Research Article

Hand Washing Behavior among Mothers and Caregivers of Infants in Abashawl Sub-Zone, Asmara: A Qualitative Study

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ABSTRACT

Objective: This study was aimed to explore the drivers of hand washing behavior among mothers and caregivers of infants in Aba-shawl sub zone, Asmara, Eritrea. Methodology: A qualitative study was conducted from July to December 2019 in Aba-shawl sub-zone, Asmara. All participants in this study were selected using chain referral sampling. In-depth interviews were conducted on twenty mothers and caregivers of infants. Focus group discussion was done in Edaga Hamus Hospital with eight mothers of infants from Aba-shawl subzone and two key informants were interviewed; one health professional from Edaga-hamus Hospital, and one administrator of Aba-shawl subzone. In addition to that the researchers observed the general conditions of the community including cleanliness, availability and accessibility of water, toilet and other cleaning facilities. Results: The barriers to hand washing behavior identified in this society were; new responsibilities of nurturing an infant, increased workload when nurturing an infant in addition to rearing other children, lack of affordability of hand washing materials for frequent use, lack of hand washing materials in the locations where they spend most of their time, elders' fear of excessive exposure to water and thereby opposing frequent hand washing behavior of mothers and caregivers of infants. Motivators of hand washing behavior include; mothers' and caregivers' perceptions of good motherhood, perception that soap is necessary to clean hands particularly for visual dirt and improving the smell of hands, support from husbands and other family members, availability of soap and close proximity of water and hand washing station and other hand washing facilities, perceived benefit of hand washing for prevention of childhood illnesses primarily diarrhea and other enteric problems, verbal cues from close ones regarding hand washing before and after breastfeeding, and environmental factors like the overall conditions of the study site. **Conclusion:** The study findings suggest that there are sizable opportunities to improve hand washing behavior among mothers and caregivers of infants in Aba-shawl sub-zone. Focusing on the specific barriers and motivators of hand washing prevailing in the study area, responsible authorities need to scale-up their efforts to improve mothers and care givers hand washing behavior.

Keywords: Hand washing, Mothers, Infants, Aba-shawl, qualitative

INTRODUCTION

SWorld Health Organization defines hand washing as washing of hands with soap and water thoroughly following the five critical moments i.e. after defecation, after cleaning child's bottom, before cooking, eating and feeding children [1]. Hand washing interrupts the transmission of disease agents and so can significantly reduce diarrhea and respiratory infections, as well as skin infections and trachoma [2]. Washing hands with water alone is significantly less effective than washing hand with soap in terms of removing germs because using soap in hand washing breaks down grease and dirt that carry most germs, using soap also means additional time consumed during massaging, rubbing and to dislodge them from fingertips and between the fingers. Effective hand washing (HW) takes 8-15 seconds, followed by thorough rinsing of hands with running water [3]. Some studies reported that, the prevalence of diarrhea is slightly higher for children in households with unimproved sanitation than for children in households with improved sanitation including hand washing practice. Soap and water, the essential hand washing agents, were observed in only 28% of urban households and 7% of rural households [4]. According to hand washing practices reported by United Nations International Children's Emergency Fund, the difference is often substantial between what people know they should do and what is actually done. The Baseline Survey of Awareness of 'Facts for Life' showed that two-thirds of the people interviewed, for example, are aware that after defecation hands should be washed with water and soap. Unfortunately, only about 9% actually do so [5]. Previous studies have largely focused on the hand washing behaviors of mothers of children under the age of 5. Some of these studies have reported infrequent hand washing among mothers and other caregivers of young children at times of possible pathogen transmission, including after contact with fecal matter [6, 7]. The perceptions, beliefs and practices related to maternal hand washing behavior in the neonatal period differs from those of mothers with older children [8]. Such detailed understanding of behavioral drivers is important for developing maternal hand washing intervention to reduce the risk of infant morbidity and mortality attributed to hygiene-preventable causes. Nested in a larger experimental study whether perinatal hand washing promotion results in reduced neonatal and infant morbidity, we

sought to explore current hand washing practices and the context of barriers and motivators to maternal and caregiver hand hygiene in Aba-shawl subzone of Asmara.

