

Utilization of Integrated Management of Neonatal and Childhood Illness (IMNCI) Guidelines and Associated Factors among Health Professionals Working in Health Centers in the West Shoa Zone, Oromia, Ethiopia

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Abstract

Background: The Integrated Management of Neonatal and Childhood Illness is a strategic approach to enhancing the health, growth, and development of under-fives by reducing mortality, morbidity, and disability. Implementing the IMNCI guideline and associated factors still need to be discovered in the study area.

Objective: To assess the utilization of the IMNCI guidelines and associated factors among health professionals working in health centers in West Shoa Zone, Oromia, Ethiopia, 2022.

Methods: A facility-based cross-sectional study was conducted from June 20 to July 20, 2022, in the West Shoa Zone, Oromia. Among the 22 districts, six were selected by simple random sampling. A sample size 255 was proportionally allocated to 27 health centers (HCs) in the selected districts. Finally, the study unit was selected using simple random sampling. Data were collected through self-administered questionnaires, checklist observation used to evaluate adherence, an inventory checklist used to assess the availability of resources, and a key informant's interview guide. Quantitative data were coded, entered into Epi-data 3.1, and exported to SPSS version 25 for processing and analysis. In a bi-variable analysis, variable with a p-value < 0.25 was selected for multivariate logistic regression analysis. The strength of association was measured by the AOR at 95% CI and significance variables of P-value < 0.05. Qualitative data were analyzed thematically and triangulated, and associated factors were presented in narrative form.

Results: 27 inventories, 162 observation sessions and ten KIIs were conducted, and participants' response rate of 98%. This study's overall IMNCI guideline implementation rate was low at 64.1%. Factors that affected the utilization of IMNCI guidelines among health professionals were a shortage of staff [AOR = 1.2, 95% CI: 1.12 - 3.36], lack of knowledge [AOR=3, 95% CI: 1.25- 7.21], and always referring to the IMNCI guidelines while managing children [AOR = 6.53, 95% CI: 2.03 - 21.01].

Conclusions: The utilization of IMNCI guideline status in the study area was low. The identified factors associated with health professionals were lack of knowledge, shortage of staff, and always referring to the IMNCI guidelines while managing under-fives. Health professional emphasize to IMNCI guideline while managing under-fives.

Keywords: Ambo University, associated factors, health professionals, utilization of IMNCI guidelines

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Background

The Integrated Management of Neonatal and Childhood Illness (IMNCI) is a strategic approach to enhancing child health that focuses on the well-being of the entire child. The main objectives of the strategy are to decrease death, the frequency and severity of illness, and disability, contributing to improved growth and development in under-fives (1).

The strategy includes a preventive and curative benchmark and the cornerstones for basic child health and survival for improving the quality of care provided to sick children from malaria, pneumonia, diarrhea, measles and deficiency diseases in health facilities that apply all IMNCI components that are enhanced by families, communities, and health professionals in promoting, protecting and treating under-fives (2–6).

The IMNCI strategy was developed by the WHO in collaboration with UNICEF in the early 1990s (4). Globally, over 100 countries adopted IMNCI components, and 44 sub-Saharan African countries were implementing IMNCI components in various stages (5). The IMNCI strategy includes three main components: improvements in the case-management skills of health professionals through the supply of locally adapted guidelines on IMNCI and activities to enhance its use. Improvements within the health system are required for the effective management of childhood illnesses. Improvements in family and community practice initiate, reinforce and sustain infancy development that have a positive impact on children's right to survive and thrive (7).

The importance of having an integrated management of neonatal and childhood illness strategy is that it enables a consistent and standardized approach that addresses the preventable causes of under-five morbidity and mortality, which are responsible for more than 90% of mortality in under-fives in Ethiopia (5,8).

In 2019, every day, about 14,000 under-five children continue to die; most of them perish from preventable causes like pneumonia, diarrhea and malaria (2). And 2.8 million, or 53% of all under-five deaths, occurred in sub-Saharan Africa. It is estimated that each minute, eight under-five children die in sub-Saharan Africa (9). Two-thirds of these deaths were caused by preventable causes like birth complications (18%), sickness (16%), inter-partum-related events (12%), child infection (7%), diarrhea (8%), and pneumonia (5%) (8).

According to the EDHS (2016) report, the health facilities in Oromia that are providing treatment for under-five-year-old children with symptoms of

acute respiratory infection (ARI), fever and diarrhea were 26.4%, 35.0% and 41.9%, respectively. Neonatal mortality in Ethiopia accounts for 42% of under-five mortality among pregnant mothers attended by skilled personnel (28%), or delivered in a health facility (26%), which is very low. Due to this, the majority of newborns, neonates, infants and children are exposed to infection during their early period of life (10).

