

BMJ Open Determinants of handwashing practice and its associated factors among mothers of under-5 children in Kolladiba town, Northwest Ethiopia: cross-sectional study

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ABSTRACT

Purpose Handwashing is a single most preventive measure for reducing the spread of contagious diseases. Mothers serve as the children's nurses and poor practice of simple hygiene increases the risk of the spread of diseases to under-5 children.

Objective This study aimed at investigating the proportion of handwashing practice at critical times and associated factors among mothers of under-5 children in Kolladiba town, Northwest Ethiopia.

Design, Setting, participants and outcome

measures A community-based cross-sectional study design was carried out from 20 February 2020 to 12 March 2020, in Kolladiba town. A total of 334 mothers participated in this study. The study participants were selected using a systematic random sampling technique. Bivariable and multivariable binary logistic regression was employed. A $p < 0.05$ was used to declare statically significant variables.

Results The proportion of good handwashing practice among mothers at critical times was 51.2% (95% CI 45.8% to 56.5%). In the multivariable binary logistic regression analysis, mothers who attained college and above (adjusted OR, AOR 4.93, 95% CI 1.28 to 19), knowledge of handwashing (AOR 1.26, 95% CI 1.11 to 1.42), husband working in governmental organisation (AOR 0.17, 95% CI 0.04 to 0.76), husband working at private organisation (AOR 0.16, 95% CI 0.04 to 0.75), mercantile husbands (AOR 0.09, 95% CI 0.02 to 0.37), tap water supply (AOR 0.26, 95% CI 0.07 to 0.93) and handwashing facility adjacent to latrine (AOR 6.17, 95% CI 2.02 to 18.8) were significant factors.

Conclusion Handwashing practice in kolladiba town among mothers at critical times was found to be low. Higher educational status, knowledge about handwashing practice and availability of handwashing facilities near the latrine, tap water source and husband occupation were significant factors. Thus, health awareness shall be given on the importance of handwashing practice with a due emphasis on mothers who do not attain higher education, with lower knowledge, who have tap water, working husbands and who do not have handwashing facilities near the latrine.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The current study studied mothers who have the biggest influence on the health promotion of under-5 children.
- ⇒ Social desirability bias might be there since handwashing practice was determined by mothers' self-reports.
- ⇒ The other limitation is recall bias which might underestimate the magnitude.
- ⇒ In addition, some variables like social norms were not explored which can affect mothers' handwashing behaviour.
- ⇒ The sample size of this study might not be enough to generalise its findings.

INTRODUCTION

Handwashing is a single most preventive measure for reducing the spread of contagious diseases since human hands are among the chief vehicles for transmitting infections especially diarrhoea.¹ But handwashing compliance remains a challenge all over the world.² Without good handwashing practice, diseases such as diarrhoea should not be expected to be reduced whereas reduction of this infection is the ultimate goal of handwashing promotion.³ The promotion of appropriate hand hygiene practice has been recognised as an important public health measure due to its significant contribution to preventing and controlling of most infectious diseases.^{4,5}

The hands are central to many of our daily activities and the use of contaminated hands for cooking and eating enhances the transmission of contaminants/germs into the body through food, thereby causing different diseases.⁶ Handwashing was related to diarrhoea, which is the second-largest cause of childhood mortality in developing countries.⁷



Globally, approximately 88% of deaths associated with diarrhoea are the result of unsafe water, inadequate sanitation and inadequate hygiene conditions.^{5 8}

The burden of communicable diseases in low/middle-income countries is largely driven by poor personal hygiene practices.⁹ Poor hand hygiene is estimated to result in almost 300 000 deaths each year, with the majority of deaths occurring in children under 5 years of age.¹⁰

Mothers serve the dual role of the children's nurse as well as the household chef for meals. This coupled with the poor practice of simple hygiene increases the risk of the spread of diseases to under-5 children.¹¹ Most mothers in low/middle-income and developed countries do not wash their hands adequately after faecal contact.⁹ Mother's hand washing practice during childcare leads to a reduced incidence of diarrhoea in children.¹² It was apparent that if the mother washed her hands properly, the annual occurrence of diarrhoea would be reduced among the whole family members, and herself.¹¹

