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Project Report

Factors determining the effectiveness of Oxfam's public health promotion approach in Haiti

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Table of contents

Executive summary

Background and objectives

In response to the devastating Earthquake of January 12th 2010 and the cholera outbreak of October of that same year Oxfam Great Britain, Oxfam Quebec and Intermón Oxfam conducted public health promotion and cholera response in Haiti. Different promotion activities were applied which aimed at changing hygiene behavior by changing perceptions and beliefs about healthy behaviors amongst people affected by crisis. In February 2011 four Oxfam affiliates in Haiti in partnership with a team of behavior change researchers from Eawag launched the present research project to do an in-depth evaluation of the promotional activities that had been conducted with the goal of further improving the WASH situation for people in Haiti and worldwide by understanding how to make hygiene promotion more effective. The main focus of the research project was around the question which specific promotion activities were strongly associated with perceptions and beliefs about handwashing with soap and were thus capable of changing handwashing behavior at key times.

Methods

To address this question, 811 structured interviews with the primary caretaker of a household were conducted in May and June 2011 in camps and neighborhoods in Port-au-Prince, Gressier, Petit Goâve, Grand-Goâve, and Léogâne.

Results

Regression analysis revealed that attitudes, norms and ability beliefs are most important in determining handwashing behavior at key times while health risk beliefs and health knowledge are of only minor importance. In terms of promotion activities, regression and mediation analysis revealed hygiene radio spots, material distributions with instructions for use, information from friends or neighbors, and hygiene theater were strongly associated with feces and food related handwashing.[1] In addition, radio programs with experts answering listener's questions fostered feces related hand washing while community clubs were beneficial for food related handwashing. However, some of the promotion activities are negatively associated with handwashing at key times. Respondents who experienced a focus group, stickers, posters and paintings, and hygiene songs wash their hands less often after any contact with feces or before handling food than respondents who did not experience these promotion activities. Moreover, special hygiene days and home visits are negatively associated with food related handwashing as well. Further analyses revealed that a combination of effective promotion activities (e.g. radio spots, material distributions, and community clubs) is more effective than applying only one fostering promotion. On the down side it is more hampering when a combination of hindering promotion activities (e.g. focus group, stickers, posters, paintings, and hygiene songs) are experienced than if only one hindering promotion is experienced. However, if fostering and hindering promotion activities are experienced, the effectiveness of the fostering promotion activities is stronger, overlaying the effect of the hindering promotion activities.

[1] Feces related handwashing subsumes handwashing after defecation, after wiping a child's bottom and after other kinds of contact with feces. Food related handwashing subsumes handwashing before eating, before preparing food, before feeding a child and before handling drinking water.

Conclusion

In summary, some of the promotion activities which have been applied by Oxfam are positively associated with behavior, some are negatively associated, while other promotion activities have no effect at all. Accordingly, some of the promotion activities should be seriously revised and others although successful still have the potential to be improved. Carefully redesigning some activities, conducting pre-tests, and subsequently protocoling the behavior change effects of the promotion activities in the field is necessary to ensure reliable and effective promotion activities.

Acknowledgements

This research was made possible by researchers Nadja Contzen and Hans-Joachim Mosler; Myra Foster, public health specialist for Oxfam America, who was Oxfam's commissioning manager and liaison to Eawag; Johanna Braun, research assistant; the data-collection team; the peer reviewers who provided comments on the research report; and the community members who participated in the study and generously shared with us their time, thoughts, and experience. For more information, contact Hans-Joachim Mosler (mosler@eawag.ch) or Myra Foster (mfoster@oxfamamerica.org).

Foreword

by Myra Foster, Oxfam America

For the purpose of this report two key moments in recent Haitian history punctuate the inception and premise for the Joint Oxfam behavior change research, beginning with the devastating Earthquake of January 12th 2010 followed by the cholera outbreak of October of that same year to present. The 7 point earthquake took the lives of an estimated 230,000 people and injured 300,000. One third of Haiti's civil servants lost their lives, 2 million people were affected and nearly 1.5 million people were left homeless and subsequently moved into spontaneous settlement sites throughout Port-au-Prince (Oxfam International, 2011). In response to the disaster Oxfam programs provided lifesaving aid for up to 500,000 people in and around Port-au-Prince, Gressier, Petit Goâve, Grand-Goâve, and Léogâne including emergency water, sanitation and hygiene facilities, hygiene promotion, shelter, and emergency food and livelihoods programs. This was accomplished in an environment where 86% of the 2 million Port-au-Prince residents lived in densely populated slum areas where clean water and sanitation infrastructure was nearly nonexistent to begin with. At that time Haiti was already the poorest nation in the Western Hemisphere and ranked amongst the 50 poorest countries in the world.

In October of that same year the Haitian people faced one of the most severe outbreaks of cholera that has been seen in the last century. The cholera outbreak of 2010 was made more complex by the humanitarian situation which resulted from the January 12 earthquake, insufficient public health infrastructure both before and after the earthquake coupled with the lack of prior immunity and experience with cholera in Haiti. In response to the outbreak Oxfam scaled up again extending coverage beyond Port au Prince into Cap Hatien, Artibonite, and Nippes departments reaching another 700,000 people in Haiti with life-saving clean water, oral rehydration salts, sanitation services, and hygiene promotion in an effort to prevent the spread of cholera in the wake of the October outbreak.

It's this context made up of layers of complexity from which the Oxfam Earthquake and cholera response was delivered. Often times it's those challenging moments that drive evolution of thought, that bring about questions so strong that they must be answered. It's this confluence of circumstance that brought about the current research question explored in this report. Are we working in the most effective way to mobilize communities to protect their health and well-being during emergencies? Is it possible to get better at understanding of why people do or do not practice lifesaving hygiene measures in an emergency and if so what if our current approach could be made better? To answer these questions four Oxfam affiliates in Haiti came together in partnership with a team of behavior change researchers from Eawag to try and find answers to some very necessary questions.

Hand washing with soap at key times is possibly one of the most effective interventions to reduce diarrheal infection yet little to no evidence of how this outcome can be obtained has been generated from rigorous research in an emergency setting. This report is a first step to building the emergency evidence base with the aim to move hygiene promotion forward both in the WASH sector and in Haiti as cholera becomes endemic.

1. Introduction

Oxfam Great Britain (OGB), Oxfam Quebec (OQ) with support from Oxfam America (OA) and Intermón Oxfam (IO) conducted post-earthquake public health promotion and cholera response in Haiti. Oxfam America did not have an operational program at the time of the research and contributed to the response through technical support, funding and research support for this study. Different activities, strategies, and programs were used which show differential effectiveness and have different effects on the individual and population level. All the activities aim at changing hygiene behavior by changing behavioral factors in the individuals, meaning that perceptions and beliefs about healthy behaviors have to be influenced amongst the target population. The question is which activities change which behavioral factors and how they consequently change hygiene behavior in a thorough and sustained manner. By comparing people who show hygiene behavior with those who do not, the behavioral factors elicited by the different activities can be identified and recommendations can be formulated about which components of the programs have the most striking effects.

The overall objective of this study is to analyze the effects of different programs and activities implemented by Oxfam to determine the most successful activities.
Research questions:

1. Which specific activities of a program are associated with which behavioral factors and accordingly how strong is their effect on behavior?
2. Which recommendations can be given about how to configure the most effective public health promotion program for hand washing with soap in emergencies?

The present research focuses upon one specific hygiene behavior: Washing hands with soap at key times. Water consumption and defecation practices are assessed at a smaller scale.

2. Method

2.1 Sample and participants

Data was collected from May 11 2011 through June 9 2011 within 20 different sites in Port-au-Prince, Gressier, Petit Goâve, Grand-Goâve, and Léogâne by means of structured interviews and observations. To be able to detect small effects with an α-error of .05 a sample size of 800 interviews was targeted and a final sample size of 811 interviews was accomplished (748 household interviews and 63 observation interviews, see below). The age of the respondents ranges between 15 and 90 years, with a mean age of 34.68 years (*SD* = 12.90). The sample consists of 98 males (12%) and 713 females (88%). Female adults are over represented in the sample as the interviews were conducted with the primary care taker in a household. Hence, the research findings primarily apply to women. It might be that different conclusions would be drawn for men or children in the study area.

2.2 Selection of the data collection sites

Three different cluster types were taken into account. First, the study looks at the public health promotions of three different affiliates, OGB, OQ and IO. Second, spatially the promotions were conducted within urban, peri-urban and rural regions and had to be clustered for sampling. Third, the affiliates worked in camps and neighborhoods each having their own specificities. Because the research goal is to find potential differences between cluster types each cluster type had to be equally represented within the sample. The same number of sites was selected per cluster type. Therefore the number of sites per cluster intersection (e.g. OBG – urban – camp) which is necessary to receive an even dispersion was defined (see Figure 1). While applying this selection criteria the sites per cluster intersection were selected randomly (e.g. from all the OGB camps in an urban area one site was randomly selected). All in all, data was collected within 20 sites. OGB and IO each have been working in seven and OQ in six of these sites, 12 are camps and eight are neighborhoods, seven sites are in an urban, six in a peri-urban and seven in a rural area.

		Site type		Total
Region type	Oxfam	Camp	Neighborhood	
Urban	OGB	1	2	7
	OQ	2		
	IO	1	1	
Peri-urban	OGB	3	1	6
	OQ	2		
Rural	OQ	1	1	7
	IO	2	3	
Total		12	8	20
			OGB	7
			OQ	6
			IO	7

Figure 1. Selection key: Data collection sites.

2.3 Data collection procedure

A cross-sectional design was applied for data collection. Data around experienced promotion activities, behavioral factors and behavior was collected at the same point in time without having an actual control group. This is a correlational study which can reveal associations between experienced promotion activities, behavioral factors and behavior. However, no conclusions regarding causality are possible.

Data was collected in two different ways: observations and structured interviews. Within the former a data collector observed during 4-6 hours the hand washing behavior of every person using the public latrines in camp sites. The goal of the observations was to measure the actual, objective behavior which is carried out – does a person wash their hands with soap after using the latrines or not. The

goal of the structured interviews was to gain detailed information about the people's health behavior (e.g. washing hands with soap), intentions, habits; behavioral factors (attitudes, norms, abilities etc.) and the recalled promotion activities and a person's attitudes towards it. Two different types of interviews were applied, household and observation interviews, which both took around 45 minutes and were conducted in Creole by 10 Haitian interviewers (5 women and 5 men). In household interviews the primary care taker of every third household was interviewed, while every second person leaving the observed latrines was interviewed in observation interviews. The objective of observation interviews was to combine the detailed information regarding experienced promotion activities and behavioral factors from the interviews with the actual, objective behavior gathered during observations.

However, observations were challenged by infrastructural and utilization issues. First, public latrines were only provided in camps but not in neighborhoods. Hence, observational data could be collected only in camps but not in neighborhoods. Second, during data collection the three affiliates were in the middle of transition from emergency to recovery; in some of the camps program handover had already taken place. As a consequence, in the majority of the camps where data was collected handwashing stations were not provided anymore or currently not provided since the affiliates were changing from temporary to permanent solutions. Third, public latrines were used rather infrequently. Hence, the sample which could be observed was relatively small.

To approach the infrastructure problem, during data collection the affiliates provided portable handwashing stations if necessary. While this enabled the research team to conduct the observations it should be mentioned that the observation situation was simulated since the handwashing station were usually not installed. Hence, the observation data has to be treated with some caution. To approach the utilization problem, observation times were extended to capture a bigger sample. However, since the provision of portable handwashing stations did not work out in all sites and since data collection repeatedly started delayed due to transportation issues, it was not possible to obtain the planned number of observation interviews. As a consequence, the sample of the observation interviews is too small to address the relationship between experienced promotion activities, behavioral factors and actual behavior by means of regression analysis. Instead only reported behavior can be analyzed in depth.

2.4 Data analysis procedure

In a first step behavior (water consumption, defecation practices and handwashing with soap) and promotion activities were generated as frequencies (see chapter 4.1-4.4). Behavior frequencies were calculated for the whole sample and by region separately.

In a second step regression analyses were conducted to reveal the relationship between promotion activities, behavioral factors and handwashing at key times. Thereby, the direct relation between promotion activities and handwashing at key times was assessed first. Second, the critical behavioral factors which explain handwashing at key times were selected. Then, the indirect relation between promotion activities and handwashing at key times, which is mediated by the behavioral factors, was addressed by means of mediation analysis.

In a third step interactions between the critical promotion activities exerting fostering effects and the critical promotion activities exerting hindering effects were addressed by means of Kruskal-Wallis tests and Mann-Whitney tests.

In a last step, the promotion activities were further examined with regards to their evaluation using one-way ANOVA and Tukey post-hoc comparisons.

3. Frequencies of behaviors and promotion activities

3.1 Water consumption

Regarding water consumption beneficiaries were asked about their primary source of drinking water. From Figure 2 it can be seen that the majority (46%) of the interviewees drink water from public fountains or water pumps. 14% use a private house connection while 10% drink bladder water and 7% drink water from kiosks vending reverse osmoses treated water. All other water sources are consumed by 5% or less than 5% of the beneficiaries.

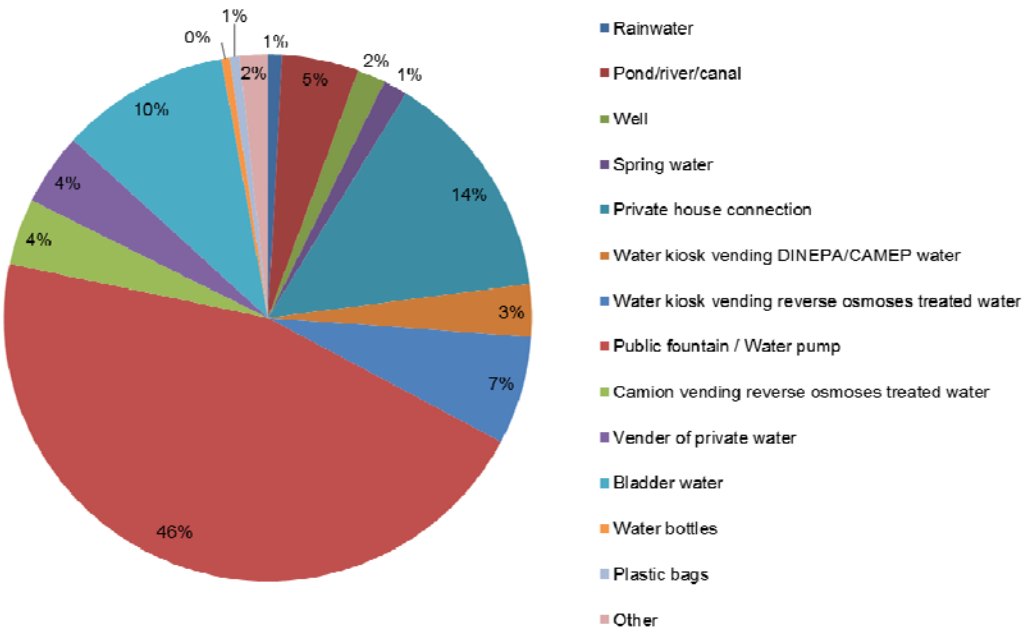

Figure 2. Primary water source – whole sample. Question: What is your primary water source of drinking water? *N* = 811.

When asked about the reasons for drinking water from the specific source 48% of the beneficiaries mentioned availability (see Figure 3 and Table 1). Another 13% stated proximity, 12% said that there is no alternative and for 7% it is the easiest option. In comparison, health (3%), water quality (3%) and

the advantage of treated water (4%) were mentioned less frequently. All in all, availability and ease of access seem to be the critical factors determining water consumption while health considerations are of only minor importance. Since availability and ease of access is mainly location-dependent the predominantly consumed water source might differ between regions. Hence, frequencies were calculated by region type separately (see Figure 4 to Figure 6).

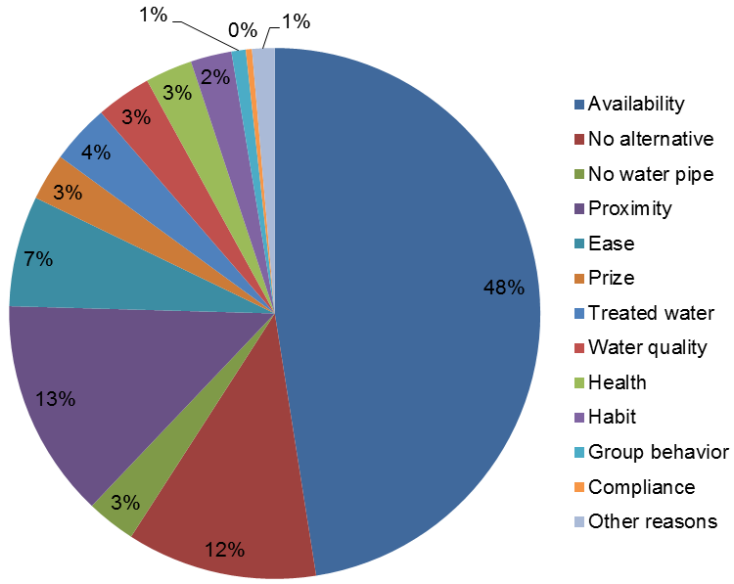

Figure 3. Reasons for primary water source. Question: Why is … your primary source of drinking water? *N* = 802.

Table 1

Reasons for primary water source: Examples of answers.

Reasons	Examples of answers
Availability	That is the available one.
No alternative	There is no other water source.
No water pipe	There is no water pipe.
Proximity	It is near.
Ease	It is the easiest.
Price	It is not expensive.
Treated water	It is treated.
Water quality	It is the best water.
Health	Due to health.
Habit	It is the one which I am used to go.
Group behavior	Everybody in the area stock up there for water.
Compliance	They told me to drink this water.

Notes: Open question. Answers were categorized subsequently.

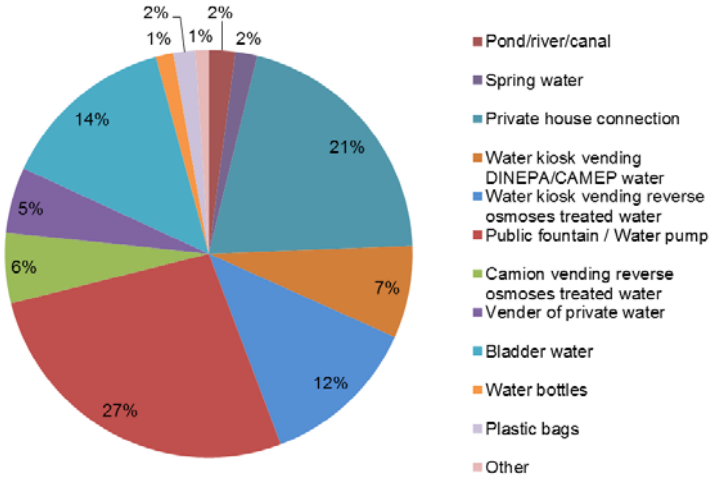

Figure 4. Primary water source in urban sites. Question: What is your primary water source of drinking water? *N* = 287.

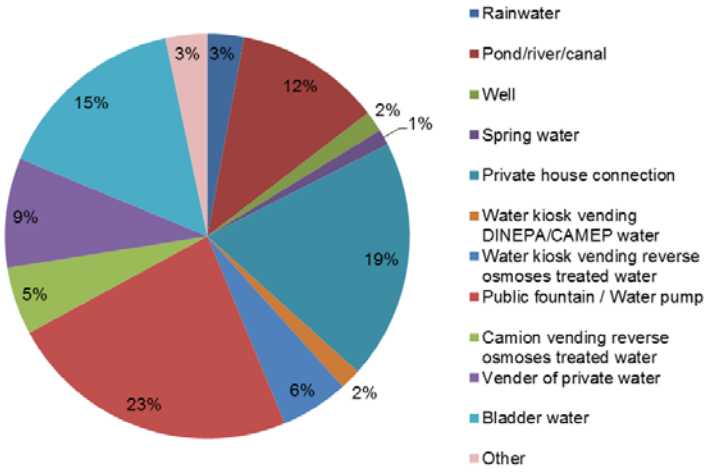

Figure 5. Primary water source in peri-urban sites. Question: What is your primary water source of drinking water? *N* = 240.

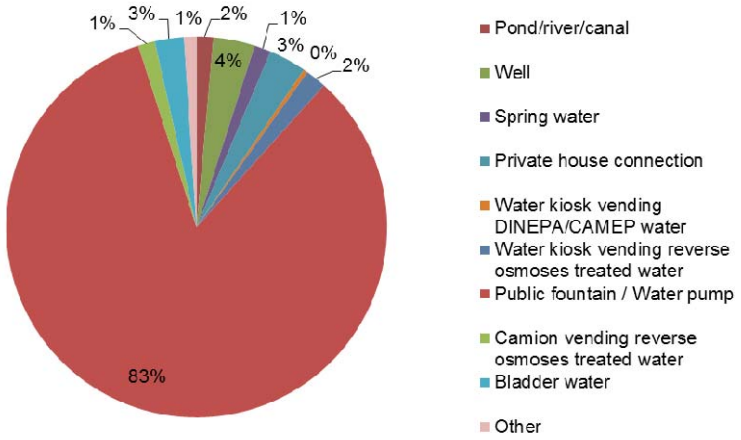

Figure 6. Primary water source in rural sites. Question: What is your primary water source of drinking water? *N* = 283.