In 2014, in Ethiopia, 69% of health facilities that provide outpatient services for sick children had IMNCI guidelines. And more than 50% of health centers had physical examination-related equipment, except for infant scales (39%), length for height or boards (44%); however, mebendazole, zinc and anti-malarial drugs were available in less than 65% of health centers. Availability of at least one IMNCI guideline-trained health professionals in health centers was 53%, and the IMNCI chart booklet (IMNCI guidelines) was 65% (11). An end-line survey in Ethiopia in 2008 revealed that most children were not checked for general danger signs, nutritional status, or vaccination. Consultation time was lower than recommended by IMNCI guidelines (15 to 20 minutes), although it was higher for IMNCI-trained health workers (13 minutes on average). In 2019, child mortality in Ethiopia, which is nearly 5 years after the adoption of the sustainable development goals (SDGs), was 50.7 per 1000 live births, which is above countries' agendas to reduce under-five mortality to 25 per 1000 live births by 2030 (3,8).

A study conducted in the Ablekuma and Ashiedu-Keteke regions of Ghana indicated that knowledgeable health workers following the IMNCI guidelines were 2.7 times more likely to utilize the IMNCI guideline (12). And also the study conducted in Yifat cluster of North Shoa Zone Amhara region and in four woredas of west Arsi Zone which indicated that nurses who always referring to the chart booklet (IMNCI guideline) during under-five management were 2.76 and 2.7 times more likely to implement the IMNCI guidelines than those who did not referring to the chart booklet (IMNCI guidelines), respectively (13,14).

However, there is still a gap in addressing the IMNCI guideline for all the management of children under-five due to assessments carried out based on only availability of the IMNCI guidelines recommends supplies and medications, adherence of health professionals with the IMNCI guideline, or studies conducted in one district that don't show full utilization of the IMNCI guidelines. There was no similar research conducted in the study area; therefore, it will be a useful contribution for further studies as baseline information for researchers and to increase health professionals'

knowledge of the IMNCI guideline. This study assessed IMNCI guideline implementation and associated factors among health professionals in health centers in the West Shoa Zone, Oromia, Ethiopia, 2022.

Methods

Study Design and Setting

A facility-based cross-sectional study was conducted from June 20 to July 20, 2022, in health centers in West Shoa Zone, Oromia, Ethiopia. The zone has 22 districts and one city administration. According to the official report of the West Shoa zonal health office, there are 101 public health institutions (1 referral hospital, 2 general hospitals, 6 primary hospitals and 92 health centers) and 526 health posts in the zone. And one thousand one hundred and twenty-four (1124) health professionals were providing health care services in health centers in the zone (15).

Sample size and sampling

For the quantitative method

Observation: 162 observations were conducted. Two health workers that provided IMNCI service were conveniently selected at the time of data collection per HC. The selected health professionals were observed in three cases for their performance in the utilization of the IMNCI guidelines.

Resource inventory: 27 HC inventories were conducted. All HCs that participated in the sample size are included in the resource inventories.

Self-administered questionnaires, the sample size was determined by considering the following assumptions of sample size calculation based on the objectives:

For the first objective, To assess utilization of the IMNCI guideline status, the single population proportional formula was used to determine sample size based on the following assumptions: 95% confidence interval ($Z_{\alpha/2} = 1.96$), from the study done in Soro District Hadiya Zone, the overall IMNCI program implementation ($P = 82.3\%$ (16)), and margin of error ($d = 5\%$). The sample size was calculated as follows:

$$n_i = (Z_{\alpha/2})^2 p(1-p)/d^2, n_i = \frac{(1.96)^2(0.823)(0.177)}{(0.05)^2} = 224,$$

$$n_f = 224 + 10\% \text{ non-respondent} = 246$$

For the second objective, To assess associated factors that affect utilization of the IMNCI guideline, the following assumptions were used:

To increase the power of the study, a sample size was calculated for three variables (prescribed drugs, IMNCI training and availability of the chart booklet) that were significantly associated with utilization of the IMNCI guideline from the study that was done before. The following assumptions were used to calculate the sample size: 95% confidence interval and 80% power, a 1:1 non-exposed to exposed ratio, and calculated using Epi-Info version 7 stat calc. Then, by comparing the three samples, the largest sample size taken was 232. Adding 10% of the non-response rate, the sample size yields 255. At the end, the decision was made by comparing the sample size in objective one (246) and the sample size in objective two (255). Therefore, the sample size of 255 was the total population that participated in this study.

For the qualitative method

Key informants interview: Ten key informants were selected purposefully (homogeneous sampling technique).

Sampling Procedures and Techniques

Quantitative study: Among 22 districts in West Shoa Zone, six districts (Chelia, Dendi, Ejere, Ejersa Lafo, Jeldu, and Toke kutaye) were selected by a simple random sampling technique. And all health centers in selected districts were included. Then a sample size of 255 was proportionally allocated to the 27 (Ale Hula Dhaba, Ale Soyoma, Amaro, Asgori, Bicho, Boda, Boni, Danisa, Ejere, Faji, Gaba Jimata, Galesa, Gedo, Ginchi, Gojo, Gorba, Goro Sole, Guder, Maruf, Olonkomi, Osole, Sariti, Shukute, Toke, Tulu Kosoru, Warka Qore and Yaya) health centers in selected districts based on population size. A list of all public health professionals and nurses who had worked on under-five children in health centers within the duration of data collection was received from the human resources unit of each of the health centers. Finally, a simple random sampling method was used to recruit the study unit.

