THE EMPOWERMENT EFFECT OF WOMENS ACCESS TO HYGIENE AND UTILIZATION STATUS IN RURAL AREAS OF EAST GOJJAM ZONE NORTHWEST ETHIOPIA

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Abstract

The empowerment has become a common component of water, sanitation, and hygiene (WASH) interventions. However, there is limited evidence on whether access to and utilization of WASH facilities have contributed to the empowerment of women. This study aimed to understand the empowerment effect of women's access to hygiene and utilization status in selected rural areas of Gozamin and Machakel districts in the East Gojjam Zone, Ethiopia. The analyses were conducted based on responses from 325 married women selected through a multi-stage cluster sampling technique. Gologit2 was used to estimate the correlation between women's access to hygiene and utilization level and their empowerment status. The gologit2 estimation identified hygiene utilization to have a statistically significant association with women empowerment in terms of self-esteem, household decision-making, and participation in rural health extension activities. A woman with a high hygiene utilization level was 2.5 times more likely to be empowered than a woman with low hygiene utilization level was. However, no statistically significant correlation was found between women's access to hygiene and their empowerment status. It showed that the mere presence of hygiene facilities did not empower women unless these were actually utilized. Therefore, the researcher recommended that the government strengthen its work to promote and monitor women's hygiene utilization in addition to the availability of hygiene facilities in the household.

Key words*: Empowerment, Rural Hygiene Interventions, Utilization, Women's Hygiene Access*

Abstrak

Pemberdayaan telah menjadi bagian komponen umum dari air, sanitasi, dan kebersihan (WASH). Namun, ada bukti terbatas tentang apakah akses dan pemanfaatan fasilitas WASH telah berkontribusi pada pemberdayaan perempuan.

Penelitian ini bertujuan untuk memahami pengaruh pemberdayaan akses perempuan terhadap status kebersihan dan pemanfaatan di daerah pedesaan terpilih di distrik Gozamin dan Machakel di Zona Gojjam Timur Ethiopia. Analisis kami didasarkan pada tanggapan dari 325 wanita menikah yang dipilih melalui teknik sampling cluster multi-stage. Gologit2 digunakan untuk memperkirakan hubungan antara akses perempuan ke tingkat kebersihan dan pemanfaatan dan status pemberdayaan mereka. Estimasi gologit2 mengidentifikasi pemanfaatan kebersihan memiliki hubungan yang signifikan secara statistik dengan pemberdayaan perempuan dalam hal harga diri, pengambilan keputusan rumah tangga, dan partisipasi dalam kegiatan penyuluhan kesehatan pedesaan. Wanita dengan tingkat pemanfaatan higiene yang tinggi memiliki kemungkinan 2,5 kali lebih besar untuk diberdayakan dibandingkan dengan wanita dengan tingkat pemanfaatan higiene yang rendah. Namun, tidak ditemukan hubungan yang signifikan secara statistik antara akses perempuan terhadap kebersihan dan status pemberdayaannya, yang menunjukkan bahwa keberadaan fasilitas kebersihan saja tidak memberdayakan perempuan kecuali jika fasilitas tersebut benar-benar dimanfaatkan. Kami, oleh karena itu; merekomendasikan agar pemerintah memperkuat pekerjaannya untuk mempromosikan dan memantau pemanfaatan kebersihan oleh perempuan selain ketersediaan fasilitas kebersihan di rumah tangga.

Kata kunci: Pemberdayaan, Intervensi Higiene Pedesaan, Pemanfaatan, Akses Higiene Perempuan

Introduction

Women empowerment has become a common component of water, sanitation and hygiene (WASH) interventions particularly in developing countries[1]. The distinction between water, sanitation, and hygiene so far becomes inconsistent, and there are many tendencies in using all concepts synonymously. However, this article focuses only on hygiene including water hygiene, menstrual hygiene, and hand-wash with soap after latrine use.

Hygiene has strong gender dimension. The day-to-day experience of men and women with regards to hygiene activities are different. Women are often responsible for the hygiene needs of their families. More than half of women (53%) in rural Ethiopia travel at least 30 minutes round trip to fetch drinking water[2]. Carrying heavy water containers and traveling long distances everyday may result in headache, neck and back pain, fatigue, musculoskeletal problems, and early degenerative damage to bones and soft tissues[3]. This burden is much worse for women who are pregnant or carrying children.

[1] Dery, Florence, Elijah Bisung, Sarah Dickin, and Michelle Dyer. 2019. "Understanding Empowerment In Water, Sanitation, And Hygiene (WASH): A Scoping Review". Journal Of Water, Sanitation And Hygiene For Development 10 (1): 5-15. doi:10.2166/washdev.2019.077.

[2] Central Statistical Agency (CSA) [Ethiopia] and ICF. 2016. Ethiopia Demographic and Health Survey 2016. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF.

[3] Geere, Jo-Anne L, Paul R Hunter, and Paul Jagals. 2010. "Domestic Water Carrying And Its Implications For Health: A Review And Mixed Methods Pilot Study In Limpopo Province, South

Women are also exposed to infectious disease risks such as Shistosomiasis (snail fever) through contact with contaminated water[4]. Risk of sexual violence, combined with the stress associated with that risk, also increases when women travel long distances away from home to collect water[5]. Poor hygiene is also a cause of conflict between men and women. In Kenya, there are reports of violence against women if there is no water in the house and the husband's clothes are not washed[6]. The long hours spent by women to fetch water also leads to problems between the marriage couples. The husbands do not believe that such much time is needed for the task[7].