Methods

Study Site, Timeline, and Sampling

This qualitative study was conducted in Aba-shawl subzone of Asmara city among mothers of infants from July through December 2018. Additionally, caregivers in the family typically fathers of infants and elders were included in the study as they are important family decision-makers.

Site-Specific Description:

Aba-shawl sub-zone is located approximately two kilometers away from the centre of Asmara city towards the north direction. It is the most densely populated area in the capital city with a total population of 39, 722 residing in an area of 0.81 km2.

Study Population

The main participants of this study were mothers and care givers of infants who live in Aba-shawl subzone. the data were collected among three main groups of the subzone- i) mothers of infants, ii) other caregivers in the family and iii) key informants (Abashawl subzone administrator and pediatric unit

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head of Edaga-Hamus Hospital).

Selection Criteria

Mothers or care givers who were voluntary to participate, living in abashawl subzone and whose children were in their first year of life were the included participants. Whereas those participants whose children were older than one year or less than 28 days and who were unwilling to participate were not included.

Sampling Method

We created a list of mothers of infants less than one year old from Akria Health Center and Edaga Hamus Hospital (health facilities serving the study population). From the list, we randomly selected mothers who met the criteria mentioned above. Secondary

caregivers (maternal or paternal grandmothers or fathers) in the family, who played an influential role in infants care were identified based on recommendation by mothers (i.e. chain referral sampling). The chain referral technique was used to select the participants for the in-depth interview which included two caregivers and eighteen mothers. The participants in the focus group discussion were selected by visiting the Expanded Program of Immunization (EPI) Unit of Edaga-Hamus Hospital (EHH) for two days, eight mothers who happened to come on these days who had children less than 1 year and greater than 28 days and whose address was Aba-shawl were included in to two focus groups of four mothers. Two key informants; one health care provider from the Integrated Management of Neonatal and Childhood Illnesses (IMNCI) Unit of the hospital and the administrator of Aba-shawl sub-zone were interviewed in their offices (Table 1).

Table 1: Data collection tools and study participants

Data collection tools	Type of participant	Number of participants
In-depth interview	Mothers	18
Focus group discussion	Care givers	2
	Mothers	8
Key-informant interview	Health care provider	1
	Administrator	1

Data Collection Instruments and Procedures

A questionnaire was developed from an extensive review of literatures, as a support guide that covered knowledge and perception about hand washing with soap, social norms and beliefs, practice and access and availability of resources. The questionnaire was then translated to the local language (Tigrigna). The questionnaire had two parts: socio-demographic data and questions related to hand washing. All the questions were open ended and were used to assess the issues mentioned above. Triangulation method was used by conducting in-depth interviews, focus group discussions and key informant interviews.

i) In-depth interviews

We conducted in-depth interviews with mothers of infants to elucidate their perceptions and opinions about the health of their children, healthy practices, prevention of illness, and taking care of children. We interviewed eighteen mothers and two care givers (a father and grandmothers of infants). Face to face mobile recorded interviews which took 45-60 minutes was done in the participant's houses. One question projector and a recorder were used during in-depth interviews.

ii) Focus Group discussions

After completing the in-depth interviews, we organized group discussions to further explore the themes related to childcare and hand hygiene that emerged from the observations and in-depth interviews. We conducted group discussions of 80-100 minutes duration with mothers of infants while they came to immunization unit of EHH on the 20thof October 2018. Three data collectors were involved in the FGD session, one was acting as moderator, the second one was a note taker and the third one was a mobile recorder.

iii) Key Informants Interview

Key informants (abashawl sub-zone administrator and IMNCI head of EHH) interview was conducted for 15 minutes for both informants at their respective offices.

Data Analysis

For explaining the determinants of maternal and caregivers' hand washing behavior, we adopted the Health Belief Model and the Theory of Reasoned Action/Theory of Planned Behavior. The model includes constructs aimed to explain individual health behavior, as well as social cognitive theory, which addresses interpersonal constructs relevant to health behavior. Taking the model as a reference, the most current understanding of motivations to improve hand washing behavior among mothers and care givers of infants in Aba-shawl sub-zone were discussed. Motivating factors relevant to infant period included planning for nurturing behavior, the child's good health, habit, normative beliefs regarding motherhood, and environmental factors such as the presence of soap and water at a hand washing station. This qualitative research instruments addressed the major constructs captured from the theoretical model (Figure 1).