Observation: Two health workers that provided IMNCI service were selected conveniently at the time of data collection per HC. In the case of more than two health professionals found in the IMNCI service room, two of them were selected randomly by the lottery method and then observed one after the other consecutively. The selected health professionals were observed in three cases for their performance on the utilization of the IMNCI guideline.

Qualitative study HC, with poor compliance and supplies. The purpose of the selection of key informants was based on having more information

about the IMNCI guidelines related to their position

Operational definitions: The level of utilization of the IMNCI guideline is categorized as high or low.

High level: Comprehensive utilization of the IMNCI guidelines above, or equal to 68% (5,17)

Low level: Comprehensive utilization of the IMNCI guidelines below 68% (5,17)

Availability: the need of clients for the type of services and volume of resources that meet with program users (18).

Availability of IMNCI drugs: the drugs (ORS, Amoxicillin, ciprofloxacin, cotrimoxazole, vitamin A, paracetamol, tetracycline eye ointment, ampicillin, gentamicin, sterile water for injection, and mebendazole) must not stock out for the last three months in HCs before the study period (13).

Availability of Trained health professionals: at least one public health professional or nurse trained in IMNCI guidelines is in the health centers (3,19)

Availability of IMNCI supplies: medical equipment is available in at least one functional number for each kind of medical equipment (weight scale, thermometer, MUAC, cups, spoons, appropriate syringes and stethoscope) and supplies (registers, chart booklets and guidelines) during visit day in the health centers (20).

Good compliance to IMNCI guideline: compliance to predetermined standards or national IMNCI guideline while assessing, classifying, treating, counseling, referring and providing follow-up care.

Poor compliance to IMNCI guideline: not compliance to predetermined standards or national IMNCI guideline while assessing, classifying, treating, counseling, referring and providing follow-up care (21).

Eligibility Criteria

Inclusion Criteria

All nurses and public health who were working in selected districts of health centers, West Shoa zone, Oromia, Ethiopia

Exclusion Criteria

Public health and nurses who were not working in under-fives OPD/Ward, leave maternity and annual

Data Collection tools

The tools for data collection were developed based on objectives. The observation checklist, inventory checklist and structured questionnaire were adapted from the national IMNCI guideline and UNICEF survey checklist (20, 21). The questionnaires were written in English and translated to Afan Oromo, then retranslated to English to check consistence by a language expert. To assess the utilization of the IMNCI guidelines status, availability of IMNCI supplies (20 questions), compliance (22 questions) and the IMNCI guidelines protocol (29 questions) were used.

The key informant interview guide included general questions about how IMNCI implementation was going on. Questions related to the availability of resources, the compliance of health professionals, and factors related to IMNCI guideline implementation.

Structured questionnaire: The semi-structured questionnaire contains socio-demographic characteristics and factors affecting the utilization of the IMNCI guidelines and activities.

Observation checklist- The checklist was used to assess the service providers' adherence to the guidelines and to check whether service was properly addressed to the child.

Inventory checklists were used to collect data on the availability of resources, which included drugs, medical equipment, guidelines, and infrastructure.

Data collection procedure- Three data collectors (Bachelor of Science nurses) and one supervisor were recruited and selected from the Ejersa Lafo health office. The data were collected using a self-administered questionnaire. Each participant was engaged for about 20 to 30 minutes within the data collected.

Observation and key informant interviews were done by the investigator and supervisor using an observation checklist and interview guides, respectively. The interview was audio-taped with the participant's consent, and the investigator took written notes. Each session took 45–60 minutes.

Data quality control and management

Quantitative: Prior to data collection, training was given for one day on how to fill out and handle the questionnaire. The pretest was done at Meti HC in Ambo district for 13 (5% of the total sample size). It was applied

prior to the actual study, and then, based on the results of the pretest, further adjustments were made to the questionnaires that helped maintain the reliability of the data. Observation and inventory checklist were checked by comparing with the IMNCI guideline.

Qualitative: The transcribed data reports were checked repeatedly by listening of audio-taped to obtain the perceptions of the results and conclusion of the study.

Data processing and analysis

For quantitative: data was collected by self-administered questionnaires, inventory checklist and observation checklist. The collected data were reviewed and checked for completeness before data entry. Any problems encountered were discussed among the data collectors. Data were coded and entered into Epi-data version 3.1, then exported to SPSS version 25 for data processing and analysis. The questionnaires, checklists and a soft copy of the data with multiple backups were kept in proper places.

Both descriptive and analytical methods were employed to analyze the data. Multi-collinearity was checked by the variance inflation factor (VIF) of the collinearity diagnostic test before proceeding to binary logistic regression analysis, with a result of VIF <5. Therefore, the predictors have no multi-collinearity issue.

Binary logistic regression analysis was used to check for association between the single variable and the outcome variable, as well as cross-tabulation to check whether the variables were correct with two by two tables. Odds ratios and 95% confidence intervals were derived from each variable coefficient. A variable that had an association with the dependent variable (P -value < 0.25) was selected for multivariate logistic regression analysis and used to assess its statistical significance. The strength of association was measured by the AOR at 95% CI and significance variables of P -value < 0.05. Multivariate logistic regression analysis was used to identify factors associated with the utilization of the IMNCI guideline among health professionals. Consequently, the results were presented in texts, frequency tables and graphs.

