

Knowledge and practice of basic neonatal resuscitation and its associated factors among nurses and midwives in government health facilities in North Shewa Zone, Oromia, Ethiopia

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ABSTRACT

Background: Neonatal resuscitation is a critical intervention that reduces morbidity and mortality among neonates suffering from asphyxia. However, evidence regarding the knowledge and practice of neonatal resuscitation among nurses and midwives is limited in low-income countries. This study aimed to assess the level of knowledge and practice of basic neonatal resuscitation and its associated factors among nurses and midwives working in government health facilities in the North Shewa Zone, Oromia, Ethiopia.

Methods: Institution-based cross-sectional study was conducted among 160 nurses and midwives from May to August 2023. A simple random sampling method was used to select the study participants. Data were collected using a structured questionnaire and an observational checklist. Descriptive statistics were employed to summarize the characteristics of the participants. A logistic regression model was used to assess factors associated with the knowledge and practice of the study participants. Statistical significance was set at a p-value < 0.05.

Results: Good knowledge regarding neonatal resuscitation was reported by 34.4% of the study participants with 95% confidence interval (CI): 28.1%–41.3%). Only 25.0% (95% CI: 18.1%–33.1%) of the participants demonstrated good practice in neonatal resuscitation. Having a Bachelor degree (AOR: 6.6; 95% CI: 2.1–20.5), receiving neonatal resuscitation training (AOR: 3.8; 95% CI: 1.6–8.3), receiving supportive supervision (AOR: 3.8; 95% CI: 1.6–9.3), and the availability of neonatal resuscitation guidelines (AOR: 7.1; 95% CI: 3.0–16.9) were significantly associated with a good knowledge score. Having a good attitude (AOR: 2.6; 95% CI: 1.1–6.7), fully equipped material for resuscitation (AOR: 9.3; 95% CI: 3.5–24.6), and receiving supportive supervision (AOR: 9.2; 95% CI: 3.1–27.1) were significantly associated with good practice.

Conclusion: Neonatal resuscitation knowledge and practice among nurses and midwives were found to be inadequate. Therefore, vital interventions are required, particularly those targeting participants with lower educational status, a poor attitude, a lack of training and supportive supervision, and the unavailability of guidelines and necessary equipment for resuscitation.

Keywords: Neonatal, Asphyxia, Children health, Nursing practice

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BACKGROUND

The World Health Organization (WHO) defines birth asphyxia as failure to initiate and sustain breathing.

during birth (1). Prenatal asphyxia is the leading cause of neonatal death in the world after infection and prematurity (2). It causes four million neonatal deaths annually in developing countries, and accounts for 23% of all neonatal mortality (2).

Low- and middle-income countries bear the majority of the perinatal and neonatal mortality burden due to neonatal asphyxia (3). Especially Sub-Saharan African (SSA) countries are the countries with the highest burden of neonatal deaths (4). Ethiopia is among the five African countries contributing to the high level of neonatal mortality in SSA countries (5).

Neonatal resuscitation is an interference performed on newborns that have difficulty in airway, breathing, and circulation (6). From 136 million neonatal births worldwide every year, ten million of them need resuscitation (7), and to assist those neonates appropriate knowledge and better practice are essential. Knowledge and practice of health workers involved in the resuscitation of neonates is crucial, and resuscitation of newborns is a more difficult process that requires adequate knowledge and skill (8). The success of neonatal resuscitation is determined by the knowledge of healthcare providers, clinical experience, or skill in how to carry out necessary procedures and how to use resuscitation equipment (9).

Pediatric advanced life support and new life support concept have been rising in SSA countries since 1999. However, due to cost and lack of awareness, the nurses and midwives may not have access to the course. This in turn would imply that the newborns may not receive adequate care due to the lack of prerequisite skill and knowledge required to carry out the procedures among the attendants.

Therefore, this study aimed to determine the level of knowledge and practice of nurses and midwives on neonatal resuscitation offering neonatal resuscitation in governmental health facilities of the North Shewa Zone, Oromia Regional State, Ethiopia.

