
** The hospital surveillance unit represents the public health unit.
*** Some hospitals may include one or more of the following consultant clinics: dermatology, gynecology, urology, and pediatrics, depending on availability.

Table 3 details the distribution of STI focal points by age, gender, job title, and education level. Males made up half the participants, with over half aged ≤40 years. Most had under five years of experience, and paramedics in PHCCs and hospitals were the most common job title. Most in PHCCs and hospitals held a diploma, while those in HIV sections mostly held a bachelor's degree.

Table 3: Distribution of STI Focal Points by Age, Gender, and Job Title in Iraq, 2022

Characteristics	HIV Control Section (N=20)	PHCCs (N=76)	Hospitals (N=20)
Gender			
Female	10 (50%)	37 (49%)	9 (45%)
Male	10 (50%)	39 (51%)	11 (55%)
Age Group			
≤40 years	12 (60%)	38 (50%)	10 (50%)
>40 years	8 (40%)	38 (50%)	10(50%)
Years of Work Experience			
< 5 years	15 (75%)	48 (63%)	14 (70%)
≥ 5 years	5 (25%)	28 (37%)	6 (30%)
Job Title			
Medical	9 (45%)	14 (18%)	4 (20%)
Paramedical	7 (35%)	60 (79%)	15 (75%)
Other	4 (20%)	2 (3%)	1 (5%)
Education Level			
High School	0	17 (22%)	1 (5%)
Diploma	4 (20%)	34 (45%)	8 (40%)
Bachelor's	12 (60%)	19 (25%)	6 (30%)
Master's	3 (15%)	3 (4%)	2 (10%)
Board/PhD	1 (5%)	3 (4%)	3 (15%)

Figure 2 shows that most HFs at the periphery experience communication shortages, especially in PHCCs.

More than half of the monthly STI report formats at the peripheral level aligned with central-level requirements, and about 87% of PHCCs and 55% of hospitals primarily used paper-based reporting to submit data to the next level, as shown in Table 4. The timeliness of report submission across all health levels fell below the 85% target, indicating delays, particularly in hospitals, as shown in Figure 3.

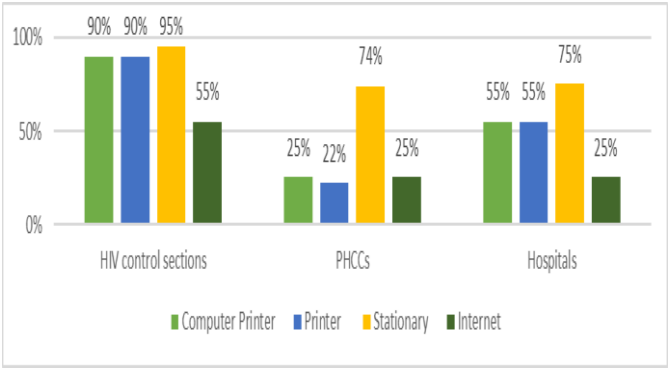

Figure 2: Availability of Communication Equipment in Surveillance Units, Iraq, 2022

Table 4: Reporting Methods Used by Health Facilities, Iraq, 2022

	HIV Control Sections (N=20)	PHCCs (N=76)	Hospitals (N=20)
Unified Forms with Central Level Reporting Method	18 (90%)	41 (54%)	12 (60%)
Paper Only	6 (30%)	66 (87%)	11 (55%)
Electronic (WhatsApp/Excel)	0	3 (4%)	4 (20%)
Both Paper & Electronic	14 (70%)	7 (9%)	5 (25%)

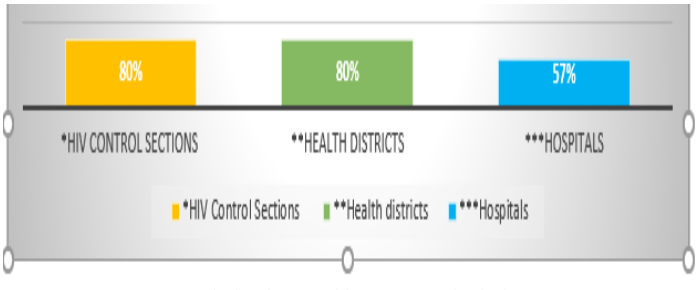

Figure 3: Percentage of Timely Monthly Report Submissions, Iraq, 2022

Only 35% of epidemiological investigations for syphilis cases were fully conducted by HIV control sections. The completion rate of syphilis case investigation forms was also 35%.