For qualitative: The data is mainly recorded with recording tape and then transcribed into word documents word by word. The data was cleaned by listening to recorded tapes repeatedly, however, incomplete, inaccurate or invalid data were not detected. Data were analyzed concurrently with data collection. The investigator and language expert had transcribed and

translated all key informant interviews (KIIs) into English. Where there was a difference, the language expert revised the transcriptions and original recordings until consensus was reached, which was then analyzed. All data was kept in a lockable cupboard and was only accessible to the investigator. Finally, factors compelling the utilization of the IMNCI guidelines were documented and presented in narrative form.

Results

Socio-demographic characteristics of respondents

A total of 250 health professionals participated, response rate of 98%. The mean age was 33.83 and the SD was ± 5.91 with a range of 25 - 58 years. The majority of respondents, 168 (67.2%), were male. Regarding age, 89 (35.6%) of respondents were aged between 30-34 years. Half of the participants were married, and 58.4% identified as Orthodox followers. Additionally, 87.6% identified as Oromo ethnically (Table 1)

Table 1: Socio-demographic characteristics of respondents among health professionals in health centers in the West Shoa Zone, 2022

Socio-demographic Variables	Response Category	Frequency	Percent
Sex	Male	168	67.2
	Female	82	32.8
Age of respondents	25-29	67	26.8
	30-34	89	35.6
	35-39	51	20.4
	>39	43	17.2
Professions	Public health	78	31.2
	BSc nurse	67	26.8
	Diploma nurse	105	42
Marital status	Married	125	50
	Single	97	38.8
	Divorced	21	8.4
	Separated	7	2.8
Religion	Orthodox	146	58.4
	Protestant	95	38
	Others*	9	3.6
Ethnicity	Oromo	219	87.6
	Amhara	24	9.6
	Others**	7	2.8

Availability of supplies and drugs in the health centers

Based on observed findings, 26 (96.3%) health centers (HCs) had specific consultation rooms for under-fives, 19 (70.4%) of HCs had an IMNCI register book; and 16 (59.26%) of HCs had a chart booklet on the table for health professionals to use during managing under-fives (Table 2). Some of the interviewed respondents argued that most of the drugs the IMNCI guidelines recommend were not supplied regularly by Biftu Adugna and pharmaceutical fund and supply agency (PFSA).

Head of HC said: "The health center has a limited budget, which is generated from client-based income. Due to that, it is difficult to fulfill all

the medications and medical equipment in the health center, and there are also services we give to clients freely, so we stock out drugs in our store.”

Table 2: Resources availability for IMNCI guideline implementation in health centers in West Shoa Zone, Oromia, 2022 (n = 27)

IMNCI Guideline Supplies and Drugs	Frequency	Percent
Functional stethoscope and trained health professional	27	100
Functional MUAC	20	74
Thermometer	23	85.2
Working weight scale	18	66.67
Materials to mix ORS, Cups, cylinder	21	77.78
IMNCI Chart booklets	16	59.25
ORS new formula	14	51.85
Amoxicillin	19	70.37
Ciprofloxacin	9	33.33
Cotrimoxazole	16	59.26
Vitamin A	18	66.67
Iron sulphate	18	66.67
Mebendazole	16	59.26
Zinc sulphate	15	55.56
Paracetamol	18	66.67
Tetracycline eye ointment	18	66.67
Gentamycin	10	37.04
Specific room for under-fives	26	96.3

Health professionals' compliance with the IMNCI guideline

This study assessed health professionals' compliance with the IMNCI guidelines through the direct observation of 54 health professionals by observing 162 cases, with each health professional managing three cases during the data collection period. From the observed health professionals, 22 (40.7%) were females, and 35 (64.8%) were trained on the IMNCI guideline. About 100 (61.6%) and 121 (74.4%) clients were measured for their weight and temperature, respectively. 137 (84.8%) clients were correctly assessed for respiratory problems, 110 (67.7%) for diarrhea, and 138 (85.4%) for fever (Table 3).

The interviewed respondents mentioned that some health professionals were not referring the IMNCI guidelines while managing under-fives. The vice head of the health center said that “Health professionals are not referring to chart booklets during managing under-fives; due to that, they are missing the steps of the IMNCI guidelines. More of our health professionals were trained on the IMNCI guidelines, but still there are problems with the assessment and classification of diseases based on guidelines and standards.” Head of the health center said, “Sometimes health professionals may not correctly assess, classify and treat sick children, give counseling and follow up as recommended on guidelines and apply all stages of the IMNCI guideline protocol; however, referring to the guidelines is very helpful to increase their capacity.”