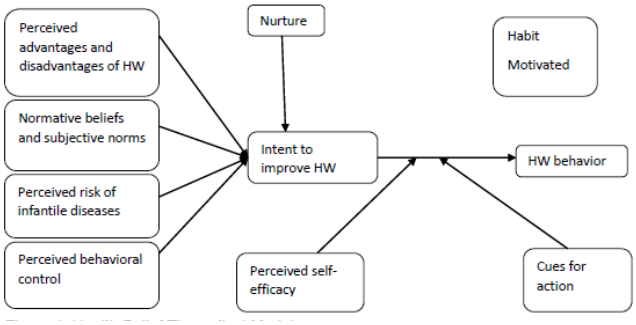

Figure 1) *Health Belief Theoretical Model*

To analyze the data, we transcribed all audio recorded interviews and discussions verbatim. Then we developed a code list based on the conceptual model and data collected, and coded all Tigrigna transcriptions. We performed thematic analysis of data from mothers, caregivers, and key informants according to the themes identified in the conceptual model to describe perceptions related to hand hygiene behaviors, physical environment to perform required hand-washing, and social dimensions that promote execution of mothers' intended actions. We identified common trends and patterns from the responses and prepared summaries of each theme. Five phases of theme formulation steps are described in Table 2.

Phase 1	familiarizing with the data	The recorded responses were first transcribed in to papers. In order to familiarize with the data, the transcribed data was read and re-read.
Phase 2	generating initial codes	Next, initial codes were generated by documenting where and how patterns occur. This happened through data reduction where data was collapsed into labels in order to create categories for more efficient analysis. Data complication was also completed here. This involved the making inferences about what the codes mean

Phase 3	searching for themes	Then, codes were combined into overarching themes that accurately depicted the data
Phase 4	reviewing the themes	In this stage, the themes were looked at how they support the data and the overarching theoretical perspective. After that, each theme was assessed on which aspects of the data it captured.
Phase 5	defining and naming the themes	Finally, the data was defined and refined to identify the essence of the themes.

Ethical Approval

The proposal was approved by the "Research and Ethical Committee" of the School of Public Health, Asmara College of Health Sciences. A formal letter was taken from the School of Public Health to the administration of Aba-shawl sub zone and EHH requesting their cooperation. After a brief explanation of the purposes of the study, those who were volunteers to participate were taken as study participants for the study. Confidentiality was kept by leaving their names and addresses out of every copy of this research paper.

RESULTS

Socio-demographic Characteristics of the Study Participants

A total of 30 participants participated in the study. Twenty six of them were mothers, two caregivers (one father and one grandmother), and two key informants. Out of the total 26 mothers, majority of them were married (23/26), multiparous (23/26), unemployed (21/26). Almost all the mothers (24/26) delivered at health facility. Of the infants, majority (17/28) were females with a median age of 8 months.

Sub-Themes Formulation

Based on the responses of the study participants, subthemes were produced from each corresponding answer to a question and relative sub themes were put under a similar theme. A total of four themes and twenty two subthemes were produced (Table 3).

Themes	Subthemes
Knowledge and perception	Perceived self-efficacy
	Perceived positive consequence
	Perceived negative consequences
	Perceived social norms
	Perceived risk and cause of infantile diseases
Cues for action	Access
	Reminders
	Environmental factors
	Benefits(advantages)
	Threats(disadvantages) of not HW
Normative beliefs and subjective norms	Nurturing child and maternal intent to improve HW behavior
	Affiliation
	Religion
	Social factors
Practice	Hand washing as Habit, motivated, planned
	Commitment with the five critical times
	Perceived behavioral control
	Perceived motivators of HW
	Perceived barriers of HW
	Materials for hand washing

Knowledge and Perception

The knowledge and perception of the respondents was lacking to promote the required HW behavior though they seemed to have some degree of good view to HW. The knowledge of the respondents varied though they all claimed that they had heard of hand washing importance through mass Medias, ANC providing clinics, EPI providing health facilities, hospitals and schools which partly influenced their perception.