In rural areas of Ethiopia, women save water for the consumption of other family members regardless of their own needs when water is scarce[8]. In addition to women's hygiene related to domestic responsibilities, several factors also contribute to women having more specific hygiene needs than men. Menstruation, pregnancy, childbirth and nursing all make women to have specific hygiene needs[9].

Moreover, women's biological feature and their involvement in domestic works make them be more in need of hygiene and lack of such facilities disproportionately affects them. On the other hand, the provision of hygiene facilities, such as protected water supply, can reportedly allow women to redirect the time and energy spent on water collection to undertake education and economic activities, decision making, and leisure time. It can also lead to health benefits.

Furthermore, women particularly in rural Ethiopia are still overwhelmingly affected by lack of other basic hygiene facilities and materials, for example safe and healthy menstrual hygiene management products and handwashing facilities.

Menstrual hygiene management products are not available or affordable for rural women. Menstruation is also seen as a taboo and there are limited awareness raising programs on the issue to avert this. Research and development interventions that do exist focus on school girls and give little attention to the menstrual needs of women and girls outside of the school environment[10].

Globally, around 500 million women and girls do not use safe and clean menstrual

Africa". Environmental Health 9 (1). doi:10.1186/1476-069x-9-52. And, Hirai, Mitsuaki, Jay P. Graham, and John Sandberg. 2016. "Understanding Women's Decision Making Power And Its Link To Improved Household Sanitation: The Case Of Kenya". Journal Of Water, Sanitation And Hygiene For Development 6 (1): 151-160. doi:10.2166/washdev.2016.128.

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[5] ibid

[6] Abu, Thelma Zulfawu, Elijah Bisung, and Susan J. Elliott. 2019. "What If Your Husband Doesn'T Feel The Pressure? An Exploration Of Women'S Involvement In Wash Decision Making In Nyanchwa, Kenya". *International Journal Of Environmental Research And Public Health* 16 (10): 1763. doi:10.3390/ijerph16101763.

[7] ibid

[8] Rheingans, Richard, John D. Anderson, Rolf Luyendijk, and Oliver Cumming. 2013. "Measuring Disparities In Sanitation Access: Does The Measure Matter?". Tropical Medicine & International Health 19 (1): 2-13. doi:10.1111/tmi.12220.

[9] Sweetman, Caroline, and Louise Medland. 2017. "Introduction: Gender And Water, Sanitation And Hygiene". Gender & Development 25 (2): 153-166. doi:10.1080/13552074.2017.1349867.

[10] Splash. 2020. "Ethiopia Menstrual Health Literature Review". https://splash.org/assets/ETH-Literature-Review.pdf.

management materials[11]. Sanitary pad utilization among women in Ethiopia is only 45%. This is far lower than in Uganda (65%) and in Kenya (87%)[12]. Similarly, 68% of households in rural Ethiopia do not have access to water, soap, and other cleaning agents near their latrine. It is against the significant health contribution of hand washing with soap after defecation[13]. In 2015, only 13.9% of households in Amhara region had handwashing station and the prevalence rate in East Gojjam Zone where this study was conducted was 12% compared with 24% in Awi Zone, 20.4% in North Shewa and 18.8% in North Wollo Zone of Amhara region[14]. Amhara region, particularly in East Gojjam Zone, is still identified as the most deprived area in terms of access to improved drinking water infrastructures[15]

Lack of access to hygiene facilities disproportionately affects women. It increases the violence towards them and the burden of unpaid domestic work. It also impedes their participation in education, employment, decision-making, and community activities. Despite the multiple benefits that hygiene provides for women and their essential role in hygiene provisioning, studies on women's access to and utilization of such services and its empowerment effect are limited.

Most existing evidences were made by NGOs working in the WASH sector and they were qualitative in nature, failed to test relationships and be inconclusive. Moreover, empirical studies attempting to characterize the relation between WASH interventions and women empowerment (e.g. Routray et al. 2017, Hirai, Graham and Sandberg 2016, Abu, Bisung and Elliott 2019) have focused on how better sanitation and hygiene can be achieved by empowering women instead of how better access to and utilization of these services and facilities have empowered women. In doing so, empowerment is regarded as a tool to improve sanitation and hygiene instead of enhancement in women's own lives.

This research argued that the empowerment of women should not solely be measured against the successes of sanitation and hygiene projects. Moreover, we propose investigation and measurement of hygiene interventions on the overall improvement of women's lives, decision making power, self-esteem, and participation in development

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[14] Oswald, William E., Tesfaye Teferi, Paul M. Emerson, Zerihun Tadesse, Elizabeth K. Callahan, Eshetu Sata, and Aisha E. P. Stewart et al. 2016. "Prediction Of Low Community Sanitation Coverage Using Environmental And Sociodemographic Factors In Amhara Region, Ethiopia". The American Journal Of Tropical Medicine And Hygiene 95 (3): 709-719. doi:10.4269/ajtmh.15-0895.

[15] Bogale, Getahun Gebre. 2020. "Hotspots Of Unimproved Sources Of Drinking Water In Ethiopia: Mapping And Spatial Analysis Of Ethiopia Demographic And Health Survey Data 2016". BMC Public Health 20 (1). doi:10.1186/s12889-020-08957-2.And, Azage, Muluken, Achenef Motbainor, and Dabere Nigatu. 2020. "Exploring Geographical Variations And Inequalities In Access To Improved Water And Sanitation In Ethiopia: Mapping And Spatial Analysis". Heliyon 6 (4): e03828. doi:10.1016/j.heliyon.2020.e03828.