This study found that two-way communication was present in slightly over half of peripheral facilities and about three-quarters of intermediate facilities, based on participant perspectives. About half of the participants received basic surveillance training, as shown in Table 5. Slightly over half of the focal point is dedicated exclusively to the STIs, especially in the HIV control section. Data cleaning was completed in only 11% of PHCCs and not at hospitals, versus 60% in the HIV control section.

Although the HIV Control Sections informed the peripheral level of the need for accurate STI diagnoses (65%), and the mechanism for distinguishing between visits. (75%), Implementation was low: only 34% in PHCCs and 25% in hospitals for accurate diagnoses, and 32% in PHCCs and 20% in hospitals for distinguishing between visits.

Table 5: Verification of Data Before Reporting to Higher Authorities in Iraq, 2022

Data Validity	HIV Control Section (N=20)	PHCCs (N=76)	Hospitals (N=20)
Two-way communication	15 (75%)	41(54%)	13 (65%)
Refresher training on basic surveillance	11 (55%)	42(55%)	10 (50%)
Focal point dedicated exclusively to the STIs unit	11(55%)	22(29%)	2 (10%)
Data cleaning process completed	12 (60%)	8(11%)	0
Correction of non-identical STI diagnoses	13 (65%)	26(34%)	5 (25%)
Differentiation between first visits and follow-ups	15 (75%)	24(32%)	4 (20%)
Data validity	13 (64%)	27(36%)	7 (28%)

Table 6: Distribution of Data Providers in Surveillance Components in Iraq, 2022

Clinic Unit	PHCCs (N=76)	Hospitals (N=57)
Separate examination rooms	(22)29%	(24)42%
Equipped examination rooms	(37)49%	(46)81%
Availability of national STI management guidelines	(38)50%	(20)35%
HCPs trained on STI management	(19)25%	(15)26%
Physicians who inquired about sexual history & risk assessment	(26)34%	(44)77%
Physicians who performed clinical examinations	(14)18%	(41)72%
Diagnosed cases meeting case definition criteria	(27)36%	(17)30%
Surveillance Unit (Infectious Disease /Public Health Unit)	PHCCs (N=76)	Hospitals (N=20)
Paper-based registration	(70)92%	(18)90%
Availability of STI records	(61)80%	(9)45%
Real-time recordings (from available records)	(47)77%	(6)67%
Fully completed record variables (from available records)	(25)41%	(3)30%
Laboratory Unit	PHCCs (N=76)	Hospitals (N=20)
Availability of syphilis tests	(36)48%	(6)30%
Availability of syphilis test SOPs	(28)37%	(8)40%
Lab staff trained on VDRL/RPR testing	(26)34%	(10)50%
Positive screening samples were sent for confirmation	(35)46%	(11)55%
Daily QC for syphilis tests	(15)20%	(7)35%
Real-time laboratory recordings	(44)58%	(13)65%
Fully completed lab records	(42)55%	(10)51%

Separate examination rooms were available in 29% of PHCCs and 42% of hospitals, while equipped rooms were available in 49% and 81%, respectively. Physicians asking about sexual history and risk assessments were 34% in PHCCs and 77% in hospitals, while physicians who performed clinical exams were 18% in PHCCs and 72% in hospitals, as shown in Table 6.

National management guidelines for STIs were found in 50% of PHCCs and 35% of hospitals, while 25% and 26% of HCPs were trained, respectively. Only 36% of diagnosed cases in PHCCs and 30% in hospitals met case definition criteria. STI records were available in 80% of PHCCs and 45% of hospitals. Real-time documentation was reported in 77% and 67%, and fully completed records in 41% and 30%. Paper registration was at 92% in PHCCs and 90% in hospitals.

Syphilis testing availability was 48% in PHCCs and 30% in hospitals. The positive screening samples sent for confirmation were 46% and 55%. SOP adherence for VDRL/RPR was observed in 37% of PHCCs and 40% of hospitals, while 34% and 50% of lab staff were trained in testing methods. Daily quality control (QC) measures were implemented in 20% of PHCCs and 35% of hospitals. Real-time records were 58% and 65%, while fully completed records were 55% and 51%, respectively.

