



An Assessment of Timeliness and Quality of Communicable Disease Surveillance System in the Kurdistan Region of Iraq

INQUIRY: The Journal of Health Care Organization, Provision, and Financing
Volume 58: 1–7
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DOI: 10.1177/00469580211056045
journals.sagepub.com/home/inq


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Abstract

Background: The quality of the surveillance system can be defined by attributes such as completeness, timeliness, usefulness, simplicity, flexibility, acceptability, and reliability. This study aims to assess these quality features of the communicable disease surveillance system (CDSS) in the Kurdistan Region of Iraq.

Methods: This study was conducted using a retrospective review of records and documents, and the interviews with the surveillance staff (n = 82) of the Kurdistan governorates during 2018, 2019, and 2020. The World Health Organization (WHO) guideline 2006 indicators were used for evaluation and monitoring the quality of the communicable disease surveillance system. The data analyzed and showed as frequencies and percentages using Statistical Package for the Social Sciences (SPSS) version 26 software.

Results: The reporting timeliness declined from 98% in 2019 to 69% in 2020. At the same time, there was an improvement in completeness of reporting from 83% in 2018 to 99% in 2020. The total scores of other surveillance quality attributes, simplicity, usefulness, flexibility, acceptability, and reliability, were 75%, 72%, 67%, 72%, and 69%, respectively.

Conclusion: Current findings demonstrate that the CDSS is still facing significant challenges in timeliness simplicity, usefulness, flexibility, acceptability, and reliability. Further studies to assess the system's quality, particularly the system's timeliness of outbreak response, sensitivity, and specificity, are recommended.

Keywords

communicable diseases, surveillance, timeliness, system evaluation, assessment, Kurdistan, Iraq

What do we already know about this topic?
Periodic assessment (evaluation and monitoring) of communicable disease surveillance system is essential to ensure that the system's objectives are approached.
How does your research contribute to the field?
This assessment tends to identify the quality of the surveillance system at this point in time that can be used as a benchmark to monitor the system's progress in the future.

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and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

What are your research's implications towards theory, practice, or policy?

The findings of this study will highlight the quality attributes of the system that could be used for revising practices and policies.

Introduction

Communicable diseases existed during humankind's prehistoric nomadic, causing dozens of devastating epidemics that harvest billions of lives.^{1,2} The history of humanity is full of tragedies resulted from infectious diseases outbreaks. The epidemics sometimes determined population, shaped social attitudes, or changed the geopolitical balance between states and ended empires. Predisposing to highly contagious, severe, and fatal communicable diseases is a nightmare of public health agencies worldwide. No country is safe or secure from getting infectious disease outbreaks. Emerging infectious diseases (EIDs) and re-emerging infectious diseases (RIDs) are prevalent in most countries, particularly in the Mediterranean region, including Iraq, and could further spread within the region.³

The early detection and prompt control actions of communicable diseases are critical for national, regional, and global health security. Since recurrent epidemics in certain places may result in onward transmission to other countries causing global pandemics, emerging of an infectious disease in any part of the world will be an international issue. The new coronavirus pandemic (COVID-19) is an excellent example to understand the ability of a communicable disease to transform from an endemic disease to a pandemic and how an infectious illness can ruin lives and destroy the global economy.

As mentioned by the British epidemiologist William Farr (1807–1883), “Diseases are more easily prevented than cured.”⁴ Thus, the famous saying “prevention is better than cure” is a proactive approach to combat infectious diseases. It means that it is sensible to stop a bad thing or a disease from occurring in the first place rather than having to cope with awful problems and their consequences later. Early detection and prompt response, in other words, surveillance system, is critical to prevent and limit undesirable consequences of communicable diseases. Surveillance undoubtedly is the most critical public health strategy for preventing and controlling communicable diseases. As the global response to infectious diseases increases, public health practitioners must continuously improve their performance in detecting and responding to communicable diseases.⁵ Therefore, building regional CDSS capacities and capabilities with adequate resources and expertise is essential to prevent and control disease outbreaks.³

A feasible and efficient CDSS can be developed and enhanced through continuous monitoring and evaluation. The

lack of performance assessment of the system is considered a significant sign of weakness.⁶ Measuring the quality of CDSS in terms of timeliness, completeness, simplicity, usefulness, flexibility, and acceptability is critical worldwide. In low- and middle-income countries (LMICs), the assessment of the CDSS is much more important since the infrastructure is often deficient, and the capacity of early detection and quick response to infectious diseases is generally lower than that in high-income countries (HICs).⁷

