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ORIGINAL RESEARCH

Integrated Disease Surveillance Response Practice and Associated Factors Among Health Professionals Working in Public Hospitals in West Hararghe Zone, Eastern Oromia, Ethiopia: Multi-Center Cross-Sectional Study

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Background: Health workforces across all levels of the healthcare system are the main modulators in the effective implementation of disease surveillance system. However, their level of integrated disease surveillance response (IDSR) practice and determinant factors was hardly investigated in Ethiopia. This study determined the level of IDSR practice and associated factors among health professionals in the west Hararghe zone, eastern Oromia, Ethiopia.

Methodology: A multicenter facility-based cross-sectional study design was conducted between December 20, 2021, and January 10, 2022, among 297 systematically selected health professionals. Trained data collectors collected data using structured pretested self-administered questionnaires. The level of IDSR practice was assessed using six questions where each acceptable practice was given "1" and unacceptable "0", with a total score of 0 to 6. Hence, a score above or equal to the median was categorized as good practice. Epi-data and STATA were used for data entry and analysis. A binary logistic regression analysis model with an adjusted odds ratio was used to determine the effects of independent variables on the outcome variable.

Results: The magnitude of good practice of IDSR was 50.17% (95% CI: 45.17, 55.17). Being married (AOR = 1.76; 95% CI: 1.01, 3.06), perceived organizational support (AOR = 2.14, 95% CI: 1.16, 3.94), good knowledge (AOR = 2.77, 95% CI: 1.61, 4.78), positive attitude (AOR = 3.30, 95% CI: 1.82, 5.98) and working in an emergency (AOR = 0.37, 95% CI: 0.14, 0.98) were significantly associated with the level of practice.

Conclusion: Only half of the health professionals had a good level of practice in integrated disease surveillance response. Marital status, working department, perceived organizational support, knowledge level, and attitude toward integrated disease surveillance were significantly associated with health professionals' practice of disease surveillance. Thus, organizational and provider-targeted interventions should be considered to improve the knowledge and attitude of health professionals that improve integrated disease surveillance response practice.

Keywords: Integrated disease surveillance, response, practice, health professionals, public hospitals, Ethiopia

Introduction

Surveillance, including early warning and epidemic intelligence, is an essential element to detect public health significance diseases and initiate management interventions rapidly.[1] It is a base for the control and prevention of disease and the principal component delineated in the International Health Regulations (IHR) core capacity monitoring framework.[1]

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Integrated Disease Surveillance and Response (IDSR) system is renowned, as a part of a health information system that organizes data to information for action, comprises health professionals, material, and database, and has been acknowledged as an effective strategy in the efforts to prevent and control diseases, especially epidemic-liable diseases.[2–4]

The need for timeliness in reporting and response that requires effective linkages to those with authorized responsibility for disease control imposes additional requirements on health information systems.[2,3] Delays in every step of reporting epidemic outbreaks and other diseases of public health priority concerns have been linked to poor implementation of the IDSR system.[5] Many less developed and developing countries have been suffering to implement effective IDSR systems.[5]

Globally there is increasing growth of threat epidemics pose to health security and a significant disaster to the livelihood of people.[6] Thus, there is a persistent need for a strategic solution for every public health system, particularly in African and other poor-income settings where infectious and epidemic-liable diseases are national priority diseases.[3] In sub-Saharan Africa, due to the increasing number of infectious disease threats from time to time, effective ways of predicting outbreaks and planning for responses become critically important.[7] Such activities need the functioning system of IDSR that involves the continuous scrutiny of disease on an individual, local, national, and international level and depends on health professionals practicing in the health-care sector.[8]

Health workforces are the main modulators in achieving effective IDSR system implementation and improvement across all levels of the healthcare system.[9] This needs consistent availability of reliable, competent, and motivated professionals that monitor and designate the incidence and spread of diseases and events of public health significance as reportable, including individual reports whose signs demonstrate unknown, acute problems as well as clinical and laboratory diagnoses that meet standard case definitions for the diseases under surveillance.[9–12]

Despite being at risk of health security threats, the developing world like the African region is still facing challenges of insufficient numbers of trained personnel and high turnover.[6,9–11] In African countries, particularly sub-Saharan, emerging and re-emerging infectious disease with pandemic potential continues to frustrate fragile health-care systems and challenged the continent.[6] The IDSR strategy assisted countries in better monitoring and tracking planned time-bound targets as part of the improvement to the health-care system. However, after a decade of implementation, the level of IDSR practice among health professionals still needs improvement.[1]

In Jordan, the level of notifiable disease surveillance practice was 39.5% among physicians,[13] while in Egypt, the mean score of IDSR practice of health professionals was 68.6%.[14] However, in Nigeria, the level of IDSR practice was reported as 18.8%,[15] while only 23.6% of health professionals knew half of the listed priority diseases under surveillance, and 40.3% of study participants did not know reporting procedure.[16] In Zanzibar (Tanzania), only 30% of district surveillance staff and 17% of the staff of public primary health facilities were able to describe the IDSR strategy.[17] In Zambia, good knowledge of disease surveillance was 45.5%,[5] while in Kenya, only 27% of health professionals knew the IDSR strategy, and 92.9% were not aware of the number of priority diseases under surveillance.[18]