Study findings from Pakistan showed that household handwashing practice interrupts the transmission of diarrhoeal pathogens sufficiently to markedly reduce diarrhoea among infants. Also, it indicates that households who received handwashing promotion from health extension workers were with lesser incidence of diarrhoea.¹³ Also, access to safe drinking water and health education for parents who wash their hands with soap and appropriate hygiene is with better outcomes concerning reducing the prevalence of diarrhoea.¹⁴⁻¹⁶ Furthermore, a study done in southern Ethiopia showed that the frequency of diarrhoea among participants with poor and good handwashing practices was 54.4% and 28.8%, respectively.¹⁷

Studies conducted in Bangladesh and South Africa revealed that handwashing with soap was a common practice among study participants.^{5 15} However, a study done in Nigeria showed that only one-third of mothers had good handwashing practices. Similarly, a study done in southwest Ethiopia also revealed that about one-third of mothers had good handwashing practices.^{4 18} In addition, other studies in Ethiopia found that the proportion of good handwashing practices in Wondogenet woreda, Debarik and Gondar was 29.9%, 52.2% and 39.1%, respectively.^{8 19 20}

A study done in Bangladesh indicates that home visit helps to improve hand hygiene behaviour. Thus, a home visit was found to have paramount importance in enhancing good handwashing practices.¹⁵

A study in South India found that family income, education, mixed family and the Christian religion had a better handwashing practice. However, mothers who worked every day were most likely to fail to wash their hands at critical times. It also found that mothers with a higher level of education had good handwashing practices than mothers with a lower level of hand-washing.⁹ Moreover, Studies done in Northern and southwest Ethiopia showed that the level of education had a significant impact on handwashing practices in which literate mothers regularly

performed handwashing practices better than illiterate mothers.^{4 19} Studies showed that having sufficient water for handwashing was more likely to have better handwashing practice than those who reported a lack of water.^{8 21}

A study done in one region of Ethiopia showed that those with a family size greater than five were less likely to practice handwashing than those that have a family size of less than four. whereas another study done in Ethiopia showed that marital status of being married and having good knowledge was found to increase the likelihood of good handwashing practice.¹⁹ However, another study shows that there is a gap between the knowledge of handwashing with soap and the optimal handwashing behaviour of mothers and other caregivers of children at home.²

Though different studies reported that poor handwashing practice among mothers of children under the age of five increases the risk of developing an infectious disease like respiratory infections, or diarrhoea, as to our search of literature there are limited studies available, and there are no published studies done on handwashing practice and associated factors among mothers of children under the age of five in the study area while the study area is with a high incidence of diarrhoea (84.9%), in which good hand hygiene was suggested as one means to combat the problem.²² Therefore, we aimed to investigate handwashing practice and its associated factors for mothers in Kolladiba town, Northwest Ethiopia.

METHODS

Study design and period

A community-based cross-sectional study design was employed while the data were collected from 20 February 2020 to 12 March 2020.

Study area

This study was conducted in Kolladiba town which is situated in the Central Gondar administrative Zone of Amhara National Regional State of Ethiopia. The town is about 35 km southwest of Gondar city and 729 km from the capital city of Ethiopia, Addis Ababa, with an estimated population of about 16035.²³ It has three kebeles (smallest administrative units), one health centre, one primary hospital, four private clinics and five government schools (three primary and two secondary schools). The dominant religious group is Orthodox Christians. Currently, in the town, there are 6074 households from these, 2342 (38.5%) of the households had children less than 5 years.

Study population

The study population was all mothers of under-5 children in the selected kebele.

Inclusion and exclusion criteria

In this study mothers who had at least one under-5 child or mothers who had raised under-5 children as adoption

Table 1 Sociodemographic characteristics of mothers of under 5 years of children at Kolladiba town, 2020 (n=334)

Variables		Frequency (n)	%
Age in years	20–35	198	59.3
	36–50	139	39.5
	51–67	4	1.2
Marital status	Single	16	4.8
	Married	284	85
	Divorced	19	5.7
	Widowed	15	4.5
Religion	Orthodox	273	81.7
	Muslim	59	17.7
	Protestant	2	0.6
Educational status of the mother	No formal education	89	26.6
	Primary level	57	17.1
	Secondary level	46	13.9
	College and above	142	42.5
Occupation of mothers	Housewife	94	28.1
	Government employee	130	38.9
	Merchant	52	15.6
	Other	58	17.4
Occupation of the husbands	Daily labourer	18	6.34
	Gov't employee	124	43.67
	Merchant	96	33.8
	Others	46	16.2
Family size	<5	192	58
	≥5	139	42

were included. Among them, mothers who have under-5 age children but who was seriously ill and unable to respond to the questions during data collection were excluded.