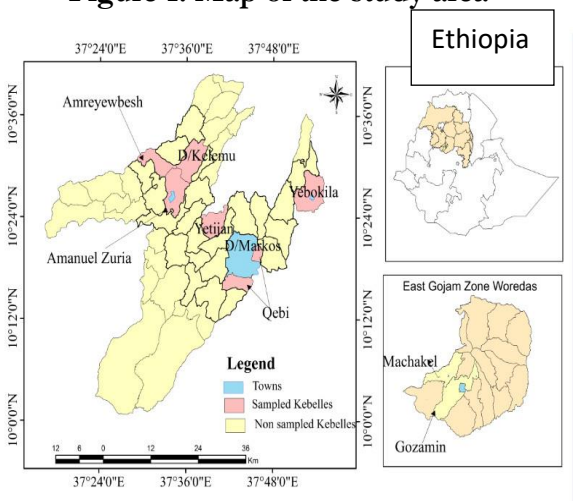
activities. Empowerment of women is a prerequisite for achieving people centered development, but is difficult to achieve it without the capacity to secure essential resources such as hygiene. Therefore, this study was specifically aimed at assessing the availability of hygiene facilities in selected rural areas of East Gojjam Zone, their uptake by women and the resulting effects on their empowerment.

Method

Study Site

The study was conducted in six of 50 selected rural villages of Machakel and Gozamin districts in the East Gojjam zone of the Amhara region in Ethiopia (figure1). Machakel and Gozamin districts both are located approximately 300 km away from Addis Ababa, the capital city of Ethiopia, and 260 km from Bahir Dar, the regional city of Amhara region. The two districts are adjacent to each other and share similar religion, language, climate, and ethnic composition, and both economic and administrative arrangement. Mixed agriculture is the dominant economic activity in both districts and the districts have 25 rural villages each.

Figure 1: Map of the study area



Source: Map created by GIS expert with data taken from CSA (2007)

Study Design, Sampling Procedure and Sample Size Determination

The quantitative research approach, particularly community based cross-sectional study design, was used. The data were collected from January 23rd, 2020 to May 24th, 2020 using pretested structured questionnaire. We applied a multistage cluster sampling technique. In the first stage, the Gozamin and Machakel districts were selected based on similar socioeconomic makeup but having contrast levels of health extension service. Machakel district is considered to perform better health extension service than Gozamin district. The aim of this selection was to show the effect of the extension service on women empowerment. Selecting adjacent districts with similar socioeconomic makeup except that there is a difference in the level of health extension service adoption is believed to show the effect of the extension service on women empowerment. The previous exposure of the researcher to the districts was also another rationale for selecting these districts.

In the second stage, villages in the selected districts were clustered into four different groups based on the Ethiopian traditional agro-ecological classification. The agro-ecological classification helps to identify villages based on altitude and their associated exposure to diseases causing vectors, such as malaria which is believed to show variations in adoption and utilization of hygiene technology. Sample villages were thus selected from two agro-climatic conditions: *dega* (highlands between 2,300 and 3,200MASL), *and woina dega* (midland between 1500-2300MASL). *Kola* (lowland between 500-

150MASL) *and wurch* (highland above 3200MASL) agro-ecologies were discarded from the study because of their non-representativeness. Only one village in each district is considered as *wurch* and *kola* by the Zone health bureau's classification.

In the third stage, four villages from *woinadega agro*-climate (*Amanuel Zuria, Amreyewbesh, Yetjanshebalema and Qebi*) and two from *dega* (*Debrekelemu and Yebokla Zuria*) were selected using lottery method. In total, six rural villages were selected; three from Machakel and three from Gozamin districts. The selected *kebele* were *Amanuel Zuriya, Amreyewbesh, and Debrekelemu* from Machakel and *Yebokla Zuria, Yetjanshebalema, and Qebi kebele*'s from Gozamin district. In the fourth stage, households from each selected villages were selected by a systematic sampling method. First, a list of households in each selected *kebele* was obtained from household registrations held by health extension workers. The selected sample kebeles had a total of 7934 households. Since it was difficult to collect data from such a large number of households, a sample size was determined using the formula of Yamane (1967) as;

$$n = \frac{N}{1+N(e)2}$$

Where n= required total sample size,
N= total household size in the selected *kebeles*, and
e= level of precision or sampling error set at 0.05.

This calculation resulted in a total sample of 380 households. In order to obtain, the appropriate household sample size from each selected village, a simple proportion (proportion to size) formula was used. Finally, a fixed sampling interval method was used to select households for administering the study questionnaire. The first household was picked randomly and the second household was selected by adding 20th interval to the first selected household. In the end, female heads of the households were selected as study participants. The focused analyses were on the 325 (of 380) participants that were currently married and excluded the 55 people that were not married.

Description of Variables

Dependent Variable

The dependent variable is the cumulative/composite women's empowerment index (WEI) which is composed of self- esteem, household decision making, and participation in rural health extension activities. The WEI is computed by an average of indices or the non-weighted arithmetic average of the normalized indicators as follows:

$$WEI = \frac{SEI+DMI+PI}{3}$$

Where
WEI= women's empowerment index
SEI= self-esteem index
DMI= decision making index
PI=participation index

After computing the WEI, respondents were divided into three groups using the cumulative square root frequency method. The final cumulative square root frequency value for the composite empowerment index was 48.52 and this was divided by three. This division gave a cutoff value of 16.17. On the basis of this cutoff value, respondents were classified as not empowered if the cumulative square root frequency value was $\leq$ 16.17, relatively empowered if it ranges from 16.18-32.35, and empowered if it is $\geq$32.36.