Paralleling the findings for the whole sample, public fountains and water pumps are the predominant water source in all regions (see Figure 4 to Figure 6). However, the share is much lower in urban sites (27%) and in peri-urban sites (23%) than in the whole sample (46%) or in rural sites (83%). In urban and peri-urban sites (as in the whole sample), water from private house connections (21% and 19%, respectively) and bladder water (14% and 15%, respectively) is consumed often as well. In addition, water from kiosks vending reverse osmoses treated water is rather frequently consumed in urban sites (12%), while in peri-urban sites 12% drink water from ponds, rivers or canals. In rural sites, where the vast majority drinks water from public fountains and water pumps, none of the other water sources is consumed by more than 4% of the respondents.

3.2 Sanitation

Regarding sanitation the primary practice for defecation was inquired. The vast majority of the beneficiaries (86%) stated that they primarily use latrines or toilets for defecation (see Figure 7). Still, 12% of the interviewees defecate outdoors (courtyard, garden, river, field, bush etc.). Again, availability might be crucial and hence the primary defecation practice might differ between regions. Hence, frequencies were calculated separately by region type.

In all regions use of latrines or toilets is the prevalent defecation practice (see Figure 8 to Figure 10). However, in urban sites it is slightly more common (95%) than in peri-urban sites (89%) while it is least common in rural sites (75%), where 25% of the interviewees stated to primarily defecate outdoors. Further, in urban sites defecation into a plastic bag is somewhat more frequent than in the peri-urban and rural regions (4% in contrast to 1% and 0%).

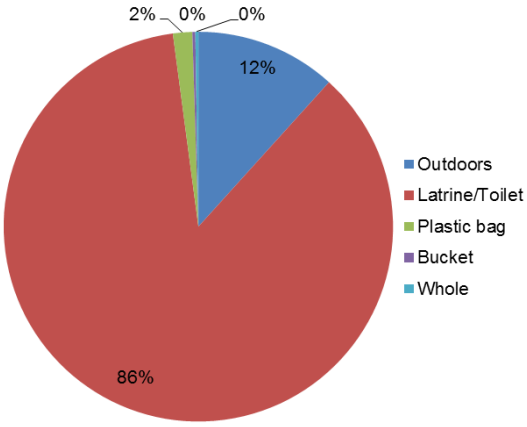

Figure 7. Primary defecation practice – whole sample. Question: What is your primary practice for defecation? *N* = 811.

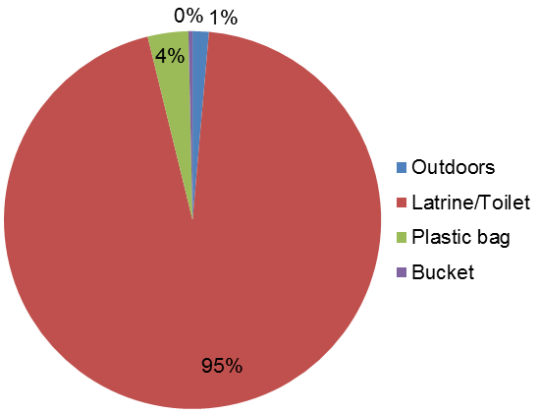

Figure 8. Primary defecation practice in urban sites. Question: What is your primary practice for defecation? *N* = 287.

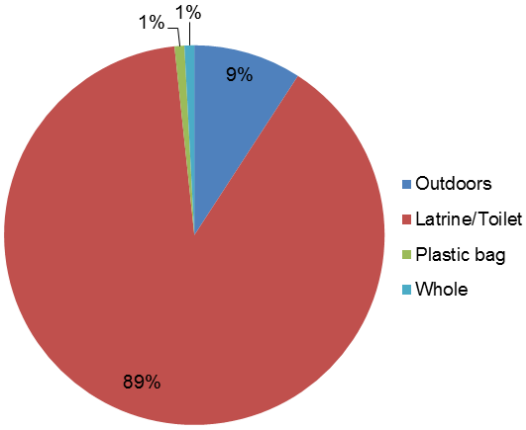

Figure 9. Primary defecation practice in peri-urban sites. Question: What is your primary practice for defecation? *N* = 240.

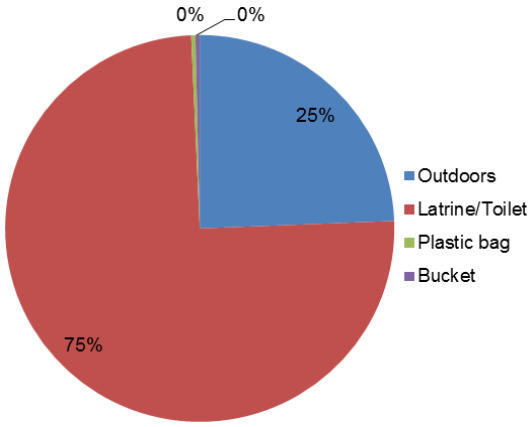

Figure 10. Primary defecation practice in rural sites. Question: What is your primary practice for defecation? *N* = 283.

Of those people using latrines or toilets for defecation 42% use a public latrine, 29% a latrine for several families and 26% have a household latrine/toilet (see Figure 11). Further, 83% of people who use a latrine use a pit latrine, 12% a chemical latrine and 5% a WC (see Figure 12).

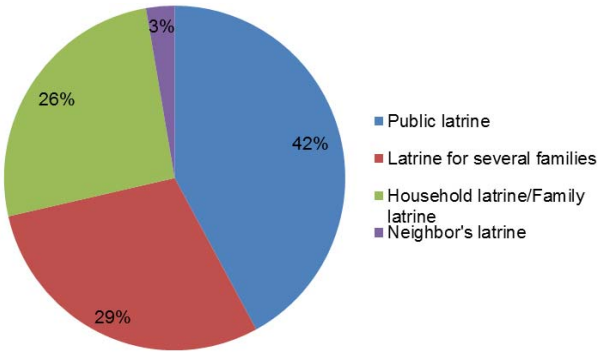

Figure 11. Latrine type – property. *N* = 630.

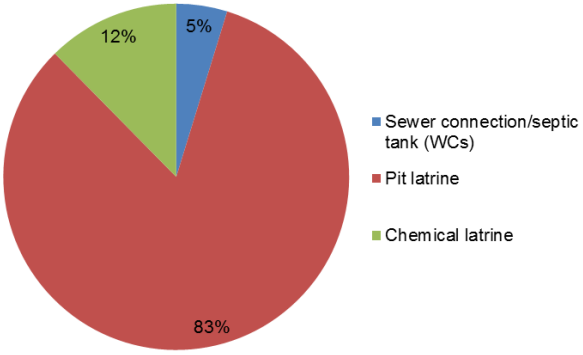

Figure 12. Latrine type – technical. *N* = 630.

3.3 Hand washing with soap (HWWS) at key times

To assess the prevalence of HWWS two different measures are taken into account, self-reports and observations.

For self-reports the mean level of HWWS at key times is rather high (see Table 2). On average respondents state to wash hands with soap (WHWS) nearly always after defecation (*M* = 3.73), often or nearly always after wiping a child's bottom (*M* = 3.44) and after other kinds of contact with feces (*M* = 3.54), and slightly more than often before eating (*M* = 3.25), before preparing food (*M* = 3.13) and before feeding a child (*M* = 3.16). The only exception is the key time "before handling water" for which on average interviewees state to WHWS only sometimes or often (*M* = 2.66).

Table 2

Means (M) and standard deviations (SD) of washing hands with soap at key times

Key time	***M***	***SD***
After defecation	3.73	0.51
After wiping a child's bottom	3.44	0.85
After other kinds of contacts with feces	3.54	0.63
Before eating	3.25	0.93
Before preparing food	3.13	0.99
Before feeding a child	3.16	0.99
Before handling water	2.66	1.18

Notes: N = 811. Introductory question: In general, how often do you wash your hands with soap at the following times? All measures ranging from 0 – (almost) never to 4 – (almost) always.

To facilitate subsequent regression analyses, the seven measures were combined to two mean scores representing two distinct types of HWWS; feces and food related HWWS (see Table 3). While the first mean score includes HWWS after defecation, after wiping a child's bottom and after other kinds of contact with feces, the second score incorporates HWWS before eating, before preparing food, before feeding a child and before handling drinking water. While feces related HWWS is very common (*M* = 3.57), food related HWWS is often conducted (*M* = 3.04).

Table 3

Means (M) and standard deviations (SD) of feces and food related HWWS

HWWS type	***M***	***SD***
Feces related hand washing (mean score)	3.57	0.56
Food related hand washing (mean score)	3.04	0.82

Notes: N = 811. Range: 0 – (almost) never to 4 – (almost) always.

A rather different result is obtained when looking at the latrine observations. Only 34% of the persons observed leaving the latrines washed their hands with soap, while 4% washed their hands only with water and 62% did not wash their hands at all (see Figure 13). This is in sharp contrast to the fact that on average respondents state to WHWS nearly always after defecation (see above) and leads to the conclusion that the self-reports produce overestimations (for a discussion of problems regarding overrated self-reports see Biran et al., 2008; Ram, 2010). However, this conclusion must be qualified by the fact that within the observations the critical behavior was HWWS after latrine usage which includes not only HWWS after defecation but also after urination. The observations were limited to HWWS at the communal hand washing station next to the latrines. It is possible that some of the latrine users washed their hands with soap at household level. It's also worth noting, observations might be biased due to the simulated observation situation (see above).

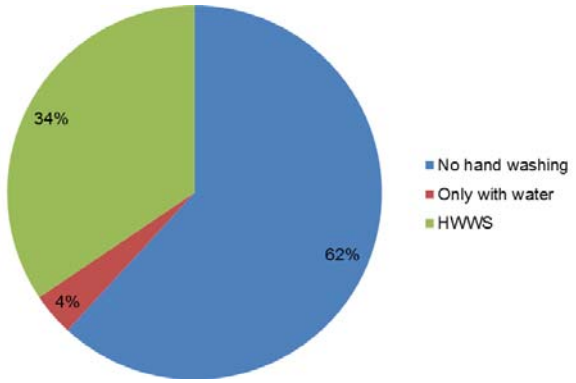

Figure 13. Observed behavior: Hand washing after latrine usage. *N* = 270.

As latrine use is only one of several possible defecation practices, the relationship between self-reported frequency in handwashing after defecation and primary defecation practice was analyzed. Even though the majority of the respondents state to WHWS often or almost always after defecation independent of the defecation practice, there is a significant association between defecation practice and frequency in handwashing after defecation, $\chi^2(16) = 36.39$, $p < .01$. Standardized residuals revealed that of the respondents defecating outdoors ($z = 3.2$, $p < .01$) or into a plastic bag ($z = 3.6$, $p < .01$) significantly more than expected do wash their hands only sometimes after defecation compared to WHWS almost never, seldom, often or almost always. No significant results are found regarding respondents using latrines, a bucket or a hole for defecation.

In addition to the prevalence in HWWS the reasons given for HWWS were investigated (see Figure 14). The majority of respondents do WHWS due to health reasons (91%), namely to avoid bacteria (64%), to avoid sickness (14%), to avoid cholera (9%) or to protect health (4%). Other reasons such as dirt (5%) or hygiene (2%) are only of minor importance.

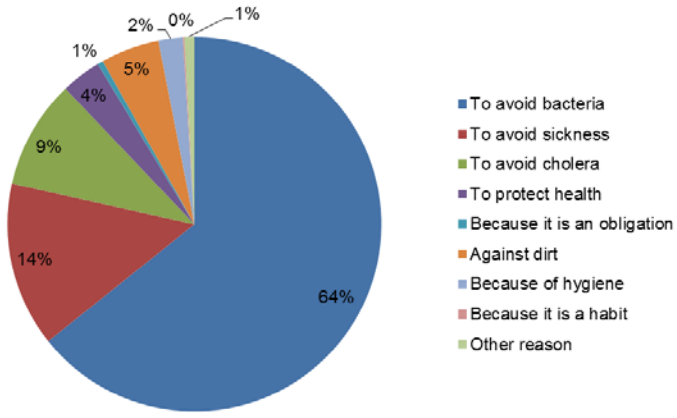

Figure 14. Reasons for washing hands with soap. Question: In general, why do you wash your hands with soap? *N* = 810.

3.4 Public health promotions

Oxfam has applied an impressive palette of promotion activities (see Table 4). All three affiliates' activities drew heavily from the WASH Hygiene Promotion tools created and rolled out as part of project 3 of the humanitarian reform and the Haiti Hygiene promotion subgroup of the WASH Cluster. The applied promotion activities of the three affiliates are very similar to each other and used methods and tools generated from the WASH HP tool kit and Oxfam materials. For the sake of the report hygiene promotion is defined as follows:

> Hygiene Promotion is (…) the systematic attempt to enable people to take action to prevent water and sanitation related disease and to maximise the benefits of improved water and sanitation facilities (…) [by means of]: 1) mutual sharing of information and knowledge, 2) the mobilisation of communities, and 3) the provision and maintenance of essential materials and facilities. Hygiene Promotion includes the use of communication, learning and social marketing strategies and combines 'insider' knowledge/ resources (what people know, want, and do) with 'outsider' knowledge/resources (e.g. the causes of disease, including social, economic, and political determinants, engineering, community development, and advocacy skills) (UNICEF, 2007).

The WASH approach builds mainly on information sharing and knowledge formation. Thereby not only top down information activities are used but as well interactive, bottom up activities that foster mutual learning and self-help.

Table 4

Overview promotion activities

Promotion activity	Description
Radio spot	First step intervention tool to spread information as quickly as possible to as many persons as possible. The spots were created, coordinated and managed by MSPP in collaboration with the INGO community. Applied primarily after the cholera outbreak. Popular radio channels were identified and spots about hand washing and cholera were aired. Main goal: information/education. Applied by OGB and IO.
Radio program	First step intervention tool to spread information as quickly as possible to as many persons as possible. Interactive program with an expert from Oxfam which answered listeners' questions. Main goal: information/education. Applied by OGB.
Information spread by megaphone	First step intervention tool to spread information as quickly as possible to as many persons as possible. Sometimes only top down information, sometimes interactive with questions and answers. Main goal: information/education and mobilization. Applied by all affiliates.
Group discussion / Community meeting	Group activity with 10-12 persons of differing target (adults, children, woman, man). Important tools: picture cards used for "three-pile-sorting", chain of contamination and analysis of problem; questions and answers; brain storming etc. Goals: Discuss (remaining) questions, deepen understanding, explore beliefs. Applied by all affiliates.
Hygiene training	2-3 day training initially with head of household, later with other target groups. Includes several activities as group discussions, role plays, educative films etc. and focuses on a specific topic. The third day is dedicated to practical demonstration of how to use the items in a hygiene kit. Attendance of the training is rewarded with a coupon which entitles to receive a hygiene kit. Applied by OQ.
Home visit / Face-to-face promotion	Second step intervention tool after mass promotion, group discussion, training sessions etc. Primary recipient is head of household. Tool: picture cards used for "three-pile-sorting", chain of contamination and analysis of problem. Main goal: clarify remaining questions, education. Sometimes combined with distribution of soap, ORS, aquatabs, flyers etc. Applied by all affiliates.
Material distribution with instructions for	Mass distributions where the correct use of the material is explained, demonstrated and exercised. Main goal: distribute material and ensure correct utilization. Applied by all

use	affiliates.

(continued)

Table 4 (continued)

Promotion activity	Description
Information from a neighbor / friend	Side benefit of any promotion tool where a promotion recipient shares the gained information with its neighbors/friends.
Focus group	Reunion to discuss problems within the community, to get feedback to the promotions, to assess knowledge, behavior and attitude. Tool: questionnaires. Applied by all affiliates.
Cinema show	Screening of educative films about health issues, sometimes in connection with a meeting. Main goal: information/education. Applied by IO and OQ.
Theater	Plays with singing and dancing about hand washing, hygiene, chain of contamination etc. Played by professionals (OQ) or lay persons (mobilizers, camp inhabitants, adults and children; IO and OGB). In interaction with the audience which is asked questions and has to demonstrate behavior. Sometimes only at special events like global handwashing day, sometimes without special occasion. Goal: Demonstrate good and bad behavior. Applied by all affiliates
Special hygiene day: e.g. global handwashing day	Special days that focus on a specific topic (hand washing, water consumption etc.) and apply a range of promotion tools as theater, songs, quiz, demonstration sessions etc. Applied by all affiliates.
Quiz	Quiz about good and bad behavior regarding hygiene, hand washing, cholera or diarrhea. Sometimes with soap as a prize. Conducted during meetings and special events. Applied by all affiliates.
Stickers/Posters/Paintings	Stickers, posters and paintings that inform about correct behavior and health issues and serve as reminders. Hang up/painted at key places as latrines, hand washing station, water source etc. Applied by all affiliates.
Community club	Meetings of a specific target group (e.g. mothers) on a regular basis to discuss and solve problems and foster self-help. Applied by OGB.
Painting contest	Painting contest with specific health related topics to encourage the participants and the viewer to reflect health topics. Participants: children and/or adults. Applied by OGB and OQ.
Art / Handicraft contest	Contests using waste (e.g. water bottles) to create art / handicraft objects and sensitize regarding waste problematic. Applied by OGB and OQ.
Hygiene songs	Songs about different health topics sang in the camps by megaphone, at meetings, at events, aired in the radio. Some provided by UNICEF, others created by Oxfam and the communities. Goal: Spread information about good behavior and as a reminder. Applied by all affiliates.

While the three affiliates applied a comparable range of promotion activities not every tool was used in each site and – of course – not every beneficiary experienced each promotion tool. Figure 15 displays the reach of the promotion activities within the sample. The activity with the highest reach is the radio spot with a reach of 92%. Hereby, it is important to note, that beneficiaries were interviewed regarding heard hygiene radio spots in general but not regarding specific radio spots or regarding spots from a particular Oxfam affiliate. Hence, it is neither possible to unpick the reach by affiliates nor to rule out that interviewees referred to radio spots by other INGOs or MSPP. Stickers, posters and paintings with a reach of 76% and information spread by megaphone with a reach of 73% are the activities with second and third highest reach. At the other side of the scale are painting, art and handicraft contests with a reach of only 2-3%. The low reaches must be qualified by the fact that these activities especially

addressed children while the interviews were conducted with adolescents and adults. However, due to their low reach and since art/handicraft contests targeted waste management instead of HWWS, the promotion activity "contests" were excluded from further analysis.

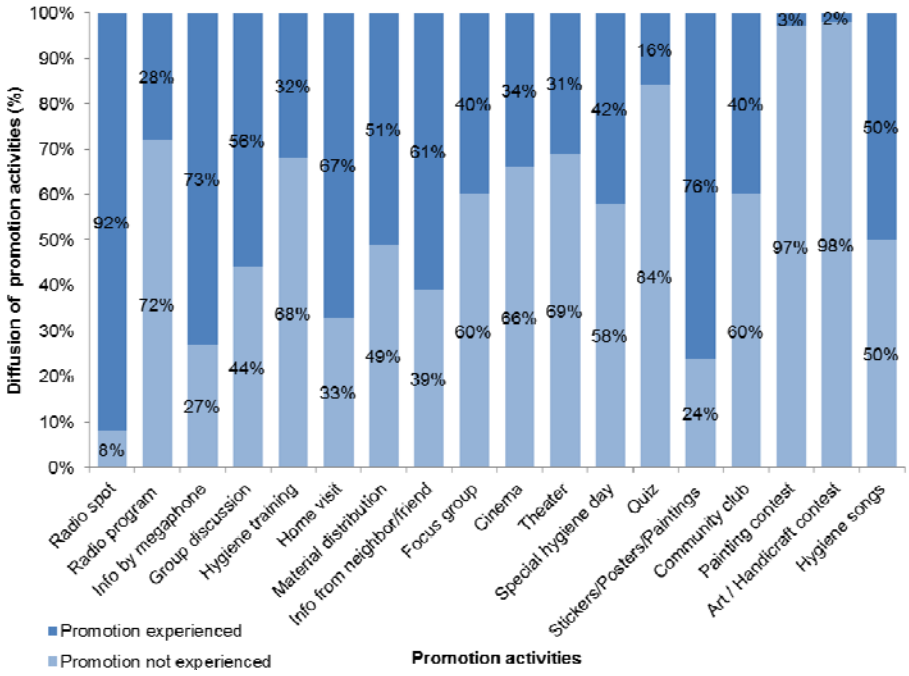

Figure 15. Reach of the promotion activities within the sample.

4. Public health promotions, behavioral factors and HWWS

The main focus of the research study is the question which specific promotion activities are most effective in changing HWWS behavior. Promotion activities can impact behavior in two ways. First, they can be directly related to the critical behavior. Second, promotion activities may influence behavioral factors which in turn influence the critical behavior; therewith, the promotion activities can be indirectly related to behavior. Direct and indirect effects for feces related HWWS are presented in the next section followed by results for food related HWWS.

4.1 Public health promotions and feces related HWWS

4.1.1 Direct effects of promotion activities on feces related HWWS

To determine the direct effect of promotion activities on feces related HWWS regression analyses were conducted. Regression analysis is used to assess the association between variables, here between promotions and HWWS. Variables are substantially associated if a change in one variable is accompanied by a change in the other variable. For example, we could expect a positive association

between hearing a hygiene radio spot and actual HWWS behavior. If these variables are indeed related substantially than hearing a hygiene radio spot should be accompanied by a change in the amount of HWWS behavior. More specifically, if one person hears a radio spot while another does not and if hearing a radio spot is indeed positively associated with actual HWWS behavior, then the first person should show more frequent HWWS behavior than the second person. The coefficients received by regression analysis indicate how much the magnitude in HWWS changes when any of the promotion activities is actually experienced while all other variables are held fixed.