Table 3: Health professionals' compliance with IMNCI guidelines in health centers in West Shoa Zone, Oromia, 2022 (n = 162)

Compliance with the IMNCI guideline	Frequency	Percent
Sick children were assessed weight	100	61.6
Sick children assessed temperature	121	74.4
Sick children Assessed for child condition	144	89
Sick children Assessed cough or respiratory problem	137	84.8
Sick children evaluated of diarrhea	110	67.7
Sick children evaluated fever	138	85.4
Sick children evaluated ear problem	119	73.2
Sick children assessed for pallor	147	90.9
Sick children check on child weight against chart/growth	79	48.8
Sick children assessed HIV/AIDS infection	96	59.14
Sick children Checked the child's immunization status	148	91.5
Sick children with correctly classified of fever	129	79.9
Sick children with correctly classified of general danger signs	41	25.6
Sick children with correctly Classified of cough	96	59.14
Sick children with correctly classified of ear infection	127	78.7
Sick children with correctly Appointed of immunization	118	72.6
Sick children that correctly treated with oral anti-biotic	157	97
Health professionals Correctly write on follow up registration	134	82.9
Health professionals explain how to administer to caregivers	53	32.9
Health professionals always use IMNCI guideline	101	62.2
HP that showed 1 st dose of administered drugs to caregivers	4	2.44
HP that was correctly given follow up for under-fives	116	71.34
Compliance with IMNCI guidelines (Averagely)	110	67.76

This study's findings showed that the overall IMNCI guideline utilization rate 64.1% (Table 4).

Table 4: Overall IMNCI guideline implementation status among health professionals in health centers in the West Shoa Zone, Oromia, 2022

Dimensions	High level	Judgment
Availability of supplies/drugs to the IMNCI guideline (20 indicators)	68.1475	
Compliance of health professionals to IMNCI guideline (22 indicators)	67.76	
Health professionals related Factors IMNCI guideline implementation (29 indicators)	56.4	
Overall high level implementation status of IMNCI guideline	64.1	Low level

IMNCI guideline implementation-related characteristics

More than half, 151 (60.4%) of respondents, have served as health care providers for less than five years. 187 (74.8%) of the respondents worked in under five rooms. 174 (69.6%) of the participants are served in under five rooms between 0-5 years. Regarding IMNCI training, more than half 147 (58.8%) of respondents attended IMNCI training at different times. Concerning the factors related to the implementation of the IMNCI guidelines, 104 (41.6%) reported a lack of prescribed drugs and a lack of IMNCI drugs, and 96 (38.4%) identified the main challenges of IMNCI implementation (Table 5).

Interviewed respondents argued that shortage of staff and IMNCI drugs were among the factors identified; suppliers were not regularly supplying program drugs as they requested due to the fact that some health professionals prescribe drugs without IMNCI guidelines.

The head of the health center said that “the irregular supply of IMNCI drugs and medical supplies from the zonal health office, PFSA and Biftu Adugna was inadequate, especially for drugs like cotrimoxazole, amoxicillin, vitamin A, and mebendazole.” Vice health center head said, “Sometimes health professionals prescribe other drugs outside the IMNCI guidelines due to the unavailability of recommended drugs in the health center dispensary. Also, in our health center, there were no fulfilled human resources (health workers) as a structure, we covered all departments with only a few health workers.”

Table 5: IMNCI guideline utilization related characteristics among health professionals in health centers in the West Shoa Zone, 2022 (n=250)

Variables	Response Category	Frequency	Percent
Year of service	<5yrs	151	60.4
	5-10yrs	61	24.4
	10-15yrs	31	12.4
	>15yrs	7	2.8
Worked in under-five OPD	Yes	187	74.8
	No	63	25.2
Year of service in under five OPD	0-5yrs	174	69.6
	6-10yrs	12	4.8
	>10yrs	1	0.4
Attended IMNCI training	Yes	147	58.8
	No	103	41.2
Types of IMNCI training	Pre service	4	1.6
	In service	143	57.2
Period of last IMNCI training	2010-2014	2	0.8
	2015-2019	74	29.6
	2020-2024	61	24.4
Received follow up training	Yes	10	4
	No	240	96
Period of follow up training	2015-2019	4	1.6
	2020-2024	6	2.4
Factors related to IMNCI guideline implementation	Shortage of staff	51	20.4
	Lack of supplies	58	23.2
	Lack of IMNCI drugs	96	38.4
	Lack of prescribed drugs	104	41.6
	Shortage of trained staff	83	33.2
	Lack of supervision	70	28
	Lack of knowledge on IMNCI	63	25.2
	Lack of good attitude towards IMNCI guideline	44	17.6

IMNCI activities performed by the study participants

A significant number of respondents confirmed that they are always performing the IMNCI recommended activities as per the guidelines. The majority of the study participants, 154 (61.4%), 157 (62.8%), 162 (64.8%), 159 (63.6%), 160 (64%), 150 (60%), 153 (61.2%), 143 (57.2%), 125 (50%), and 109 (43.6%), were always performing checks for vaccination, danger signs, pallor, assessing fever, diarrhea, malaria, cough, weighing children, checking weight against a chart, and checking for ear problems, respectively. Only 46 (18.4%) of respondents indicated that it was difficult to apply all steps of the guidelines (Figure 1).