Study variables

Dependent variable

The outcome variable practice of handwashing was assessed by the categorisation of the summed score into two based on the median as poor and good practice. The 14 items that assessed handwashing practice were: after toilet visit, before and after eating, before food preparation, after handling babies' excreta, after changing babies' diapers, after touching money, after touching skin, after patient care, after touching raw food, after touching work cloth, after handling garbage, after sneezing and coughing and before handling raw food. A summed score above the median was declared as good handwashing practice coded as '1', whereas, summed score below the median was declared as poor handwashing practice coded as '0'.

Independent variables

Based on the literature, the independent variables included in this were knowledge of handwashing, socio-demographic/economic factors (age, religion, educational status, occupation, family size), environmental factors, availability of facilities and handwashing places.

Sample size and sampling technique

Sample size determination

The sample size was estimated by using a single population proportion determination:

Proportion formula (Gondar, Debarik)

$$n = \frac{(Z_{\frac{\alpha}{2}})^2 P(1-P)}{d^2}$$

Where;

p=34.9% was taken from the previous proportion of handwashing practice in Bench Maji.⁴

d=Degree of precision or margin of error (0.05)

α=the risk of rejecting the null hypothesis (0.05)

Z=the SE corresponding to a 95% CI

$$n = \frac{(1.96)^2 0.349(1-0.349)}{(0.05)^2}$$

n≈349

Since the total size of the population is <10000, we use the correction formula

$$N_{fe} = n_0 / (1 + n_0 / N)$$

Where: nf=the final sample size; n₀= initial sample size which is 349 and N=number of mothers of under-5 children

$$Nf = 349 / (1 + 349 / 2342) = 304$$

Plus, with a 10% non-response rate, the final sample size will be 334.

Sampling technique

There are three kebeles in Kolladiba town. A total of 2342 households with under-5 children were found in Kolla Diba town. The total sample size needed to answer the research objective was 334. Based on these we calculate the skip interval by dividing the total population by the sample size, and we found an interval of 7. Then, we randomly select the starting kebele (kebele 3) and then we select randomly the starting household using the lottery method out of the first seven households. The lottery method is the most popular and simplest method in which required numbers are selected whereas the selection of the households depends on chance.¹¹ Then every seventh interval until the required sample size was attained.

Patient and public involvement

This research was done without involving the patient in the design and implementation. However, the participants and administrative officials were informed about the objectives of the study. The results will be disseminated to the Central Gondar zone health office and the open-access journal.

Table 2 Handwashing issues of mothers of under 5 years children at Kolladiba town, 2020 (n=334)

Variables	Category	Frequency	%
Have you ever heard about handwashing at critical times	Yes	327	97.9
	No	7	2.1
Source of information about handwashing at critical times	Radio	133	40.7
	TV	196	59.9
	HEW	150	45.9
	Family	34	10.4
	Teachers	48	14.7
Frequency of visits by HEW	At least once per month	130	38.9
	Never visited in a month	204	61.1
Source of water	River	2	0.6
	Tap water	308	92
	Lake	2	0.6
	Spring water	22	6.6
Type of handwashing facility usually used	Water only	112	33.5
	Water and soap/ash	222	66.5

HEW, health extension worker; TV, television.

Data collection procedure

A comprehensive questionnaire comprising handwashing practice and its associated factors was prepared from different literature reviews which were used to collect data. Data were collected using interviewer-administered questionnaires at home and sociodemographic variables were completed with mothers. Ten data collectors participated in data collection after they are given 2 days of training. The data collectors were six females and four males all of them having bachelor's degrees in public health. Each mother was interviewed using a semistructured questionnaire and any misconceptions or queries that respondents might have on all sections of the questionnaire were clarified at the end of the interview, the respondents were thanked for extending cooperation.