Available shreds of evidence show several organizational and individual-related factors associated with a poor level of IDSR practice. Lack of organizational support, poor knowledge, lack of time or workload, procedure complexity, inadequate resources, transport and communication challenges, perceptions, lack of regular data analysis and interpretation, absence of feedback, poor staff motivation, lack of staff, lack of training and weak supervision were factors linked to poor IDSR practice and reported to affect the overall implementation of the IDSR system.[5,8,19–24] Like other resource-restricted countries, in Ethiopia, recurrent and unexpected disease outbreaks are continually confronting the public health system. The management of health consequences of natural and human-made disasters, emergencies, crises, wars, and conflicts is challenging the detection and response to outbreaks and continues to disrupt the already fragile healthcare system in the country. Due to these problems, the detection and response to outbreaks are becoming complicated.[19,20,25]

Currently, the surveillance system is operated in health facilities under the guidance of the Ethiopian public health institute through a dedicated structure from the facility to a higher level in all regions.[25] Despite the achieved improvement through IDSR evidenced in Ethiopia, the overall implementation status of the system is not satisfactory.[19,20,25] In Dawuro zone, Southwestern Ethiopia, 64.3% of health centers had a reporting system, of which 35.7% reported sending in surveillance reports by hand delivery,[25] while the overall quality of IDSR service provision was good in 13% of health facilities in Tigray region, Northern Ethiopia.[19]

To find a possible solution for challenged surveillance in complex situations where resources are limited, studies are needed. However, to the best of the Authors' knowledge, no study addressed the level of and factors affecting the practice of disease surveillance among health professionals in Ethiopia, particularly in eastern part. Yet there is a gap in the scientific evidence on the level of practice of disease surveillance and affecting factors among health professionals. Therefore, the purpose of this study was to determine the level of IDSR practice and associated factors among health-care professionals in the West Hararghe zone, eastern Oromia, Ethiopia.

Methods and Materials

Study Area and Period

The study was conducted in public hospitals of West Hararghe Zone. West Hararghe Zone is one of the 20 Zones in the Oromia Regional State. Chiro town, the capital of the zone, is located, 321 kilometers from Addis Ababa, the capital city of the country, in the eastern direction. By 2020, the Zone has a total population of 2,728,836. The zone has 15 districts and 2 city administrations. There are a total of seven public hospitals, 84 public health centers, and 482 health posts in the zone.[26] There are two general hospitals; Chiro and Gelamso General Hospital, and five primary hospitals: Asebot, Hirna, Burka Dhintu, Badessa, and Daro Labu. Since the last three primary hospitals, Burka Dhintu, Badessa, and Daro Labu, did not have functional disease reporting systems until the development of the proposal, the study was conducted in Chiro and Gelamso General Hospitals and Asebot and Hirna Primary Hospitals from December 20, 2021, to January 10, 2022.

Study Design and Population

The study employed a multi-facility-based cross-sectional study design using an interviewer-administered questionnaire. All health professionals including Doctors, Nurses, Midwives, Laboratory technicians, Health officers, Integrated emergency surgical officers, Psychiatry professionals, Anesthetists, and Optometrists who met the inclusion criteria and gave consent were studied. All health professionals who were working in public hospitals, who were available during the data collection period, and who gave consent were included in the study, whereas, health professionals who were on annual leave during data collection time, not volunteers, not staff of the stated hospital, and less than six months after recruitment were not included in the study.

Sample Size Determination and Sampling Procedures

The sample size required for this study was calculated using the double population proportion formula: $n = \frac{(Z\alpha/2+Z\beta)2*(P1(1-P1)+(P2(1-P2))}{(P1-P2)2}$ with the assumptions of 63.5% prevalence of a good level of IDSR practice from the study in Nigeria[27] and 74.8% of health professionals reported different factors associated with the DSR system,[21] power of 80%, a design effect of 2 and 10% non-response rate. This resulted in a sample size of 257. When multiplied by a design effect of 2 yields 514. Since our total population (586) was less than 10,000, the sample size was adjusted using the correction formula and resulted in a sample size of 275. After adding a 10% non-response rate, the sample size was 303. Finally, 303 was the final sample size used for this study. However, data were collected from 297 health professionals who signed consent for this study.

Proportional allocation to size (PPS) was used for selecting study participants from each public hospital in West Hararghe. Accordingly, from the four functional hospitals in the zone, sample sizes were proportionally allocated to each hospital based on the number of health professionals in each hospital then the respondents were selected from each hospital by using simple random sampling. Accordingly, 101/195, 91/176, 53/103, and 58/112 health professionals were selected from Chiro General Hospital, Gelamso General Hospital, Asebot Primary Hospital, and Hirna Primary Hospital, respectively.

Data Collection Methods and Procedures

Four clinical nurses collected the data using a self-administered questionnaire that was adapted, standardized, and used in different studies.[5,13,14,28] The questionnaire had five parts. The first part was the socio-demographic characteristics of health professionals, the second part was perceived organizational support factors, the third part was behavioral factors (knowledge and attitude of health professionals on IDSR), the fourth part was technical competency, technical

complexity factors and perceived IDSR data quality factors, and the last part was IDSR practice of health-care professionals. The data collection was done at the workplace of study participants in each hospital simultaneously from December 20, 2021, to January 10, 2022.

Variables

The main outcome variable of this study was the level of integrated disease surveillance reporting practice, whereas, socio-demographic characteristics (sex, age, educational status, profession, working department, year of experience), perceived organizational factors (training, availability of report form, supervision, motivation, work overload, responsibility, accountability, the culture of data use), behavioral factors (knowledge, beliefs, and attitude of IDSR), perceived quality of IDSR data and perceived technical competency (design of data collection, use of technology, format friendly, complexity of report procedure) were independent variables.