Discussion

Assessing surveillance systems is essential to optimizing their functionality, strengthening existing frameworks, and improving data interpretation to enhance STI control programs. Iraq's local surveillance system operates at three levels: the peripheral level, which serves as the first point of contact with the population and the primary source of data collection; the intermediate level, responsible for data cleaning, analysis, and response coordination; and the central level, overseeing policy implementation and national-level decision-making. [5, 11, 17]

This study provides a comprehensive overview of the key components of Iraq's STI surveillance system. However, comparing these findings with those from other countries is challenging due to variations in surveillance approaches, disease monitoring priorities, and evaluation methods that evolve over time. [18-20]

Resources, both human and logistical, are fundamental to the effectiveness and sustainability of any surveillance system. A shortage of these resources can undermine system stability and efficiency. [13-15] In Iraq, STI surveillance and services are coordinated by STI focal points in the HIV control sections of all DOHs, working in collaboration with their counterparts at PHCCs and hospitals.

The current findings indicate that males and individuals aged ≥40 years each constituted approximately half of the participants, many participants in PHCCs and hospitals held a diploma and the primary job title was paramedic, with the majority having less than five years of work experience. High staff turnover and frequent transfers—primarily due to a lack of incentives and institutional support—pose significant challenges to system functionality. [19, 21, 22] A 2021 study in Iraq assessing communicable disease surveillance officers (SOs) reported that males aged 30–59 years comprised over three-quarters of participants. Furthermore, 53% of surveillance officers had less than five years of experience, with the highest proportion holding a diploma and working as medical assistants. [23] In contrast, a study conducted in Kenya found that 51% of health personnel were female, more than half were aged 18–40 years, and over three-quarters held a diploma. Additionally, two-thirds had over three years of work experience, and 65% were employed in nursing roles. [22]

The current results suggest that most peripheral-level HFs face a shortage of essential communication tools, including internet access, computers, printers, and stationery, particularly in PHCCs.

Infrastructure and resources at the intermediate level were found to be relatively better than at the peripheral level. This aligns with findings from two national studies conducted in Baghdad (2016) [24] and the Kurdistan Region (2021) [25], where 54% of PHCCs were reported to have internet access. However, a 2023 study in Mosul found that 75% of main PHCCs had an adequate supply of resources and materials, but internet access remained limited. [27] The discrepancy between these studies may stem from differences in methodology and geographic scope, as the Mosul study was conducted in a single governorate.

Surveillance units are required to submit monthly reports at every level, which must be regularly updated and aligned with central-level standards. These reports help track new STI cases and associated syndromes based on location, time, gender, and other key variables. [3, 11, 14] This study found that at the peripheral level, more than half of monthly STI reports aligned with central-level requirements. These findings are consistent with a 2019 study in Baghdad, which reported that 46% of HFs experienced a shortage of reporting forms over six months. [26] Conversely, a 2023 study in Mosul found that 75% of main PHCCs and all hospitals used standard monthly reporting formats. [27]

Surveillance reporting involves transferring data from source points (PHCCs and hospitals) to higher administrative levels. [1, 10, 11, 15] In our study, 87% of PHCCs and 55% of hospitals primarily relied on paper-based submissions to transmit data. This finding partially aligns with Hamalaw SA [25], who reported that district-level facilities used emails for reporting, while peripheral-level facilities relied on paper-based formats (50%), phone calls (22%), and social media (22%).

The timeline shows the percentage of surveillance units that submit reports on schedule each month. Timely submission is crucial for prompt actions such as investigations and preventive measures. [1,11,14,15] Our study found that the timeliness of report submissions across all health levels fell below the 85% target, indicating delays, particularly in hospitals. This delay can be attributed to several factors: focal points at the peripheral level often manage multiple public health programs or are not assigned at all. Additionally, some physicians lack awareness of the importance of the notification process. [20] Our study aligns with a 2023 study from Uganda [28], which found that timeliness of reporting remained inadequate, with referral hospitals having the lowest on-time reporting rates. Similarly, a study conducted in the Kurdistan Region in 2021 [18] reported that timeliness decreased to 69% in 2020. However, our findings contradict two national studies from Baghdad (2019) [26] and Najaf (2021) [29], which reported higher timeliness levels.