METHODS

Study area and period

This study was conducted in the North Shewa Zone, Oromia Regional State, Ethiopia, from May 1 to August 30, 2023. Twenty-nine government health facilities were selected based on availability of neonatal resuscitation from North Shewa Zone, Oromia Regional State of Ethiopia. North Shewa Zone is one of twenty-two zones in the Oromia Regional State, and Fiche Town is the capital city of the zone. It is located 114 km north of Addis Ababa. According to the 2007 population census, the zone has a total population of 1,884,247 residents, comprising 942,805 males and 941,442 females. According to the 2023 North Shewa Zone Health Administrative Office, the zone has sixteen districts, seven government-run hospitals, 64 health centers, 264 health posts, and 64 private health facilities.

Study design and population

An institution-based cross-sectional study was conducted to determine the knowledge and practice of basic neonatal resuscitation and its associated factors, and all nurses and midwives who were assigned to the delivery or neonatal intensive care unit were considered as the study population.

Inclusion and exclusion criteria

All nurses and midwives who were working in the delivery room or neonatal intensive care unit in the selected health institutions were included. However, nurses and midwives who had work experience below six months were excluded from the study.

Sample size calculation

The sample size was calculated using the single population proportion formula assuming 9.8% true population proportion of knowledge (10), 24.5% proportion of practice (11), 95% confidence level and 5% margin of error. The sample size was also calculated to estimate factors associated with knowledge and practice related to neonate resuscitation. However, the largest sample size 160 which determined based on single population formula was selected as sample size of this study.

Sampling method

A total of 71 governmental health facilities (seven hospitals and 64 health centers) exist in North Shewa Zone of Oromia Regional State. All of the health facilities were providing neonatal resuscitation service. A total of 40 % of health facilities which provide neonatal resuscitation were selected using a simple random sampling method. Thus, six hospitals and twenty-three health centers were selected for this study. Study participants were proportionally allocated among all selected health facilities, and they were selected using a simple random sampling method from each health facilities.

Data collection tools and methods

The data collection tool for this study was developed based on different literature reviews and WHO guidelines (14), American Heart Association Guidelines (15) as well as Ethiopian Pediatric Association Guidelines. . The data collection tool includes structured, self-administered questionnaires covering socio-demographic, provider, and institutional features. A structured questionnaire was used to collect data. Twelve items was used to measure the knowledge level of the participants. Correct responses received a score of one, while incorrect responses received a score of zero. Those who scored 9.6 and above out of 12, or above 80%, were considered as having good knowledge, and those below 80% were considered as having poor knowledge (12). Eleven observed questionnaires were used to assess the participants' practice related to neonatal resuscitation. Correctly performed activity received a score of one; while incorrectly performed activity received a score of zero. Those who scored 8.8 and above out of 11, or above 80% were considered to have a good practice, and those below 80% were considered to have a poor practice (12). The attitude of the participants towards neonatal resuscitation was assessed by five questions and the response was captured by 5-point Likert scale, which ranges from strongly agreeing (which contains 5 points), to strongly disagreeing (which contains one point). Those who score 20 and above out of 25, or above 80%, were considered as having a good

attitude, and those who score below this were considered as having a poor attitude (13).

The questionnaire was pretested on 5% of the study population before actual data collection, and necessary adjustments were made. Two BSc nurses and two BSc midwives collected data, while two BSc midwives from outside of the selected health facilities were assigned for supervision. Training was given to the data collectors and supervisors on the study's objective and data collection methods. Data were collected using self-administered questionnaires, and observational checklists. During data collection, the completeness and consistency of the response were checked daily by the principal investigator before submission.

Data processing and analysis

The collected data were checked manually for their completeness, coded, and entered into Epi Data version 3.1 and then exported to SPSS version 26.0 for analysis. Descriptive statistics were used to summarize the characteristics of the study participants. Logistic regression was employed to identify factors associated with knowledge and practice of basic neonatal resuscitation. Independent variables having a p-value of less than 0.25 during the bivariate analysis were added to the multivariable logistic regression model. In the multivariable logistic regression model, the variable with a p-value of less than 0.05 was considered as a factor significantly associated with the outcome variables. Multicollinearity was diagnosed using the variance inflation factor, and the model fitness was assessed using the Hosmer and Lemeshow criteria.