Table 5 and Figure 16 depict five significant positive associations: Respondents who heard a radio spot, who participated in a material distribution, who heard a radio program, who participated in a group discussion or who watched a theater do wash their hands with soap more often after any contact with feces than respondents who have not experienced any of these promotion activities. Further, three significant negative relationships were elicited: Respondents who know a hygiene song, who participated in a focus group, or who noted any stickers, posters or paintings do wash their hands with soap less often after any contact with feces than respondents who have not experienced any of these promotion activities. The remaining eight promotion activities are not significantly associated with feces related HWWS.

Table 5

Linear regression analysis for promotion activities explaining feces related HWWS

Promotion activity	***B***	**SE *B***	***p***	**CI (95%) for *B***
Constant	3.44	0.08	.000	[3.28, 3.61]
Radio spot	**0.04**	**0.02**	**.024**	**[0.01, 0.08]**
Radio program	**0.04**	**0.01**	**.002**	**[0.01, 0.06]**
Information spread by megaphone	-0.02	0.01	.184	[-0.04, 0.01]
Group discussion / Community meeting	**0.03**	**0.01**	**.008**	**[0.01, 0.06]**
Hygiene training	0.00	0.01	.919	[-0.03, 0.02]
Home visit / Face-to-face promotion	-0.02	0.01	.121	[-0.04, 0.01]
Material distribution with instructions for use	**0.04**	**0.01**	**.000**	**[0.02, 0.06]**
Information from a neighbor / friend	0.02	0.01	.063	[0.00, 0.04]
Focus group	**-0.04**	**0.01**	**.005**	**[-0.07, -0.01]**
Cinema show	0.01	0.01	.616	[-0.02, 0.03]
Theater	**0.03**	**0.01**	**.054**	**[0.00, 0.05]**
Special hygiene day: e.g. global handwashing day	-0.02	0.01	.214	[-0.04, 0.01]
Quiz	0.02	0.02	.294	[-0.01, 0.05]
Stickers/Posters/Paintings	**-0.03**	**0.01**	**.012**	**[-0.06, -0.01]**
Community club	0.02	0.01	.161	[-0.01, 0.04]
Hygiene songs	**-0.04**	**0.01**	**.000**	**[-0.06, -0.02]**

Notes: N = 704. Adjusted R^2 = .11. CI = Confidence interval. Promotion activities in bold are significantly related with feces related HWWS.

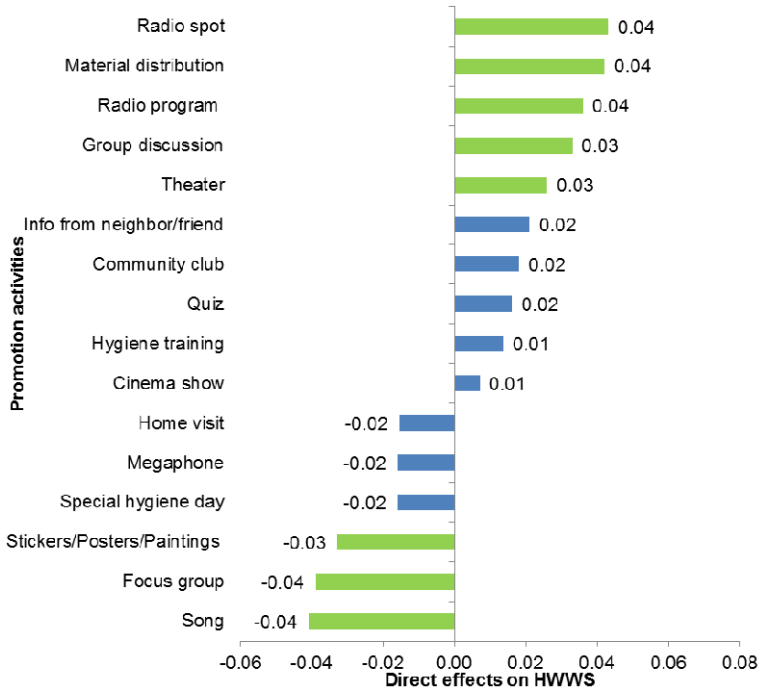

Figure 16. Direct effects of promotion activities on feces related HWWS. *N* = 704. Green bars represent significant unstandardized regression coefficients with $p < .05$.

Altogether, the promotion activities can explain 11% of the variance in feces related HWWS directly. In other words, only 11% of the differences in the frequency of feces related HWWS between respondents can be explained due to different promotion activities which they did or did not experience. However, promotion activities could influence feces related HWWS not only directly but indirectly as well.

4.1.2 Indirect effects of promotion activities on feces related HWWS

When looking at indirect effects, in a first step, the behavioral factors which influence feces related HWWS at key times had to be identified. The potential factors influencing feces and food related HWWS were derived from the RANAS Model (R(isk), A(ttitudes), N(orms), A(bilities), and S(elf-regulation) of Behavioral Change (Mosler, accepted). The model builds on several theories of behavioral change and describes factors that can neatly be classified into the following five factor blocks:

- *Risk factors* entail perceived vulnerability and perceived severity of contracting a disease, and factual knowledge about the possibility of being affected by a potential contamination.
- *Attitude factors* comprise instrumental beliefs about costs and benefits of the targeted behavior, as well as affective beliefs, i.e. feelings arising when thinking about the behavior.
- *Norm factors* include different social influences: descriptive norms (behaviors typically performed by others), injunctive norms (behaviors typically approved or disapproved by others) and personal norms (personal standards, what should be done).

- *Ability factors* indicate people's perception to perform a behavior (perceived behavioral control) and the confidence in one's ability to organize and manage the targeted behavior (self-efficacy).
- *Self-regulation factors* help to manage conflicting goals and distracting cues when intending to implement and maintain a certain behavior. Important determinants are commitment, perceived habit and remembering the behavior.

For each behavioral factor data was collected using one or several questions. If several questions were applied, these were combined to a mean score to facilitate the analysis. The five factor blocks, the corresponding behavioral factors and examples of questions from the structured interviews are presented in Table 6 along with means, standard deviations and Cronbach's alphas for the mean scores.

Table 6

Overview of the behavioral factors: questions, means, standard deviations and Cronbach's alphas for scales

Behavioral factor group	Behavioral factor	Questions	Range	*M*	*SD*	α
Risk factors	Perceived vulnerability (1 question)	How high or low do you feel are the chances that you or someone in your family gets cholera?	-4–4	-2.08	1.91	–
	Perceived cholera severity (3 questions)	Imagine that you contracted cholera, how severe would be the impact on your life in general?	0–4	2.62	0.90	.85
	Health knowledge (4 questions)	What are the effects of cholera on your body?	0–4	1.12	0.37	.64
Attitude factors	*Instrumental beliefs*					
	Efforts (4 questions)	Do you think that washing hands with soap is time-consuming?	0–4	0.76	0.66	n.a.
	Attractiveness (1 question)	I feel more attractive when I have washed my hands with perfumed soap.	-4–4	1.68	2.42	–
	Nurture: Teaching and caring (3 questions)	It is important to teach the children to wash their hands with soap.	-4–4	2.93	0.75	n.a.
	Return (1 question)	Considering all the benefits and efforts related to washing hands with soap, how much do you think is it worthwhile for you to wash hands with soap?	-4–4	2.47	1.57	–
	Affective beliefs					
	Liking and pleasantness (2 questions)	How much do you like or dislike washing hands with soap?	-4–4	2.95	0.73	.55
	Soap attributes: Smell (1 question)	How much do you like or dislike the smell of the soap?	-4–4	2.55	1.26	–
	Disgust (3 questions) - feces	I feel dirty and smelly if I don't wash my hands with soap after visiting the toilet.	-4–4	2.59	1.16	n.a.
	Disgust (2 questions) - food	I wash my hands with soap before handling food because it would be disgusting to get dirt into the food and then eat it.	-4–4	2.51	1.26	n.a.
	Attitude towards cholera patients (1 question)	What do you think of people who have cholera?	-4–4	-0.71	1.97	–

(continued)

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Table 6 (continued)

Behavioral factor group	Behavioral factor	Questions	Range	*M*	*SD*	α
Norm factors	*Descriptive norms*					
	Family (1 question) - feces	How many people of your relatives wash hands with soap after contact with stool?	0–4	3.62	0.76	–
	Family (1 question) - food	How many people of your relatives wash hands with soap before handling food?	0–4	3.59	0.82	–
	Community (1 question) - feces	How many people of your community wash hands with soap after contact with stool?	0–4	2.21	1.21	–
	Community (1 question) - food	How many people of your community wash hands with soap before handling food?	0–4	2.16	1.18	–
	Injunctive norm (2 questions) - feces	Most of the people who are important to me think I should wash my hands with soap after contact with stool.	-16–16	8.06	4.57	.87
	Injunctive norm (2 questions) - food	Most of the people who are important to me think I should wash my hands with soap before handling food.	-16–16	7.97	4.56	.89
	Personal norm (2 questions) - feces	I feel a strong personal obligation to wash hands with soap after contact with stool.	-4–4	2.75	1.27	.72
	Personal norm (2 questions) - food	I feel a strong personal obligation to wash hands with soap before handling food.	-4–4	2.70	1.35	.79
	Compliance mobilizers (1 question)	I wash my hands with soap because that is what the hygiene mobilizers told us.	-4–4	2.13	1.98	–
Ability factors	Perceived behavioral control / Self-efficacy (2 questions) - feces	How difficult or easy is it to always wash hands with soap after contact with stool?	-4–4	3.09	0.67	.65
	Perceived behavioral control / Self-efficacy (2 questions) - food	How difficult or easy is it to always wash hands with soap after contact with stool?	-4–4	3.05	0.74	.69
	Response efficacy (1 question)	How certain are you that washing hands with soap after defecation and before handling food prevents you and your family from getting diarrhea or cholera?	0–4	3.17	0.70	–

(continued)

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Table 6 (continued)

Behavioral factor group	Behavioral factor	Questions	Range	*M*	*SD*	α
	Maintenance self-efficacy					
	General hindrance (1 question)	How often does it happen that you want to wash hands with soap but are hindered in doing so?	0–4	0.88	0.96	–
	HW-station out of order (2 questions)	How often does it happen that the hand washing station is damaged?	0–4	0.71	0.84	.65
	No water or no soap (2 questions)	How often does it happen that there is no soap available at the hand washing station?	0–4	1.54	0.92	.67
	Recovery self-efficacy (1 question)	Imagine you have stopped washing hands with soap for several days. How confident are you to start washing hands with soap again?	0–4	3.11	0.51	–
Self-regulation factors	Forgetting (1 question) – feces	How often does it happen that you forget to wash hands with soap after contact with stool?	0–4	0.70	1.02	–
	Forgetting (1 question) – food	How often does it happen that you forget to wash hands with soap before handling food?	0–4	0.99	1.03	–
	Control Planning: Detailed plan (2 questions) - feces	Have you made a detailed plan regarding how to avoid forgetting to wash hands with soap after contact with stool?	0–4	2.51	0.85	.80
	Control Planning: Detailed plan (2 questions) - food	Have you made a detailed plan regarding how to avoid forgetting to wash hands with soap before handling food?	0–4	2.46	0.87	.78

Note: N = 745. n.a. = not applicable: items are that divers that a joint variance is not expected and thus Cronbach's alphas are not applicable. Still, the items were combined to scales due to theoretical reasons.

By means of regression analysis the relevant behavioral factors which explain feces related HWWS were identified. Table 7 depicts seven significant positive associations: Respondents who think it is worthwhile to WHWS (return), who like the smell of soap (soap attributes: smell), who feel dirty and smelly if they do not WHWS (disgust), whose community members do WHWS (descriptive norm – community), who think it is easy to WHWS (perceived behavioral control/self-efficacy), who think that HWWS protects from cholera contagion (response efficacy), and who have a plan how to deal with hindrance and forgetting (control planning: detailed plan) do wash their hands with soap *more often* after any contact with feces than respondents who don't think it is worthwhile to WHWS, who don't like the smell of soap, who don't feel dirty and smelly if they do not WHWS, whose community members don't WHWS, who don't think it is easy to WHWS, who don't think that HWWS protects from cholera contagion, and who don't have a plan how to deal with hindrance and forgetting. Further, two significant negative associations were elicited: First, respondents who think they are often hindered in WHWS (general hindrance) do wash their hands with soap *less often* after any contact with feces than respondents who think they are seldom hindered in WHWS. Second and counterintuitively, respondents who know the effects of cholera (health knowledge) do wash their hands with soap *less often* after any contact with feces than respondents who do not know the effects of cholera.

Together, the behavioral factors explain 45% of the variance in feces related HWWS. In other words, 45% of the differences in the frequency of feces related HWWS between respondents are explained due to differences in the behavioral factors. The remaining 55% of the variance is explained by factors not captured within the analysis. An explained variance of 45% is rather average within psychological studies while an explained variance of less than 30% would be small and an explained variance of more than 60% would be high.

The nine behavioral factors which are significantly associated with feces related HWWS were selected to examine indirect effects of promotion activities on feces related HWWS by means of mediation analysis (see Figure 17-1 to 17-5). The remaining behavioral factors are not significantly associated with feces related HWWS and were thus not further analyzed.

For optimizing promotion programs within a specific population it is not only relevant to know which behavioral factors are related with the target behavior and hence, could be triggered by promotion activities. It is at the same time crucial to know if a behavioral factor is prevalent in the population or not. For example, if in a population everyone thinks that it is easy to WHWS it is not worthwhile to target this behavioral factor within the promotion – the optimal level within the behavioral factor is already reached. Subsequent promotions can't optimize the prevalence in the behavioral factor and thus they can't change the behavior by changing the behavioral factor. Regarding feces related HWWS the mean levels of the relevant behavioral factors are rather optimal (see Table 6): Respondents do think it is worthwhile to WHWS (return; M = 2.47), do like the smell of soap (soap attributes: smell; M = 2.55), do feel dirty and smelly if they don't WHWS (disgust; M = 2.59), do think it is easy to WHWS (perceived behavioral control /self-efficacy; M = 3.09), do think that WHWS prevents from cholera contagion (response efficacy; M = 3.17), and don't feel often hindered in WHWS (general hindrance; M = 0.88). However, respondents show only mediocre levels regarding having a plan how to deal with hindrance and forgetting (control planning: detailed plan; M = 2.51), regarding HWWS frequencies of community members WHWS (descriptive norm – community, M = 2.21), and regarding knowing the effects of cholera (health knowledge; M = 1.12). These behavioral factors could be targeted in future promotion activities.

Table 7

Linear regression analysis for behavioral factors explaining feces related HWWS

Behavioral factor group	Behavioral factor	*B*	SE *B*	*p*	CI (95%) for *B*
	Constant	2.39	0.17	.000	[2.05, 2.73]
Risk factors	Perceived vulnerability	0.00	0.01	.730	[-0.02, 0.01]
	Perceived cholera severity	0.00	0.02	.980	[-0.04., 0.03]
	Health knowledge	**-0.10**	**0.05**	**.038**	**[-0.19, -0.01]**
Attitude factors	Instrumental beliefs				
	Efforts	-0.02	0.02	.328	[-0.07, 0.02]
	Attractiveness	-0.02	0.01	.060	[-0.03, 0.00]
	Nurture: Teaching and caring	0.03	0.02	.141	[-0.01, 0.08]
	Return	**0.03**	**0.01**	**.005**	**[0.01, 0.05]**
	Affective beliefs				
	Liking and pleasantness	-0.04	0.03	.117	[-0.10, 0.01]
	Soap attributes: Smell	**0.06**	**0.01**	**.000**	**[0.03, 0.09]**
	Disgust	**0.05**	**0.02**	**.001**	**[-0.02, 0.08]**
	Attitude towards cholera patients	0.00	0.01	.611	[-0.02, 0.01]
Norm factors	Descriptive norms				
	Family	0.00	0.03	.919	[-0.05, 0.05]
	Community	**0.04**	**0.01**	**.005**	**[0.01, 0.07]**
	Injunctive norm	0.01	0.00	.204	[0.00, 0.01]
	Personal norm	0.01	0.02	.669	[-0.03, 0.05]
	Compliance mobilizers	0.01	0.01	.219	[-0.01, 0.03]
Ability factors	**Perceived behavioral control / Self-efficacy**	**0.12**	**0.04**	**.002**	**[0.04, 0.19]**
	Response efficacy	**0.06**	**0.02**	**.014**	**[0.01, 0.10]**
	Maintenance self-efficacy				
	General hindrance	**-0.06**	**0.02**	**.003**	**[-0.10, -0.02]**
	HW-station out of order	0.00	0.02	.944	[-0.04, 0.04]
	No water or no soap	-0.04	0.02	.029	[-0.08, 0.00]
	Recovery self-efficacy	0.04	0.03	.241	[-0.03, 0.10]
Self-regulation factors	Forgetting	-0.03	0.02	.129	[-0.06, 0.01]
	Control Planning: Detailed plan	**0.12**	**0.02**	**.000**	**[0.07, 0.17]**

Notes: N = 745. Adjusted R^2 = .45. CI = Confidence interval. Factors in bold are significantly related with feces related HWWS and were selected for subsequent mediation analysis.

To determine which promotion activities influence the relevant behavioral factors and accordingly feces related HWWS mediation analyses were conducted using the *indirect method* by Preacher and Hayes (2008). Mediation analysis tests if a variable, here a promotion activity, is indirectly related with a target variable, here HWWS, via mediating variables, here behavioral factors. For this, it is examined

if a promotion activity is significantly related to behavioral factors. If this is the case and since the studied behavioral factors are significantly related with HWWS, the promotion activity might be indirectly related with HWWS. Indirect effects are obtained by multiplying the influence that a promotion activity has on a single behavioral factor with the influence that this single behavioral factor has on feces related HWWS. Of the 16 analyzed promotion activities 14 have at least one significant relation with behavioral factors, which are illustrated in Figures 17-1 to 17-5. No significant association with behavioral factors is found for the following activities: hygiene training and quiz (see Table 8). However, when looking at indirect impact on behavior only 9 promotion activities have a significant total indirect effect on feces related HWWS (see Table 8 and Figure 18). The total indirect effect is the sum of all indirect effects per promotion activity and represents the overall effect which a promotion activity exerts on feces related HWWS via all behavioral factors.

Table 8

Overview of the relation between promotion activities and behavioral factors and impact on feces related HWWS

Promotion activity	**Nr. of sig. relations with behavioral factors**	**Significant indirect impact on feces related HWWS**
Radio spot	5	Positive impact
Radio program	1	–
Information spread by megaphone	2	–
Group discussion / Communitymeeting	3	–
Hygiene training	0	–
Home visit / Face-to-face promotion	1	–
Material distribution with instructions for use	6	Positive impact
Information from a neighbor / friend	6	Positive impact
Focus group	5	Negative impact
Cinema show	2	–
Theater	3	Positive impact
Special hygiene day: e.g. global handwashing day	4	Negative impact
Quiz	0	–
Stickers/Posters/Paintings	4	Negative impact
Community club	5	Positive impact
Hygiene songs	6	Negative impact

As shown in Figure 17-1, respondents who heard a radio spot are more likely to like the smell of soap, to feel dirty and smelly when not WHWS, to think that it is easy to always WHWS, and to have a detailed plan against hindrance and forgetting. Further, they are less likely to feel hindered in WHWS. Altogether, hearing a radio spot influences 5 behavioral factors and has a significant fostering indirect impact on feces related HWWS (see Table 8 and Figure 18). Those who heard a radio program are more likely to think that HWWS protects for sure. However, radio program has no significant indirect impact on feces related HWWS (see Table 8 and Figure 18). Counterintuitively, respondents who got information spread by megaphone are less likely to feel dirty and smelly when not WHWS and they

are more likely to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS). Again, the indirect influence on feces related HWWS is not significant (see Table 8 and Figure 18).

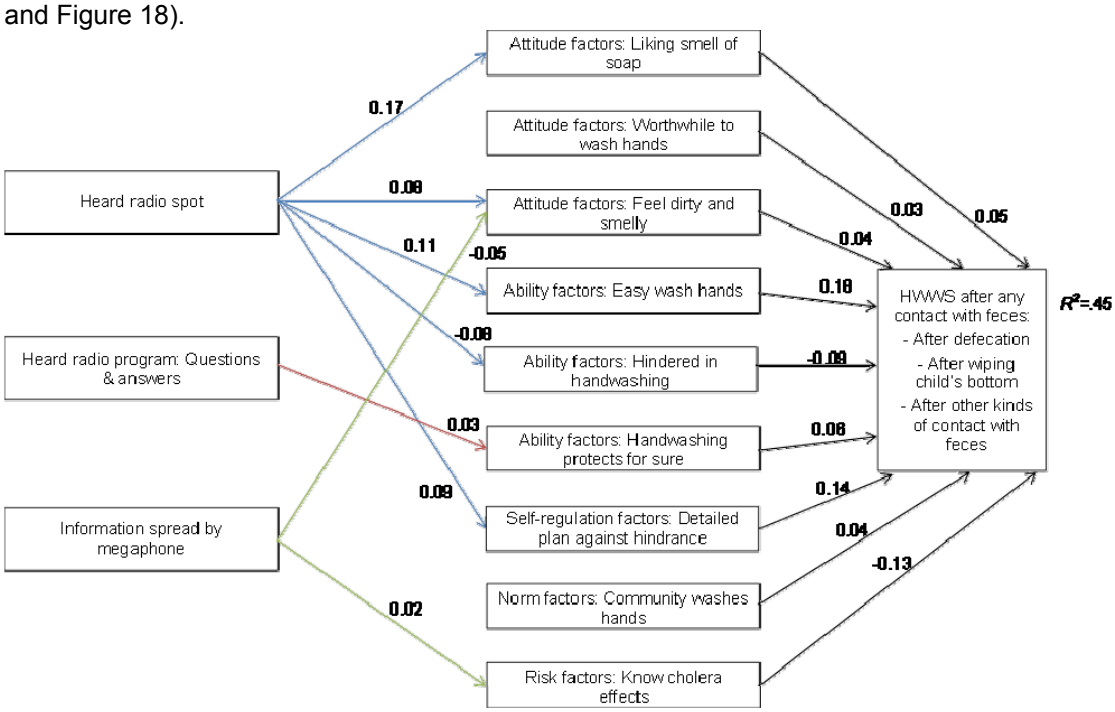

Figure 17 – 1. Relations between promotion activities, behavioral factors and feces related HWWS. *N* = 653. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Against expectations, respondents who participated in a focus group (problem discussion and program evaluation, see Figure 17-2) are less likely to like the smell of soap, to feel dirty and smelly when not WHWS, to think it is easy to always WHWS, and to have a detailed plan against hindrance and forgetting. Further, they are less likely to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS). All in all, participating in a focus group is derogatorily related with 5 behavioral factors and has a significant hindering indirect impact on feces related HWWS (see Table 8 and Figure 18). In contrast, respondents who participated in a community club are more likely to like the smell of soap, to think it is easy to always WHWS, and to have a detailed plan against hindrance and forgetting, and their community is more likely to WHWS. Further, they are less likely to feel hindered in WHWS. Altogether, participation in a community club influences five behavioral factors and has a significant fostering indirect impact on feces related HWWS (see Table 8 and Figure 18). While respondents who participated in a group discussion are more likely to feel dirty and smelly when not WHWS and to think that HWWS protects for sure, their community is less likely to WHWS. The indirect influence on feces related HWWS is not significant (see Table 8 and Figure 18).