The most typical surveillance quality attributes that should be assessed periodically are timeliness and completeness that can be measured quantitatively.^{5,8-10} According to the Encyclopedia of public health, the timeliness of a surveillance system reflects the delay between steps in a system.¹¹ In the surveillance context, timeliness can have various dimensions: reporting timeliness, response timelines, and Ministry of Health communication timeliness.¹² Reporting timeliness can be expressed as a proportion of all expected reports in a reporting system received by the due date.^{5,13} Completeness likewise, also may refer to various meanings, including completeness of reporting sites, completeness of case reported, and completeness of surveillance data.⁵ The other surveillance attributes (usefulness, simplicity, flexibility, sensitivity, acceptability, and reliability) can be measured or calculated in a qualitative manner from the participant perceptions. Likert scale, which was developed in 1932 by the social psychologist Rensis Likert scale, is a very popular tool for measuring people's perspectives.^{14,15} A Likert scale is a question, that is, a five-point or seven-point scale. The choices range from Strongly Agree to Strongly Disagree so the survey maker can get a holistic view of people's opinions. All Likert scales also include a mid-point, for example, neither agree nor disagree, for those who are neutral on the subject matter.

Meanwhile, the surveillance information is vital for determining the need for public health intervention and evaluating the effectiveness of the public health programs.⁵ It is necessary to assess the performance of CDSS to verify the credibility of the information yielded by the system and whether the system meets the target goals.⁶ Providing a baseline information on the quality of the CDSS of Iraq may be the first step toward comprehensive strengthen of the system.

In Iraq, the CDSS ignition starts from detecting communicable disease case/s that initiate registration, including the name, age, sex, and address of the patient, that activates a notification system that dictates confirmation, usually by laboratory techniques. The data from notifications and laboratories is collected, analyzed, and disseminated to the authorities for decision making. Then, the response and control measures will occur if there is a suspicion of an outbreak.¹⁶

Kurdistan is an autonomous region in northern Iraq that involves four Kurdish majority provinces, including Erbil, Sulaimani, Duhok, and Halabja, with about six million