Quality control and assurance

Then data were collected through a self-administered interview with a semistructured questionnaire, which was adapted by reviewing different literature.^{3-5 8 16 18} It was first prepared in the English language and then translated to Amharic, which is the local language of the study area then it was retranslated back to English to improve the consistency of the wording, and a pretest was done to ensure whether respondents can understand the questions or not and to check the wording, logic of the questions in a rational way to the respondents. After pretesting, amendments such as many wording errors were corrected before actual data collection. After data

collection, each questionnaire was given a unique code by the principal investigators. The returned data were arranged and organised in a meaningful way and was checked for its completeness.

Data processing and analysis

The data were entered into EPI Info V.7 and exported into STATA V.14 for further analysis. The Listwise Deletion method was used to handle missing values. A binary logistic regression model was fitted to assess whether there was an association between handwashing practice and categorical independent variables. Variables with $p \leq 0.2$ during the bivariable binary logistic regression analysis were included in the multivariable logistic regression analysis. In the multivariable binary logistic regression model, the adjusted OR (AOR) with the 95% CI was reported to declare the statistical significance and strength of association between the variables, and variables with $p < 0.05$ were treated as significantly associated factors of handwashing practice at critical times.

RESULTS

Sociodemographic characteristics of study participants

A total of 334 caregivers were included in this study. Only three participants were found with missed data. The mean age of the study participants was 35.67 years with a SD of ± 7.74 . of the total, about 85% and 81.7% were married and followers of orthodox religion, respectively. Based on the educational status of the mothers, 26.6% of them have no formal education and only 42.5% had completed college and above level. About 28.1% of study participants were housewives while 43.67% of their husbands are government employees (table 1).

Handwashing issues of mothers

Almost 97.9% of the study participants had heard about handwashing at critical times at least once in their lifetime. The source of water in 7.8% of the household was found to be unprotected and 66.5% of them use soap/ash frequently while washing their hands in addition to water (table 2).

Mother's response towards conditions they wash hands

The majority of the mothers ($\geq 75\%$) of mothers replied that they wash their hands with soap and water after the toilet, before and after eating, before food preparation, after handling babies' excreta and after changing baby's diapers whereas less than 50% of mothers replied wash their hands with soap and water after sneezing and coughing, after touching money, after touching skin, before handling raw food, after touching work cloth and after handling garbage (table 3).

The practice of handwashing at critical times

According to a self-report of the mothers of under 5 years children in Kolladiba town, the proportion of good handwashing practice was 51.2% (95% CI 45.8% to 56.6%) while college and above education accomplishment,

Table 3 The response towards conditions the mothers of under 5 years children wash hands in Kolladiba town, 2020 (n=334)

Variables	Category	Frequency	%
Do you wash your hands with water and soap after a toilet visit?	No	82	24.6
	Yes	252	75.4
Do you wash your hands with water and soap after sneezing and coughing?	No	202	60.5
	Yes	132	39.5
Do you wash your hands with water and soap before eating/feeding?	No	68	20.4
	Yes	266	79.6
Do you wash your hands with water and soap after eating/feeding?	No	26	7.8
	Yes	308	92.2
Do you wash your hands with water and soap before food preparation?	No	40	12
	Yes	294	88
Do you wash your hands with water and soap after handling babies' excreta?	No	25	7.5
	Yes	309	92.5
Do you wash your hands with water and soap after touching money?	No	247	74
	Yes	87	26
Do you wash your hands with water and soap after touching your skin?	No	253	76
	Yes	81	24
Do you wash your hands with water and soap after patient care?	No	124	37
	Yes	210	63
Do you wash your hands with water and soap before handling raw food?	No	197	59
	Yes	137	41
Do you wash your hands with water and soap after touching raw food?	No	68	20.4
	Yes	266	79.6
Do you wash your hands with water and soap after touching the work cloth?	No	207	62
	Yes	127	38
Do you wash your hands with water and soap after handling garbage?	No	232	69.5
	Yes	102	30.5
How often do you wash hands with water and soap after changing the baby's diapers?	No	36	10.8
	Yes	298	89.2