Investigating cases is essential for preventing the transmission of infection by identifying at-risk individuals, particularly pregnant women who may be unaware of their infection. This approach reduces the risk of missed diagnoses, reinfections, and congenital syphilis. To ensure effective case detection, it is important to assess the percentage of fully completed case investigations. [18,24]

Completeness is a critical component of disease surveillance. The system incorporates different completeness measures, including internal completeness, matching reported data with expected requirements, and case-based completeness, which is more complex than aggregated data. Addressing missing or incomplete data at every reporting level is essential. [3,14,15]

The study found that only 35% of HIV control sections fully conducted case investigations, with the same percentage achieving data completion. This shortfall may stem from inadequate training of healthcare personnel and poor communication between peripheral and intermediate levels regarding the significance of case investigation and contact tracing. These results align with a study conducted in the USA [30], which reported that, in December 2021, only 32.4% of COVID-19 cases had completed interviews. Similarly, a 2021 study in Kenya [22] indicated declining reporting completeness rates since 2017. However, our findings contradict studies from Sierra Leone (2019) [31] and the Kurdistan Region (2021) [18], which reported data completeness exceeding 90%.

Validity, the proportion of correctly reported data elements, is essential for ensuring that STI surveillance systems reflect the actual epidemiological situation. To achieve accuracy, continuous error correction must be implemented at all levels, whether data is processed manually or automatically. [3,14] Effective communication plays a crucial role in facilitating reporting and feedback within healthcare systems. [14,15] the study found that two-way communication in surveillance units was reported by about over half of participants at the peripheral level and three-quarters at the intermediate level. Compared to a 2019 study in Baghdad [26], which found that only 20% of surveillance unit communication met established standards, our findings suggest that insufficient communication can negatively impact staff performance and data quality.

Approximately half of the participants in the study reported receiving training in basic surveillance. This proportion is lower than the 70% training rate reported in an Iraqi study by Mahmood RR and colleagues [23]. Inadequate training among health personnel can compromise data quality and reporting accuracy.

The current results revealed that more than two-thirds of focal points dedicated to STI units were managing one or more public health programs, particularly at the peripheral level. A study by Kadhum SA [26] supported these findings, indicating that some surveillance units operate without permanent staff, relying on physicians who simultaneously manage multiple programs.

Conversely, our results contradict a 2015 study in Ghana [19], which reported that most HFs had designated disease surveillance officers at the peripheral level. Dedicated personnel for data management are crucial for an efficient surveillance process. [32,33] The WHO recommends assigning trained personnel at the local level to maintain accurate patient records and reports. [34]

The current results also contrast with those of Younus YM (2023) [27], who reported that all main PHCCs and hospitals had dedicated staff for preparing patient surveillance reports. This discrepancy may stem from the fact that the communicable disease surveillance assessment in that study was conducted in only one governorate.

Data cleaning should be performed at the peripheral and intermediate levels before submission to the central level. Delays in this process hinder valid data analysis and complicate long-term corrections. However, data cleaning is time-consuming and influenced by workload, training, and experience. [14] Our study found that only 11% of PHCCs and 0% of hospitals did the data cleaning process, while the HIV control sections achieved 60%. This disparity may be due to

focal points in the peripheral level managing multiple public health programs or the absence of assigned personnel.

Additionally, while 65% of HFs acknowledged the importance of accurate STI diagnosis records, the correction rates for inconsistent diagnoses remained low—only 34% at PHCCs and 25% in hospitals. These findings contrast with a 2024 study in Mosul [35], which reported that all Right & Left PHCC sectors, main PHCCs, and hospitals completed their registration processes correctly.

Newly diagnosed cases should be reported separately from follow-up visit cases to prevent duplication and ensure accurate incidence rates. [2,11] In our study, 75% of HIV control sections informed HFs at the peripheral level about the distinction between new and follow-up cases. However, only 32% of HCPs in PHCCs and 20% in hospitals implemented this classification mechanism. These results align with a 2012 study by Venkatarao E in India [32], which found that only 17% of respondents accurately classified cases as new or old.