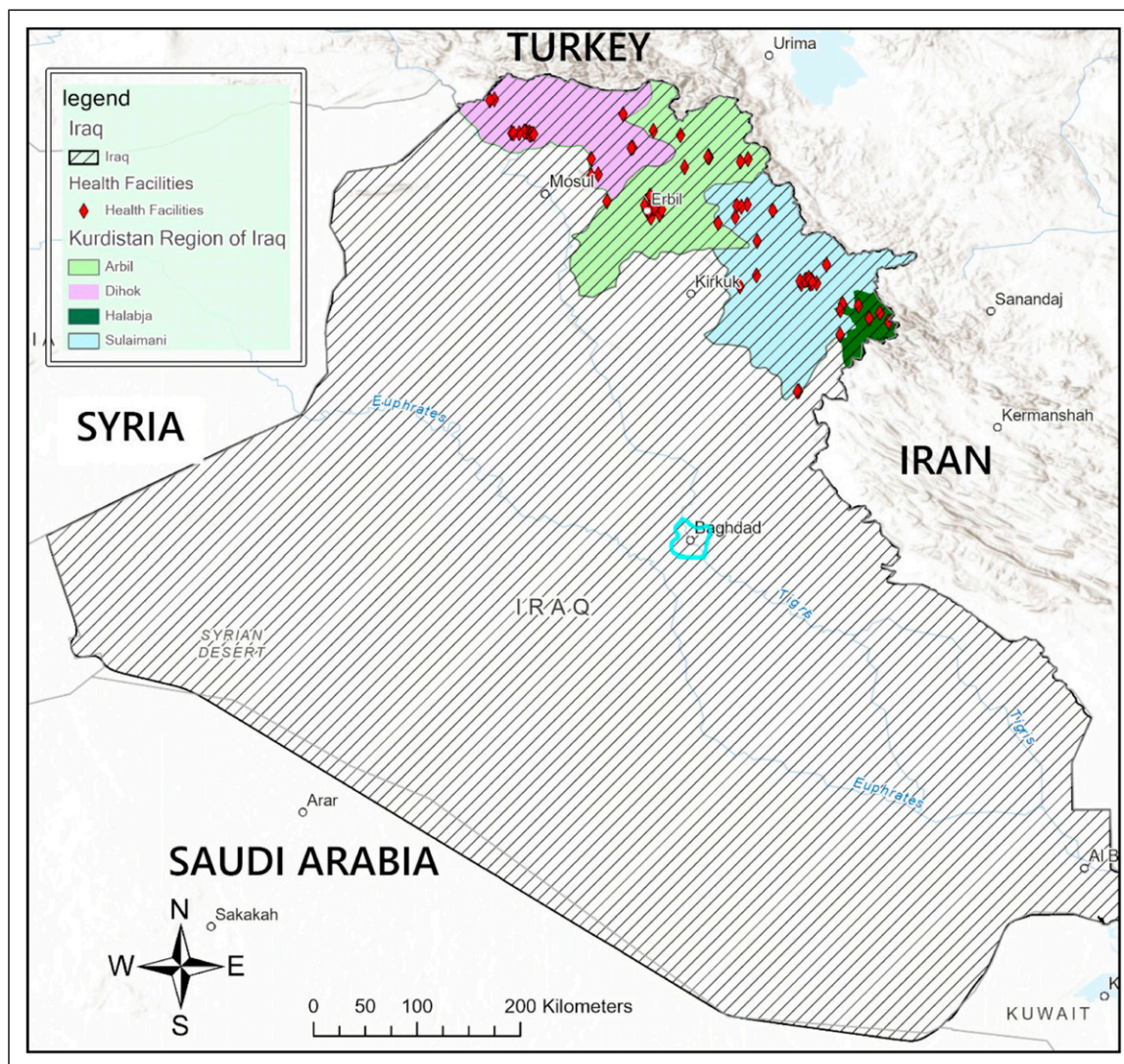


Figure 1. The randomly selected health facilities for assessment of CDSS in the Kurdistan region of Iraq.

inhabitants who live on a territory of 46 861 squared kilometers.¹⁷ The CDSS in Kurdistan is directed by the MoH of federal government in Baghdad. The CDSS in the region involves 291 communicable disease reporting sites (hospitals and primary healthcare centers) which assigned to report communicable diseases. Up to our knowledge, the quality of the CDSS in the Kurdistan Region of Iraq has never been assessed. The current study aims to determine the quality of CDSS in this region of Iraq.

Methodology

Design and Settings

A retrospective records review and direct interviews with surveillance staff in all surveillance system levels $n = 82$ (national $n = 1$, districts $n = 7$, and health care facilities (HF) n

$= 74$) were conducted in the Kurdistan region Iraq from September 2018 to June 2021.

Generally, the communicable diseases surveillance in Iraq is passive or routine surveillance except for acute flaccid paralysis (AFP), the occurrence of any outbreak in the country will trigger an active surveillance activity. There are 53 communicable diseases which have surveillance priority that classified into; immediately notifiable, weekly reported, and case-based reporting diseases.^{16,18} According to the priority of some conditions, there are syndromes under surveillance like acute diarrhea on a weekly basis. The governorates share their data with the national surveillance level using Epi-info 7 software. Two leading quality indicators are used to monitor the CDSS performance; completeness, which means how many surveillance sites are reported, and timeliness, which means submitting the reports

at the due time. In these settings, the system quality attributes in terms of timeliness, completeness, simplicity, usefulness, flexibility, and acceptability were assessed, using the indicators of evaluation and monitoring of CDSS that validated by the World Health Organization (WHO) 2006 guide for assessing CDSS.⁵

Sampling and sample size estimation: A total of 74 surveillance sites were selected in the Kurdistan governorates (Duhok, Erbil and Sulaimani, and Halabja) using random stratified sampling to represent the surveillance sites in the region, see [Figure 1](#). The WHO guide for the service availability and readiness assessment (SARA) was utilized to determine the sample size.¹⁹ The following formula was used

$$n = [(z^2 * p * q) + ME^2] / [ME^2 + z^2 * p * q / N]$$

where: $z = 1.96$ for a confidence level (α) of 95%, $P = .5$ proportion (expressed as a decimal), $q = 0.5 (1-p)$, $N = 291$ population size, $Me = 0.10$ margin of error.