Self-esteem index

Self-esteem is linked with hygiene and was thus included as one dimension of women empowerment. To do this, we applied the two

self-esteem indicators developed by Mahmud, Shah and Becker (2012) which were considered universal and related self-esteem to decision-making and acceptance or rejection of gender based violence. Participants in the study were asked a total of 18 questions on self-esteem, with 9 questions focusing on decision making and the other 9 questions on acceptance or rejection of gender based violence.

Self-esteem with regard to decision making	**Self-esteem with regard to acceptance or rejection of gender based violence**
1. She thinks she should have a say in decisions on:	2. She thinks beating wife done by her husband is justified:
1.1 Buying household furniture such as bed, cupboard, and wardrobe	2.1 If there is no water in the household
1.2 Spending family income/ savings	2.2 If she comes home late when fetching water
1.3 Taking a loan	2.3 .If the house is not clean
1.4 Latrine installation	2.4 If she asks him to help with household chores (e.g. washing dishes)
1.5 Latrine site identification	2.5 If she does not complete her domestic work to his satisfaction
1.6 Materials used for latrine construction	2.6 If she spends money without permission
1.7 Sanitation and hygiene related activities in her village	2.7 If she becomes a member of women's development team without his permission
1.8 Drinking water interventions	2.8 If she goes to the toilet during daytime
1.9 Structure and function of women's development team	2.9 If she attends community meetings outside of the church without his permission

Participant answers were coded as no (0), yes (1), and I do not know (2) for questions focusing on decision-making. Those on acceptance or rejection of gender based on violence were reverse coded as yes (0), no (1) and I do not know option was treated as missing. Scores were added for each individual participant, with a maximum sum score of nine for each category of questions (i.e disapproval of violence against women in all the described scenarios and approval of women having a say in all the described decision making scenarios) and a minimum score of two. In ordered to assess how empowered the respondents are in terms of self-esteem with regard to acceptance or rejection of gender based violence as well as self-esteem with regard to decision-making, a separate self-esteem index was constructed using the following formula as used by Pervin, Khan and Shah 2014, Niketha et al. 2017, and Golam et al.2008.

$$M_{ij} = \frac{X_{ij} - \min_k (X_{ik})}{\max_k (X_{ik}) - \min_k (X_{ik})}$$

Where

M_{ij} =index of self-esteem with regard to gender equality attitude or self-esteem in decision-making

X_{ij} =actual score of self-esteem with regard to gender equality attitude or decision-making

Min (X_{ik}) =minimum score of self-esteem with regard to gender equality attitude or decision-making

Max (X_{ik}) =maximum score of self-esteem with regard to gender equality attitude or decision-making.

After the individual self-esteem scores for the two self–esteem indicators were obtained using the above formula, the scores were again added together and divided into two to get a composite self-esteem index.

Self-esteem index =

$$\frac{\text{self-esteem in decision making index} + \text{self-esteem in gender equality attitude index}}{2}$$

After the composite self-esteem index was constructed by a simple arithmetic average, respondents were divided into three categories of self-esteem empowerment (low, moderate and high) based on the cumulative square root frequency method.

The final cumulative square root frequency value for the cumulative self-esteem index was 70.7. This was divided by three (the numbers of group respondents were needed to be classified) which gave a value of 23.6. The number 23.6 was thus, the interval value or cutoff point to categorize respondents. Accordingly, a cumulative square root frequency of 0-23.6 was categorized as having low self-esteem empowerment; 23.7- 47.3 as having moderate self-esteem; and > 47.3 as having high self-esteem empowerment.

Decision-Making Index

Decision-making was also another indicator used to measure women empowerment. Decision-making in the self-esteem section above shows how much the respondent was willing to participate in decision-making. Meanwhile, decision making in this section was about how far the respondent was really participating in the household decision-making.

Investments in hygiene facilities reduced the burden of unpaid work on women and were believed to facilitate participation in household decision-making. In household level, decisions made by spouses who often have different preferences and bargaining power have significant implications for women empowerment. Thus, a woman's decision-making power with in her household was measured by the extent of her involvement in making decisions with respect to (1) spending her own earning; (2) spending her husband's earning; (3) making purchase for her clothes; (4) making purchase for her husband's clothes; (5) crop selling or buying in large quantity; (6) crop selling or buying in small quantity; (7) cattle selling or buying; (8) borrowing or lending money; (9) construction and use of latrine; (10) raw material type for latrines; (11) having hand washing facility near latrine; (12) where to collect water; (13) how to use land; (14) household financial administration; (15) respondent's visit to health post for different services; and (16) respondent's participation in women's health development team.

The response options in each of these identified areas were respondent alone (coded as 2); respondent and husband jointly (coded as 1); husband alone (3) other people (coded as 4) and decision was not made or not applicable (coded as 5). These responses were further re-coded into husband or others (0), jointly (1), and the respondent alone (2), and not applicable was treated as missing. 0 indicates that the woman did not participate in the decision at all. It was possible to give a

score of 1 to each decision which a woman participates jointly with someone else. However, in Ethiopian context especially in rural areas, it is believed that there is unequal balance of bargaining power between men and women within the household although a woman replies that decision was made jointly. Thus, it was important to see the relative difference in the level of participation in the decision-making as single decision maker, jointly, and or did not participate in the decision at all.