Operational Definitions and Measurements

Attitude: It is a health professional's beliefs, opinions, and agreement regarding IDSR whether positive or negative opinions. A scoring system was used in which the respondent's correct and incorrect answers provided for the questions were allocated "1" or "0" points, respectively, and a score above or equal to the median was categorized as a positive attitude, whereas a score below the median as negative attitude towards IDSR.[4,14] Knowledge of IDSR: this study defined knowledge of disease under surveillance, condition, and even notified, knowledge of reporting procedure and period and measured by six questions. Each correct answer was assigned "1" and an incorrect was "0" and summed up to give a total knowledge score ranging from 0 to 6 and used to classify the knowledge into two categories: good knowledge (if above or equal to the median) and poor knowledge (if below the median).[4,5,14] Practice of IDSR: is the act of identification of cases, investigation, registration, notification, and reporting of priority disease data to relevant bodies. It was measured using six questions, where each acceptable or correct practice was given a score of "1" and unacceptable was assigned a score of "0", hence the total score of IDSR practice ranged from 0 to 6. Since data were not normally distributed, the median was used for the classification of practice that scored above or equal to the median categorized as good practice whereas a score below the median was the poor practice of IDSR.[4,13,14] Perceived organizational support: is defined as any factor associated with organizational support related to surveillance activity of health-care professionals and assessed by 7 computed questions with a total score range of 0 to 7. Based on the respondent's correct or incorrect answer to each question, a score of "1" was allotted for each acceptable support and "0" for unacceptable support. Then, the total score above or equal to the median was categorized as good organizational support, whereas a score below the median as poor organizational support. Perceived quality of IDSR data: in this study defined in terms of data accuracy, completeness, and timeliness of the report and measured using five-point Likert scale questions scored out of 25. A total score of 20 and above was taken as good, and a score less than 20 was considered poor.[19] Perceived technical competency of IDSR: is defined in terms of data collection design, use of technology for data entry, analysis, and format friendly and measured by Five Point Likert scale questionnaire. A total of six questions were computed to construct the technical competency factor and scored out of 30, a score of 24 and above was reported as good technical competency, and a score less than 24 was reported as poor technical competency.[4]

Data Quality Management

Data were collected using a standardized self-administered questionnaire after adequate training was given to the data collectors and supervisors on data collection tools and procedures. The standard questionnaire was prepared in English. The tool was pre-tested on 5% of the sample size in Haramaya Hospital and appropriate amendments were done before the actual data collection. A content validity test was applied by checking the coverage of the content listed conceptual framework. Data collectors were clinical nurses and supervisors were professional nurses and/or public health officers. Both data collectors and supervisors were selected from other health institutions not under study. Two days of training were given to the data collectors on the data collection tool and the data collection procedures. Supervisors and the principal investigator closely supervised the data collection process at each hospital. The collected data were checked for completeness of each questionnaire at the end of each day. Two data clerks did double data entry and crosschecked the

consistency of the entered data by comparing the two separately entered data into Epidata and then exporting to STATA for analysis.

Data Processing and Analysis

After data collection, each questionnaire was checked for completeness and coded before entry into the software, then entered into Epidata version 3.1 and exported to STATA version 16.0, cleaning and analysis were done accordingly. Frequency, percentage, and descriptive summaries were computed for univariate variables. Binary logistic regression was carried out to identify factors associated with IDSR practice. The goodness of model fitness was checked by the Hosmer-Lemeshow test. Multi-collinearity tests were carried out to see the correlation between independent variables and checked by using the standard error and collinearity statistics (variance inflation factors >10 and standard error >2 were considered as suggestive of the existence of multi co-linearity). Variables with a p-value less than 0.25 in the bivariate binary logistic regression analysis were considered for further multivariate binary logistic regression analysis to control for possible confounding factors. In the multivariate binary logistic regression, the Odds ratio along with 95% CI was used to present the association, and statistical significance was declared at a p-value <0.05. The finding was described and presented using tables, charts, and graphs.

Results

Socio-Demographic Characteristics of the Study Participants

Out of 303 health professionals recruited for this study, 297 participated with a response rate of 98.01%. The median age of respondents was 28 (IQR: 5) years while 30.64% of respondents were between the age of 25–28 years. The majority of the study participants, 61.95%, were males. More than half, 52.53% were nurses in the profession and 35.69% were working in the inpatient department. About a third, 32.00%, of the respondents, reported experience in an administrative position/role and 42.09% had worked for more than five years (Table 1).

Perceived Organizational Support

In this study, perceived organizational support related to IDSR practice was also assessed. Accordingly, the presence of training on IDSR within 12 months preceding data collection time, availability of adequate IDSR reporting formats, presence of a system of recognition or reward system for good performance, accountability for reporting system or a penalty for not reporting and receiving feedback for the practice of IDSR from the zonal or regional health bureau was reported by 39.06%, 71.72%, 54.21%, 64.31%, and 65.66% of the study participants, respectively. The computed overall good perceived organizational support for IDSR practice was reported by 62.96% of the study participants (Figure 1).