Perceived self-efficacy

Majority of them said that they have had a person who could provide them the necessary facilities in the times they had needed help like during night time. While some others mentioned they had no one to take care of them during these times.

One mother said,

"I do not need assistance from any person, I move by myself to do the necessary things."

A mother of a four months old infant stated,

"It is my responsibility to maintain the health of my family especially my child, thus motherhood was a changing point in my hand washing behavior because when I was alone I only thought of myself but when I got a baby I started to do it for the benefit of both of us."

Perceived positive and negative consequences

When asked what the negative consequences of HWWS were, some mothers responded as follows.

"HW does not have any negative results only that it takes some time."

Another one said,

" It does not have any harm to health, but sometimes when I need to prepare injera (local food), I do not want it to smell soapy so I use lily instead."

All the mothers stated that hand washing has many advantages mainly being prevention of diseases but also took cleanliness (neatness), comfort and luxury into account.

One mother of 11 months old male infant said,

"It has many uses, it may prevent them (the infants) from contracting tonsillitis, vomiting or having diarrhea. Generally by washing hands we can prevent various diseases that occur due to dirtiness."

Besides, mothers gave their ideas about the usage of only water as a hand washing material.

Other mother of 11 months old male infant stated,

"It is not enough when a mother washes her hands using water only, because there is no complete cleanliness compared to soap."

Perceived social norms

Mothers of infants are usually advised not to go outside, keeping their baby alone in the room until 40 days.

One mother said,

"When I first gave birth [during the first 40days] when there was no one available in the room, I could not get down from this bed even for a hand wash . . . people said that keeping a newborn alone in the room is bad during this time."

"In our society, uvulectomy (by traditional practitioners) is supported because swelling of the uvula is believed to cause difficulty of sucking breast and diarrhea to the baby ", said a mother of 9 months old male infant.

Norms regarding good motherhood

Mothers generally said that a good mother always takes care of and loves her baby.

One mother said,

"A good mother is always supposed to keep her baby clean, warm and cozy and gives her baby's health priority."

Perceived risk and cause of infantile diseases

Regarding the main common dangerous child diseases that are avoidable using proper HW such as pneumonia, common cold, diarrhea and fever, perception was quite deficient about the ways they are caused by.

One father/caregiver claimed,

"Pneumonia, bronchitis, common cold, diarrhea and vomiting are the dangerous illnesses that can affect an infant."

Elder care givers seem to lack some understanding about the causes of child illnesses.

One grandmother of an infant when asked how it would affect the child's health if her grandmother's hands were dirty, she said,

"Not at all, I am like her mother what about I could possibly hurt her? I even some times give her my breast to soothe her when she cries and her mother is not around."

When respondents were asked when is the period that an infant is most vulnerable to diseases,

One mother said,

"Infants are susceptible to diseases after they start taking additional food that is beyond 6 months of age, however as I have heard it from a doctor even if you do not give sufficient care, a one month old kid can also be susceptible".

A mother of two infants said,

"An infant is more susceptible to diseases before the age of 6 months because after 6 months he can get immunity from the additional food given to him."

The multiparous mothers who washed their hands at the critical times observed improved health status of their families and children compared to their first child's. Besides the incidence of diseases observed before was reduced.

"Mothers HW behavior has a big impact on her child. If the HW practice is poor, her child may get sick because mother's cleanliness means families cleanliness. Plus the mother's positive behavior is determinant for the child's health status" indicated mother of a 4 months old male child"

A mother of a 10 months female infant said,

"It is a mess now that she started crawling she just picks up whatever she finds on the floor and puts it in her mouth. I guess that is why she gets diarrhea more now than when she was younger."

Some mothers also linked seasonal variations and illnesses.

One mother said,

"There is a seasonal pattern to illnesses; some illnesses are more common in one season and other illnesses more common in another season. In cold seasons flu is common."

Most of the respondents pointed out that they did not know what causes fever. Yet, they tried to describe it as a response indicator of diseases.

One mother said,

"Fever is a result or cause of an illness."