Data Collection

The WHO generic questionnaire was modified by adding indicators from the WHO 2006 guideline.^{5,13} Then, it applied for data collection by a direct interview with the surveillance workers in the selected places. Additionally, the researchers reviewed the records and documents in the district and central levels of surveillance to assess the timeliness and completeness of surveillance during 2018, 2019, and 2020. Timeliness is calculated by equation, (Total number of reports received on time within time period divided by the number of reports expected in that time period). While, the completeness of reporting sites is computed by the equation, (Total number of reports received within the time period (irrespective of time of receipt)/Number of reports expected in the time period). This study focused on reporting timeliness and completeness of reporting sites. The staff perspectives were recorded on a prepared questionnaire during face-to-face direct interviews. The question like (In your experience/judgment do you believe any part of the surveillance system is unnecessarily complicated? Please state your opinion on scale (Complicated Difficult Moderate Simple Very simple)) was used to assess the simplicity and so on for other quality attributes.

Data Analysis

As mentioned previously 53 diseases are clustered in three reporting forms (immediately notifiable, weekly reported, and case-based reporting), the timeliness and completeness of these reporting forms was calculated. The Likert scales were used which include responses like (Very Poor, Poor, Fair, Good, and Excellent) each of these responses had gotten a numeric value. The numeric values were indicating performance quality as (Very Poor = 20%; Poor = 40%; Fair = 60%;

Table 1. Surveillance reporting timeliness and completeness of CDSS in the Kurdistan region of Iraq from 2018–2020.

Quality Attributes	No of HFs	2018, %	2019, %	2020, %
Timeliness				
Erbil	101	88	95	54
Sulaimani and Halabja	114	72	99	93
Duhok	76	94	100	26
Total	291	83	97.87	68.86
Completeness				
Erbil	101	87	98	98
Sulaimani and Halabja	114	73	99	100
Duhok	76	93	94	100
Total	291	83	97.25	99.21

Good = 80%; and Excellent = 100%) performance. The collected data were extracted into an excel spreadsheet and analyzed by IBM Statistical Package for the Social Sciences (SPSS) statistics 2019 software version 26. The average performance score was computed using the numeric values, and the results were reported with descriptive statistical measurements (frequencies and percentages).

Ethical Considerations

The Ethics Committee of the Sulaimani Polytechnic University granted permission to conduct this study under project number CH00036/21/October/2019. The study participation was entirely voluntary, and the anonymity of the participants and confidentiality of the information was assured and maintained throughout this study.

Results

Timeliness

The timeliness of CDSS is a crucial performance quality indicator. [Table 1](#) shows the reporting timeliness of the surveillance system in the Kurdistan governorates from 2018 to 2020. The findings showed fluctuation in timeliness; the highest was in 2019 with 100%, 99%, and 95% in Duhok, Sulaimani, and Erbil, respectively. And the lowest was in 2020, with 26% for Duhok, 93% for Sulaimani, and 54% for Erbil.

Completeness

There was significant progress in all governorates regarding completeness. It had improved from 83% in 2018 to 97% in 2019 and almost achieved the target (100%) in 2020 ([Table 1](#)). Regarding the data completeness (Are all the data on each of the required variables in a surveillance form collected, registered, and compiled?⁵), 94.6% of health facilities have had complete filled registers.

Table 2. The quality attributes (simplicity, usefulness, flexibility, acceptability, and reliability) of CDSS in the Kurdistan region of Iraq.

Quality Attributes	Frequencies 74	Percentage 100%	Total scores 1.00 (100%)
Simplicity			
Very difficult	0	0	0.75 (75%)
Difficult	8	10.8	
Moderate	8	10.8	
Simple	54	73	
Very simple	4	5.4	
Usefulness			
Very Poor ^a	0	0	0.72 (72%)
Poor	7	9.5	
Fair	24	32.4	
Good	36	48.6	
Excellent	7	9.5	
Flexibility			
Very poor	0	0	0.67 (67%)
Poor	8	10.8	
Fair	32	43.2	
Good	34	45.9	
Excellent	0	0	
Acceptability			
Very poor	0	0	0.72 (72%)
Poor	10	13.5	
Fair	11	14.9	
Good	50	67.6	
Excellent	3	4.1	
Reliability			
Very poor	2	2.7	0.69 (69%)
Poor	10	13.5	
Fair	16	21.6	
Good	45	60.8	
Excellent	1	1.4	

^aVery Poor = 20%, Poor = 40%, Fair = 60%, Good = 80%, Excellent = 100.

Simplicity

The term simplicity in surveillance context refers to the structure of the system and ease of operation. In the simplicity domain of CDSS, 73% of the participants believed that the system is simple, and 5.4% saw the system as very simple, while 10.8% stated the system is complex, and the total simplicity score was 75% see [Table 2](#).