RESULTS

Sociodemographic characteristics

A total of 160 participants involved, with a response rate of 100%. Female participants account for 78 (48.10%), and 117 (73.1%) of the participants were degree holders. Fifty-nine (36.9%) of the participants reported that full resuscitation material is available in the working unit while 75 (46.9%) reported the availability of guidelines in the working unit (Table 1).

Table 1: Sociodemographic of the study participants and institutional characteristic

Variables		Frequency	Percent
Sex	Male	82	51.2
	Female	78	48.8
Age	20-24	15	9.4
	25-29	71	44.4
	30-34	56	35
	35-39	18	11.3
Profession	Nurse	49	30.6
	Midwives	111	69.4
Level of education	Diploma	43	26.9
	BSc	117	73.1
Work experience	< 5 years	49	30.6
	6-10 years	90	56.3
	11-15 years	20	12.5
	16-20 years	1	0.6
Working unit	Delivery	137	85.6
	NICU	23	14.4
Take NR training	Yes	64	40.0
	No	96	60.0
Have NR corner	Yes	96	60.0
	No	64	40.0
Full NR material	Yes	59	36.9
	No	101	63.1
Guidelines in your unit	Yes	75	46.9
	No	85	53.1
Supportive supervision	Yes	92	57.5
	No	68	42.5

NR-Neonatal-resuscitation BSc-Bachelor of Science

Knowledge level in terms of provider characteristics

Of the total of 111 midwives, about 50 (45.0%) had good knowledge of neonatal resuscitation. Similarly, of 49 total nurses included to the study, only five (10.2%) had good knowledge of neonatal resuscitation. From a total of 117 degree-holding participants, 48 (40.0%) had good knowledge about neonatal resuscitation. Among a total of 123 participants with poor attitudes, 85 (69.1%) had poor knowledge related to neonatal resuscitation. Of the 75 participants working in health centers, 29.3% had a good knowledge score about neonatal resuscitation, while 33.3% the participants who were working in primary hospitals had good knowledge. About 35.7% who were working in the general hospital had good knowledge, while 55% who were working in

Neonatal resuscitation knowledge level

Figure 1 below depicts the knowledge level of nurses and midwives regarding neonatal resuscitation. Low (34.4% (CI: 28.1%, 41.2%)) proportion of study participants had good knowledge about neonatal resuscitation.

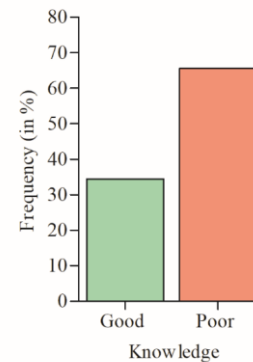


Figure 1: Knowledge status of the nurses and midwives regarding neonatal resuscitation in government health facilities in North Shewa Zone, Oromia, Ethiopia, 2023

comprehensive specialized hospital had good knowledge of neonatal resuscitation (Table 3).

Table 2: Knowledge level of nurses and midwives towards neonatal resuscitation among different government health facilities in North Shewa Zone, Oromia, Ethiopia, 2023

Variables	Categories	Good knowledge	Poor knowledge
Profession	Midwives	50(45.0%)	61(55.0%)
	Nurses	5(10.2%)	44(89.8%)
Level of education	Diploma	7(16.3%)	36(83.7%)
	Degree	48(40.0%)	69(60.0%)
Attitude	Good	20(54.0%)	17(46.0%)
	Poor	38(30.9%)	85(69.1%)
Type of facility	Health center	22(29.3%)	53(70.7%)
	Primary hospital	17(33.3%)	34(66.7%)
	General hospital	5(35.7%)	9(64.3%)
	Specialized hospital	11(55%)	9(45%)
Place of working	Delivery	37(21.07%)	100(72.99%)
	NICU	19(78.3%)	5(21.7%)

NICU-Neonate intensive care unit

Factors associated with knowledge level of the study participants

Level of education, good attitude, taking neonatal resuscitation training, availability of neonatal resuscitation guidelines, type of health facility, having a neonatal resuscitation corner, and having supportive supervision were associated with knowledge of neonatal resuscitation at p-value < 0.25 and included to multivariable logistic regression model (Table 3).