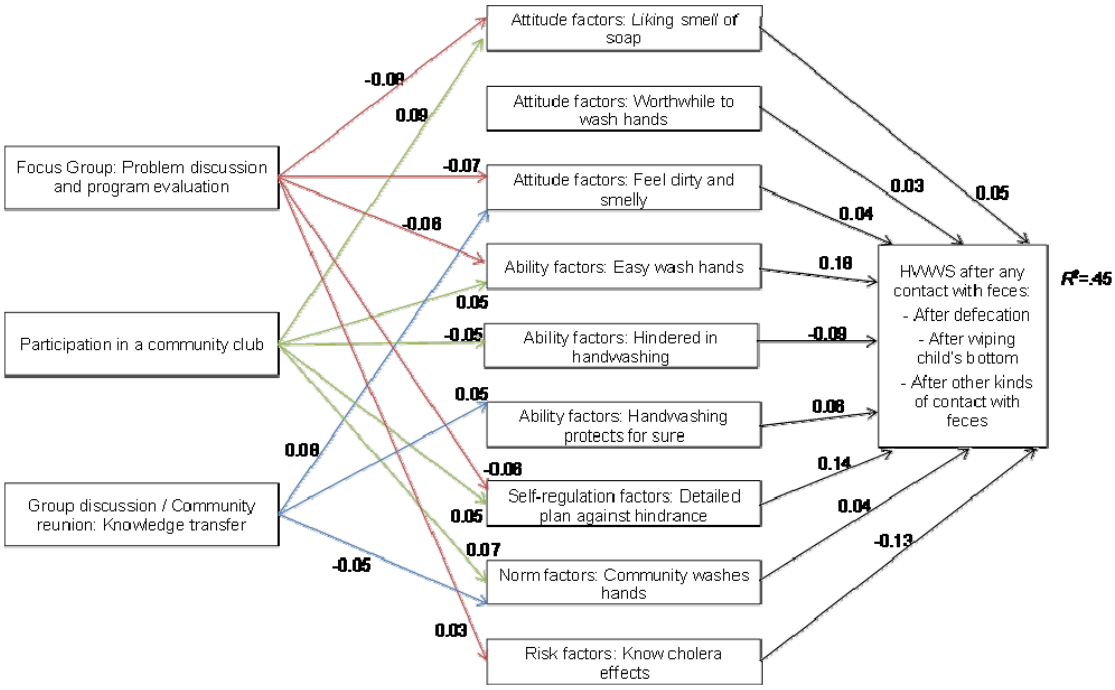

Figure 17 – 2. Relations between promotion activities, behavioral factors and feces related HWWS. *N* = 653. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

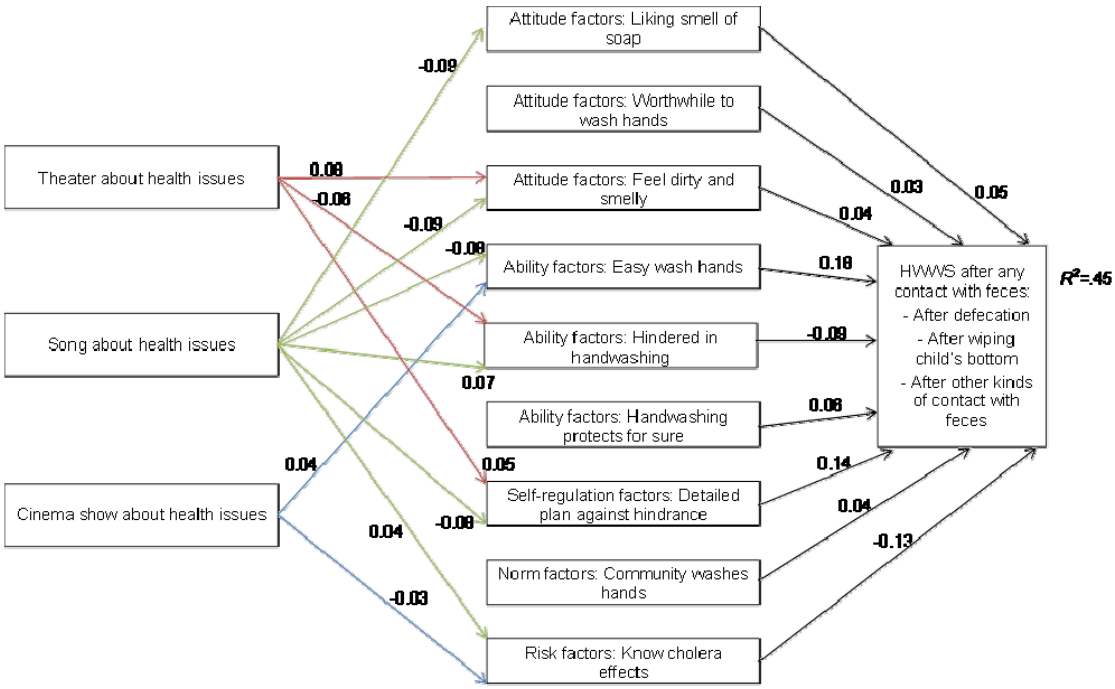

Figure 17 – 3. Relations between promotion activities, behavioral factors and feces related HWWS. *N* = 653. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Figure 17-3 depicts that respondents who watched a theater are more likely to feel dirty and smelly when not WHWS and to have a detailed plan against hindrance and forgetting and they are less likely to feel hindered in WHWS. Thereby, watching a theater has a significant fostering indirect impact on feces related HWWS (see Table 8 and Figure 18). Counter intuitively, respondents who know a hygiene song are less likely to like the smell of soap, to feel dirty and smelly when not WHWS, to think that it is easy to always WHWS, and to have a detailed plan against hindrance and forgetting. Further, they are more likely to feel hindered in WHWS and to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS). Altogether, knowing a song is derogatorily associated with six behavioral factors and has a significant hindering indirect impact on feces related HWWS (see Table 8 and Figure 18). While participants who watched a cinema show are more likely to think that it is easy to always WHWS and less likely to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS), watching a cinema show has no significant indirect influence on feces related HWWS (see Table 8 and Figure 18).

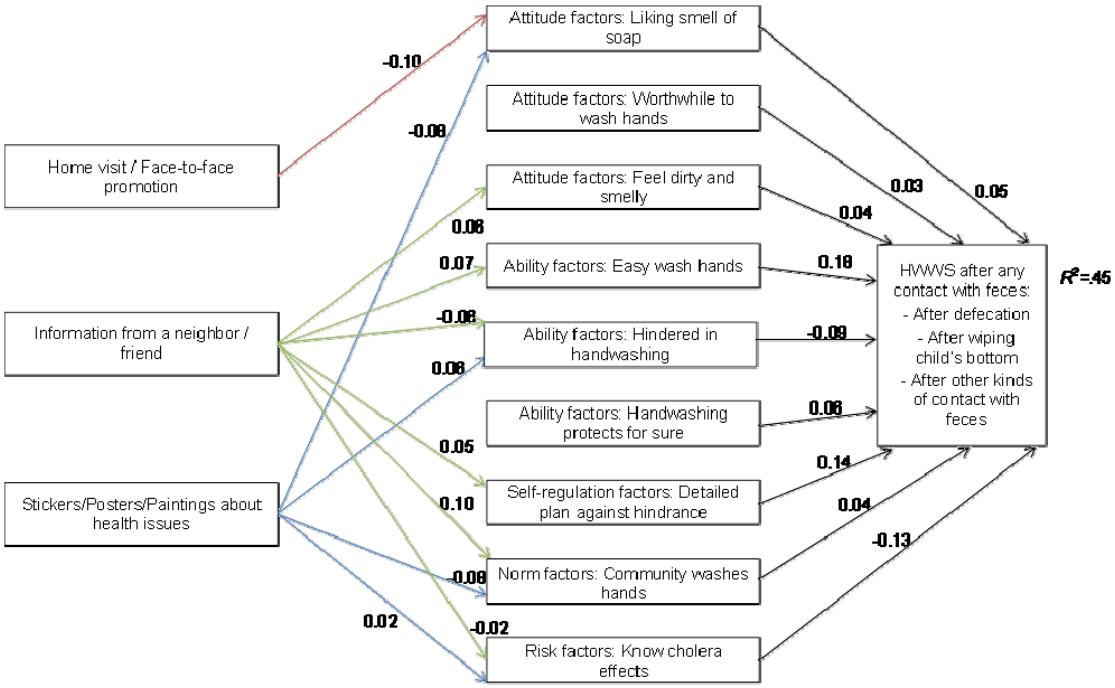

Figure 17– 4. Relations between promotion activities, behavioral factors and feces related HWWS. *N* = 653. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Against expectations, respondents who experienced a home visit are less likely to like the smell of soap (Figure 17-4). One explanation for this relationship might be that the affiliates indeed distributed disliked types of soap during home visits. However, since the affiliates distributed different types of soap, the relationship should not be negative regarding all affiliates. Hence, the relationship was tested for each affiliate separately. Simple regression analysis revealed that regarding all affiliates home visits are negatively related with liking the smell of soap, however, that the relationship is higher within IO respondents (*B* = -0.08, 95% CI [-0.17, 0.01]) than within OQ (*B* = -0.01, 95% CI [-0.08, 0.06]) and OGB respondents (*B* = -0.04, 95% CI [-0.12, 0.04]). Going back to the whole sample, while having a significant relationship with soap attribute smell, home visit has no significant indirect impact

on feces related HWWS (see Table 8 and Figure 18). Contrary, respondents who got information from a neighbor or friend are more likely to feel dirty and smelly when not WHWS, to think that it is easy to always WHWS, to have a detailed plan against hindrance and forgetting, and their community is more likely to WHWS. Further, they are less likely to feel hindered in WHWS and to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS). All in all, information from a neighbor or friend influences six behavioral factors and has a significant fostering indirect impact on feces related HWWS (see Table 8 and Figure 18). Respondents who noted stickers, posters or paintings, however, are less likely to like the smell of soap and their community is less likely to WHWS. Further, they are more likely to feel hindered in WHWS and to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS). Influencing four behavioral factors stickers, posters or paintings have a significant hindering indirect impact on feces related HWWS (see Table 8 and Figure 18).

Figure 17-5 shows that respondents who experienced a material distribution are more likely to like the smell of soap, to think that it is easy to always WHWS, to think that HWWS protects for sure, and to have a detailed plan against hindrance and forgetting and their community is more likely to WHWS. Further, they are less likely to feel hindered in WHWS. Altogether, material distribution influences six behavioral factors and has a significant fostering indirect impact on feces related HWWS (see Table 8 and Figure 18). Against expectations, people who participated at a hygiene day are less likely to think that it is easy to always WHWS and to have a detailed plan against hindrance and forgetting. Further, they are more likely to feel hindered in WHWS and to have knowledge in effects of cholera (which in itself is negatively related with feces related HWWS). Therewith, hygiene day is related with four behavioral factors and has a significant hindering indirect impact on feces related HWWS (see Table 8 and Figure 18).

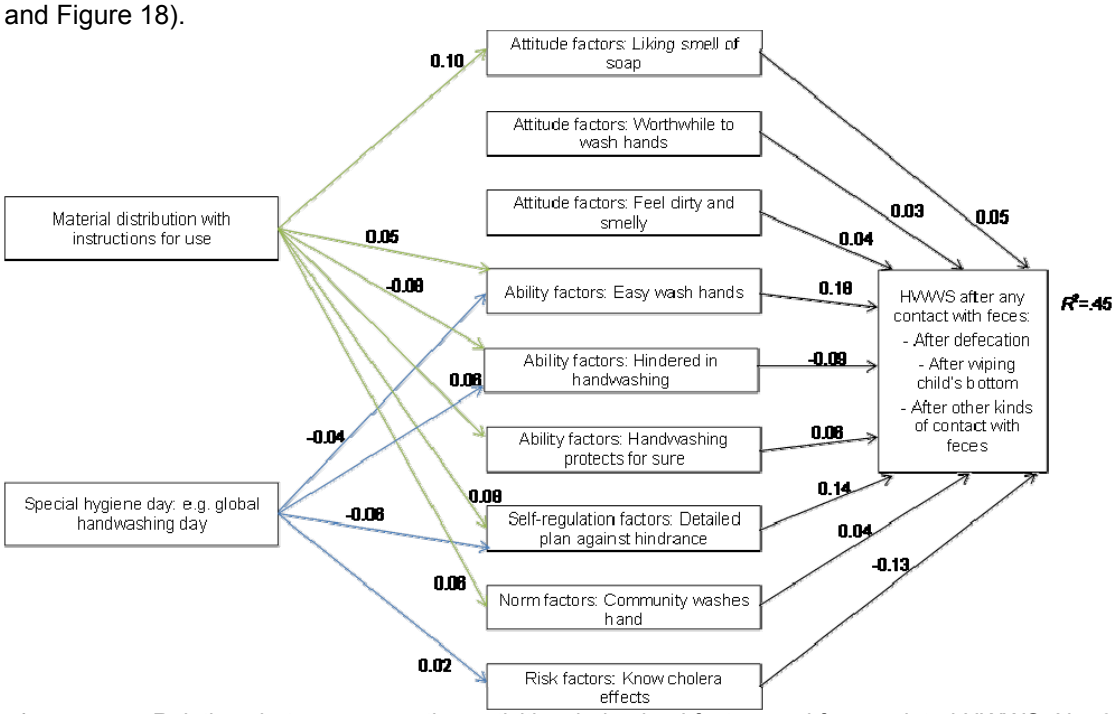

Figure 17– 5. Relations between promotion activities, behavioral factors and feces related HWWS. N = 653. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Finally, Figure 17-1 to 17-5 depict that neither of the promotion activities has a substantial influence on the behavioral factor "return". In other words, none of the conducted promotion activities affects if a respondent thinks it is worthwhile or not worthwhile to WHWS. Other promotion activities are needed to trigger this behavioral factor (see discussion).

Figure 18 summarizes the total indirect effects of the promotion activities on feces related HWWS and thus the extent and polarity of influence. As was said already, of the 16 promotion activities only nine have a significant indirect effect on feces related HWWS (see Table 8 and Figure 18). The highest fostering association with feces related HWWS has radio spot followed by material distribution, information from a neighbor or friend, community club and theater. In other words, respondents who heard a radio spot, who participated in a material distribution, who got information from a neighbor or friend, who participated in a community club or who watched a theater do wash their hands with soap *more often* after any contact with feces than respondents who have not experienced these promotion activities.

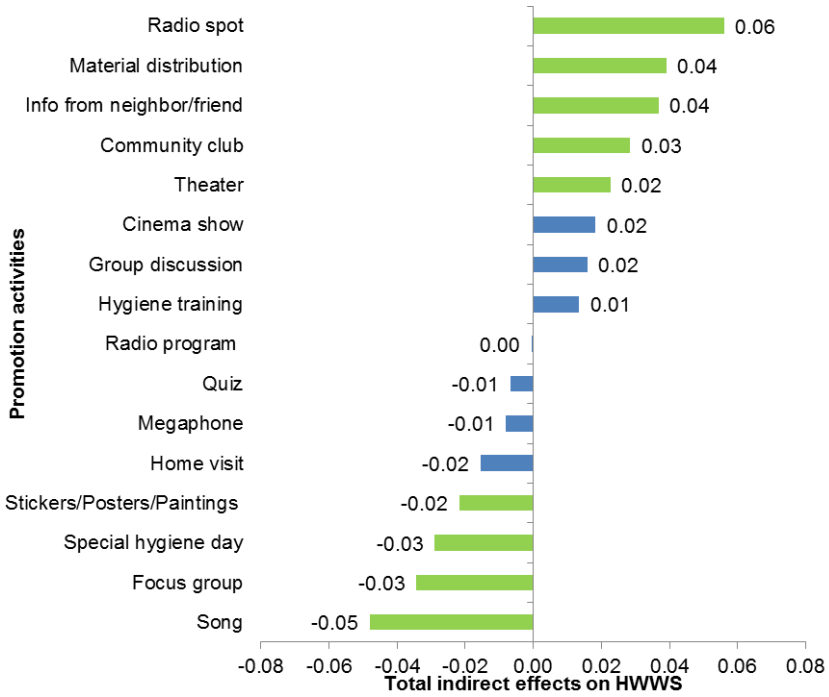

Figure 18. Total unstandardized indirect effects of promotion activities on feces related HWWS. *N* = 653. Green bars represent significant unstandardized regression coefficients with $p < .05$.

On the other pole of the scale are hygiene songs, focus groups, hygiene days and stickers, posters, paintings that show significant negative associations on feces related HWWS. In other words, respondents who know a hygiene song, who participated in a focus group or at a hygiene day or noted stickers, posters or paintings do wash their hands with soap *less often* after any contact with feces than respondents who have not experienced these promotion activities.
The total indirect effect of the remaining promotion activities is not significant (home visit, megaphone, quiz, radio program, hygiene training, group discussion and cinema show).

4.1.3 Total effects of promotion activities on feces related HWWS

So far the direct and indirect effects of promotion activities on feces related HWWS were discussed. Combining the two effects, the total effect of a promotion activity is revealed. The total effect summarizes the influence which a promotion activity exerts directly on feces related HWWS with the influence which it exerts indirectly by affecting behavioral factors and hence behavior. Figure 19 displays the total effects of the promotion activities on feces related HWWS. Radio spots exert the highest fostering influence followed by material distribution, radio program, information from neighbor or friend and theater. Hindering total effects are revealed for hygiene songs, focus groups and stickers, posters and paintings. All other promotion activities have no significant total effect on feces related HWWS (home visit, megaphone, hygiene day, hygiene training, cinema show, quiz community club and group discussion).

Since literacy could hamper a positive effect of stickers, posters, paintings, the effect of stickers, posters, paintings was compared between urban and rural site as literacy is rather low in rural areas. However, simple regression analysis revealed that stickers, posters, paintings are negatively related with feces related HWWS in urban (B = -0.04, 95% CI [-0.08, 0.00]) and in rural sites (B = -0.06, 95% CI [-0.09, -0.03]).

Total effects were calculated for each affiliate separately as well (see Figure 20 to 22). Since some promotion activities were conducted only by some of the affiliates, not every activity could be analyzed regarding each affiliate (e.g. hygiene training and community clubs). While radio spots and radio programs were not applied by all affiliates, they were analyzed regarding all affiliates since they potentially reached and influenced beneficiaries from all affiliates.

Looking at the positive promotion activities while radio spots and information from neighbor or friends are the only activities significantly fostering feces related HWWS within OGB beneficiaries (see Figure 20), the two activities are not significantly related with HWWS within OQ and IO beneficiaries (see Figure 21 and 22). In contrast, within OQ beneficiaries, only material distributions and theater are significant positive promotion activities while not having an influence regarding OGB and IO beneficiaries. Regarding material distribution it is worth noting that hygiene training, which was applied only by OQ and which was linked with the distribution of material (see Table 4), reveals itself as more effective when only beneficiaries from OQ are analyzed. However, while material distribution is significantly influencing feces related HWWS within OQ beneficiaries, hygiene training is not. Further, that theater is only relevant within OQ is interesting inasmuch as OQ applied the promotion activity differently than OGB or IO: while OGB and IO theaters were played by lay persons, OQ hired professionals and achieved higher effectiveness. Turing to IO beneficiaries, only radio programs foster feces related HWWS significantly while not influencing OGB and OQ beneficiaries.

Turning to the negatively associated promotion activities, stickers, posters, paintings is a significant hindering promotion only within OGB beneficiaries, while hygiene songs hinder IO and OQ beneficiaries significantly. Further, focus groups are only negatively associated with feces related HWWS within OQ beneficiaries but not in OGB and IO. In contrast to the whole sample and IO, within OGB and OQ beneficiaries home visits significantly hinder feces related HWWS.