Knowledge of IDSR

Out of 297 study participants, 69 (23.23%) knew the exact figure of reportable disease. More than two-fifth of the participants, 43.43% knew reporting timeliness of the disease/conditions both immediately and weekly. The overall good level of IDSR knowledge of health professionals was 52.52% (Figure 2).

Attitude of Health Professionals on IDSR

Out of the study participants, 94.28% agreed with the use of surveillance to detect epidemics, whereas 86.53% agreed with the importance of surveillance. The convenience of the surveillance system was reported by 68.01% of study participants. More than three-fifths (61.95%) of health professionals agreed with the responsibility of reporting by service providers, while 29.63% of participants agreed on the importance of reporting the case despite the difficulty in confirming it. More than four-fifths, 80.13%, of the study participants answered that reporting notifiable diseases was mandatory, irrespective of other work. Overall, 68.01% of health professionals had a positive attitude toward IDSR (Table 2).

Table 1 Socio-Demographic Characteristics of the Respondents in West Hararghe Zone, Oromia, Eastern Ethiopia, 2022 (n = 297)

Variables	Category	Frequency	Percent (%)
Age of respondents*	<25	79	26.60
	25–28	91	30.64
	28–30	54	18.18
	>30	73	24.58
Sex of respondents	Male	184	61.95
	Female	113	38.05
Marital status	Married	164	55.22
	Unmarried	123	41.41
	Divorced	10	3.37
Educational status	Diploma	87	29.30
	Degree	193	65.00
	Masters and above	17	5.70
Professional	Nurse	156	52.53
	Medical doctor	31	10.44
	Laboratory professional	23	7.74
	Pharmacy professional	22	7.41
	Midwife	36	12.12
	Health officers	7	2.36
	IESO	6	2.02
	Psychiatry professionals	5	1.68
	Anesthesia professionals	6	2.02
	Optometrists	5	1.68
Working department	Inpatient	106	35.69
	Outpatient	75	25.25
	Emergency	31	10.44
	Laboratory	19	6.40
	Pharmacy	16	5.39
	Maternity	32	10.77
	Others**	18	6.06
Experience of administrative position	Yes	95	32.00
	No	202	68.00

(*Continued*)

Table 1 (Continued).

Variables	Category	Frequency	Percent (%)
Level of administrative experience	Department head	88	29.62
	Hospital director	3	1.01
	Chief executive officer	4	1.35
Year of experience [Φ]	≤5 years	172	57.91
	6–10 years	87	29.30
	>10 years	38	12.79
Year of experience in the current facility	≤5 years	213	71.71
	6–10 years	67	22.56
	>10 years	17	5.73
Monthly salary of the respondents in ETB	<5,500	40	13.46
	5500–7000	83	27.97
	7000–8500	95	31.98
	8500–10,000	34	11.44
	>10,000	45	15.15

Notes: *Age: classified based on quartile age classification system. **ART clinic, TB Clinic, Eye clinic, and psychiatry clinic; [Φ]Classified based on the study conducted in Egypt.[14]
Abbreviation: IESO, Integrated emergency surgical officers.

Perceived Technical Competency, Technical Complexity, and Quality of IDSR Data

Out of 297 study participants, 50.17%, 59.25%, 63.97% and 55.90% of respondents reported the presence of well-designed surveillance data collection and reporting formats, the ability of trained staff to fill out IDSR formats, the presence of skilled human resources to collect health data, and the presence of a friendly format that is easy for reporting results and to visualize, respectively.

The presence of IDSR reporting formats, tally sheets, and registers common tools for data collection and reporting was reported by 69.36% of health professionals, while the presence and usage of appropriate technology for IDSR data

Figure 1 Perceived organizational support for IDSR practice among health professionals in public hospitals in West Hararghe zone, Oromia, Eastern Ethiopia, 2022.

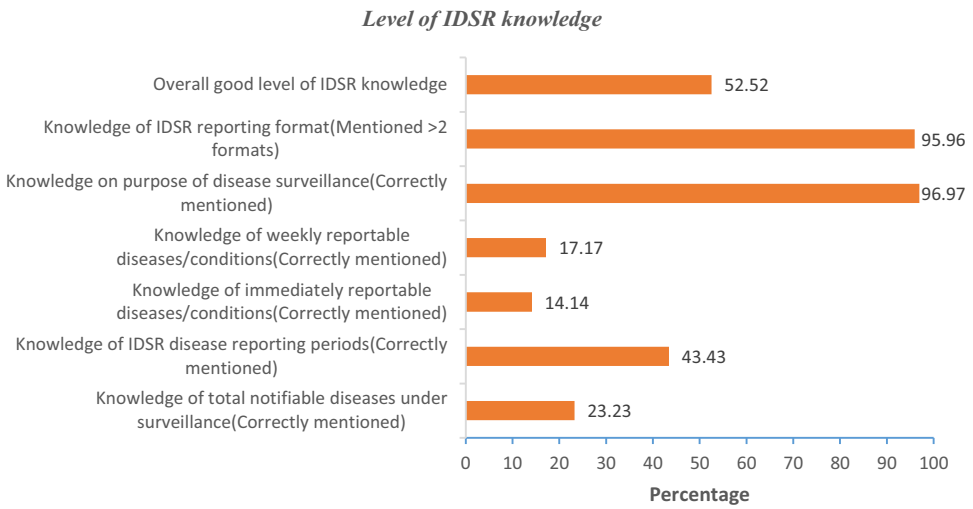

Figure 2 Level of IDSR knowledge among health professionals working in public hospitals in West Hararghe zone, Oromia, Eastern Ethiopia, 2022.

analysis, transfer, and presentation was reported by 47.48% of study participants. In this study, the computed perceived technical competency of IDSR was good among 27.27% of health professionals.