Level of education (AOR: 6.6, 95% CI: 2.1– 20.5), having neonatal resuscitation training (AOR: 3.7, 95% CI: 1.6–8.3), having supportive supervision (AOR: 3.8, 95% CI: 1.6– 9.3), and availability of neonatal resuscitation guidelines in the workplace (AOR: 7.1, 95% CI: 3.00– 16.9) were significantly associated with neonate resuscitation knowledge (Table 3).

Table 3: Factors associated with neonate resuscitation knowledge score in government hospitals in North Shewa Zone, Oromia, Ethiopia, 2023.

Variables	Categories	Knowledge status		COR (95% CI)	P- value	AOR (95% CI)	P- value
		Poor	Good				
Education	Diploma	36	7	1	1	1	1
	BSc	69	48	3.6(1.5– 8.7)	0.005	6.6(2.1– 20.5)	0.001**
Attitude	Poor	85	38	1	1	1	1
	Good	20	17	1.9(0.89–4.0)	0.094	1.4(0.53– 3.7)	0.488
Training	Yes	32	32	3.2(1.6– 6.3)	0.001	3.7(1.6– 8.4)	0.002**
	No	73	23	1	1	1	1
Guidelines	Yes	36	39	4.7(2.3– 9.5)	0.000	7.1(3.0– 16.9)	0.001**
	No	69	16	1	1	1	1

Facility	Health center	53	22	1	1	1	1
	Hospital	52	33	0.65(0.33– 1.3)	0.208	0.81(0.35– 1.9)	0.636
NR corner	Yes	68	28	0.56(0.29– 1.1)	0.091	0.47(0.20– 1.1)	0.083
	No	37	27	1	1	1	1
Supervision	Yes	52	40	2.7(1.3– 5.5)	0.006	3.8(1.6– 9.3)	0.003**
	No	53	15	1	1	1	1

**-significant at p value < 0.05, 1-reference, COR-Crude odd ratio, AOR-Adjusted odd ratio, NR-Neonatal resuscitation

Neonatal resuscitation practice

Low (25% [CI: 18.1%–33.1%]) of nurses and midwives had good neonatal resuscitation practice (Fig 3). Of the total of 111 midwives, 31 (27.9%) had good practice of neonatal resuscitation, and of 49 nurses, nine (18.4%) of them had good practice of neonatal resuscitation. Of 117 degree holders, 32 (27.35%) had good practice of neonatal resuscitation, and of 96 participants with no neonatal resuscitation training, 78 participants had poor performance of neonatal resuscitation. The most frequently (97.5%) performed activity were checking functionality of equipment before delivery.

Factors associated with practice of neonatal resuscitation

Profession, good attitude, availability of resuscitation material, having supportive supervision, working unit, and workload were association with neonatal resuscitation practice at p -value < 0.25 and included to multivariable logistic regression. Good attitude (AOR: 2.6, 95% CI: 1.1–6.7), having supportive supervision (AOR: 9.2, 95% CI: 3.1–27.1), and availability of fully equipped material for resuscitation (AOR: 9.3, 95% CI: 3.5–24.6) were significantly associated with neonatal resuscitation practice (Table 4).

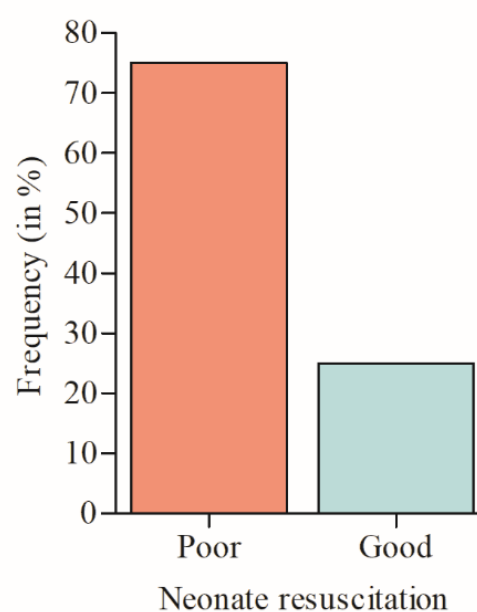


Figure 1: Neonatal resuscitation practice among nurses and midwives in government health facilities in North Shewa Zone, Oromia, Ethiopia, 2023.