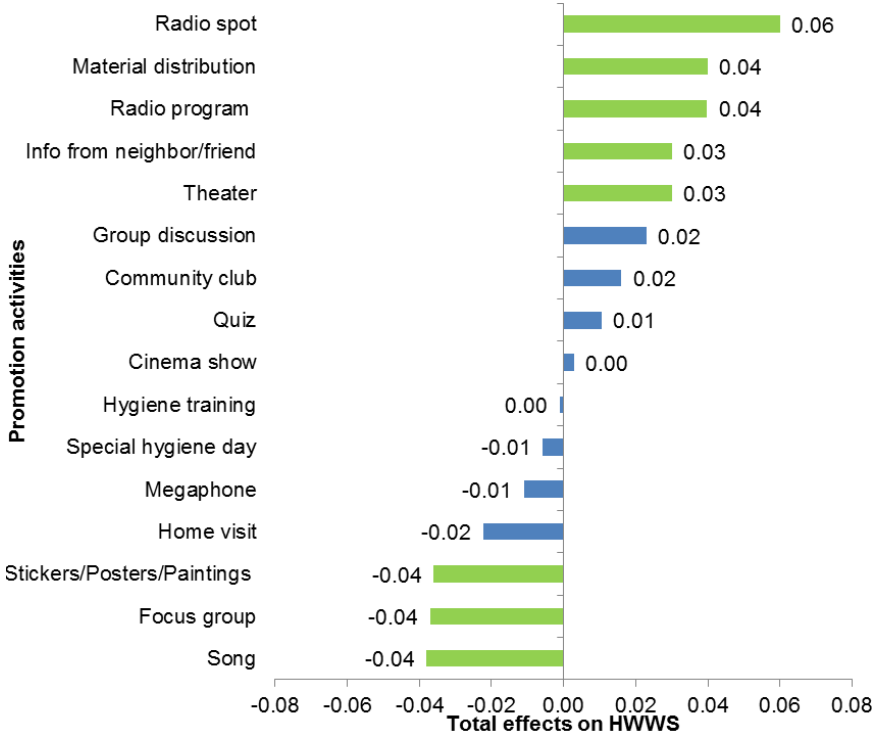

Figure 19. Total unstandardized effects of promotion activities on feces related HWWS – all affiliates. *N* = 653. Green bars represent significant unstandardized regression coefficients with $p < .05$.

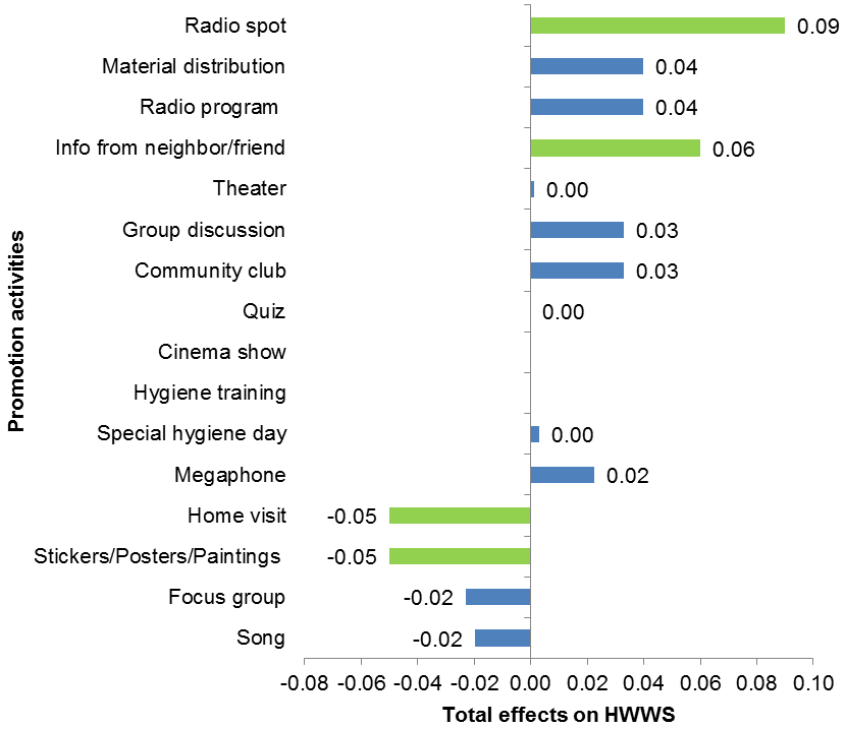

Figure 20. Total unstandardized effects of promotion activities on feces related HWWS – OGB. *N* = 235. Green bars represent significant unstandardized regression coefficients with $p < .05$.

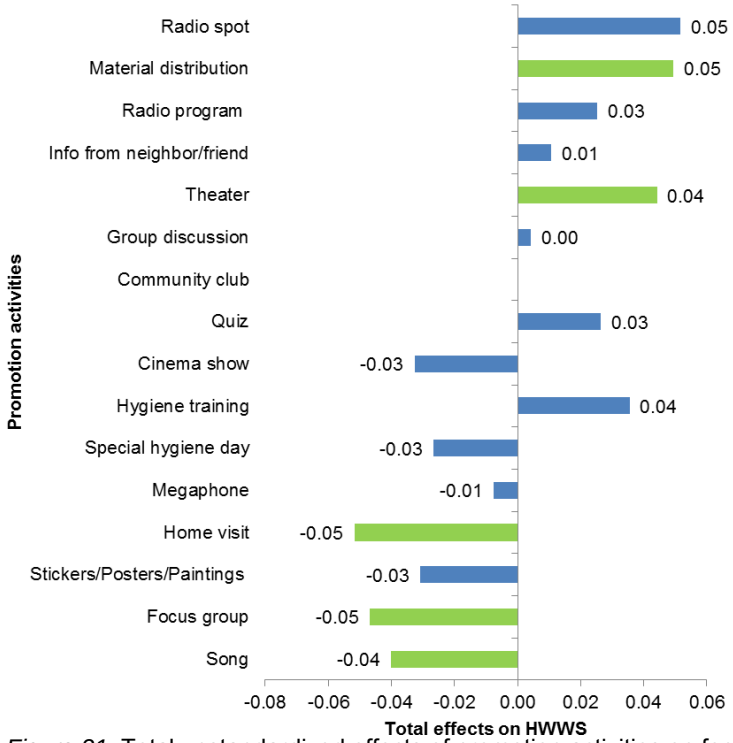

Figure 21. Total unstandardized effects of promotion activities on feces related HWWS – OQ. *N* = 186. Green bars represent significant unstandardized regression coefficients with $p < .05$.

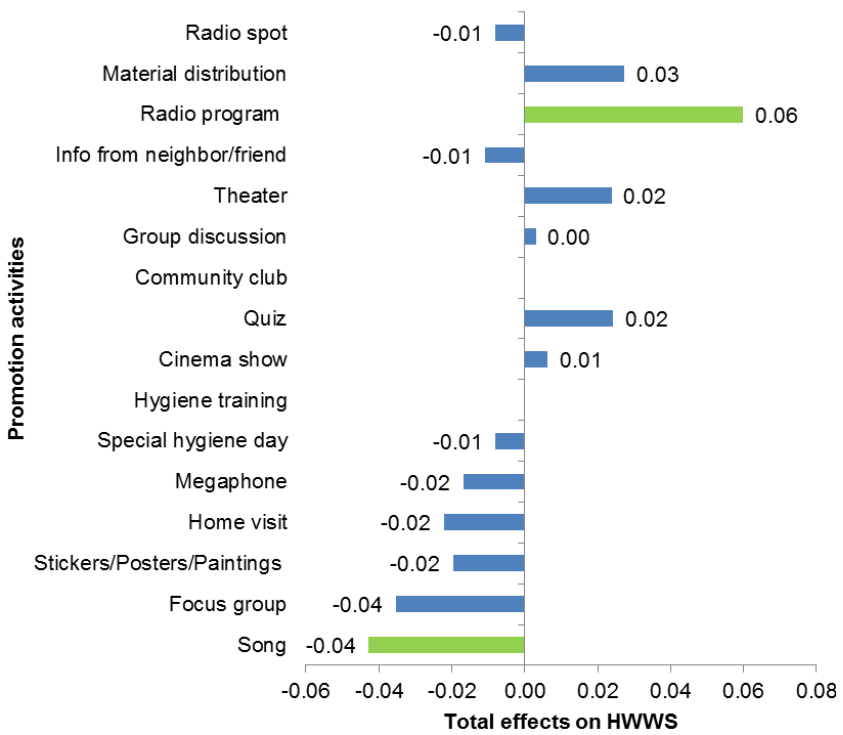

Figure 22. Total unstandardized effects of promotion activities on feces related HWWS – IO. *N* = 266. Green bars represent significant unstandardized regression coefficients with $p < .05$.

4.1.4 Interactions between promotion activities regarding feces related HWWS

Regarding the whole sample, radio spots, material distribution and radio programs are most important in fostering feces related HWWS while songs, focus groups and stickers, posters, paintings are most detrimental. However, how are these promotion activities interacting with each other? Is a combination of beneficial promotion activities better than using the most effective? Does the effect of the fostering promotions exceed the effect of the hindering promotions? To address these questions Kruskal-Wallis tests and Mann-Whitney tests were conducted.

When looking at the three most beneficial promotion activities, radio spots, material distribution and radio programs, the frequency in feces related HWWS was compared between respondents who experienced none of the three promotion activities, respondents who experienced only radio spots, respondents who experienced radio spots in combination with material distributions and respondents who experienced all three promotion activities.[2] The Kruskal-Wallis test was significant, $H(3) = 39.97$, $p \leq .000$, and Jonckheere's test revealed a significant trend in the data: as more beneficial promotion activities are experienced, the median frequency in feces related HWWS increases, $J = 94'161$, $z = 5.61$, $p \leq .000$ (1-tailed), $r = .21$. Mann-Whitney tests were used to follow up these findings. Since six Mann-Whitney tests were conducted a Bonferroni correction was applied whereby p-values < .008 are considered as significant. Experiencing only radio spots ($U = 4950$, $p > .10$, 1-tailed) and radio spots in combination with material distributions ($U = 4810$, $p > .10$, 1-tailed) does not significantly increase the frequency in feces related HWWS compared to experiencing none of the three promotions. Further, experiencing only radio spots compared to radio spots in combination with material distributions does not affect the median frequency in feces related HWWS significantly ($U = 30348$, $p > .008$, 1-tailed). However, experiencing all three promotion activities increases the frequency significantly compared to experiencing none of the three promotions at all ($U = 1775$, $p \leq .000$, 1-tailed), experiencing only radio spots ($U = 10907$, $p \leq .000$, 1-tailed) and experiencing radio spots in combination with material distribution ($U = 11593$, $p \leq .000$, 1-tailed). In other words, the combination of the three most beneficial promotion activities is more effective than applying only one or two of them.

Regarding the three most hindering promotion activities, songs, focus groups and stickers, posters, paintings, the frequency in feces related HWWS was compared between respondents who experienced none of the three promotion activities, respondents who experienced only a hygiene song, respondents who experienced hygiene songs in combination with focus groups, and respondents who experienced all three hindering promotion activities. The Kruskal-Wallis test was again significant, $H(3) = 51.19$, $p \leq .000$, and Jonckheere's test revealed a significant trend in the data: as more hindering promotion activities are experienced, the median frequency in feces related HWWS decreases, $J = 11477$, $z = -6.94$, $p \leq .000$ (1-tailed), $r = -.37$. Mann-Whitney tests were used to follow up these findings. Since six Mann-Whitney tests were conducted a Bonferroni correction was applied whereby p-values < .008 are considered as significant. Experiencing only a song ($U = 2066$, $p > .10$, 1-tailed) and experiencing a song in combination with focus group ($U = 497$, $p > .10$, 1-tailed) does not

[2] It has to be mentioned that it was not possible to control regarding other promotion activities. In other words, respondents who experienced "only radio spots" did not experience material distributions or radio programs. However, they might have experienced any of the remaining promotion activities. This applies for all interaction analysis.

significantly decrease the frequency in feces related HWWS compared to experiencing none of the three detrimental promotion activities at all. Further, experiencing only a song does not significantly differ regarding feces related HWWS compared to experiencing a song in combination with focus group (U = 192, p > .10, 1-tailed). However, experiencing all three detrimental promotion activities decreases the frequency in feces related HWWS significantly compared to experiencing a song in combination with focus group (U = 561, p = .008, 1-tailed), experiencing only a song (U = 2290, $p \leq$ .000, 1-tailed), and experiencing none of the three promotion activities at all (U = 5870, $p \leq$ .000, 1-tailed). In other words, the combination of the three most hindering promotion activities is more detrimental than experiencing only one or two of them.

When looking at the combination of the most beneficial and the most hindering promotion activities, the frequency in feces related HWWS was compared between respondents who experienced only the three detrimental promotion activities, respondents who experienced neither the three detrimental nor the three beneficial promotion activities, respondents who experienced the detrimental in combination with the beneficial promotion activities, and respondents who experienced only the three beneficial promotion activities. The Kruskal-Wallis test was significant, $H(3) = 10.64$, $p < .05$, and Jonckheere's test revealed a significant trend in the data: the more beneficial promotion activities are experienced or the less negative promotion activities are experienced, the higher is the median frequency in feces related HWWS, J = 497, z = 2.18, $p < .05$ (1-tailed), r = .31. Again, Mann-Whitney tests were used to follow up these findings. Since six Mann-Whitney tests were conducted a Bonferroni correction was applied whereby p-values < .008 are considered as significant. Experiencing only the beneficial promotion activities does not increase the frequency in feces related HWWS significantly compared to experiencing the detrimental in combination with the beneficial promotion activities (U = 71, p > .10, 1-tailed), experiencing neither the detrimental nor the beneficial promotion activities (U = 27, p > .10, 1-tailed) or experiencing only the three detrimental promotion activities (U = 1, p > .008, 1-tailed). Further, experiencing neither the detrimental nor the beneficial promotion activities does not differ regarding frequencies in feces related HWWS compared to experiencing only the three detrimental promotion activities (U = 8, p > .01, 1-tailed) or experiencing the detrimental in combination with the beneficial promotion activities (U = 171, p > .10, 1-tailed). However, experiencing the detrimental in combination with the beneficial promotion activities increases the frequency in feces related HWWS significantly compared to experiencing only the detrimental promotion activities (U = 5, p < .008, 1-tailed). In sum, it was revealed that the beneficial promotion activities tend to overlay the detrimental promotion activities: Respondents who experienced the detrimental in combination with the beneficial promotion activities tend to WHWS more often than respondents who experienced only the detrimental promotion activities. At the same time does the frequency in HWWS not differ significantly between respondents who experienced the detrimental in combination with the beneficial promotion activities and respondents who experienced only the beneficial promotion activities. In other words: The experience of beneficial promotion activities is crucial regarding the frequency in feces related HWWS while it is of less importance if detrimental promotion activities are experienced or not.

4.2 Public health promotions and food related HWWS

4.2.1 Direct effects of promotion activities on food related HWWS

Paralleling the results for feces related HWWS five promotion activities have a significant direct effect on food related HWWS (Table 9 and Figure 23). Whereas three promotion activities are the same as for feces related HWWS (hearing a radio spot, participating in a material distribution and watching a theater), two differ: Participation in a community club and getting information from a neighbor or friend triggers more food related HWWS while participation in a group discussion and hearing a radio program affects feces related HWWS. Further, four significant negative relationships were elicited: As is the case for feces related HWWS, respondents who participated in a focus group or know a hygiene song do wash their hands less often before handling food than respondents who have not experienced these promotion activities. In contrast to feces related HWWS, participation at a hygiene day or the experience of a home visit diminishes food related HWWS, while stickers, posters, paintings are not significantly related. The remaining seven promotion activities are not significantly related with feces related HWWS.

Table 9

Linear regression analysis for promotion activities explaining food related HWWS

Promotion activity	***B***	**SE *B***	***p***	**CI (95%) for *B***
Constant	2.77	0.12	.000	[2.54, 2.99]
Radio spot	**0.07**	**0.03**	**.008**	**[0.02, 0.12]**
Radio program	0.03	0.02	.074	[0.00, 0.06]
Information spread by megaphone	-0.01	0.02	.558	[-0.04, 0.02]
Group discussion / Communitymeeting	0.03	0.02	.070	[0.00, 0.07]
Hygiene training	0.03	0.02	.074	[0.00, 0.07]
Home visit / Face-to-face promotion	**-0.05**	**0.02**	**.002**	**[-0.09, -0.02]**
Material distribution with instructions for use	**0.08**	**0.02**	**.000**	**[0.05, 0.11]**
Information from a neighbor / friend	**0.06**	**0.02**	**.000**	**[0.03, 0.09]**
Focus group	**-0.07**	**0.02**	**.000**	**[-0.11, -0.03]**
Cinema show	0.00	0.02	.894	[-0.03, 0.04]
Theater	**0.06**	**0.02**	**.001**	**[0.03, 0.10]**
Special hygiene day: e.g. global handwashing day	**-0.07**	**0.02**	**.000**	**[-0.10, -0.03]**
Quiz	0.02	0.02	.317	[-0.02, 0.06]
Stickers/Posters/Paintings	**-0.04**	**0.02**	**.030**	**[-0.08, 0.00]**
Community club	**0.07**	**0.02**	**.000**	**[0.04, 0.11]**
Hygiene songs	**-0.06**	**0.02**	**.000**	**[-0.09, -0.03]**

Notes: N = 704. Adjusted R^2 = .19. CI = Confidence interval. Promotion activities in bold are significantly related with food related HWWS.

Altogether, the promotion activities can explain 19% of the variance in food related HWWS directly what is slightly more than the directly explained variance in feces related HWWS.

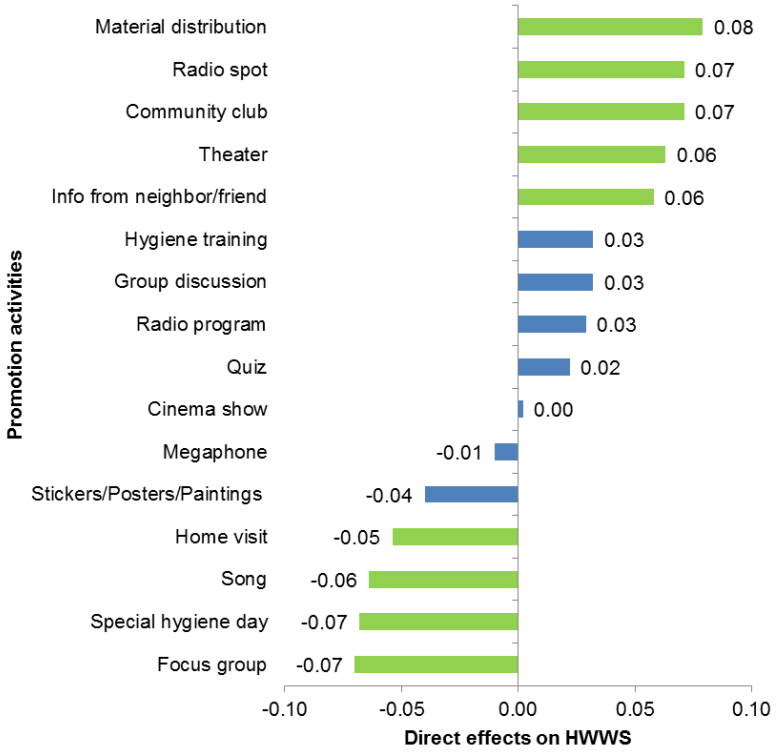

Figure 23. Direct effects of promotion activities on food related HWWS. *N* = 704. Green bars represent significant unstandardized regression coefficients with $p < .05$.

4.2.2 Indirect effects of promotion activities on food related HWWS

When looking at indirect effects on food related HWWS, again, the relevant behavioral factors had to be specified first. Regression analysis revealed 12 behavioral factors of which eight have a positive relationship (see Table 10; for a comparison with the behavioral factors explaining feces related HWWS see chapter 5.3: Similarities and differences in explaining feces and food related HWWS)[3]: Respondents who think that a cholera contagion is severe (perceived cholera severity), who feel more attractive when WHWS (attractiveness), who like the smell of soap (soap attributes: smell), whose family members WHWS (descriptive norm – family), who think that others think they should WHWS (injunctive norm), who think it is easy to always WHWS (perceived behavioral control/self-efficacy), who have a detailed plan against hindrance and forgetting (control planning: detailed plan), and, counterintuitively, who think that it happens often that the handwashing-station is out of order (HW-

[3] One behavioral factor, personal norm, had to be excluded from the analysis due to high multicollinearity. Multicollinearity is a very strong correlation between two or more predictors (here behavioral factors) which may bias the regression results.

station out of order) do wash their hands with soap *more often* before handling food than respondents who don't think that a cholera contagion is severe, who don't feel more attractive when WHWS, who don't like the smell of soap, whose family members don't WHWS, who don't think that others think they should WHWS, who think it is difficult to always WHWS, who don't have a detailed plan against hindrance and forgetting, and who think that it happens seldom that the handwashing-station is out of order.

Further, those who think negatively about cholera patients (attitude cholera patients), who think they are often hindered in WHWS (general hindrance), who think that it happens often that there is no soap or water available (no soap or no water) and who think they often forget to WHWS (forgetting) do wash their hands with soap *less often* than respondents who think positively about cholera patients, who think they are seldom hindered in WHWS, who think that it happens seldom that there is no soap or water available and who think they seldom forget to WHWS.