Other mother described,

"During the first 40 days after I gave birth, my contact with water was limited since I do not leave the bed that much, besides my mother used to tell me that touching cold water repeatedly will only make the child catch cold."

A care giver (grandmother) also reported.

"My granddaughter has pneumonia. Her mother takes her to hospital frequently. I told her not to wash clothes and hold water when she first gave birth but she would not listen to me, I told her bathing the baby repeatedly would not do her any good but look at what she has done to the poor baby now. Nothing kills a baby except hunger."

One mother of a 10 months old female infant stated,

"She (referring to the baby) got diarrhea when she started growing milk teeth, she used to scrub her gums with anything on her hand because it is itchy when they grow teeth."

When asked about what causes fever for an infant, one mother stated,

"When I stay in the sun for long hours with my baby, he gets feverish but gets better when we get home and I cool him by loosening his clothes."

Another mother of a 6 months child said,

"A baby could get fever when he/she is fed too much in excess of his usual amount."

One mother described,

"When a person with an itching disease or with dirty hands holds the baby he would get skin diseases."

Perceived positive and negative consequences

As one mother said,

"Hand washing with soap has of course positive consequences on my health and my baby's health too. Besides being healthy I would also feel good and clean after washing my hands."

Access

All the respondents outlined that no matter how much the soap costs they buy it because it is a necessity. However, shortage of detergents and unavailability of clean water was considered as a shortcoming for good hand washing behavior.

One mother said,

" I have never been without soap, even if I have to stay without food..., I have to buy soap no matter what..."

Another respondent said,

" I have never been without soap and my neighbors call me 'Senay Laundry' because I use soap excessively."

Another factor discussed was the availability of clean water. Mothers emphasized the fact that shortage of water limits their behavior towards good hand washing practice.

One mother said,

" I usually have to conserve water until the next time the water truck comes, I use the water to wash the babies napkins and the bed mattress, so little is left for me to wash my hands every time before I hold the child or every time I breastfeed him."

According to one mother,

"Soap is something I have to buy at all costs even if I have to reduce the groceries I buy. I cannot be without soap when I have a baby that defecates a couple of times a day. So it is not a matter of affordability, we buy it because we have to."

While other respondent described,

"There are days when I completely run out of soaps; even now I do not have soap. I use the neighbors' soap to wash and since it is not mine I cannot use

it as I please, so except for the times when my hand is extremely dirty, I just wash with water only."

"Getting soap from shops is of no problem but to get water from nearby areas is tiring and hard. Moreover the water that we bring is either brackish or non-potable," said mother of infant.

One mother also stated that,

"The water we get is too expensive it is hard to afford it but we are forced to buy even though it is out of our capability. We buy water from carts which is 100-150 nakfa. Besides one barrel does not last for even a week so we go to Edaga-Hamus (nearby area) to bring water for washing but we buy bottled water (10 litters) for drinking purposes."

Reminders

Having supporters at home helps mothers to remind them in all their activities.

One mother said,

"My husband is very supportive, even when I am in a hectic situation he reminds me to wash my hands before I breastfeed the baby, he also holds the baby till I finish."

A 30 years old female mother of a 9 months female infant described,

"When she was being exclusively breastfed her stool did not smell that bad so I used to change her diapers and just rinse my hands with only water. But now that she started to eat other foods her stool is harder and smellier than it was, so to remove the smell and to feel less disgusted I wash my hands with soap and water."

Environmental factors

In addition to the almost constant shortage of water and the relatively high prices of soap, some environmental factors also seemed to play a role in the hand washing behavior of these mothers and caregivers of infants. The study area is a known place for 'traditional drinks' and presence of many prostitutes (sex workers). The fact that the site is the most overcrowded area in Asmara makes it more contagious place with regard to pathogen transmission.

One mother claimed,

"Watching how dirty our environment is makes me worry about the health of my baby and my family, so I wash my hands with soap so many times after any activity."

When asked about how hard it was for her to remind the other children to wash their hands with soap and water before touching the infant, One mother of 5 children answered,

"Living in this area itself is enough to remind us to wash our hands before doing anything let alone touching the baby. Our kids spend a lot of their time outdoors playing and I am almost constantly worried they might hold any sharp objects like blades or disposed condoms. Therefore I am always cautious about reminding them to wash their hands with soap and water."