Table 4: Bivariate and multivariable analysis of factors associated with participants' scores in governmental health facilities, North Shewa Zone, Oromia, Ethiopia, August, 2023.

Variables		Practice status		COR (95% CI)	P- value	AOR (95% CI)	P- value
		Poor	Good				
Profession	Nurse	40	9	1	1	1	1
	Midwives	80	31	1.7(0.74–4.0)	0.201	1.7(0.62–4.8)	0.296
Attitude	Poor	99	24	1	1	1	1
	Good	21	16	3.1(1.4–6.9)	0.004	2.6(1.1–6.7)	0.042**
Full material	Yes	33	26	4.9(2.3–10.5)	0.000	9.3(3.5–24.6)	0.002**
	No	87	14	1	1	1	1
Supervision	Yes	60	32	4.0(1.7–9.4)	0.001	9.2(3.1–27.1)	0.001**
	No	60	8	1	1	1	1
Working unit	Delivery	105	32	0.57(0.22–1.5)	0.246	0.88(0.28–2.8)	0.825
	NICU	15	8	1	1	1	1
Work load	No	102	30	1	1	1	1
	Yes	18	10	1.9(0.78–4.5)	0.154	1.8(0.61–5.3)	0.280

NICU-Neonate intensive care unit

DISCUSSION

This study found that 34.4% of the health professionals had adequate knowledge of neonatal resuscitation. This situation suggests that the neonates are at risk of asphyxia due to nurses' and midwives' insufficient knowledge for neonatal resuscitation.

This finding is in line with the study done in Kenya, which shows that only 35.4% of the study participants had good knowledge of neonatal resuscitation (16). Similarly a study from India reported that 34% of the participants had good knowledge (17). Still another study reported from India reported similar result (33.3%) of neonatal resuscitation knowledge with the present study (18). Moreover, the study reported from Nepal shows 64.6% of respondents had insufficient knowledge of newborn resuscitation (19). This finding is similar with

the results of the study reported from Ethiopia, which shows 32.9% of the participants had good knowledge of neonatal resuscitation (11). This could be due to similarity in the healthcare systems and providers' competency, sample size, economic status, and study design across the study area.

In contrast to the previous studies, knowledge level of the participants in the current study was higher in which 34.4% of nurses and midwives had good knowledge. For instance a study conducted in Eastern Ethiopia reported only 9.8% of the study participants had good knowledge about neonatal resuscitation (20). Similarly a study from Ghana found that only 1.9% of the study participants are knowledgeable about neonatal resuscitation (21). A study from Nepal also reported a lower knowledge of neonatal resuscitation (7.0%) (22), which is significantly lower than the findings of the present study. The difference between the

current and previous studies might be attributable to variation in study years.

In contrast, the result of the current study was lower than studies reported from Southern Ethiopia, which shows that 57.9% of the participants had adequate knowledge of neonatal resuscitation (23). Moreover, another study from Southern Ethiopia reported that 76.2% of medical professionals had adequate knowledge of basic neonatal resuscitation. A study from Northwest of Ethiopia also reported slightly higher (46.5%) proportion of neonatal resuscitation knowledge than the current study (24). This difference could be due to the fact that most of the listed studies were conducted in a single health facility and facilities in the town which can offer better healthcare services. However, this finding was from a multi-facility level, including a health center in the rural area that has limited access to updated neonatal resuscitation information, and supplies.

In the current study, the level of education was significantly associated with neonatal resuscitation knowledge among nurses and midwives. Health professionals who attended degree were six times more knowledgeable than diploma holders in neonatal resuscitation. This was consistent with the results of the study reported from Ghana, which indicated that health professionals with a first degree had significantly knowledge of neonatal resuscitation than those holding a diploma (21).

Receiving neonatal training was significantly associated with neonatal resuscitation knowledge level. The good knowledge in neonatal resuscitation was three times higher among nurses and midwives who received neonatal resuscitation training than those who did not. This finding was supported by a finding reported from South Sudan in which knowledge increased post-training, although

the knowledge decreases overtime (25). The current study finding is also consistent with previous study reported from Ghana in which neonatal resuscitation knowledge was related to history of previous training among midwives (26). It is also similar with the findings reported from Southern Ethiopia, which show that nurses or midwives who took training on helping babies breathe are two times more knowledgeable than those who did not take training (27).