Table 10

Linear regression analysis for behavioral factors explaining food related HWWS

Behavioral factor group	**Behavioral factor**	***B***	**SE *B***	***p***	**CI (95%) for *B***
	Constant	1.09	0.22	.000	[0.65, 1.52]
Risk factors	Perceived vulnerability	-0.01	0.01	.446	[-0.03, 0.01]
	Perceived cholera severity	**0.06**	**0.02**	**.006**	**[0.02, 0.10]**
	Health knowledge	0.02	0.06	.787	[-0.10, 0.13]
Attitude factors	Instrumental beliefs				
	Efforts	-0.01	0.03	.678	[-0.07, 0.05]
	Attractiveness	**0.03**	**0.01**	**.007**	**[0.01, 0.05]**
	Nurture: Teaching and caring	0.04	0.03	.188	[-0.02, 0.09]
	Return	0.02	0.01	.055	[0.00, 0.05]
	Affective beliefs				
	Liking and pleasantness	0.04	0.03	.199	[-0.02, 0.11]
	Soap attributes: Smell	**0.05**	**0.01**	**.007**	**[0.01, 0.08]**
	Disgust	0.03	0.02	.078	[0.00, 0.06]
	Attitude towards cholera patients	*-0.02*	*0.01*	*.041*	*[-0.04, 0.00]*
Norm factors	Descriptive norms				
	Family	**0.09**	**0.03**	**.004**	**[0.03, 0.15]**
	Community	0.02	0.02	.210	[-0.01, 0.06]
	Injunctive norm	**0.02**	**0.01**	**.000**	**[0.01, 0.03]**
	* Personal norm				
	Compliance mobilizers	0.02	0.01	114	[-0.01, 0.04]

(continued)

Table 12 (continued)

Behavioral factor group	Behavioral factor	*B*	SE *B*	*p*	CI (95%) for *B*
Ability factors	**Perceived behavioral control / Self-efficacy**	**0.12**	**0.04**	**.007**	**[0.03, 0.21]**
	Response efficacy	0.04	0.03	.162	[-0.02, 0.10]
	Maintenance self-efficacy				
	General hindrance	**-0.14**	**0.03**	**.000**	**[-0.19, -0.09]**
	HW-station out of order	*0.06*	*0.03*	*.031*	*[0.01, 0.11]*
	No water or no soap	*-0.09*	*0.03*	*.001*	*[-0.14, -0.04]*
	Recovery self-efficacy	0.01	0.04	.821	[-0.07, 0.09]
Self-regulation factors	**Forgetting**	**-0.10**	**0.02**	**.000**	**[-0.14, -0.05]**
	Control Planning: Detailed plan	**0.16**	**0.03**	**.000**	**[0.10, 0.22]**

Notes: N = 748. Adjusted R^2 = .61. CI = Confidence interval. Factors in bold are significantly related with food related HWWS and were selected for subsequent mediation analysis. Factors in italic are significantly related with food related HWWS but had to be excluded from mediation analysis. * Factor had to be excluded due to high multicollinearity.

Together, the behavioral factors explain 61% of the variance in food related HWWS. In other words, 61% of the differences in the frequency of food related HWWS between respondents can be explained due to differences in the behavioral factors. The remaining 39% of the variance is explained by factors not captured within the analysis. An explained variance of 61% is rather high.

The 12 behavioral factors which are significantly related with feces related HWWS were selected to examine indirect effects of promotion activities on feces related HWWS by means of mediation analysis. The remaining behavioral factors which are not significantly related with feces related HWWS were not further analyzed. Within mediation analysis, however, three of the 12 behavioral factors, attitude towards cholera patient, HW-station out of order and no water or no soap, were revealed as dissatisfactory since they lacked significance and where thus excluded from further analysis.

The mean levels of the nine remaining factors are partly optimal (see Table 6): Respondents do like the smell of soap (*M* = 2.55), their families do WHWS (*M* = 3.59), they think it is easy to always WHWS (*M* = 3.05), they feel seldom hindered in WHWS (*M* = 0.88), and they seldom forget to WHWS (*M* = 0.99). However, four behavioral factors with only mediocre mean levels could be targeted in subsequent programs: the perceived severity of a cholera contagion (*M* = 2.62), the felt attractiveness when HWWS (*M* = 1.68), the plan how to deal with hindrance and forgetting (*M* = 2.46) and the feeling that people think one should WHWS (*M* = 8.06).

Turning to the indirect influence of the promotion activities, of the 16 analyzed promotion activities, only hygiene training has no significant relation with behavioral factors explaining food related HWWS while the other 15 promotion activities have at least one (see Table 11). Their relations are illustrated in Figure 24-1 to 24-5. When looking at indirect impact on food related HWWS 11 promotion activities have a significant total indirect effect on food related HWWS, two more than regarding feces related HWWS (see Table 11 and Figure 25).

Table 11

Overview of the relation between promotion activities and behavioral factors and impact on food related HWWS

Promotion activity	**Nr. of sig. relations with behavioral factors**	**Significant indirect impact on food related HWWS**
Radio spot	4	Positive impact
Radio program	1	–
Information spread by megaphone	1	–
Group discussion / Community meeting	1	–
Hygiene training	0	–
Home visit / Face-to-face promotion	2	Negative impact
Material distribution with instructions for use	9	Positive impact
Information from a neighbor / friend	8	Positive impact
Focus group	6	Negative impact
Cinema show	3	Positive impact
Theater	6	Positive impact
Special hygiene day: e.g. global handwashing day	7	Negative impact
Quiz	1	–
Stickers/Posters/Paintings	2	Negative impact
Community club	8	Positive impact
Hygiene songs	7	Negative impact

Figure 24-1 depicts that respondents who heard a radio spot are more likely to like the smell of soap, to think that it is easy to always WHWS, and to think that others think they should WHWS, and their families are more likely to WHWS. Influencing four behavioral factors, hearing a radio spot has a significant fostering indirect impact on food related HWWS (see Table 11 and Figure 25). The families of respondents who heard a radio program are more likely to WHWS. Still, radio program has no significant indirect impact on food related HWWS (see Table 11 and Figure 25). Counterintuitively, respondents who got information spread by megaphone are less likely to think it is easy to always WHWS. However, the indirect influence on food related HWWS is not significant (see Table 11 and Figure 25).

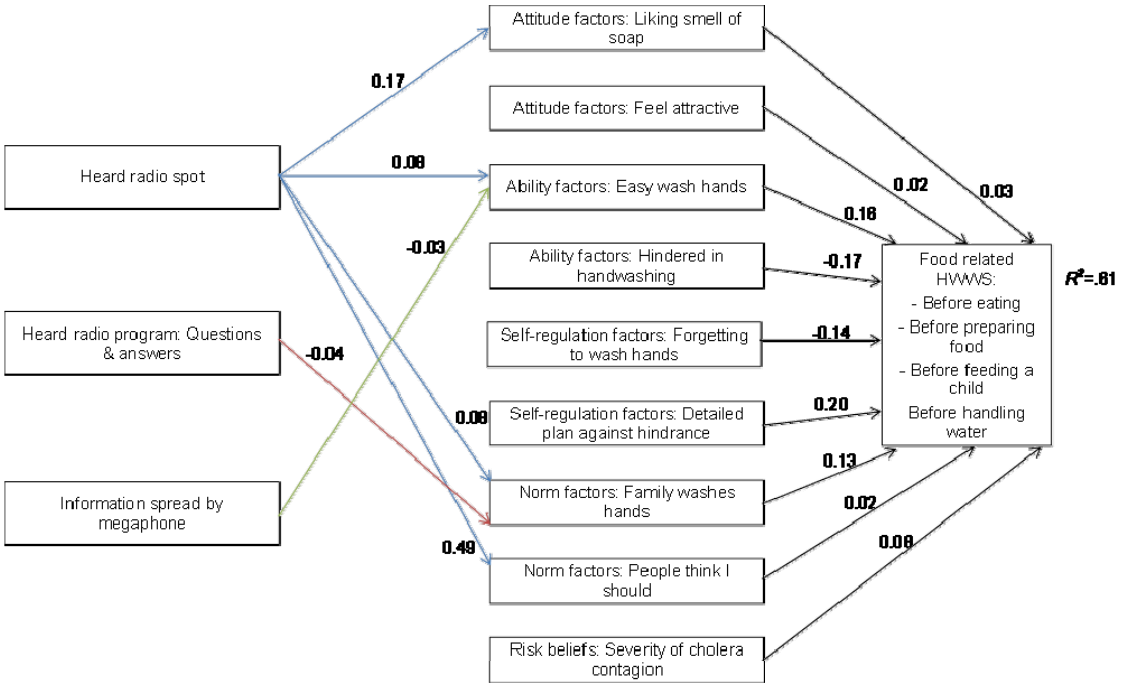

Figure 24 – 1. Relations between promotion activities, behavioral factors and food related HWWS. *N* = 701. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

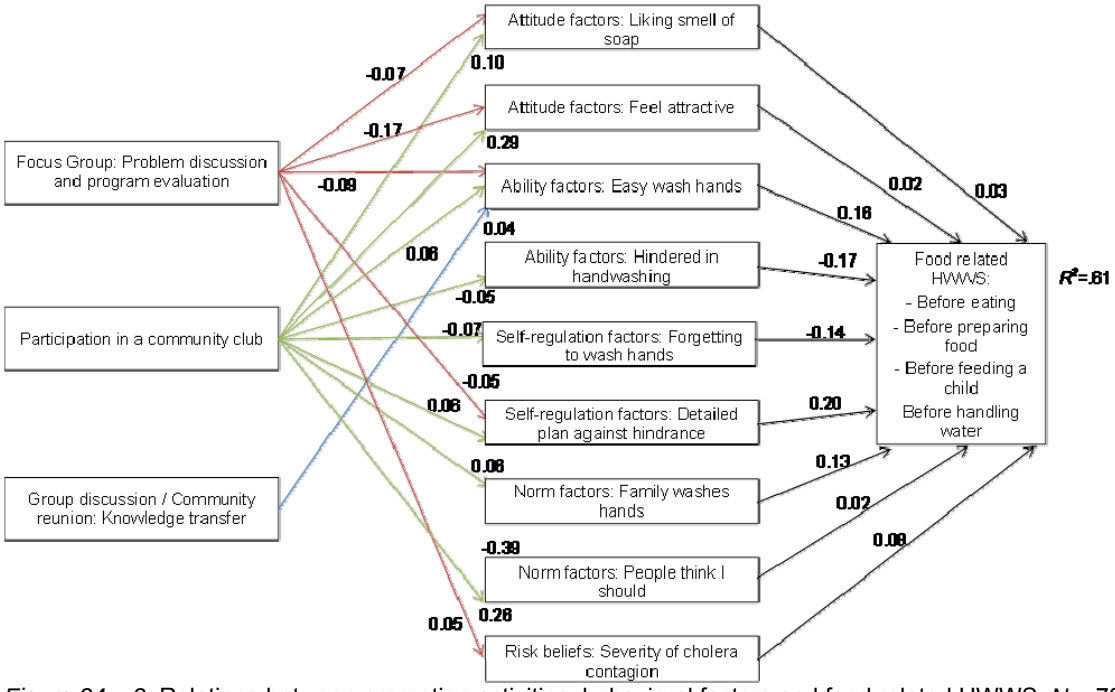

Figure 24 – 2. Relations between promotion activities, behavioral factors and food related HWWS. *N* = 701. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Against expectations, respondents who participated in a focus group (problem discussion and program evaluation) are less likely to like the smell of soap, to feel attractive when WHWS, to think it is easy to always WHWS, and to have a detailed plan against hindrance and forgetting (see Figure 24-2). However, they are more likely to think that a cholera contagion is severe. Altogether, participating in a focus group has still a significant hindering indirect impact on food related HWWS (see Table 11 and Figure 25). In contrast, respondents who participated in a community club are more likely to like the smell of soap to feel attractive when WHWS, to think it is easy to always WHWS, to have a detailed plan against hindrance and forgetting, to think that others think they should WHWS, and their families are more likely to WHWS. Further, they are less likely to feel hindered in WHWS and to forget WHWS. Altogether, participation in a community club influences eight behavioral factors and has a significant fostering indirect impact on food related HWWS (see Table 11 and Figure 25). While respondents who participated in a group discussion are more likely to think it is easy to always WHWS, the indirect influence of group discussion on food related HWWS is not significant (see Table 11 and Figure 25).

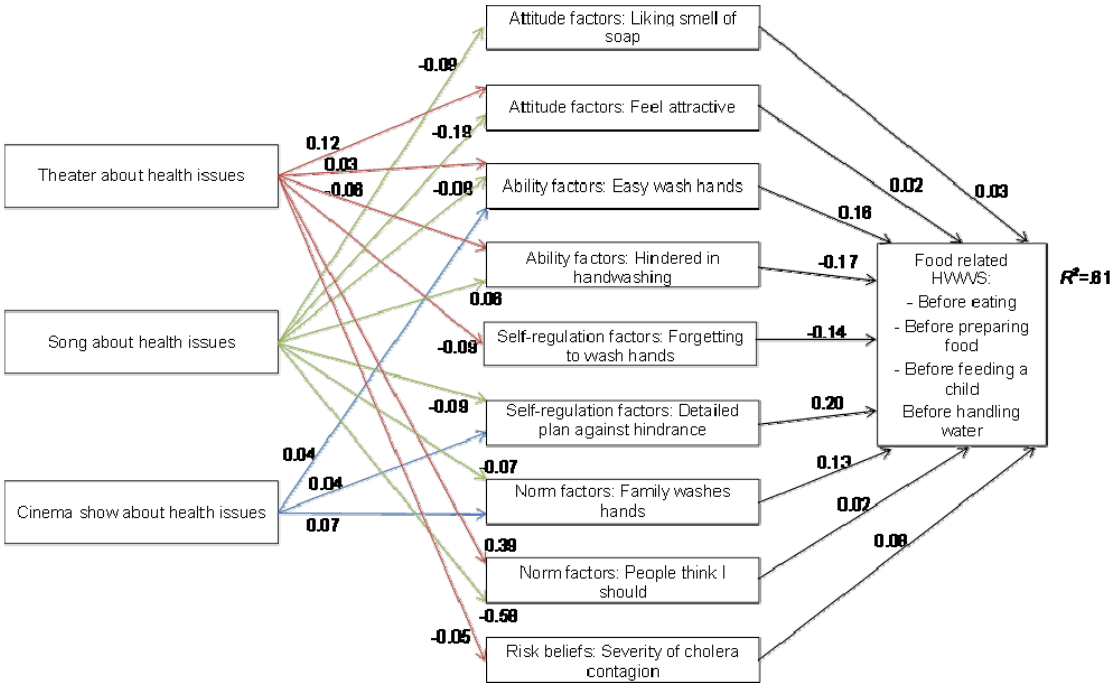

Figure 24 – 3. Relations between promotion activities, behavioral factors and food related HWWS. *N* = 701. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

As Figure 24-3 shows, respondents who watched a theater are more likely to feel attractive when WHWS, to think it is easy to always WHWS, and to think that others think they should WHWS. Further they are less likely to feel hindered in WHWS and to forget to WHWS before handling food. Surprisingly, they are as well less likely to think that a cholera contagion is severe. Nevertheless, watching a theater has a significant fostering indirect impact on food related HWWS (see Table 11 and Figure 25). Against expectations, respondents who know a hygiene song are less likely to like the smell of soap, to feel attractive when WHWS, to think it is easy to always WHWS, to have a detailed plan against hindrance and forgetting, to think that others think they should WHWS, and their families

are less likely to WHWS. Further, they are more likely to feel hindered in WHWS. All in all, knowing a song is derogatorily related with seven behavioral factors and has a significant hindering indirect impact on food related HWWS (see Table 11 and Figure 25). In contrast, respondents who watched a cinema show are more likely to think that it is easy to always WHWS, to have a detailed plan against hindrance and forgetting and their families are more likely to WHWS. Therewith, cinema show has a significant fostering indirect impact on food related HWWS (see Table 11 and Figure 25).

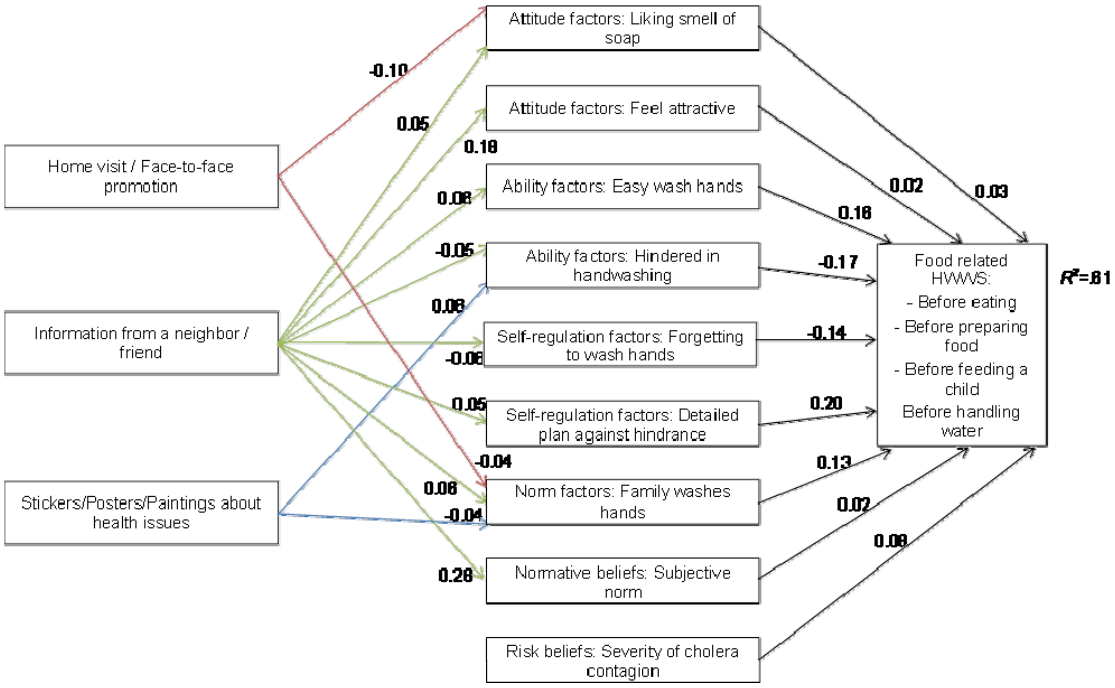

Figure 24 – 4. Relations between promotion activities, behavioral factors and food related HWWS. *N* = 701. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Contrary to expectations, respondents who experienced a home visit are less likely to like the smell of soap and their families are less likely to WHWS (see Figure 24-4). Herewith, home visit has a significant hindering indirect impact on food related HWWS (see Table 11 and Figure 25). Respondents who got information from a neighbor or friend are more likely to like the smell of soap, to feel attractive when WHWS, to think that it is easy to always WHWS, to have a detailed plan against hindrance and forgetting, to think that others think they should WHWS, and their families are more likely to WHWS. Further, they are less likely to feel hindered in WHWS and to forget to WHWS. All in all, information from a neighbor or friend influences eight behavioral factors and has a significant fostering indirect impact on food related HWWS (see Table 11 and Figure 25). In contrast, respondents who noted stickers, posters or paintings are more likely to feel hindered in WHWS and their families are less likely to WHWS. Therewith, stickers, poster, paintings have a significant hindering indirect impact on food related HWWS (see Table 11 and Figure 25).

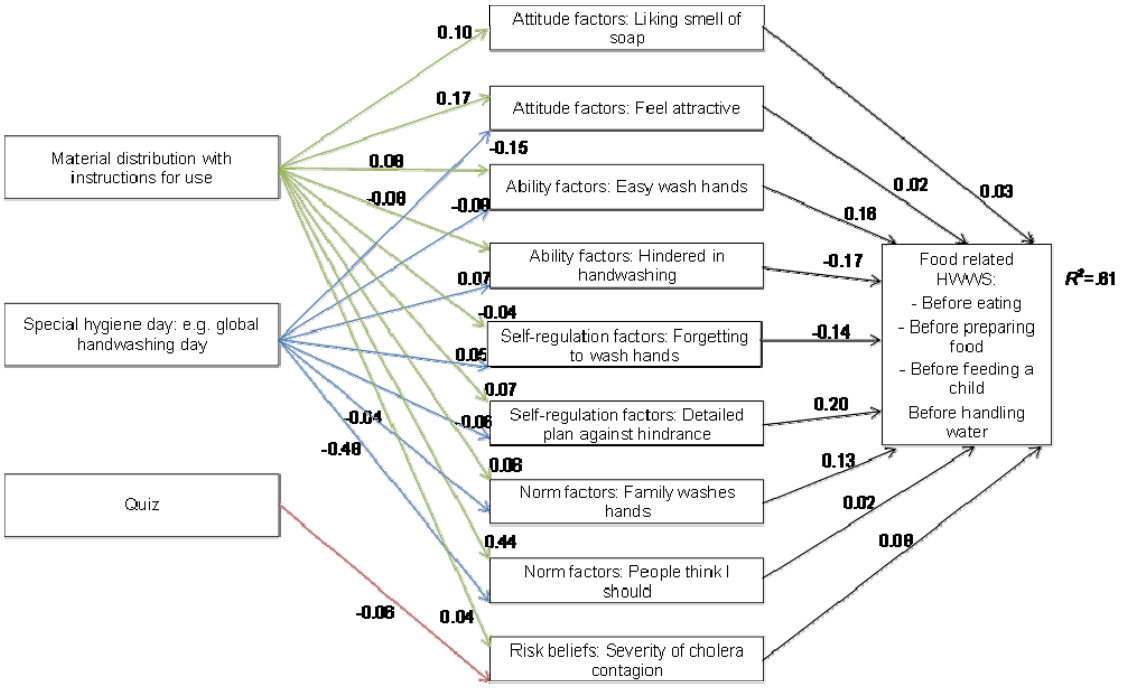

Figure 24 – 5. Relations between promotion activities, behavioral factors and food related HWWS. *N* = 701. Numbers next to the arrows indicate unstandardized regression coefficients. Higher numbers mean stronger relations. Only significant coefficients with $p < .05$ displayed.