To get the total score of a respondent in relation with her participation in household decision making, individual scores from a total of 16 decision making responses were added. The possible maximum score would be 32 if the respondent made all of the 16 decisions alone and the minimum decision-making score would be zero if the respondent did not participate in all of the 16 cases. The actual result, however, showed the minimum decision-making score was 3 and the maximum score was 30. The minimum decision-making score of 3 meant that respondents have participated in at least some of the decision aspects either alone or jointly and the maximum score of 30 indicated that no woman was making all of the 16 decisions alone. Once the minimum and maximum decision making score of respondents was identified, decision making index was calculated to classify respondents according to their level of participation in household decisions. The decision making index was calculated by using the same formula used by Pervin, et al. (2014), Niketha et al. (2017) and Golam et al. (2008) as applied above in self-esteem section. After the decision making index was calculated, respondents were categorized into three groups as not empowered, relatively empowered, and empowered based on cumulative square root frequency method. The total cumulative square root frequency value was 86.5 and this was divided by 3 (the number of groups that respondents were needed to be classified). This gave the cutoff point 28.83. Hence, cumulative square root frequency that ranged from 0-28.83 was classified as low empowered in decision-making, cumulative square root frequency that ranged from 28.84-57.68 was classified as relatively empowered in decision making, and cumulative square root frequency above 57.68 was categorized as empowered in decision making.

Participation in Rural Health Extension Activities

When women's hygiene needs are met, their unpaid domestic work burden will reduce and they will have time to participate in community activities leading to their social empowerment. Hygiene also provides comfort and confidence which helps women to go out and be with others. Thus, the respondents were asked about their participation in five health extension related activities as: 1) participating in communicating health information between households and health extension workers, 2) participating in sensitizing and monitoring neighbors' adoption of healthy behaviors, 3) participating in making neighboring households' become member of community based health insurance scheme, 4) participating in child immunization campaign and service use, 5) participating in supporting neighboring women to deal with administrative matters. These questions had binary responses; yes (coded as 1) and no (coded as 0).

Participation score was first calculated by summing the number of activities a respondent has participated. The minimum participation score was zero indicating that a respondent did not participate in any of the five activities listed and the maximum score was 5 indicating that the respondent has participated in all of the five listed rural health extension activities. Once the total participation score for each respondent was obtained, the second step was estimating participation index using the same formula used above in the calculation of self-esteem indices. After the participation index was calculated, respondents were categorized into three groups based on their level of participation using a similar approach of cumulative square root frequency method. The final cumulative square root frequency value has become 40.2 and this was divided by three (the number of groups' respondents were required to be classified). The division resulted the cutoff point 13.4.

Cumulative square root frequency value that ranged from 0-13.4 was classified as having low participation and being low empowered. Cumulative square root frequency that ranged from 13.5-26.9 as having medium participation and being relatively empowered. Cumulative square root frequency above 26.9 was categorized as having high participation and being empowered.

Independent Variables

The independent variables are access to and utilization of hygiene facilities.

Control Variables

The control variables that could influence the dependent variable, women empowerment, are respondent's age, education, occupation, household income, wealth, household size, access to health, extension information, home plot ownership, participation in women health development team, and husband's education and occupation.

Table 1: Description of Variables

Dependent Variable	**Women Empowerment: not empowered, relatively empowered & empowered**
Independent variables	Hygiene Access : low, medium & high access
	Hygiene Utilization: low, medium & high utilization
Control Variables	*Woreda*: Machakel, Gozamin
	Age : young (15-24), middle adult (25-34), adult (35-49) & old (≥50)
	Education: no education, primary education, secondary & above
	Husband's education: no education, primary education, secondary & above
	Occupation: farm only & nonfarm only or farm plus
	Husband's occupation: farm only & nonfarm only or farm plus
	Household size: continuous
	Home plot ownership: owned & not owned
	Household income: ≤20,000; 20,000.01-45,000 & 45,000.01+
	Wealth: lowest, second, middle, fourth & highest
	Access to health extension information: yes, no
	Participation in women health development team: yes, no

Source: table by author

Method of Data Analysis

The data collected was coded and entered into IBM SPSS version 20, edited, cleaned, stored, and later transferred into Stata version 14 to perform the generalized ordered logistic regression model. Descriptive statistics was used to describe respondents' characteristics as well as their level of hygiene access and utilization while generalized ordered logistic regression (gologit2) was used to estimate the correlation between the independent and dependent variables. The statistical significance of each independent variable was tested using likelihood and Odds ratio tests.

Estimation Strategy

This study used generalized ordered logistic regression (gologit2) also known as partial proportional odds model (PPOM) to analyze the effect of hygiene access and utilization on women empowerment. Women empowerment is ordinal in nature. Women are at different level of empowerment. Some are not empowered, others are relatively empowered, and still more others are empowered. Therefore, in order to evaluate the effect of hygiene access and utilization on the likelihood of women's different level of empowerment, ordered logistic regression was planned to be used. Ordered logistic regression, however, evaluates the results by testing proportionality assumption, also known as parallel lines assumption. Brant test is the most widely used test of the proportional odds assumption and the test has become significant in the primary analysis. According to Williams (2019), if brant test becomes significant, it shows that the model assumption is violated and the researcher has to use another model. Accordingly, generalized ordered logistic regression or partial proportional odds model was used to estimate the association between women's access to and utilization of hygiene facilities and their empowerment level. The partial proportional odds model was specified as below following Williams (2005) expression.

$$P(Y_i > j) = \frac{exp(a_j + X_{1i}\beta_1 + X_{2i}\beta_2 + X_{3i}\beta_{3j})}{1 + [exp(a_j + X_{1i}\beta_1 + X_{2i}\beta_2 + X_{3i}\beta_{3j})]}, j = 1,2,\ldots,M-1$$

Where:

i refers to individuals,

M represents the number of categories of the ordinal dependent variables and j represents its cut points.