Perceived similarity of reported data from their facility and the data in facility registers was reported by 192 (64.65%) of study participants, while 58.92% of respondents reported perceived similarity of immediate and weekly reported data and the monthly report of the same cases. Completeness of report and data and timeliness of reporting in their working facilities were perceived by 69.02%, 62.96%, and 65.31% of the respondents, respectively. Moreover, overall perceived good quality of IDSR data was reported by 45.45% of health professionals (Table 3).

Table 2 Health Professionals' Attitude on IDSR in West Hararghe Zone, Oromia, Eastern Ethiopia, 2022

Variables	Category	Frequency	Percentage
Surveillance useful to detect epidemic	Yes	280	94.28
	No	17	5.72
Reporting notifiable disease is important	Yes	257	86.53
	No	40	13.47
Reporting disease is one of the public health responsibilities of health professionals	Yes	264	88.89
	No	33	11.11
Feel the surveillance and reporting system in general	Convenient	202	68.01
	Not convenient	95	31.99
Reporting communicable diseases is time consuming and should not be done by health care workers	Yes	184	61.95
	No	113	38.05
Difficulty of diagnose made less likely to be reported	Yes	88	29.63
	No	209	70.37
Too busy to report IDSR	Yes	238	80.13
	No	59	19.87

(*Continued*)

Table 2 (Continued).

Variables	Category	Frequency	Percentage
Preferred IDSR disease reporting methods	Telephone/Mobile	212	71.38
	Fax	18	6.06
	Internet/mail	46	15.49
	Hard copy	21	7.07
Measures to increase willingness to report	Mentioned ≥1 measures	275	92.59
	Not mentioned any measures	22	7.41
Overall attitude	Positive	202	68.01
	Negative	95	31.99

Table 3 Perceived Technical Competency, Technical Complexity and Quality of IDSR Data Among Health Professionals in West Hararghe Zone Public Hospitals, Oromia, Eastern Ethiopia, 2022

Variables	Category	Frequency	Percentage
Perceived technical competency of IDSR			
There is well designed data collection and reporting forms	Agree	149	50.17
	Disagree	148	49.83
Trained staffs able to fill out forms	Agree	176	59.25
	Disagree	121	40.75
There is skilled human resource to collect health data	Agree	190	63.97
	Disagree	107	36.03
Friendly format for reporting results and easy-to-visualize	Agree	166	55.90
	Disagree	131	44.10
There is reporting forms, tally sheets, and registers as a common tool for data collection and reporting	Agree	206	69.36
	Disagree	91	30.64
There is use of appropriate technology for data analysis, transfer, and presentation	Agree	141	47.48
	Disagree	156	52.52
Overall perceived technical competency	Good	81	27.27
	Poor	216	72.73
Perceived technical complexity of IDSR			
Feel IDSR reporting format is easy to understandable	Yes	231	77.78
	No	66	22.22
Data collection tools are difficult to understand	Yes	122	41.08
	No	175	58.92

(*Continued*)

Table 3 (Continued).

Variables	Category	Frequency	Percentage
Surveillance data analysis there	Yes	198	66.67
	No	99	33.33
Overall technical complicity of IDSR	Good	207	69.69
	Poor	90	30.31
Perceived surveillance data quality (data accuracy, completeness, timeliness)			
Data reported similar to data in facility registers	Agree	192	64.65
	Disagree	105	35.35
Weekly and immediately reported surveillance data are similar to data on monthly reports submitted	Agree	175	58.92
	Disagree	122	41.08
Expected surveillance reports are submitted to next level	Agree	205	69.02
	Disagree	92	30.98
Surveillance data elements expected in immediately and weekly reports are completely filled	Agree	187	62.96
	Disagree	110	37.04
Immediately and weekly disease report submitted by specified dead line to the next level	Agree	194	65.31
	Disagree	103	34.69
Overall perceived data quality	Good	135	45.45
	Poor	162	54.55

Level of IDSR Practice with Its Components

Out of 297 health professionals who participated in this study, 50.17% (95% CI: 45.17–55.17) have good practice of IDSR (Figure 3). The computed overall good perceived organizational support for IDSR practice was reported by 62.96% of the study participants. The overall good level of IDSR knowledge of health professionals was 52.52% and 68.01% of health professionals had a positive attitude toward IDSR. Moreover, overall perceived good quality of IDSR data was reported by 45.45% of health professionals, whereas only 27.27% of health professionals reported good perceived technical competency on IDSR (Figure 4).

Factors Associated with IDSR Practice

After running the Chi-square test, marital status (X^2=8.04, p = 0.01), profession (X^2=19.78, p = 0.01), salary (X^2=23.64, p = 0.00), perceived organizational support (X^2= 17.05, p = 0.000), level of IDSR knowledge (X^2=23.22, p = 0.000), the attitude of providers on IDSR (X^2=26.42, p = 0.000), perceived technical competency (X^2=8.76, p = 0.003), perceived technical complexity (X^2=18.75, p = 0.000), and surveillance data quality (X^2=18.13, p = 0.000) were significantly associated with providers practice of IDSR.