Benefits and Threats

The respondents clearly mentioned that HW would promote heath by preventing diseases both to the mother or caregiver, the child and the family in general.

One respondent said,

"Washing my hands with soap and water ensures my health and my family's health by removing the disease causing bacteria and dirt in my hands."

Normative Beliefs and Subjective Norms

Nurturing child and maternal intent to improve hand washing

In some instances, the social construction of a woman's role being a wife and a mother of one or more children (multiparous) often impacted her hand washing behavior.

One primiparous mother said,

"After I became a mother, the frequency of my HW behavior increased because of my increased responsibility to care for my child's health."

On the other hand another mother said,

"Being a mother of five children is sometimes hard to remember to wash my hands with soap and water as required because I do not have the time to do so because of the house chores and the responsibility to look over all the children."

Affiliation

A mother described,

"If I am dirty and do not take care of my baby, people would think bad of me and I would feel ashamed of myself. In addition to the health benefits cleanliness increases my self-esteem"

Religion

There was link of religion to hand hygiene in the Islamic religion.

One mother of Islamic religion said,

"In our religion it is a must to wash your hands, face and feet with water or with soap after using the toilet and before praying."

Social factors

Most elderly people do not actually believe that HW is a necessity to the health of the child and they stress out that feeding and nurturing the baby is quite enough for the health of the baby.

One 65 years old woman caregiver said,

"We have raised lots of children in our long life experience and you just need to feed them any food well and nothing would affect them."

Another mother claimed,

"My mother-in-law lives with us and every time she watches me washing my hands and other things with soap, she criticizes and tells me not to spend much time with water."

One respondent mother said,

"It is so hard to tell people to wash their hands before touching (hugging) the baby even though I myself sometimes think that they are clean. But it would be better if they restrain themselves from holding the baby with dirty hands."

Practice

Hand washing behavior (Habit, motivated or planned)

When asked if hand washing was part of their plan, habit or they do it because something motivated them; three mothers gave the following responses.

"I wash my hands because it is in my habit. I always wash my hands before I eat and use the toilet to the very least with water only."

"When I am doing activities that would make my hands dirty I am motivated to wash them with soap and water before holding or feeding the baby."

Another mother who works as a waitress said,

"After I come from work, I always wash my hands before holding the baby I am not sure about the other times but after coming from work, it is in my plan to wash my hands."

Commitment with the five critical times

When asked whether they washed their hands with soap at all important moments, mothers replied as follows.

"It is hard to always remember to wash your hands for example sometimes at night when I change her diapers, I immediately breastfeed her."

"There are times when I come from outside and hold the baby before washing my hands."

Hand washing before breast feeding or feeding the baby Some of the mothers stated:

"If dirt remains in my hands or if my breasts are dirty, the dirt will enter the baby's stomach through the milk and cause him stomach illness"

The respondents also mentioned that it was necessary to wash hands with soap before feeding the baby with bare hands in the post-weaning stage because the dirt, bad odor and germs on their mothers or caregivers hands may be ingested by the infant and cause him/her illnesses like diarrhea

After visiting the toilet/defecation

One mother of a 4 months infant said,

"I always remember to wash my hands after visiting the toilet because then my baby will get sick if I breastfeed him with my dirty hands that would carry germs."

Before eating

One mother said,

"I always wash my hands before eating at least with water. I use soap depending on what I was doing before eating. If I was doing activities that would dirt my hands, I wash with soap and water before eating."

Before preparing and serving foods

One mother stated,

"During food preparation, I wash my hands together with the ingredients like onion and after I finish cooking, I use soap to wash my hands because I have to remove the garlic or hot peppers before holding my baby."

After cleaning the child's bottom/ changing diapers of the baby

A mother of a three months male infant said.

"I usually do not change his diapers at night because I normally do so before we go to sleep, but if he cries because of the discomfort, I just change his diapers and go back to sleep. At that time I am just too lazy to get out of bed and wash my hands with soap and water."