Figure 24-5 depicts that respondents who experienced a material distribution are more likely to like the smell of soap, to feel attractive when WHWS, to think that it is easy to always WHWS, to think that HWWS protects for sure, to have a detailed plan against hindrance and forgetting, to think that others think they should WHWS, to think that a cholera contagion is severe, and their families are more likely to WHWS. Further, they are less likely to feel hindered in WHWS and to forget to WHWS. Material distribution influences all nine behavioral factors and has a significant fostering indirect impact on food related HWWS (see Table 11 and Figure 25). Counterintuitively, people who participated at a hygiene day are less likely to feel attractive when WHWS, to think that it is easy to always WHWS, to have a detailed plan against hindrance and forgetting, to think that others think they should WHWS, and their families are less likely to WHWS. In addition, they are more likely to feel hindered in WHWS and to forget to WHWS. Therewith, hygiene day is related with seven behavioral factors and has a significant hindering indirect impact on food related HWWS (see Table 11 and Figure 25).

Regarding the extent and polarity of indirect influence, Figure 25 summarizes the total indirect effects of the promotion activities on food related HWWS. As mentioned, 11 of the 16 promotion activities have a significant indirect effect on food related HWWS (see Table 11 and Figure 25). Paralleling the results for feces related HWWS, material distribution, radio spots, community clubs, information from neighbor or friend and theater have significant fostering indirect impacts on food related HWWS. In addition and in contrast to feces related HWWS, cinema show is as well indirectly enhancing food related HWWS. In sum, respondents who participated in a material distribution, who heard a radio spot, who participated in a community club, who got information from a neighbor or friend, or who watched a theater or a cinema show do wash their hands with soap *more often* before handling food than respondents who have not experienced these promotion activities.

As for feces related HWWS on the negative pole of the scale are hygiene songs, hygiene days, focus groups and stickers, posters, paintings having significant indirect hindering effects on food related HWWS. In contrast to feces related HWWS home visit is additionally exerting significant indirect hindering influence on food related HWWS. All in all, respondents who know a hygiene song, who participated in a focus group or at a hygiene day, who noted stickers, posters or paintings or experienced a home visit do wash their hands with soap *less often* before handling food than respondents who have not experienced these promotion activities.
The total indirect effect of the remaining promotion activities is not significant (megaphone, radio program, quiz, group discussion and hygiene training).

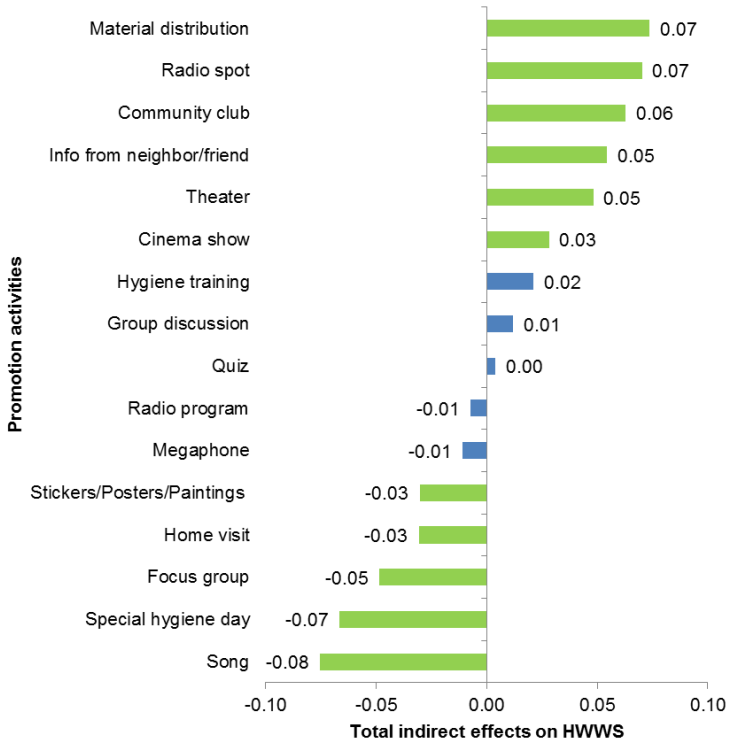

Figure 25. Total unstandardized indirect effects of promotion activities on food related HWWS. *N* = 701. Green bars represent significant unstandardized regression coefficients with $p < .05$.

4.2.3 *Total effects of promotion activities on food related HWWS*

Looking at total effects Figure 26 depicts that material distribution has the highest fostering influence regarding food related HWWS followed by community club, radio spot, theater and information from neighbor or friend. Hindering total effects are revealed for focus groups, hygiene days, hygiene songs, home visits and stickers, posters and paintings. All other promotion activities have no significant total effect on feces related HWWS (megaphone, cinema show, quiz, radio program, hygiene training, and group discussion; for a comparison between promotion activities influencing feces related HWWS and food related HWWS see chapter 5.3: Similarities and differences in explaining feces and food related HWWS).

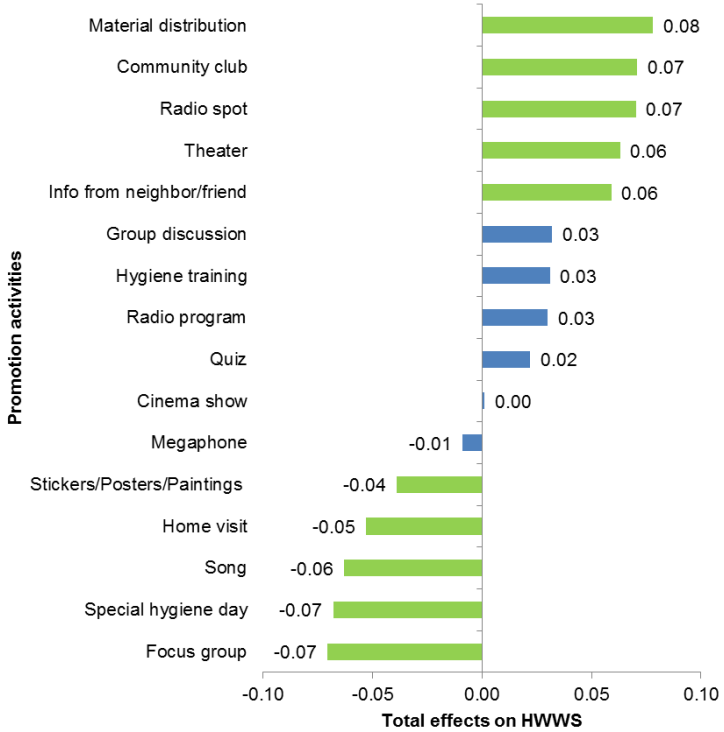

Figure 26. Total unstandardized effects of promotion activities on food related HWWS. N = 701. Green bars represent significant unstandardized regression coefficients with $p < .05$.

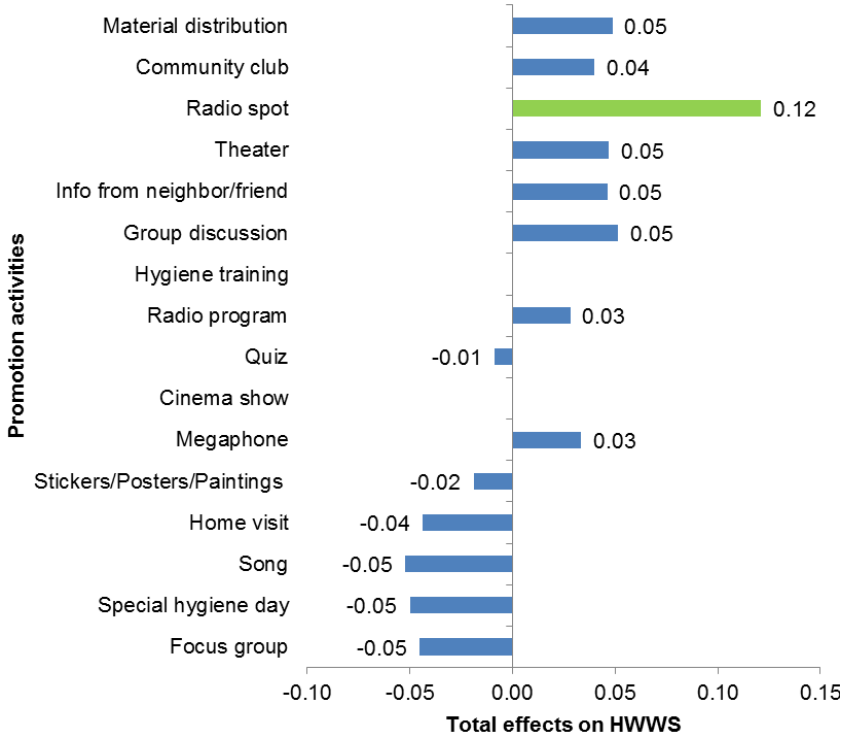

Figure 27. Total unstandardized effects of promotion activities on food related HWWS – OGB. N = 235. Green bars represent significant unstandardized regression coefficients with $p < .05$.

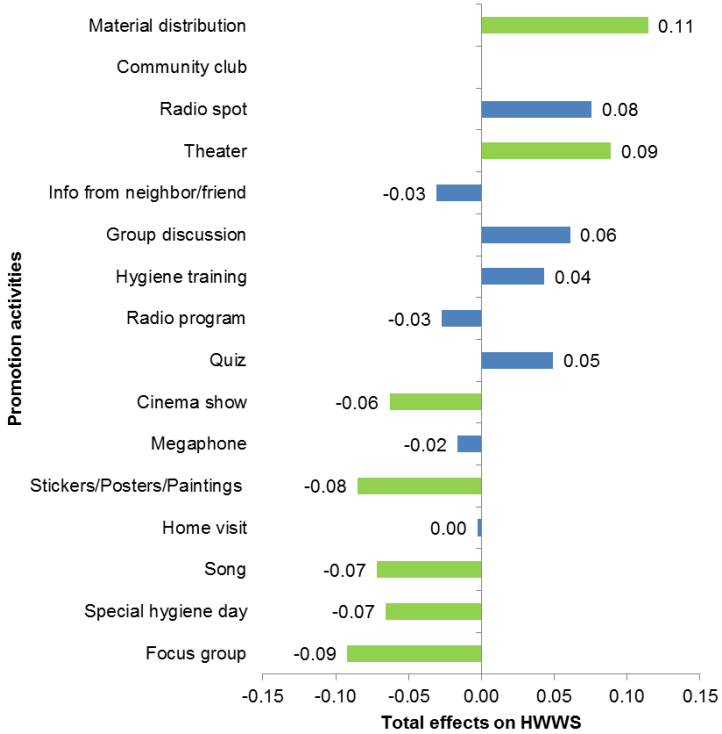

Figure 28. Total unstandardized effects of promotion activities on food related HWWS – OQ. N = 186. Green bars represent significant unstandardized regression coefficients with $p < .05$.

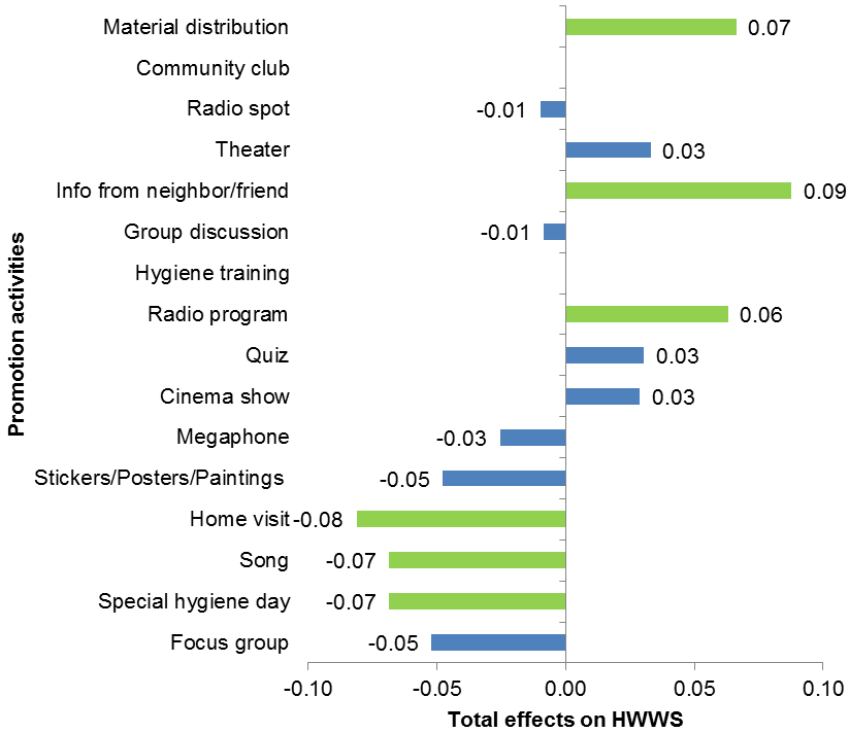

Figure 29. Total unstandardized effects of promotion activities on food related HWWS – IO. N = 266. Green bars represent significant unstandardized regression coefficients with $p < .05$.

Again, stickers, poster, paintings were tested regarding their effect in urban and rural sites since low literacy in rural sites might be responsible for the negative effect of this promotion activity. As for feces related HWWS, simple regression analysis revealed that stickers, posters, paintings are negatively related with feces related HWWS in urban (*B* = -0.06, 95% CI [-0.12, -0.01]) and in rural sites (*B* = -0.08, 95% CI [-0.13, -0.03]).

Regarding the total effects by affiliate, Figures 27 to 29 show that within OGB beneficiaries radio spots are the only promotion activity significantly fostering food related HWWS while they are not relevant regarding OQ and IO. In contrast, material distributions are significantly positively related with feces related HWWS within OQ and IO beneficiaries. While information from friend or neighbor is only relevant regarding IO beneficiaries, theaters are significantly fostering feces related HWWS only in OQ beneficiaries. As mentioned, OQ was the only affiliate hiring professionals for the plays. As for feces related HWWS, hygiene training is less effective than material distributions within OQ beneficiaries.

Turning to the negative promotion activities none of the promotion activities is significantly hindering food related HWWS within OGB beneficiaries. Songs and hygiene days are negatively related with food related HWWS within OQ and IO beneficiaries. While home visits are only relevant regarding IO, focus groups and stickers, posters, paintings are only significantly negatively influential in OQ beneficiaries. In addition and in contrast to the whole sample, cinema shows do significantly diminish food related HWWS in OQ beneficiaries.

4.2.4 Interactions between promotion activities regarding food related HWWS

Regarding the whole sample, material distribution, community clubs and radio spots are most important in fostering food related HWWS while focus groups, hygiene days and songs are most detrimental. Again, analyses were conducted to test interactions between these six promotion activities.

When looking at the three most beneficial promotion activities, material distribution, community clubs and radio spots, the frequency in food related HWWS was compared between respondents who experienced none of the three promotion activities, respondents who experienced only material distributions, respondents who experienced material distributions in combination with community clubs, and respondents who experienced all three promotion activities. The Kruskal-Wallis test was significant, $H(3) = 8.67$, $p \leq .05$, and Jonckheere's test revealed a significant trend in the data: as more beneficial promotion activities are experienced, the median frequency in food related HWWS increases, $J = 7292$, $z = 2.94$, $p \leq .001$ (1-tailed), $r = .18$. Mann-Whitney tests were used to follow up these findings. Since six Mann-Whitney tests were conducted a Bonferroni correction was applied whereby *p*-values < .008 are considered as significant. Experiencing only material distributions does not affect the median frequency in feces related HWWS significantly compared to experiencing none of the three promotions at all ($U = 233$, $p > .10$, 1-tailed), experiencing material distributions in combination with community clubs ($U = 54$, $p > .10$, 1-tailed) or experiencing all three promotion activities ($U = 1364$, $p > .05$, 1-tailed). Further, experiencing material distributions in combination with community clubs does not significantly differ in food related HWWS compared to experiencing none of the three promotions ($U = 559$, $p > .10$, 1-tailed) or experiencing all three promotion activities ($U = 485$, $p > .05$, 1-tailed). However, experiencing all three promotion activities increases the frequency in

food related HWWS significantly compared to experiencing none of the three promotions at all (U = 2213, p < .008, 1-tailed). In sum, it is the combination of the three most beneficial promotion activities which is needed to achieve a change in food related HWWS.

Turning to the three most hindering promotion activities, focus groups, hygiene days and songs, the frequency in food related HWWS was compared between respondents who experienced none of the three promotion activities, respondents who experienced only focus groups, respondents who experienced focus groups and hygiene days, and respondents who experienced all three hindering promotion activities. The Kruskal-Wallis test was again significant, $H(3) = 21.53$, $p \leq .000$, and Jonckheere's test revealed a significant trend in the data: as more hindering promotion activities are experienced, the median frequency in food related HWWS decreases, $J = 28627$, $z = -4.04$, $p \leq .000$ (1-tailed), $r = -.19$. Mann-Whitney tests were used to follow up these findings. Since six Mann-Whitney tests were conducted a Bonferroni correction was applied whereby p-values < .008 are considered as significant. Experiencing only a focus group does not significantly differ in frequency in food related HWWS compared to experiencing none of the three hindering promotion activities (U = 3628, p > .10, 1-tailed). Further, experiencing a focus group in combination with a hygiene day does not significantly affect the frequency in food related HWWS compared to experiencing none of the three hindering promotion activities (U = 5587, p > .10, 1-tailed), experiencing only a focus group (U = 728, p > .01, 1-tailed) or experiencing all three hindering promotion activities (U = 3275, p > .01, 1-tailed). However, experiencing all three hindering promotion activities significantly decreases the frequency in food related HWWS compared to experiencing only a focus group (U = 1668, p < .008, 1-tailed) or experiencing none of the three detrimental promotion activities (U = 12910, p < .008, 1-tailed). In other words, it is the combination of the three most hindering promotion activities which is detrimental regarding food related HWWS.

Regarding the combination of the most beneficial and the most hindering promotion activities, it was not possible to compare the three most hindering with the three most beneficial promotion activities since group sizes were too small. Instead, only the two most hindering, focus groups and hygiene days, were compared with the two most promising, material distribution and community clubs. The frequency in feces related HWWS was compared between respondents, who experienced only the two most detrimental promotion activities, respondents who experienced neither the two detrimental nor the two beneficial promotion activities, respondents who experienced the detrimental in combination with the beneficial promotion activities, and respondents who experienced only the two beneficial promotion activities. The Kruskal-Wallis test was significant, $H(3) = 60.84$, $p \leq .000$, and Jonckheere's test revealed a significant trend in the data: the more beneficial promotion activities are experienced or the less negative promotion activities are experienced, the higher is the median frequency in food related HWWS, $J = 27683$, $z = 5.62$, $p \leq .000$ (1-tailed), $r = .29$. Again, Mann-Whitney tests were used to follow up these findings. Since six Mann-Whitney tests were conducted a Bonferroni correction was applied whereby p-values < .008 are considered as significant. Experiencing only the beneficial promotion activities does not increase the frequency in food related HWWS significantly compared to experiencing the detrimental in combination with the beneficial promotion activities (U = 1240, p > .10, 1-tailed) or experiencing neither the detrimental nor the beneficial promotion activities (U = 2103, p > .10, 1-tailed). Further, experiencing the detrimental in combination with the beneficial promotion activities does not increase the frequency in food related HWWS compared to experiencing neither the detrimental nor the beneficial promotion activities (U =

9944, $p > .10$, 1-tailed). However, experiencing only the detrimental promotion activities does decrease the frequency in food related HWWS significantly compared to experiencing neither the detrimental nor the beneficial promotion activities ($U = 1479$, $p \leq .000$, 1-tailed), experiencing the detrimental in combination with the beneficial promotion activities ($U = 523$, $p \leq .000$, 1-tailed) or experiencing only the beneficial promotion activities ($U = 114$, $p \leq .000$, 1-tailed). In other words, regarding food related HWWS the detrimental and the beneficial promotion activities are crucial: Respondents who experienced only the hindering promotion activities tend to WHWS less often than those who experienced neither hindering nor fostering promotion activities. However, respondents who experienced hindering and fostering promotion activities in combination tend to WHWS more often than respondents who experienced only the hindering promotion activities. Hence, when combined, the fostering promotion activities overlay the hindering promotion activities.

4.3 Similarities and differences in explaining feces and food related HWWS

The current study aimed to specify which promotion activities change which behavioral factors and accordingly how strong is their effect on feces and food related HWWS. For that, in a first step, the behavioral factors were determined which explain feces and food related HWWS.

While for both types of HWWS nine behavioral factors are relevant, only four behavioral factors are critical in explaining both types of HWWS, whereas five differ between feces and food related HWWS (see Table 12). The behavioral factors soap attribute (smell), perceived behavioral control/self-efficacy, general hindrance and control planning (detailed plan) are relevant regarding feces and food related HWWS. In other words, respondents who like the smell of soap, who think it is easy to always WHWS, who feel seldom hindered in WHWS and who have a detailed plan against hindrance and forgetting tend to wash their hands more often after any contact with feces and before handling food. However, the behavioral factors health knowledge, return, disgust, descriptive norm community, and response efficacy are only relevant regarding feces related HWWS while perceived cholera severity, attractiveness, descriptive norm family, injunctive norm and forgetting are only important regarding food related HWWS. That is, respondents who do not know the effects of cholera, who think it is worthwhile to WHWS, who feel dirty and smell if they don't WHWS, whose community members do WHWS and who think that WHWS protects from cholera for sure tend to wash their hands more often after any contact with feces but not necessarily before handling food. In contrast, respondents who think that cholera contagion is severe, who feel more attractive when WHWS, whose family members do WHWS, who think that others think they should WHWS and who seldom forget to WHWS tend to wash their hands more often before handling food but not necessarily after any contact with feces.
Why are some behavioral factors relevant regarding both types of HWWS, while others are only relevant for one but not the other type of HWWS? It is possible, that within promotion activities some of the behavioral factors were actually linked with feces *and* food related HWWS, while other behavioral factors were more targeted regarding feces than food related HWWS and vice versa. For instance, it is possible that promotion activities emphasized more the protectiveness of WHWS after any contact with feces than the protectiveness of WHWS before handling food. However, behavioral factors can be more relevant regarding one or the other type of HWWS by their nature. For instance, it might be that there is a stronger link between disgust and not WHWS after defecation than between disgust and not WHWS before handling food by nature.