For this study, binary logistic regression was fitted. During bivariable analysis, eight variables (including marital status, working department, organizational support factors, level of IDSR knowledge, attitude toward IDSR, technical competency, perceived surveillance data quality, and technical complexity) with a p-value <0.25 were included in multi variable analysis (Table 4).

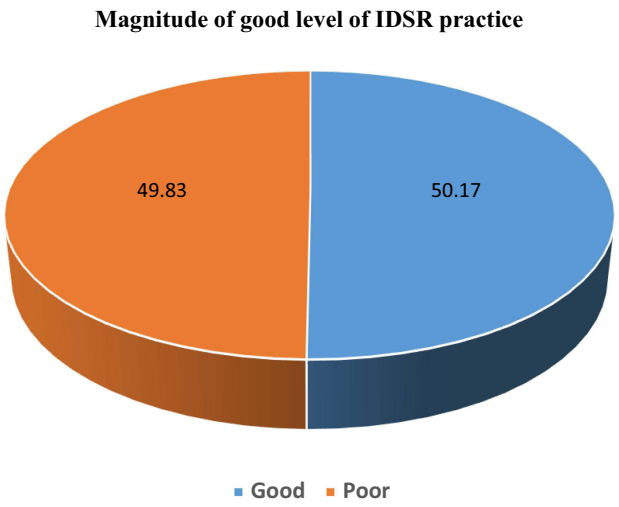

Figure 3 Magnitude of good level of IDSR practice among health professionals in public hospitals of West Hararghe zone, Oromia, Eastern Ethiopia, 2022.

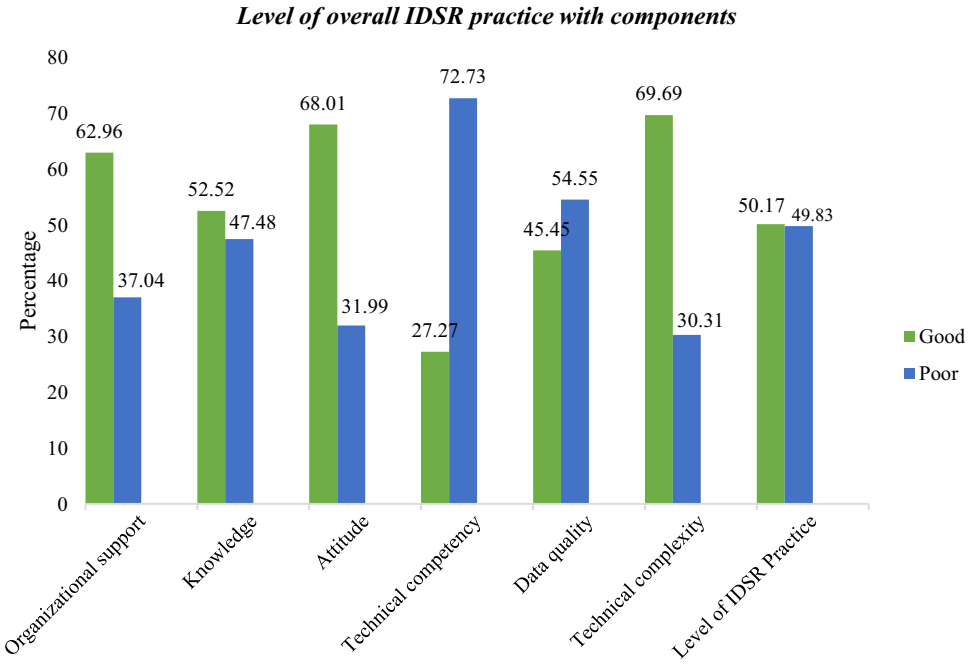

Figure 4 Level of overall IDSR practice with components among health professionals in public hospitals in West Hararghe zone, Oromia, Eastern Ethiopia 2022.

During multivariate analysis, only five variables including, marital status, working department, perceived organizational support, knowledge of IDSR, and attitude of health professionals on IDSR showed significant association with IDSR practice at p-value <0.05.

Accordingly, the odds of good practice of IDSR was 1.76 (AOR = 1.76, 95% CI: 1.01, 3.06) times higher among married study participants compared to those not married. Similarly, those who had perceived good organizational support were 2.14 (AOR = 2.14, 95% CI: 1.16, 3.94) times more likely to practice IDSR compared with their counterparts. Likewise, those who have good knowledge of IDSR were 2.77 (AOR = 2.77, 95% CI: 1.61, 4.78) times more likely to better practice IDSR compared with those who had poor IDSR knowledge. Health professionals who had a positive attitude were 3.30 (AOR: 3.30, 95% CI: 1.82, 5.98) times more likely to better practice IDSR compared to those who had

Table 4 Bivariable Binary Logistic Analysis of Factors Associated with IDSR Practice Among Health Professionals Working at Public Hospitals in West Hararghe Zone, Oromia, Eastern Ethiopia, 2022