One mother mentioned,

"Just the sight of the dirt or feces of the baby makes me want to wash my hands with soap."

Perceived behavioral control

One mother of twins and 4 older children explained,

"It is not about knowing how important hand washing with soap is; you have got to have the time and suitable conditions to do the correct things. When one of the twins cries the

other one follows. At such times I do not even remember about washing my hands, it is just too hectic to think about anything else but calming the twins first."

Perceived barriers of hand washing

Lack of importance

One mother described,

"I am a house wife and do not go out that much. Especially when I first gave birth I barely went out of the house at such times, I don't need to wash my hands with soap every now and then because my hands do not get that dirty"

Workload and new role of motherhood

A mother of an infant said,

"When sneezing/coughing while her child is in her lap, she cannot go outside for a hand wash; but before childbirth she could wash hands."

Lack of attendant support

As one of the mothers of an infant said:

"Sometimes I can wash, sometimes I cannot. The child cries a lot. I cannot give him to anyone [attendant] even for going to toilet because it takes a long time in the toilet. Then if he continues crying more, I hurry and come from the toilet without washing my hands"

Responsibility for multiple children

One mother explained,

"I want to remind the elder children to wash their hands before holding the infant but do not have that opportunity because I am busy with other work" This was a very common scenario in almost all the mothers.

Opposition from elder family members

One mother of a 10 months old infant said.

"My mother hated it when I washed clothes or did the chores when I gave birth because she was afraid that I was going to make the child sick."

Availability of hand washing materials

One mother also said,

"It would have been better to have a hand washing station here or near the public toilets. We travel a distance to use the toilet and by the time we are back home, it is already too late to remember to wash our hands with soap and water."

Avoiding soap smell in food

Some mothers said,

"It is good to wash with soaps frequently but some times when I have to prepare injera for lunch or dinner especially when we have guests over the house, because I am afraid that the injera would smell like soap I just wash my hands with water only."

Perceived Motivators of Hand Washing

Hand washing for removing visible dirt and as habit

One mother said,

"Despite the fact that I know I should wash my hands with soap at the critical times, I cannot help but feel like washing when my hands are visibly dirty ,and do not remember washing when they look clean."

Information as a motivator

One mother particularly mentioned,

"I learned from television that hand washing could reduce illnesses. They teach us in the clinics when we go for checkups too."

Attendant support

One mother stated,

"My mother lives with me, so I have time to do hygienic practices when I feel necessary."

Another mother also said,

"When I first gave birth, my husband used to bring me soap and water to the bed, so I was never troubled to get up and wash."

Materials for hand washing

One mother of infant said,

"During the night time I prepare a wet clothe near my bed. So, when I change my child's diaper at night, I only wipe my hand using the wet cloth."

Discussion

Despite the available opportunities to improve maternal hand washing behavior in the study sites, the implementation of proper hand washing practice was relatively poor. The lack of hand washing practices was consistent with findings from other low-income countries [8, 9]. Mothers and caregivers in the study area were observed to have a general idea about the importance of hand washing, though their level of knowledge, perception, and the sources of information differed. The main sources of information about hand washing were health education in health care facilities, mass media and schools. Similarly, a quantitative research done in Zambia indicated health centers, places of worship, social clubs, radio, schools, cell phones, health educators, and village leaders as the main sources of information [10]. As all the participants in the current study visited the recommended antenatal care (ANC) during all their pregnancies, they received the appropriate health education about hand washing. These initiative made the mothers to attain the maximum knowledge about the importance of hand washing. However, in a similar study conducted in Kenya, mothers' knowledge about hand washing, and hygiene standards required to protect the infant from infections were limited [11]. The difference

might be due to the fact that new mothers did not attend the prescribed four ANC visits during pregnancy, which might contributed to their limited knowledge. Moreover, during the ANC visit at the facility, majority of the women were not shown how to wash their hands before handling an infant. A multi-country analysis of drivers of hand washing behavior among mothers of children less than 5 years old has shown that perceptions of risk usually did not motivate maternal hand washing, except in outbreaks such as epidemic cholera [12].