The current study, conducted at PHCCs and hospitals, found that separate examination rooms were available in 29% and 42% of facilities, respectively. Additionally, equipped examination rooms were present in 49% of PHCCs and 81% of hospitals. Physicians who inquired about sexual history and conducted risk assessments accounted for 34% and 77%, while those performing clinical examinations comprised 18% and 72%, respectively. Khan et al. [36] noted that collecting sexual histories from asymptomatic patients is not well integrated into medical consultations, underscoring the need to create supportive environments that encourage participation in sexual risk assessments. The availability of a separate examination room with full equipment is necessary to conduct a clinical examination to establish a correct diagnosis.

The presence of national STI management guidelines was reported in 50% of PHCCs and 35% of hospitals, while training for HCPs was documented in 25% and 26%, respectively. Compared to a 2020 study in Nepal [37], which found that fewer than 10% of HFs offering STI services had guidelines (8.1%) or trained HCPs (8.4%), our findings suggest moderate adherence but still indicate a need for improvement. Systematic training leads HCPs to follow guidelines in management.

Diagnosed cases that met case definition criteria were reported at 36% of PHCCs and 30% of hospitals. This finding aligns with studies conducted in Najaf (2021) [29] and India (2013) [21], both of which found that case definitions were rarely utilized in clinical practice. The case definition is vital for case detection. An unclear case definition will have an impact on the sensitivity and specificity of surveillance systems. [11]

Regarding STI records, 80% of PHCCs and 45% of hospitals had records available, with real-time documentation at 77% and 67%, and complete data entry at 42% and 29%, respectively. Paper-based registration was prevalent in 92% of PHCCs and 90% of hospitals. A 2010 study in Wasit [38] reported similar findings, with 94.1% of facilities maintaining clinical registers, though only 22.9% of them were correctly completed.

Syphilis testing was available in 48% of PHCCs and 30% of hospitals. In comparison, a 2020 study in Nepal [37] found that only 15.9% of facilities providing STI services had syphilis test kits available. Similarly, a 2011 study in China [39] highlighted that syphilis screening was scarce in basic prenatal care settings.

The proportion of positive samples sent for confirmatory testing was 46% at PHCCs and 55% at hospitals. This could be attributed to shortages of testing supplies at the local health lab or delays in sample transport to the central lab. These findings align with a 2015 study by Adokiya MN [19], which reported similar challenges. A 2014 study in Qatar [40] found that lab. Confirmation of suspected cases was appropriately implemented.

The study also found that adherence to SOPs for VDRL/RPR testing was noted in 37% of PHCCs and 40% of hospitals. Additionally, 34% and 50% of HFs, respectively, had laboratory staff who received training on testing methods. QC measures were implemented daily in 20% of PHCCs and 35% of hospitals. Real-time documentation accounted for 58% and 65%, with fully completed records recorded at 56% and 51%, respectively.

The following limitations were challenging during the conduct of this study: This initial study evaluates the STI surveillance system, serving as the first baseline assessment in Iraq. STI services sometimes overlap with other health programs. Furthermore, underreporting and limited resources create challenges.

Conclusion

Syndromic surveillance depends on preclinical and clinical data, influenced by factors such as HCP training, case definitions, available examination rooms, and patients' sexual histories. Etiological surveillance utilizes confirmation lab data collected by trained staff following SOPs to minimize errors and incorporate QC measures.

Case reporting accuracy depends on communication tools and personnel expertise. Effective coordination among surveillance staff and data providers (HCPs and lab staff) is essential for proper detection, recording, and reporting. STI surveillance at the peripheral and intermediate levels has been inadequate. It is recommended to allocate resources and tools fairly, offer regular training with incentives, strengthen coordination to improve system efficiency and data accuracy, and establish STI electronic surveillance systems.

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Conflict of Interest

The authors declare no conflicts of interest related to this work.

Data availability

Data are available upon reasonable request.

Author Contributions

NSA contributed to conception, study design, data analysis, interpretation, and manuscript drafting and revision; HRA and HAM contributed to conception, study design and manuscript revision; YYM and ZNA contributed to data collection and revision; NFY contributed to data collection and Kobo Toolbox design. All authors revised the manuscript, approved the final version, and agree to be accountable for all aspects of the work.

All authors meet the ICMJE criteria for authorship and agree to be accountable for all aspects of the work.

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