knowledge, husband occupation, tap water source and handwashing facility were significantly associated with good handwashing practice. Mothers who attained college and above level increased the odds of good handwashing practice by 4.93 times as compared with those with no formal education (AOR 4.93; 95% CI 1.28 to 19). Similarly, a higher knowledge score increased the odds of good handwashing practice by 1.26 times (AOR 1.26; 95% CI=1.11 to 1.42) than their counterparts. Husband occupation was significantly associated with the handwashing practice of husbands who are government employed (AOR 0.17; 95% CI 0.04 to 0.76), the private company employed (AOR 0.16; 95% CI 0.04 to 0.75) and merchants (AOR 0.09; 95% CI 0.02 to 0.37) decreased the odds of good handwashing practice as compared with those who are daily labourer. Mothers whose water source is tap water decreased the odds of good handwashing practice by 74% times (AOR 0.26; 95% CI 0.07 to 0.93). Availability of a handwashing facility near a latrine increased the odds of good handwashing practice by 6.17

times as compared with those who have no handwashing facility near a latrine (AOR 6.17; 95% CI 2.02 to 18.8) (table 4).

DISCUSSION

This study aimed to assess handwashing practice and its associated factors among mothers of under-5 children in Kolladiba town, northwest Ethiopia. Those who have good handwashing practice were about 51.2% (95% CI 45.8% to 56.5%). This result is in line with a study done in Debark town, northwest Ethiopia.⁸ While the current finding revealed higher handwashing practice than a study done at Gondar, Bench Maji, and Wondogenet, Indonesia, and Pakistan.^{4 19 20 24 25} The possible explanation for this difference might be due to the socio-economic difference and difference in the tool used for assessing handwashing practice and techniques of assessment. Some of the studies use observation techniques²⁰ while others use self-report techniques^{3 15 21 22} while the

Table 4 Associated factors of handwashing practice at critical times among mothers of under 5 years of children at Kolladiba town, 2020 (n=334)

Variables/ categories		COR (95% CI)	P value	AOR (95% CI)
Age of mothers (in years)	20–35	1	–	1
	36–50	0.46 (0.29 to 0.73)	0.2	1.67 (0.76 to 3.61)
	51–70	0.23 (0.02 to 2.26)	0.09	1.14 (0.08 to 15.9)
Educational status of mothers	No formal education	1		1
	Primary level	2.24 (1.11 to 4.54)	0.08	2.58 (0.89 to 7.42)
	Secondary level	3.13 (1.48 to 6.62)	0.18	2.41 (0.67 to 8.69)
	College and above	6.61 (3.65 to 11.9)	0.02	4.93 (1.28 to 19)
Family size	<5	2.81 (1.79 to 4.42)		1.9 (0.9 to 4)
	≥5	1		1
Marital status	Single	1		1
	Married	0.47 (0.16 to 1.38)	0.88	0.84 (0.08 to 8.48)
	Divorced	0.5 (0.13 to 2.03)	0.89	1.13 (0.15 to 8.54)
	Widowed	0.3 (0.07 to 1.33)	0.44	0.46 (0.06 to 3.32)
Knowledge	Knowledge	1.25 (1.15 to 1.36)	0.001	1.26 (1.11 to 1.42)
Respondent occupation	Housewife	1		1
	Daily labourer	0.19 (0.02 to 1.54)	0.08	0.11 (0.01 to 1.27)
	Government employed	2.97 (1.72 to 5.16)	0.34	0.54 (0.16 to 1.89)
	Private employed	3.03 (1.26 to 7.31)	0.79	1.19 (0.33 to 4.290)
	Merchant	1.24 (0.62 to 2.47)	0.66	0.78 (0.27 to 2.29)
	Jobless	3.93 (0.95 to 16.2)	0.69	1.49 (0.2 to 11)
	Others	1.69 (0.45 to 6.24)	0.83	1.29 (0.12 to 13.5)
Husband occupation	Daily labourer	1		1
	Government employed	0.88 (0.31 to 2.49)	0.02	0.17 (0.04 to 0.76)
	Private employed	0.62 (0.19 to 1.99)	0.019	0.16 (0.04 to 0.75)
	Merchant	0.26 (0.09 to 0.76)	0.001	0.09 (0.02 to 0.37)
	Job less	0.5 (0.06 to 4.47)	0.69	0.55 (0.03 to 9.36)
	Others	0.4 (0.13 to 1.22)	0.09	0.2 (0.03 to 1.28)
Heard about critical times for handwashing	No	1		1
	Yes	2.4 (0.73 to 8)	0.18	0.3 (0.05 to 1.73)
Have you been visited by a health extension worker	No	1		1
	Yes	1.4 (0.86 to 2.16)	0.15	1.6 (0.84 to 2.96)
Source of water	River	1		1
	Tap water	0.46 (0.18 to 1.16)	0.04	0.26 (0.07 to 0.93)
	Other	0.47 (0.03 to 8.59)	0.73	0.46 (0.01 to 36)
Location of health washing facility	Near to latrine	7.7 (3.3 to 17.8)	0.001	6.17 (2.02 to 18.8)
	Near to household	1.5 (0.75 to 2.93)	0.34	1.6 (0.61 to 4.16)
	There is no separate place	1.19 (0.63 to 2.27)	0.39	1.5 (0.6 to 3.7)
	There is no handwashing facility	1		1