The HW behavior of the mothers was greatly affected by the organizational norms, social norms followed by the society and need to be obedient to the norms of the social network they live. In the current study, some mothers reported that they were not supposed to go outside the bedroom during their first forty days of delivery. Moreover, elder mothers perceive that frequent washing has the tendency to increase childhood infection. Similar perceptions were reported in a study done in Bangladesh [9]. Beside it is unsound from a biomedical understanding of pathogen transmission, such beliefs, attitudes, and norms hamper the practice of hand washing behavior. Hence, to discourage the mentioned societal perceptions, awareness building communications focusing on behavior chance need to be enhanced at the community level. Alternative options, such as waterless hand sanitizer, might be considered to minimize the humoral concerns of mother's excessive exposure to water [9]. Religion was a strong belief held strictly by mothers and caregivers of infants which guides and influences their hand washing behavior. In this study, religion difference seems to have quite an impact on the hand washing behavior of the mothers or caregivers of infants. In the Muslim religion, there are specific timings i.e. five times a day before each prayer in which they must wash their hands. Though, the practice of soap was not common, hand washing behavior was quite good among Muslims. To make the hand-washing practice more effective, utilization of soap should be encouraged. Likewise, in a study conducted in Nepal hand washing was practiced mainly with plain water [13]. Lack of soap utilization might be because of their belief that they can maintain their hand cleanliness by washing their hands merely with water. Participants emphasized the fact that knowing about HW is not sufficient to carry out the recommended hand hygiene practices at the recommended times, rather the presence of suitable situations, facilities and support is also equally important. Non-significant relationship between knowledge and practice of hand washing suggests that other factors besides knowledge were more important in determining adherence to the practice of hand washing [11].

The presence of hand washing materials, fear of pathogen transmission from a fragile environment, and the presence of reminders and supporters from family members facilitated mothers as cues to action for hand washing. On the other hand, work overload due to multiple children, opposition of frequent hand washing from the elder family members, and lack of available water and soap in some houses were mentioned as barriers of hand washing. Similar findings were reported from previous studies [9, 14].To ensure a better hand washing habit; involvement of health workers, community leaders, family members, and administrators is more vital. Hence, interventions that promote hand-washing to mothers need to address the broader context by engaging her family and community to make her physical and social environment conducive to hand washing [9]. The study had limitations. One of the limitations of our study was the possibility of increased hand washing practice due to observation bias. The presence of an observer has been shown to increase hand-washing behavior in similar studies [15, 16]. Another limitation was conducting the study during the cold season, i.e. due to humoral concerns related to water contact and the risk of respiratory infections, mothers may wash hands less frequently than during other seasons.

Conclusion

This qualitative study identified several important barriers to and motivators of hand washing practice among mothers and other family caregivers in Aba-shawl sub zone. In order to improve infantile health, it is important to enhance the motivators and hamper the barriers to improve hand washing practice. Knowledge and perception, cues for action, normative beliefs and subjective norms, and practice were explored. Minimizing or narrowing the gap between knowledge and practice through provision of supplies and facilities needed to practice proper hand washing is needed. The education given to mothers and caregivers should be based on specific barriers, and motivators relevant to their prevailing conditions, followed by effective demonstration on how and when to wash hands.

Declarations

Abbreviations

ANC: Antenatal Care; EHH: Edaga Hamus Hospital; EPI: Expanded Program on Immunization; FGD: Focus Group Discussion; HW: Hand Washing; IMNCI: Integrated Management of Neonatal & Child Illnesses

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Conflict of interest

None declared

Authors' Contributions

All authors participated in all phases of the study including topic selection, design, data collection, data analysis and interpretation. Idris and Samuel contributed in critical revision of the manuscript for publication. All authors approved the manuscript.

Availability of data and materials

The complete data set supporting the conclusions of this article is available from the corresponding author and can be accessed up on reasonable request.

Ethical Approval

The proposal was approved by the "Research and Ethical Committee" of the School of Public Health, Asmara College of Health Sciences. A formal letter was taken from the School of Public Health to the administration of Aba-shawl sub zone and ECH requesting their cooperation. After a brief explanation of the purposes of the study,

those who were volunteers to participate were taken as study participants for the study. Confidentiality was kept by leaving their names and addresses out of every copy of this research paper.

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