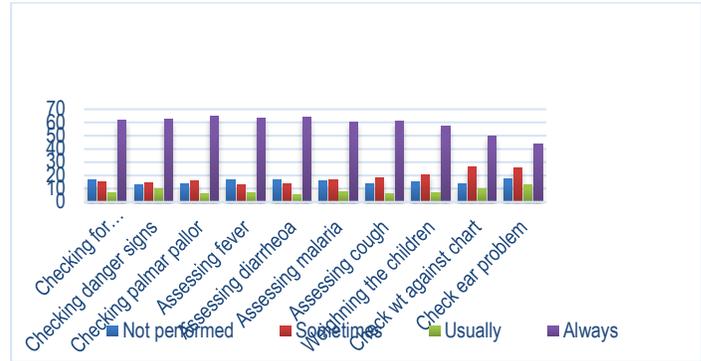


Figure 1: IMNCI guideline activities performed among health professionals in health centers in the West Shoa Zone, 2022.

Time spent managing under-fives using the IMNCI guideline protocol

Nearly half of the participants strongly agreed, 117 (46.8%) spending between 10-29 minutes when using the IMNCI protocol. Less than half, 54(21.6%) of study participants strongly agreed on spending between 30-40 minutes when using the IMNCI protocol, which is above the WHO recommended consultation (15-20 minutes). Only 43 (17.2%) participants strongly agreed on spending 1-9 minutes with an under-fives patient when using the IMNCI protocol (Figure 2).

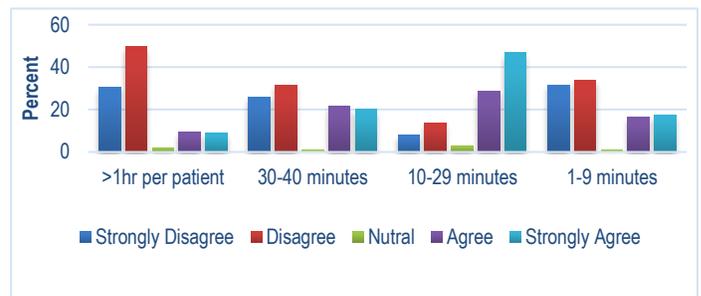


Figure 2: Time spent managing an under-fives patient when using the IMNCI case management protocol among health professionals in health centers in the West Shoa Zone, 2022.

Experiences of the health professionals with IMNCI guidelines and procedures implementing

Among the respondents, 133 (53.2%) and 40 (16%) strongly-agreed and agreed, respectively, to the notion that the IMNCI guidelines are user-friendly for health workers. Regarding the idea that IMNCI is easy to understand, 133 (53.2%) strongly agreed and 44 (17.6%) agreed, while only 35 (14%) and 30 (12%) of respondents agreed and strongly agreed with the statement IMNCI is not practical at our health center. Of the total respondents, 104 (41.6%), 115 (46%), and 104 (41.6%) disagreed with the notion that the IMNCI protocol is too long, IMNCI protocol is tedious, and time-consuming, respectively (Figure 3).

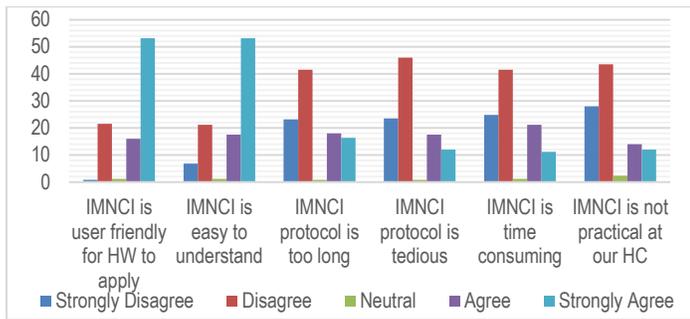


Figure 3: Experiences of the health professionals implementing the guidelines and procedures of the IMNCI guideline among health professionals in health centers in the West Shoa Zone, 2022.

Multivariable logistic regression analysis of overall IMNCI guideline utilization related factors among health professionals in health centers in West Shoa Zone

In bivariate logistic regression analysis, those variables with p-values < 0.25 were: shortage of staff [95%CI: 1.01, 3.02], lack of supplies [95%CI: 1.08, 3.56], lack of IMNCI drugs [95%CI: 1.09, 3.13], lack of prescribed drugs [95%CI: 1.35, 3.87], lack of training [95%CI: 1.47, 4.38], lack of supervision [95%CI: 1.19, 3.68], lack of knowledge [95%CI: 1.4, 4.5], lack of good attitude towards the IMNCI guideline [95%CI: 1.64, 6.26], always apply IMNCI stages [95%CI: 5.33, 18.42], and always refer to the IMNCI chart booklet (IMNCI guideline) [95%CI: 4.83, 17.1] were found to have an association with IMNCI guideline implementation among health professionals in health centers of West Shoa Zone.

Among those variables, only three were significantly associated with the utilization of the IMNCI guidelines among health professionals in health centers. Shortage of staff, lack of knowledge and always referring to the chart booklet (IMNCI guideline) were independent predictors of IMNCI utilization. Health professionals with no shortage of staff [AOR=1.2, 95% CI: 1.12, 3.36], health professionals knowledgeable on IMNCI guidelines [AOR=3, CI: 1.25, 7.21], and health professionals who always referring to the chart booklet (IMNCI guideline) during under-fives management [AOR=6.53, 95%CI: 2.03, 21.01] (Table 6).