Usefulness

The surveillance system is useful if provided information was used for early detection and appropriate public health response and control of outbreaks. Almost most surveillance staff believed that the surveillance information is valuable and can be used to prevent and control infectious disease and guide public health authorities to make appropriate decisions. However, 9.5% of participants thought that the provided data are poorly helpful for decision making; the total score of usefulness was 0.72.

Flexibility

Flexibility denotes the system's ability to adapt to changing information requirements and operating conditions per minimal additional cost. Regarding the flexibility domain of CDSS, 45.5% of interviewees believed that the system has good flexibility, whereas 43.2% referred to the system as fair and 10.8% referred to it as having poor flexibility. The total score of flexibility was 67% ([Table 2](#)).

Acceptability

Acceptability of a CDSS is the willingness of the surveillance staff to participate and implement the system, including those who operate the system and surveillance data end-users, and to accept and use the data yielded by the system. 67.6% of the study population state that they are happy with working in CDSS and willing to remain at work in this program. 13.5% of the staff ranked the system as poorly acceptable; they claimed that the

end-users do not use the produced data for action. All participants (100%) were satisfied with their job as surveillance staff.

Reliability

Reliability reflects “the ability to collect, manage, and provide data properly without failure”²⁰ and whether the end-users of surveillance information relies on this information for decision making or not. 60.8% of study participants ranked the system as having good reliability, besides 13.5% and 2.7% of them ranked the system as having poor and very poor reliability, respectively, with an overall score of 69% in reliability domains (Table 2).

Discussion

The assessment of the quality of CDSS is essential to document and track the progress in quality indicators (timeliness, completeness, simplicity, usefulness, flexibility, and acceptability) and demonstrate any changes in the system performance. However, evaluation of surveillance systems’ quality and comparison with other countries is complicated. Knowing that various surveillance techniques are applied across countries and changing over time, it may not be reasonable to make a direct comparison.²¹ On the other hand, few published evaluations of infectious disease surveillance have reported timeliness that are not comparable.²²

Reporting timeliness in the Kurdistan Region of Iraq is similar to Kadhum, S. study in Baghdad who reported timeliness as 92.8%,²³ and with Hossein Akbari et al findings in Iran in which timeliness was 87%,²⁴ and is much higher than in Ghana, 45% in 2012 and 61% in 2013²⁵ and British national microbiological surveillance system 49.9%.²⁶

The completeness improvement in the current study may be due to the rise in public attention about communicable diseases resulting from COVID-19 pandemic. In addition to the intensive training courses and comprehensive supervision visits in 2018. According to Tawfeeq W. F et al, the completeness of the surveillance report in Wasit (a province in Iraq) was 22.9% in 2010²⁷; since this study was conducted 10 years ago, the improvement during that period is expected. The findings are similar to the completeness in Sierra Leone 91%, Ghana 96%,^{25,28} contrary to the Qatar study, 47%.²⁹ Bear in mind that the completeness in the previous studies is for 1 disease, for example, malaria surveillance in Qatar, not overall system completeness. According to the benchmark standard target of performance of developing countries is 80% based on WHO and CDC guide for Africa⁽³⁰⁾ the timeliness of reporting communicable diseases was under a standard (68.9%) in 2020 in the Kurdistan region, whereas completeness was reasonably high.

The staff perception about the simplicity of the surveillance system was 75%, which is higher than the Tunisia study that scored 54%.³¹ The CDSS in the Kurdistan region of Iraq had better surveillance quality performance compared to the influenza-like illness surveillance system in Tunisia, except

for flexibility, that records in quality attribute include acceptability, flexibility, usefulness and availability’s mean scores were 60%, 80%, 60%, and 54% respectively.³¹

Conclusion

In conclusion, our findings demonstrate that, although some progress in the CDSS was seen in the previous years. Comparing to the standard benchmark performance target of 80%, the system is still facing significant challenges in timeliness, simplicity, usefulness, flexibility, acceptability, and reliability. Further studies to assess the system’s quality, particularly the system’s timeliness of outbreak response, sensitivity, and specificity, are recommended. A periodic assessment of the CDSS may help in identification of challenges to and opportunities of the system.

Acknowledgments

We want to express our gratitude to the Ministry of Health for allowing this study and making data collecting possible. In addition, we would like to thank the surveillance employees and health care providers that assisted with this assessment.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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