X represents the independent variables, where x_i *is* a vector of independent variables,

β represents coefficient/parameter of every dividing point m-1, β_1 is a vector of estimable parameters, and a_j and α (m-1) are the upper and lower thresholds for women empowerment M.

In the equation β's for X_1 and X_2 are the same for all values of j but β's for X_3 are free to differ[16] (Williams 2005 and 2006, Ucal and Günay 2019).

[16] Williams, Richard. 2005. Gologit2: A program for generalized logistic regression/partial proportional odds models for ordinal dependent variables. Retrieved from https://www.stata.com/meeting/4nasug/gologit2.pdf. Williams, Richard. 2006. "Generalized Ordered Logit/Partial Proportional Odds Models For Ordinal Dependent Variables". The Stata Journal: Promoting Communications On Statistics And Stata 6 (1): 58-82. doi:10.1177/1536867x0600600104. Ucal, Meltem, and Simge Günay. 2019." Perceived Happiness, Perceived

Knowing that women's level of hygiene utilization was predicted by their level of access to the required hygiene materials, multi-collinearity/correlation among the independent variables was suspected. Therefore, multi-collinearity test was conducted using Kendall's tau-b correlation coefficient. The result showed that there was no perfect correlation among the independent variables. Kendall's tau-b correlation coefficient between the variable hygiene access and hygiene utilization was $\tau = 0.154$; $p=0.001$, indicating the absence of perfect correlation. According to Voorhees (1998), Kendall's Tau (τ) ≥ 0.9 indicates the presence of strong correlation between the two variables and 0.9 is considered as the threshold (cited in Sanderson and Soboroff 2007). Based on this reference, the multi-collinearity among the independent variables was not found to be severe and hence all the variables were included in the model.

Results and Discussion

Background Characteristics of Study Participants

A total of 325 currently married women have participated in the study with a response rate of 100%. 126 participants were from Machakel *woreda* and 199 participants were from Gozamin. About 48.3% (n=157) were adults. For education level, around 76.3% or 248 participants have no education (table-2).

Table 2: Background characteristics of study participants

Variables	Frequency	Percent
Woreda		
Machakel	126	38.8
Gozamin	199	61.2
Age		
young (15-24)	43	13.2
middle adult (25-34)	84	25.8
adult (35-49)	157	48.3
old(≥ 50)	41	12.6
Level of education		
no education	248	76.3
primary school	61	18.8
Secondary school and above	16	4.9
Husband's level of education		
no education	261	80.3
primary school	39	12
Secondary school and above	25	7.69
Occupation		
farm only	216	66.5
non-farm only or farm plus	109	33.5
Husband's occupation		
farm only	284	87.4
non-farm only or farm plus	41	12.6
Access to health extension information		
Yes	299	92

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No	26		8	
Participation in women health development team				
Yes	99		30.46	
No	226		69.54	
Home plot ownership				
Owned (with title)	215		66.15	
not owned (without title)	110		33.85	
Income				
≤ 20000.00 ETB	46		14.15	
20000.01 - 45000.00 ETB	186		57.23	
≥45,000.01 ETB	93		28.6	
Wealth quantile				
Lowest	66		20.3	
Second	53		16.3	
Middle	63		19.4	
Fourth	72		22.2	
Highest	71		21.8	
	Mean	Min	Max	St.Dev
HH size	4.17	2	8	1.330

Source: Table by author

Women's Hygiene Access Level in the Study Area

Table 3 indicates the distribution of respondents according to their level of access to and utilization of hygiene facilities. Women's hygiene access was measured by using 11 hygiene related to indicators. Most of these 11 hygiene indicators had binary responses (yes and no). Survey questions with multiple responses were also converted into binary for standardization purpose following standardized definitions from the literature review.

For instance, respondents were asked what their source of drinking water was and the response options were 1) protected hand pump, 2) protected spring, 3) protected dug well, 4) river, and 5) unprotected spring. These options were later categorized into protected/improved and unprotected/unimproved sources following the Joint Monitoring Program of UNICEF and WHO (2012) definition. Thus, respondents who checked or selected their water source as from protected hand pump, protected spring, and protected dug wells were categorized as having protected source of drinking water and it was recoded as Yes.

Those who selected river and unprotected spring were categorized as having unprotected drinking water source and it was recoded as no. Similarly, the survey question about the time spent to get water (round trip) had five response options as 1) water source is in the premise, 2) less than 30 minutes, 3) within 30 minutes, 4) 31 to 60 minutes, and 5) more than 60 minutes. According to the WHO (2006) about drinking water guideline, a person is said to have access to water if the water is in the premises, or the collection time does not exceed 30 minute round trip. In contrast, if a person travels more than 30 minutes or 1000m (1km), he/she is said to have no access to water. In line with this reference, responses were recoded and the first three response options (1, 2 &3) were recoded

as yes indicating that the respondent has access to drinking water and the last two response options (4 &5) were recoded as No indicating the respondent's lack of access to water.

Once the multi-category response options were standardized into binary response (yes and no), respondents' overall hygiene access status was estimated using simple arithmetic average method. The average of the normalized responses gave a numerical score for each respondent. Consequently, the minimum average hygiene access score was 0.10 and the maximum was 1.00. The maximum average score of one indicates that the respondent has access to all of the 11 hygiene indicators. Meanwhile, the minimum mean hygiene access score of 0.10 indicates that the respondent has access at least to one of the 11 hygiene indicators. After the mean score of each respondent was calculated from the 11 indicators, respondents were classified into different groups according to their level of average hygiene access score.