Discussion

The findings revealed that the proportion of utilization of IMNCI guideline status was 64.1%, which indicated a low level of IMNCI guideline utilization in the study area. This is higher than the study conducted in Kenya and China (14%) (17), and the study conducted in North Shoa Zone (58.4%), West Arsi zone (58%) and Shire governmental health institutions (54.2%) (13,14,24) of Ethiopia. However, it is lower than the

standard level established (68%) by WHO and UNICEF (5) and also study done in Soro district Hadiya zone (82.3%) (16). The difference may be due to socio-demographic characteristics, the study area, or sample size.

The findings of the study showed that health professionals knowledgeable about IMNCI guidelines were about three times more likely to implement IMNCI guidelines than those with a lack of knowledge about IMNCI guidelines. This study was in-line with a study conducted in the Ablekuma and Ashiedu-Keteke regions of Ghana that indicated that knowledgeable health workers following the IMNCI guidelines were 2.7 times more likely to utilize the strategy (12).

Health professionals who always refer to the chart booklet (IMNCI guideline) during the under-fives management process were 6.53 times more likely to utilize the IMNCI protocol than those who did not always refer to the chart booklet (IMNCI guideline) during under-fives management. This result is almost similar to the study conducted in Yifat cluster of North Shoa Zone Amhara region and in four woredas of west Arsi Zone which indicated that nurses who always refer to the chart booklet during under-five management were 2.76 and 2.7 times more likely to implement the IMNCI guidelines than those who did not refer to the chart booklet (13,14). This finding was supported by some interviewed respondents, who argued that the unavailability of supplies or drugs was related to the purchasing capacity of each health center and varies from one health center to another, as was the irregularity of essential drugs distributed by Biftu Adugna and PFSA.

Inventory data from this study showed that at least one IMNCI guideline trained health professionals in a health center at 100%. This finding is different from the study conducted in Ethiopia, Survey Provision Assessment, 2015, which indicates that the percentage of IMNCI trained health professionals found at least one in health centers was (53%), and the availability of IMNCI guidelines and chart booklets was (65%) (18). The difference might be due to the study area. The observation findings indicated that 61.6% of weight, 74.4% of temperature, and 84.8% of respiratory problems were assessed in sick children. This finding is not similar to the study in Rwanda in 2016, which indicated that health professionals assessed under-fives for temperature, weight and child respiratory problems at 75.3%, 100% and 99.5%, respectively (4).

Table 6: Multivariable logistic regression analysis of overall utilization of the IMNCI guidelines related factors among health professionals in health centers in the West Shoa Zone, 2022

Variables	Category	IMNCI Implementation		COR (95%CI)	AOR (95%CI)	P-Value
		High level	Low level			
Shortage of staff	Yes	28(11.2%)	23(9.2%)	1		
	No	132(52.8%)	67(26.8%)	1.62(1.01, 3.02)	1.2(1.12, 3.36)	0.013*
Lack of supplies	Yes	30(12.0%)	58(23.2%)	1		
	No	130(52.0%)	62(24.8%)	1.96(1.08, 3.56)	1.4(0.49, 4.0)	0.771
Lack of IMNCI drugs	Yes	53(21.2%)	43(17.2%)	1		
	No	107(42.8%)	47(18.8%)	1.85(1.09, 3.13)	0.69(0.26, 1.84)	0.462
Lack of prescribed drugs	Yes	55(22.0%)	49(19.6%)	1		
	No	105(42%)	41(16.4%)	2.28(1.35, 3.87)	0.84(0.31, 2.27)	0.724
Lack of IMNCI training	Yes	41(16.4%)	42(16.8%)	1		
	No	119(47.6%)	48(19.2%)	2.54(1.47, 4.38)	1.73(0.72, 4.14)	0.22
Lack of Supervision	Yes	36(14.4%)	34(13.6%)	1		
	No	124(49.6%)	56(22.4%)	2.09(1.19, 3.68)	0.84(0.36, 1.95)	0.684
Lack of knowledge	Yes	30(12%)	33(13.2%)	1		
	No	130(52%)	57(22.8%)	2.51(1.4, 4.5)	3.0(1.25, 7.21)	0.014*
Lack of good attitude towards IMNCI guideline	Yes	18(7.2%)	26(10.4%)	1		
	No	142(56.8%)	64(25.6%)	3.2(1.64, 6.26)	1.74(0.71, 4.27)	0.663
Always referring chart booklets	Yes	114(45.6%)	18(7.2%)	9.9(5.33, 18.42)	6.53(2.03, 21.01)	0.002*
	No	46(18.4%)	72(28.8%)	1		
Always apply all steps of IMNCI guidelines	Yes	106(42.4%)	16(6.4%)	9.08(4.83, 17.1)	2(0.63, 6.34)	0.24
	No	54(21.6%)	74(29.6%)	1		

*Variable that has a statistical association (p -value<0.05), 1 = Reference variable, COR=Crude odd ratio, AOR=Adjusted odd ratio, CI = Confidence of interval

About 97 % of cases were treated correctly with oral antibiotics for classified diseases. This result was better than the study done in Shire governmental health institution in 2018, which indicated that 42.7% of cases were treated correctly, and also the study done in Soro District of Hadiya Zone, which indicated that sick children with cases treated correctly had 75% of anemia, 69.7% of diarrhea, 75% of pneumonia, 84% of malaria, and 59% of malnutrition according to the recommended IMNCI guideline, which indicated that they were below standards (100%) (13,14,16,24). The difference might be due to the study area and sample size of participants.