The bold values indicate significantly associated independent variables. AOR, adjusted OR; COR, crude OR.

latter may inflate the magnitude of good handwashing practice.

The handwashing practice in the study area was lower than a study done in Nigeria, Debarik and much lower

than a study done in South Africa.^{17 20 21} This might be due to sociodemographic differences, especially differences in the education status of the population and better living life standard

In this study, higher levels of education were associated with good handwashing practice. This finding is consistent with studies done in South India, Northeastern India, Benchi Maji and Gondar Ethiopia.^{4 9 12 19 26} However, a study done in South Africa showed that the level of education of the mothers had no association with handwashing practices.⁵

This study revealed that having higher knowledge about handwashing practices was associated with good handwashing practices. This is in line with a study done at Gondar town, Northwest Ethiopia.¹⁹

Husband occupation at a government organisation, private organisation and merchant was associated with a lower likelihood of handwashing practice as compared with those who are jobless. This might be due to being busy and rushing to work by the husband the workplace might lessen their practice of encouraging the woman to wash their hands. Also, their minimal support to the mothers in giving care to the baby might overburden the mothers which that makes them unable to stick to important precautions in giving care to the children including handwashing practice.

This study revealed that those who have access to tap water were less likely to practice good handwashing practice than those who have access to river water. This might be explained by the high frequency of non-functionality of tap water even though they are available in their compound while the non-functionality of water sources despite their presence is revealed by another study done in the same study area.²⁷ Thus, the availability of tap water could not guarantee to keep good personal hygiene where there is frequent non-functionality of the water source. However, this finding is in contrast with studies done in Ethiopia and Nigeria in which the availability of water sources was associated with better handwashing practice.^{8 21}

Availability of a handwashing facility near the latrine was associated with good handwashing practice. Because this fulfilment of the facility minimises forgetfulness and encourages the practice of the appropriate precautions when it is found immediately in the latrine.

Limitation of the study

Social desirability bias might be there since the handwashing practice of the mothers was determined by only their self-reports and those reports could not be confirmed by other methods including observation which might overestimate the magnitude of handwashing practice. The other limitation is recall bias which might under/overestimate the magnitude.

CONCLUSION

Handwashing practice in kolladiba town among mothers at critical times was found to be low. Higher educational status, knowledge about handwashing practice and availability of handwashing facility near latrine were associated positively with good handwashing practice while tap

water source and husband occupation were associated negatively. Thus, health awareness shall be given on the importance of handwashing practice with a due emphasis on mothers who do not attain higher education and with lower knowledge, working husbands, who have tap water and who do not have handwashing facilities near the latrine.

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Patient consent for publication Not applicable.

Ethics approval Ethical approval was obtained from the Ethical Review Board of the Institute of Public Health, College of Medicine and Health Science, University of Gondar Ref No/IPH/345/04/2013. An official letter of permission was obtained Kolladiba town administrator. Verbal consent was obtained from the participants and the study participants were provided with clear information about the purpose of the study and asked if they were willing to participate in the study. Data were collected after receiving verbal consent from those who were willing to participate in the study. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

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