Finally, a woman's hygiene access level is categorized as low if her mean score ranges from 0.00-0.50, medium if the mean score ranges from 0.51-0.75, and high if the mean score ranges from 0.76-1. Since, there was no previously defined cutoff scores in the literature that can be taken as a reference, a cut off score was defined arbitrarily. The result in table-3 below showed that out of the total 325 currently married women surveyed, 157 (48.3%) had medium hygiene access compared with 96 (29.5%) who had high, and 72 (22.2 %) had low level of hygiene access.

The result was in agreement with Getahun's finding (2020) that East Gojjam zone is among the hotspot areas in lack of access to protected water source. Water and hygiene are interlinked. People use water for hygienic purpose, and to be hygienic, the water itself has to be clean and safe. Without access to clean water, one cannot talk about hygiene because there is no way to clean dishes or people.

Table-3: Distribution of women according to their level of hygiene access

Survey Question	Response	Hygiene Access Level			
		Low	Medium	High	Total
Access to protected water source	Yes	43	116	86	245
	No	29	41	10	80
Time spent to get water(round trip)	Yes	49	126	96	271
	No	23	31	0	54
Is drinking water available to you at all time you need	Yes	38	86	74	198
	No	34	71	22	127
shelf for household utensil	Yes	28	82	81	191
	No	44	75	15	134
availability of separate drinking water transportation container	Yes	36	130	94	260
	No	36	27	2	65
availability of its	Yes	33	128	94	255
	No	39	29	2	70

own cover for the water transportation container					
availability of separate drinking water storage container	Yes	35	139	94	268
	No	37	18	2	57
availability of its own cover for the water storage facility	Yes	39	144	95	278
	No	33	13	1	47
availability of hand washing facility near latrine	Yes	11	65	64	140
	No	61	92	32	185
availability of water in the hand washing facility	Yes	2	29	52	83
	No	9	36	12	57
Availability of Shawor facility in the household?	Yes	5	33	42	80
	No	67	124	54	245
Total		72	157	96	325

Source: Table by author, 2020

Women's Hygiene Utilization in the Study Areas

Women's overall hygiene utilization score was computed by combining respondents score on six hygiene related indicators listed in table-4 below. Some of the survey questions had binary response options as yes (coded as 1) and no (coded as 0) while others had multiple response options. Survey questions with multiple category responses were first dichotomized for standardization purpose and the dichotomization was done following literature.

For instance, the survey question on the type of water container usually used by respondents to transport drinking water had clay pots, jerican and barrel as response options and if the respondent has checked/selected jerican, it was re-coded as narrow neck container (coded as 1) and if checked either clay pot or barrel, it was re-coded as open neck container (coded as 0). Similar procedure was used to recode survey question which deals with the specific water container usually used by respondents to store drinking water.

The survey question about the common withdrawal means of drinking water from the storage container had also two response options; tilt and pour into a water server, and dip the hand with any available water server. The response tilt and pour indicated safe withdrawal practice while the response dipping hand indicated unsafe withdrawal practice. Moreover, the survey question on whether the respondent used sanitary materials for menstrual hygiene management had three response options; yes, no and does not apply. The response option 'does not apply' was treated as missing.

Once the survey questions were standardized, then, hygiene utilization score of each respondent was computed using simple average method. The finding showed a minimum hygiene utilization score of zero demonstrating that the respondent has not practiced any of the mentioned hygiene behaviors and the maximum of 0.83 indicating that the respondent has practiced at least some of the hygiene behaviors mentioned.

Based on their average hygiene utilization score, respondents were, finally, categorized into three groups as having low hygiene utilization (if the average hygiene utilization score of a respondent ranges from 0- 0.28), having medium hygiene utilization (if average hygiene utilization score was between 0.29-0.56) and as having high hygiene utilization status (if the average hygiene utilization score of a respondent was equal to or greater than 0.57). In line with this categorization, about 178 (54.8%) of surveyed women had medium hygiene utilization status. 52 (16%) had low hygiene utilization status and 95 (29%) had high hygiene utilization status. The fact that majority of the respondents had medium hygiene practice was expected as the study areas are rural and there is low hygiene practice in rural areas overall.

Table 4: Distribution of women according to their hygiene utilization status

Survey question	Response	Hygiene Utilization			
		Low	Medium	High	Total
Use sanitary materials for menstrual hygiene management	Yes	8	3	49	60
	No	36	175	31	242
use soap to wash hands after defecation	Yes	1	1	19	21
	No	51	177	76	304
Treat drinking water at home	Yes	2	1	19	22
	No	50	177	76	303
safe withdrawal of water from storage container	Yes	1	177	95	273
	No	51	1	0	52
Use narrow neck water transportation container	Yes	3	172	95	270
	No	49	6	0	55
Use narrow neck water storage container	Yes	3	172	95	270
	No	49	6	0	55
Total		52	178	95	325

Source: Table by author, 2020

Women's Level of Empowerment in the Study Area

Of the total 325 currently married women surveyed, 26.5% (n= 86) had low self-esteem empowerment, 32% (n=104) had moderate self-esteem empowerment, and 41.5% (n=135) had high self-esteem empowerment. About 27.7% (n=90) were not empowered in decision-making, 44% (n=143) were relatively empowered, and 28.3% (n=92) were empowered. Additionally, About 24% (n= 78) had low empowerment in terms of participation in rural health extension activities, 46.5% (n=151) had medium

empowerment status, and 29.5% (96) had high empowerment. Overall, the results indicated that 33.8% (n=110) of the respondents were not empowered in all of the three dimensions of empowerment, 34.5% (n=112) were moderately empowered, and 31.7 % (n=103) were empowered. The results indicated there was no significant difference in the number of women who were not empowered and empowered.