Variables	Categories	IDSR Practice		COR (95% CI)	P-values
		Good (n=149)	Poor (n=148)		
Age category	<25	31 (39.24)	48 (60.76)	1	
	25–28	44 (48.35)	47 (51.65)	1.44 (0.78, 2.66)	0.23
	28–30	31 (57.41)	23 (42.59)	2.08 (1.03, 4.21)	0.04
	30+	43 (58.90)	30 (41.10)	2.21 (1.15, 4.24)	0.01
Marital Status	Unmarried	52 (34.90)	71 (47.97)	1	
	Married	94 (63.09)	70 (47.30)	1.83 (1.14, 2.94)	0.012
	Divorced	3 (2.01)	7 (4.73)	0.58 (0.14, 2.37)	0.45
Working department	Outpatient	44 (29.53)	31 (20.95)	1	
	Inpatient	49 (32.89)	57 (38.51)	0.60 (0.33, 1.10)	0.100
	Emergency	14 (9.40)	17 (11.49)	0.58 (0.17, 1.95)	0.206
	Laboratory	10 (6.71)	9 (6.08)	0.78 (0.28, 2.15)	0.63
	Pharmacy	5 (3.36)	11 (7.43)	0.32 (0.10, 1.01)	0.053
	Maternity	17 (11.41)	15 (10.14)	0.79 (0.34, 1.83)	0.59
	Others	10 (6.71)	8 (5.41)	0.88 (0.31, 2.48)	0.810
Perceived Organizational support	Good	111 (74.50)	76 (51.35)	2.76 (1.69, 4.51)	0.000
	Poor	38 (25.50)	72 (48.65)	1	
Knowledge of IDSR	Good	99 (66.44)	57 (38.51)	3.16 (1.96, 5.08)	0.00
	Poor	50 (33.56)	91 (61.49)	1	
Attitude toward IDSR	Positive	122 (81.88)	80 (54.05)	3.84 (2.26, 6.50)	0.00
	Negative	27 (18.12)	68 (45.95)	1	
Perceived technical competency	Good	52 (34.90)	29 (19.59)	2.19 (1.29, 3.72)	0.003
	Poor	97 (65.10)	119 (80.41)	**1**	
Perceived surveillance data quality	Good	86 (57.72)	49 (33.11)	2.75 (1.72, 4.42)	0.00
	Poor	63 (42.28)	99 (66.89)	1	
Perceived technical complexity	Good	121 (81.21)	86 (58.11)	3.11 (1.84, 5.26)	0.00
	Poor	28 (18.79)	62 (41.89)	1	

a negative attitude. However, those who worked in the Emergency department were 63% (AOR: 0.37, 95% CI: 0.14, 0.98) less likely to practice IDSR compared with those who worked in the outpatient department (Table 5).

Discussion

This study was done to identify the level of IDSR practice and associated factors among health professionals. Accordingly, half of the health professionals had a good level of IDSR practice. This finding is higher than the study done in Jordan[13] and the Eastern part of Nigeria[21] in which only 39.50% and 25.20% of health-care providers had a good

Table 5 Multivariable Binary Logistic Analysis of Factor Associated with IDSR Practice Among Health Professionals Working in Public Hospitals in West Hararghe, Oromia, Eastern Ethiopia, 2022

Variables	Categories	IDSR Practice		AOR (95% CI)	P-values
		Good (n=149)	Poor (n=148)		
Marital Status	Unmarried	52 (34.90)	71 (47.97)		
	Married	94 (63.09)	70 (47.30)	1.76 (1.01, 3.06)	0.044*
	Divorced	3 (2.01)	7(4.73)	0.48 (0.10, 2.28)	0.36
Working department	Outpatient	44 (29.53)	31 (20.95)	1	
	Inpatient	49 (32.89)	57 (38.51)	0.66 (0.32, 1.33)	0.25
	Emergency	14 (9.40)	17 (11.49)	0.37 (0.14, 0.98)	0.046*
	Laboratory	10 (6.71)	9 (6.08)	0.58 (0.17, 1.95)	0.38
	Pharmacy	5 (3.36)	11 (7.43)	0.26 (0.06, 1.01)	0.052
	Maternity	17 (11.41)	15 (10.14)	0.65 (0.25, 1.71)	0.392
	Others	10 (6.71)	8 (5.41)	0.53 (0.16, 1.73)	0.29
Perceived Organizational support	Good	111 (74.50)	76 (51.35)	2.14 (1.16, 3.94)	0.015*
	Poor	38 (25.50)	72 (48.65)	1	
Knowledge of IDSR	Good	99 (66.44)	57 (38.51)	2.77 (1.61, 4.78)	0.00**
	Poor	50 (33.56)	91 (61.49)	1	
Attitude toward IDSR	Positive	122 (81.88)	80 (54.05)	3.30 (1.82, 5.98)	0.00**
	Negative	27 (18.12)	68 (45.95)	1	
Perceived technical competency	Good	52 (34.90)	29 (19.59)	1.45 (0.76, 2.75)	0.25
	Poor	97 (65.10)	119 (80.41)	1	
Perceived surveillance data quality	Good	86 (57.72)	49 (33.11)	1.51 (0.83, 2.74)	0.167
	Poor	63 (42.28)	99 (66.89)	1	
Perceived technical complexity	Good	121 (81.21)	86 (58.11)	1.80 (0.94, 3.43)	0.072
	Poor	28 (18.79)	62 (41.89)	1	

Note: *Significant predictors at $p < 0.05$, **Significant predictors at $p < 0.01$.

level of IDSR practice, respectively. On the contrary, the result of this study showed a lower level of IDRS practice compared to the study conducted in Egypt,[14] Nigeria,[27] Kingdom of Bahrain[8] and in the Tigray region of Ethiopia,[19] which revealed 68.70%, 63.50%, 80.01%, and 80.40% good level of IDSR practice, respectively. The reason for this discrepancy might be knowledge differences, low organizational support, the country's educational curriculum, and the complexity of reporting systems and study areas.[8,14]

Health professionals who had good perceived organizational support were more than two times (AOR: 2.14) more likely to have good IDSR practice compared to those who had poor organizational support. This was in line with a Nigerian study, in which health-care workers who had received training on disease surveillance and those who received regular feedback for their reporting practice were three (AOR: 3.41) and four (AOR: 4.12) times more likely to report neglected tropical diseases and had good IDSR practice compared to their counterparts, respectively.[27] This might be because organizational support like training was one supportive package of IDSR implementation indicating that

effective training closes the knowledge gap and therefore improves the attitude and practice of health-care workers in disease surveillance and reporting.[25] However, a contrasting study finding was reported from South Africa[29] revealing no significant association between training on disease surveillance and notification (DSN) (OR: 1.16) and IDSR practice.