This study indicated that 58.8% of study participants had attended IMNCI guideline, training, which is below the WHO recommendation that at least 60% of health care workers seeing sick children in the health facilities are trained in IMNCI. However, the present finding is higher than that of the study conducted in Indonesia, which showed only 43% of IMNCI trained health workers. This slight difference might be due to staff turnover and the high cost of training (23, 25). And this finding is almost similar to a study conducted in four districts in the west Arsi Zone which showed IMNCI trained health professionals were 57.8% (14).

In this study, health systems-related factors identified as affecting IMNCI utilization were lack of supplies (23.2%), lack of supervision (28%), lack of IMNCI drugs (38.4%), and lack of prescribed drugs (41.6%). Inconsistent with this study, the study conducted in Botswana showed that only 10% of respondents agreed that IMNCI recommended drugs are often out of stock, and 15% of the respondents claimed that IMNCI chart booklets are often unavailable in their health facilities, while 36% of the

participants responded that their health centers have supplies to support the IMNCI guideline implementation. The reason for the difference might be due to differences in socio-economic status, the study area, or sample sizes. In another way, several studies done in different areas of the world identified similar challenges in IMNCI utilization (20,27).

This study also tried to identify IMNCI guideline steps related to barriers to IMNCI utilization by health professionals, who strongly agreed that the time-consuming steps of the IMNCI guideline and IMNCI protocol were too long at 11.2% and 16.4%, respectively. The average consultation time in this study was 75.7% 10-29 minutes using the IMNCI guidelines. This finding is slightly lower than that of a study conducted in Botswana, where the time-consuming nature of the protocol was 57% (28). In Tanzania, the IMNCI protocol is perceived as unnecessarily time-consuming, and health workers sometimes do not follow IMNCI guideline steps to manage clients awaiting their attention (29). The average time spent on one client in this study was supported by WHO records that it takes 10-29 minutes, 5-9 minutes longer than a traditional consultation (20).

One strength of this study is that it assessed the utilization of IMNCI guideline based on compliance of health professionals with IMNCI guideline and availability of supplies. However, it infers association but not causation from its results, as it is cross-sectional study. The result of this study depends on the self-report of health professionals, and, as a result, there might be an influence of social desirability; nevertheless, the study was confidential, and data collectors were instructed by the health professionals to guarantee that their responses could not be related to them.

Conclusions

Findings revealed that the overall high-level IMNCI guideline implementation status among health professionals serving children under five in the study area was low (64.1%), particularly in assessing, classifying, treating, and giving follow-up. Lack of knowledge, shortage of staff, and always referring to the chart booklet (IMNCI guideline) when managing under-fives were the predictors of IMNCI guideline utilization among health professionals in health centers in the West Shoa Zone, Oromia, Ethiopia.

Health professionals should emphasize using IMNCI guidelines and chart booklets while managing every child who attends a health center. Zonal health offices, district health offices, and health centers should fill the staff as the structure of health centers recommends. Policymakers should consider IMNCI guideline training and refreshments to increase health professionals' knowledge about the IMNCI guidelines and reduce infant and child mortality. The Ministry of Health should facilitate training by collaborating with the relevant regulatory bodies for continuous professional development (CPD) accreditation to incentivize staff to take up the training. Future studies should consider further regional-level studies with robust study designs to address the limitations in this study related to IMNCI guideline implementation.

Abbreviations

ARI: Acute Respiratory Infection

COR: Crude Odd Ratio

EDHS: Ethiopian Demographic Health Survey

HC: Health Center

IMNCI: Integrated Management of Neonatal and Childhood Illnesses

KII: Key Informants Interview

MUAC: Mid Upper Arm Circumference

PFSA: Pharmaceuticals Fund and Supply Agency

SPSS: Statistical Package for Social Science

UNICEF: United Nation International Children Emergency Fund

WHO: World Health Organization

Declarations

Consent for publication

Participants consented for unanimous sharing of compiled data as approved by the IRB of the Ambo University, College of Medicine Health

Sciences.

Ethical declaration

Ethical clearance was obtained from Ambo University College of Medicine Health Sciences ethical review committee. Permission letter was obtained from West Shoa Zonal Health Office and informed consent was obtained from a respondent who participated in the study. The participation of this study was voluntary. Study participants had the right to withdraw at any time from the study when they feel uncomfortable. Confidentiality was maintained by omitting their name and personal identification.

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Authors' Contributions

DBH made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; ND and YDB, gave final approval of the version to be published; and agreed to be accountable for all aspects of the work.

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Competing interest

All authors read and approved the final manuscript. The authors declare that they have no competing interests.

Availability of Data and Materials

The datasets used in the current study or data collection tool are available from the corresponding author with a reasonable request.

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