The Empowerment Effect of Women's Access to Hygiene and Utilization

Table 5 below presented the results of the generalized ordered logistic regression model estimation. Given that there were three ordinal empowerment categories as, not empowered, relatively empowered, and empowered, the gologit2 model has provided a series of binary logistic regressions where categories of empowerment were divided into two panels. In the first panel, not empowered category was contrasted with relatively empowered and empowered categories. In the second panel, not empowered and relatively empowered categories were contrasted with empowered category. Each panel gives the results for coefficients (β) and the odds ratio estimates (e^β).

The result showed hygiene utilization had positive and statistically significant correlation with women's level of empowerment. The positive coefficient for hygiene utilization (β=0.916, p=0.015) in the first panel indicated that a woman who had high level of hygiene utilization was more likely to be relatively empowered and empowered than a woman who had low level of hygiene utilization. On the other hand, the positive coefficient for hygiene utilization (β=0.916, p=0.015) in the second panel indicated that a woman who had high level of hygiene utilization was more likely to be empowered than being relatively empowered and not empowered compared with a woman who had low level of hygiene utilization.

Similarly, the odds ratio of 2.5 for the variable hygiene utilization at high category indicated that a woman who had high level of hygiene utilization was 2.5 times more likely to be empowered than a woman who had low level of hygiene utilization. In sum, the result indicated that a woman who had better hygiene utilization was more empowered than a woman who had low hygiene utilization.

Statistical significant association or correlation was not found between the variable hygiene access and a woman's level of empowerment. Further, it indicated that availability of material resources, in this case hygiene facility, did not automatically bring women empowerment. Utilization of the available facilities, however, did bring empowerment leading to the conclusion that utilization, not access, was a determinant factor for women empowerment. This could be explained by the fact that if there was a protected private water source in the premises of a household and used for drinking purpose only, not for washing clothes, watering vegetables, and nourishing animals, the time a woman spent to collect water was not yet reduced demonstrating that she has not got the opportunity to empower herself.

In conclusion, the outcomes of the present study were not comparable with the existing literature as there was no scholarly work that has tried to measure the correlation between hygiene access and utilization and women empowerment. The existing literatures are either qualitative in nature or they have focused only on a single indicator such as

water if quantitative. In this study, however, hygiene was not measured with a single indicator making it difficult to compare the result with other prior studies.

But, some non-composite studies showed that latrine utilization has reduced violence against women which was one aspect of women empowerment. For instance, a study by Jadhav, Weitzman and Smith-Greenaway 2016 found that women who primarily defecate in the open field were 2.14 times more likely to face the risk of non-partner sexual violence than women who use latrine. Similarly, open defecation was found to have a statistically significant association with women's preterm birth and low birth rate[17]. Some non-empirical assertions in the literature also indicated that investments in water, sanitation, and hygiene have reduced the burden of unpaid work on women and girls, facilitated their participation in education, employment, and decision making both at household and community level. It further helped them to engage in leisure activities and equipped them with WASH information and knowledge. The increased harmony in women's relationship with their husbands increased women's literacy classes and women's sense of well-being in terms of dignity, freedom, and happiness. It also grew awareness and acceptance that women had rights of various kinds.[18]

Table 5: The Effect of Hygiene Access and Utilization on Women Empowerment

Empowerment		Not empowered VS Relatively empowered & Empowered				Not empowered & Relatively empowered VS Empowered			
Variables	Category	Coef	Std.Err	OR	P>z	Coeff	Std.Err	OR	P>z
Hygiene access	Medium	-.354	0.3093	.702	0.252	-0.354	.3093	.702	0.252
	High	-.575	0.3561	.563	0.106	-0.575	.3561	.563	0.106
Hygiene utilization	Medium	0.241	0.344	1.273	0.483	0.241	.3440	1.273	0.483
	High	0.916	0.375	2.500	0.015**	0.916	.3751	2.500	0.015**
_cons		-0.316	0.7295	.729	0.665	-2.149	.7373	.118	0.004
Log likelihood = -305.92689; N= 325; LR chi2 (20 = 101.83; Prob > chi2 = 0.0000; Pseudo R² = 0.1427									
Note: Each estimated coefficient shows the effec of the observable category relative to th base/reference category.									
The base values are not shown here.									
***** implies significance at 5% while OR indicate odds ratio***									

Source: table by Author's own Stata computation

Conclusion

The mere presence of hygiene facilities did not empower women but the actual utilization of the facilities did so. To put it more simply, a woman who had high level of hygiene utilization was more likely to be empowered than a woman who had low level of hygiene utilization. A woman who practiced good hygiene had high social acceptance and respect. This leaded her to have high self-esteem and the confidence to participant in public events and decision-making. As a result,

[17] Mahrukh, Saleem, Teresa Burdett and Vanessa Heaslip. 2019. Health and social impacts of open defecation on women: a systematic review. BMC Public Health 19, 158. https://doi.org/10.1186/s12889-019-6423-z

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they became empowered. Therefore, it is suggested that the government should strengthen its work towards the expansion of not only hygiene facilities coverage but also promotes and monitor their utilization. Empowerment of women is a process. It changes from time to time. A woman empowered today may be disempowered tomorrow and vice versa. Therefore, opportunities to strengthen access and utilization of hygiene services should be strengthen.

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