Regarding the level of IDSR knowledge, health-care professionals who had good knowledge were about three times (AOR: 2.77) more likely to have good IDSR practice compared with those who had poor knowledge. This is consistent with studies conducted in Nigeria[16,21] and Egypt,[14] in which knowledge of the reportable disease, the reporting formats, the reporting period and frequency, and the purpose of surveillance tended to affect the level of IDSR practice. This indicates knowledge of the disease reporting system is essential for IDSR practice, which plays a crucial role in the prevention and control of infectious diseases.[30]

Moreover, health professionals who had a positive attitude were 3.30 times (AOR: 3.30) more likely to practice IDSR. This finding is in agreement with the study conducted in Egypt.[14] This indicates positive attitudes toward the IDSR system signifies willingness to participate in disease surveillance, helps maintain a good level of practice, and is an enabling factor for disease surveillance and reporting practice.[14] However, the current study is in contrast with the study conducted in South Africa[29] and Jordan.[13] The discrepancy might be due to differences in methodology, training, and level of awareness.[14]

Finally, the odds of having a good level of IDSR practice was 63% (AOR: 0.37) less likely among health professionals working in the emergency department compared with those who were working in the outpatient department. This finding is in agreement with a study conducted in Egypt.[14] This might be due to the high flow of patients and workload in the emergency department. However, our finding is in contrast to the study finding in South Africa.[29] The possible reason might be attributed to the difference in the method of study, time, and population difference.[31]

The current study was the first of its kind in Ethiopia, particularly in the eastern part to assess health professionals' level of IDSR practice. The study focused on a little-investigated but very important theme and provides future direction for national studies. It presented a wide scope since all relevant health-care workers that might be engaged in IDSR implementation at any time when the need arise were included. Further, the study based on primary data examined the level of IDSR practice using a standardized tool and implemented a good measurement process. Exposures of multiple variables measured at a time were also tested with outcome variables.

Despite all these merits, the study finding should be interpreted with the following limitations; the absence of local and national studies limited a comparison, the cross-sectional nature of the study design, and the study is the self-reported information that is prone to social desirability bias that might lead to an over-estimation of the level of IDSR practice among health-care workers.

Conclusions

In this study, only half of the health professionals reported a good level of IDSR practice. Among many factors expected to predict the level of IDSR practice marital status, working department, well-perceived organizational support, knowledge, and attitude of IDSR were significant factors associated with the level of IDSR practice among health-care professionals.

Awareness, information, education, and communication programs concerning the surveillance system and its importance for health-care providers should be provided on a regular basis to build capacity for IDSR practice. Health professionals should comply with the national standard instruction manual, principles, and guidelines on integrated disease surveillance developed for health facilities. Organizational support like training, supportive supervision, and feedback to all individuals working in the health institution on integrated disease surveillance and response should be strengthened at the health facility level. The MOH strongly advised developing ongoing evaluation mechanisms of IDSR practice since practices are unlikely to remain static. Furthermore, the MOH should also ensure and secure resource needs for the provision of regular IDSR training targeting all health-care workers. Finally, another study with mixed method or qualitative or comparative should be conducted.

Abbreviations

AOR, Adjusted Odd Ratio; CHMS, College of Health and Medical Science; COR, Crude Odd Ratio; DSN, Disease Surveillance and Notification; EPHI, Ethiopian Public Health Institute; MOH, Ministry of Health; IDSR, Integrated Disease Surveillance and Response; WHO, World Health Organization.

Data Sharing Statement

All datasets pertinent to the work are included within the article. Detailed raw data analyzed for the work reported can be available from the corresponding author upon reasonable request.

Ethical Consideration

This study was conducted according to the Helsinki Declaration. Ethical clearance was obtained from the Institutional Health Research and Ethics Review Committee (IHRERC) of Haramaya University, College of Health and Medical Science with ethics number: HUSM_2022_857. Before data collection, an official support letter obtained from Haramaya University College of Health and Medical Sciences was submitted to the West Hararghe zone health bureau and each hospital under study. Permission to conduct the study was secured from the head of each hospital. Each study participant provided a written voluntarily signed consent after the purpose, risk, and benefit of the study were explained. All COVID-19 standard safety principles were implemented strictly throughout the data collection process.

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Author Contributions

All authors made substantial intellectual contributions to the work reported, whether in the conception, study design, execution and acquisition of data, analysis, and interpretation or all of these parts; participated in drafting the manuscript, critical review or revision of the article; have read and approved the final version; selected and settled the journal to which the article submitted; and approved accountability in all aspects of the work reported.

Disclosure

The authors report no conflicts of interest in this work.

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