In the present study, having supportive supervision was significantly associated with neonatal resuscitation knowledge among nurses and midwives. Nurses and midwives who received supportive supervision were nearly three times more knowledgeable than those who did not. This finding is consistent with the results of the study reported from Afghanistan in which having supportive supervision was significantly associated with higher knowledge of neonatal resuscitation (28). It also agrees with the finding reported from Northeast Ethiopia, which shows health professionals who had supportive supervision were five times more knowledgeable than those who had not (29).

In the current study, the availability of neonatal resuscitation guidelines in the workplace was significantly associated with the knowledge level of the study participants. Nurses and midwives who had access to neonatal resuscitation guidelines in workplace were seven times more knowledgeable than those who did not have. This is supported by a study reported from Afghanistan in which lack of guidelines in the workplace is substantially linked to poor knowledge of neonatal resuscitation (28). This might be because lack of guidelines in delivery and neonatal intensive care units impedes nurses and midwives from updating their knowledge on neonatal resuscitations through continuous reading.

A good attitude was significantly associated with neonatal resuscitation practice in the current study. Nurses and midwives with a good attitude were two times more likely had good neonatal resuscitation practice compared to those who had poor attitude. This finding is supported by a study conducted in Tanzania (30).

In the present study nurses and midwives who had supportive supervision were nine times more likely to perform neonatal resuscitation. This finding was consistent with the result of the previous study reported from Northeast Ethiopia in which poor practice was significantly associated with lack of supportive supervision. This could be due to absence of supportive supervision, which leads to poor practice and a progressive decline in performance over time.

The current study shows a significant association between the availability of resuscitation equipment and neonatal resuscitation practice. This finding is supported by a study from Kenya in which availability of resuscitation equipment is significantly associated with good neonatal resuscitation practice (16). It is also similar with a previous study conducted in Ethiopia, which identified absence of resuscitation equipment as a reason why healthcare workers could not effectively resuscitate newborns (10).

The main strength of the current study is inclusion of different health facilities including both health centers and hospitals, which helped to generate comprehensive evidence on the level of knowledge and practice of basic neonatal resuscitation, as well as factors influencing it. However, the study has some limitations, the primary one being its cross-sectional design, which cannot establish causal associations between the influencing factors and the dependent variable.

CONCLUSION

Neonatal resuscitation knowledge and practice among nurses and midwives were inadequate in the study area. Only one-third of nurses and midwives had good knowledge, while one-fourth had good practice of neonatal resuscitation. Having a bachelor degree, having neonatal resuscitation training, availability of resuscitation guidelines, and supportive supervision were significantly associated with neonatal resuscitation good knowledge, while having supportive supervision, good attitude, and availability of resuscitation equipment were significantly associated with good neonatal resuscitation practice. Hospital managers and decision makers in collaboration with regional and zonal health bureau should strengthen continuous and regular training on neonatal resuscitation and supportive supervision for midwives and nurses.

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Declarations

Ethical consideration

Ethical clearance was obtained from the Salale University Institutional Review Board, and permission to conduct the research was granted by the management of each participating institution. Written consent was taken from each participant, after the purpose and objectives of the study were explained. The privacy of participants and the confidentiality of all collected information were kept confidential.

Consent for publication: Not applicable

Availability of data and materials

All data are available and will be provided to the upon request.

Competing interests

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

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Salale University had covered all the costs for instruments, data collection, data entry, and analysis.

Author contributions

BGK was responsible for data collection, statistical analysis and interpretation, and wrote the manuscript. GSH, DE, MB, and BG interpreted and supervised statistical analysis and edited the manuscript. All authors approved the final version of the manuscript.

List of abbreviations

AOR-Adjusted Odd Ratio; BMV-Bag and Mask Ventilation; BSc-Bachelor of Science; CI-Confidence Interval; HCPs-Healthcare professionals; LMICs-Low and middle-income countries; NGO-Non-Governmental Organization; NICU-Neonatal Intensive Care Unit; NMR-Neonatal Mortality Rate; NR-Neonatal Resuscitation; SDG-Sustainable Development Goal; SPSS-Statistical Package for Social Science; SSA-Sub-Saharan Africa; WHO- World health organization

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