As to explained variance, the behavioral factors are more effective regarding food related HWWS: 61% of the variance in food related HWWS is explained by the behavioral factors, whereas only 45% of the variance in feces related HWWS is accounted for by the behavioral factors.

Turning to promotion activities, Table 13 summarizes the total effects of promotion activities on feces and food related HWWS. Four promotion activities were revealed to have a significant positive impact on both feces and food related HWWS: Respondents who experienced a radio spot, a material distribution, a theater or got information from a neighbor or friend do wash their hands more often after any contact with feces or before handling food than respondents who have not experienced these promotions. In addition, radio programs are positively influencing only feces related HWWS while community clubs are only affecting food related HWWS. It might be that indeed radio programs focused more on feces related HWWS while community clubs primarily covered food related topics. On the negative side three promotion activities are hindering feces and food related HWWS: Respondents who experienced a focus group, know a hygiene song or noted stickers, posters, paintings do wash their hand less often than respondents who have not experienced these promotion activities. While these are the only three promotion activities significantly hindering feces related HWWS, two additional promotion activities are detrimental regarding food related HWWS: home visits and hygiene days.

Table 12

Summary of the impact of behavioral factors and on HWWS

Behavioral factor group	Behavioral factor and description	Relevant in explaining HWWS		Nr. of promotions sig. influencing the factor	
		Feces	Food	Feces	Food
Risk factors	Perceived vulnerability – high/low cholera risk	–	–		
	Perceived cholera severity – severity of cholera contagion	–	Positive impact		4
	Health knowledge – knowing effects of cholera and its prevention	Negative impact	–	7	
Attitude factors	*Instrumental beliefs*				
	Efforts – HWWS takes time	–	–		
	Attractiveness – HWWS makes attractive	–	Positive impact		7
	Nurture – HWWS to teach and care	–	–		
	Return – HWWS is worthwhile	Positive impact	–		
	Affective beliefs				
	Liking and pleasantness of WHWS	–	–		
	Soap attributes: Smell – liking the smell of soap	Positive impact	Positive impact	7	7
	Disgust – feel dirty and smelly	Positive impact	–	7	
	Attitude towards cholera patients	–	–		
Norm factors	Descriptive norm family – family does HWWS	–	Positive impact		10
	Descriptive norm community – community does HWWS	Positive impact	–	5	
	Injunctive norm – people think I should HWWS	–	Positive impact		7
	Personal norm – feel obligated to HWWS	–	–		
	Compliance mobilizers – they told me to HWWS	–	–		
Ability factors	Perceived behavioral control / Self-efficacy – easy to wash hands	Positive impact	Positive impact	8	11
	Response efficacy – HWWS protects for sure	Positive impact	–	3	

(continued)

○○○

Table 12 (continued)

Behavioral factor group	Behavioral factor and description	Relevant in explaining HWWS		Nr. of promotions sig. influencing the factor	
		Feces	Food	Feces	Food
	Maintenance self-efficacy				
	General hindrance – hindered in WHWS	Negative impact	Negative impact	8	7
	HW-station out of order – damaged or stolen	–	–		
	No water or no soap	–	–		
	Recovery self-efficacy – restart to WHWS	–	–		
Self-regulation factors	Forgetting	–	Negative impact		5
	Control Planning: Detailed plan – against forgetting and hindrance	Positive impact	Positive impact	8	7
	R^2	.43	.62		

○○○

Table 13

Summary of the impact of promotion activities on behavioral factors and on HWWS

Promotion activity	Feces related HWWS		Food related HWWS	
	Nr. of sig. relations with behavioral factors	Significant total impact on feces related HWWS	Number of relations with behavioral factors	Significant total impact on food related HWWS
Radio spot	5	Positive impact	4	Positive impact
Radio program	1	Positive impact	1	–
Information spread by megaphone	2	–	1	–
Group discussion / Communitymeeting	3	–	1	–
Hygiene training	0	–	0	–
Home visit / Face-to-face promotion	1	–	2	Negative impact
Material distribution with instructions for use	6	Positive impact	9	Positive impact
Information from a neighbor / friend	6	Positive impact	8	Positive impact
Focus group	5	Negative impact	6	Negative impact
Cinema show	2	–	3	–
Theater	3	Positive impact	6	Positive impact
Special hygiene day	4	–	7	Negative impact
Quiz	0	–	1	–
Stickers/Posters/Paintings	4	Negative impact	2	Negative impact
Community club	5	–	8	Positive impact
Hygiene songs	6	Negative impact	7	Negative impact

4.4 Evaluation of promotion activities by interviewees

Respondents were asked to evaluate the experienced promotion activities regarding liking, conviction and trustworthiness.[4] While all the promotion activities were positively evaluated there are some differences in the magnitude.

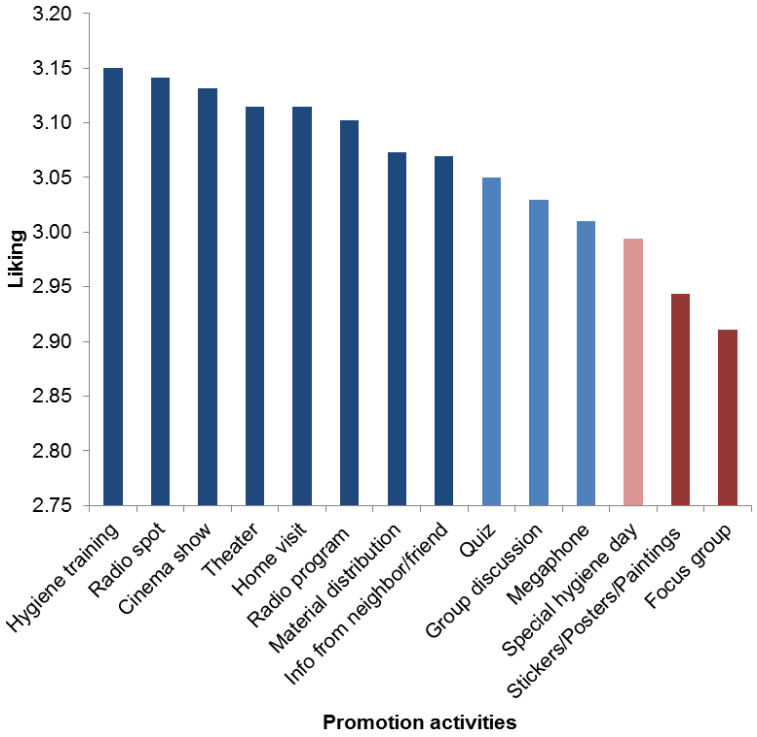

Figure 30. Liking of promotion activities. Question: Did you like it? 0 – not at all / 4 – very much. *N* = 24 - 744.

A one-way ANOVA revealed that liking differs significantly across the promotion activities, $F(13, 1699) = 7.19$, $p \leq .000$.[5] Figure 30 shows that respondents most favored hygiene trainings, radio spots and cinema shows. Least favored are focus groups and stickers, posters, paintings. Tukey post-hoc comparisons indicate that information from neighbor or friend ($M = 3.07$, 95% CI [3.02, 3.12]) along with all more favored promotion activities is significantly more liked than stickers, posters, paintings ($M = 2.94$, 95% CI [2.89, 3.00]) or focus groups ($M = 2.91$, 95% CI [2.84, 2.98]), $p < .05$. Further, hygiene days ($M = 2.99$, 95% CI [2.94, 3.05]) are significantly less liked than radio spots ($M = 3.14$, 95% CI [3.10, 3.18]) and hygiene trainings ($M = 3.15$, 95% CI [3.09, 3.21]), $p < .05$.

Conviction differs as well significantly across the promotion activities, $F(13, 1701) = 7.87$, $p \leq .000$. Radio spot was rated as the most convincing promotion activity followed by hygiene training and radio program (see Figure 31). Least convincing is the focus group followed by stickers, posters, paintings and hygiene day. Tukey post-hoc comparisons show that information from neighbor or friend (M =

[4] Hygiene songs were not evaluated regarding liking, conviction and trustworthiness.

[5] For all one-way ANOVA results Welch's *F*-ratios are reported.

2.99, 95% CI [2.94, 3.04]) along with all higher rated promotion activities is significantly more convincing than stickers, posters, paintings (*M* = 2.83, 95% CI [2.76, 2.89]) or focus groups (*M* = 2.80, 95% CI [2.72, 2.88]), $p < .05$. Further, hygiene days (*M* = 2.93 95% CI [2.86, 2.99]) are significantly less convincing than radio spots (*M* = 3.08, 95% CI [3.04, 3.13]), $p < .05$.

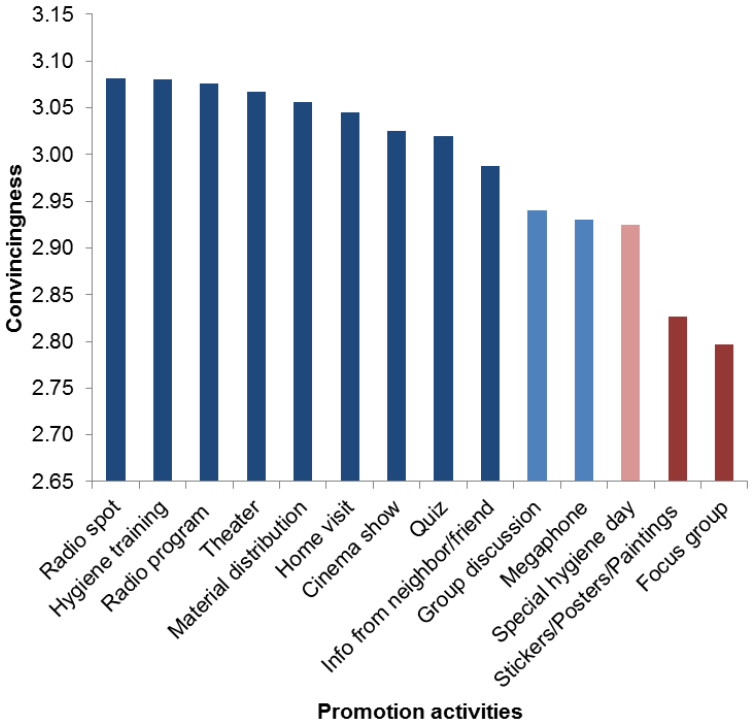

Figure 31. Conviction of promotion activities. Question: Was the information rather unconvincing or convincing? 0 – very unconvincing / 4 – very convincing. *N* = 224 - 745.

Regarding trustworthiness one-way ANOVA reveals again significant differences across the promotion activities, $F(13, 1965) = 10.50$, $p \leq .000$. Theater was rated as the most trustworthy promotion activity followed by cinema show and radio spot (see Figure 32). Least trustworthy are focus groups followed by stickers, posters, paintings and hygiene days. Tukey post-hoc comparisons depict that information spread by megaphone (*M* = 2.86, 95% CI [2.81, 2.91]) along with all higher rated promotion activities is significantly more trustworthy than stickers, posters, paintings (*M* = 2.72, 95% CI [2.65, 2.79]) or focus groups (*M* = 2.69, 95% CI [2.60, 2.78]), $p < .05$. Further, hygiene days (*M* = 2.83, 95% CI [2.76, 2.90]) are significantly less trustworthy than radio spots (*M* = 3.01, 95% CI [2.96, 3.05]), cinema shows (*M* = 3.01, 95% CI [2.96, 3.07]) and theaters (*M* = 3.03, 95% CI [2.98, 3.07]), $p < .05$.

All in all, focus groups, hygiene days and stickers, posters, paintings are rated as less likable, less convincing and less trustworthy than other promotion activities.

However, this finding is qualified by the fact that male respondents do rate the three promotion activities more positive than female respondents (see Appendix 3). This tendency is true for nearly all the promotion activities. In detail, male respondents do like hygiene trainings, home visits, stickers, posters, paintings and focus groups more than do female respondents, they rate hygiene trainings,

theaters, group discussions, special hygiene days, stickers, posters, paintings as more convincing than do female respondents, and they evaluate hygiene trainings, quizzes, megaphone, special hygiene days, stickers, posters, paintings, and focus groups as more trustworthy than do female respondents. Only radio programs are rated as less likeable, convincing and trustworthy, material distributions as less likeable and cinema shows as less convincing by male respondents in comparison to female respondents.

Consequently, it has to be concluded that focus groups, hygiene days and stickers, posters, paintings are rated as less likable, less convincing and less trustworthy than other promotion activities by *female* respondents but not necessarily by male respondents.

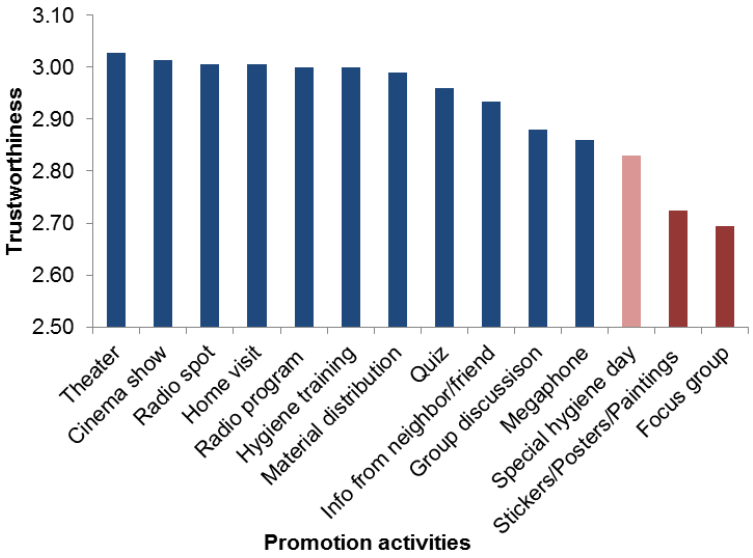

Figure 32. Trustworthiness of promotion activities. Question: Is the source rather untrustworthy or trustworthy? 0 – very untrustworthy / 4 – very trustworthy. *N* = 224 - 737.

5. Discussion

5.1 Behavioral factors influencing HWWS to be addressed by promotion activities

To change behavior successfully, promotion activities have to address the factors which are influencing behavior. The results reveal that the most influential factors on both behaviors (feces and food related HWWS) are ability factors and self-regulation factors. Regarding ability promotion activities should show how to deal with hindrances, strengthen self-efficacy, confirm that it is easy to WHWS and that WHWS is protective. Further, to trigger self-regulation factors like how to deal with forgetting, promotion activities should apply prompts and reminders to avoid forgetting. Normative factors seem to be very influential as well, especially the descriptive norm (regarding feces related

HWWS "community members WHWS" and regarding food related HWWS "family members WHWS") and in case of food related HWWS also the injunctive norm ("People think I should WHWS"; "I feel obligated to WHWS", "I feel guilty if I don't WHWS"). This means that promotion activities should contain messages which highlight that others often WHWS and that relatives, friends and neighbors appreciate WHWS. Moreover, attitudinal factors play an important role as well. Promotion activities should emphasize the nice smell of the soap, that it is worthwhile to WHWS, that it is disgusting to not WHWS and that WHWS makes one more attractive. Risk factors play only a minor role. Severity when being infected with cholera is related with WHWS before handling food and should thus be stressed within the promotion activities. Health knowledge is related with feces related HWWS but in a negative way. Hence, it should be treated with caution within promotion activities.

Results revealed that the attitudinal factor return is not influenced by any of the applied promotion activities while all other behavioral factors are. Future promotion activities should pay special attention to triggering the feeling that it is worthwhile to WHWS. Therefore promotion highlighting that WHWS is instrumental for being perceived as attractive, achieving a good reputation, and for not evoking disgust should be scaled up.

When optimizing promotion programs not only the influence of a behavioral factor is crucial but its prevalence in the population as well. Those behavioral factors with low prevalence within the population should be especially targeted since they have the highest potential to change. While the mean level of most of the influential behavioral factors is rather optimal there are some influential behavioral factors with only mediocre level: Control planning (having a plan how to deal with hindrance and forgetting), descriptive norm community (frequency of community members WHWS), perceived severity of a cholera contagion, attractiveness when WHWS, and injunctive norms (the feeling that people think one should WHWS). These behavioral factors should be especially focused on in future promotion activities. Control planning can be fostered by prompting people to think about hindrances and how to overcome them. The descriptive norm can be enhanced by telling people that already many others perform the behavior. The perceived severity of a cholera contagion can be augmented by showing how persons suffer when they contracted cholera and by using threat inducing arguments which rise fear with the help of frightening information. The factor attractiveness can be improved by presenting modeling persons whose attractiveness increased when WHWS. Injunctive norms may be fostered by communicating that important persons will appreciate when WHWS.
While health knowledge (knowing the effects of cholera) has only a mediocre mean level as well, it is negatively related with WHWS after defecation and should thus be treated with caution.

5.2 The differential influence of the promotion activities

5.2.1 Negatively associated promotion activities

All the applied promotion activities aim to foster healthy behavior, i.e. HWWS at key times, namely after contact with feces and before handling food. However, the analyses revealed that some promotion activities are significantly negatively associated with HWWS at these key times: focus groups, stickers, posters, paintings, and hygiene songs regarding feces and food related HWWS, and in addition participation at a hygiene day and home visits regarding food related HWWS. While these

promotion activities are rather different in form and content three of them have one commonality: Female respondents evaluate focus groups, hygiene days and stickers, posters, paintings significantly less positive than other promotion activities.[6]
Focus groups are primarily held to evaluate Oxfam's work and to discuss problems within the community. Since every promotion program has its qualities and flaws an evaluation reveals not only positive but negative aspects of a program as well. The discussion of problems in the community, of course, focuses on difficulties that have arisen and hence negative aspects of a program as well. All in all, respondents who participated at a focus group might be primarily confronted with negative aspects of a promotion program and hence are not convinced and doubt trustworthiness of the program. Further, it might be that people were adversely recruited to participate in a focus group, that the expectations of people attending a focus group were not met, or that the focus group was perceived as effortful (e.g. bad timing, time consuming, not entertaining).

While the affiliates organized several hygiene days one major event at which many of the beneficiaries participated was the global handwashing day at October 15 2010. Though this event in itself might have been a success, it was retrospectively overshadowed by the fact that cholera broke out just days after the event. Rumors went round that the global handwashing day caused the cholera outbreak – a day that celebrated one of the most crucial preventers of cholera transmission, HWWS. Again, a negative aspect might have lowered the trustworthiness and conviction of the promotion activity.

For the negative evaluation of stickers, posters or paintings we do not have an explanation but we would like to emphasize the importance of a short pre-testing of materials before going into the field. It is possible to develop guidelines for pre-testing procedures which would produce reliable results about how the materials are received by the target population.

While a lack in liking, conviction and trustworthiness may explain why focus groups, hygiene days and stickers, posters and paintings are negatively associated with HWWS the argumentation must be qualified by the fact that home visits exert a hindering influence regarding food related HWWS as well. Still, they are rated rather favorably regarding liking, conviction and trustworthiness. Hence, promotion activities which beneficiaries like or rate as convincing and trustworthy must not necessarily be efficient or can even be detrimental. In reverse, a promotion activity might be negatively evaluated and still be effective.

Promotion activities may interact, reinforce each other. This is true for the negatively associated promotion activities: the study revealed that it is the combination of the three most hindering promotion activities which is most detrimental regarding feces and food related HWWS compared to experiencing only one or two hindering promotion activities.

All in all, focus groups, stickers, posters, paintings, hygiene songs, hygiene days and home visits are negatively associated with HWWS. However, before abandoning these promotion activities

[6] While home visits are rated more favorable, hygiene songs were not evaluated within the interviews. Thus, it is not clear if hygiene songs are rated as well unfavorable or favorable.

subsequent research should analyze this negative relation in-depth to further reveal its reason and mechanism of action.

5.2.2 Positively associated promotion activities

For both HWWS behaviors significantly influencing promotion activities are material distribution, radio spots, and theater. They have the highest total effects on the behaviors, meaning that they directly influence behavior and above that many behavioral factors are influenced and that these factors are influencing behavior significantly. The same holds for radio programs for feces related HWWS and community clubs for food related HWWS. Interestingly an indirect promotion via friends and neighbors is also influential on both behaviors. This implies that promotion activities should foster the transmission of the messages via these person-to-person channels by giving persons the task to talk to others on the subject.
Although these promotion activities seem to be quite successful their impact could be improved by targeting those behavioral factors on which they have no or only a small influence so far. In case of feces related HWWS none of the promotion activities do target return (that it is worthwhile to wash hands) and only a few do target response efficacy (that HWWS protects for sure) and descriptive norm community (community members do WHWS). In case of food related HWWS only a few of the promotion activities affect the perceived severity of cholera contagion and forgetting. Promotion activities which target these factors should be designed and tested so that they can be reliably employed.

As it is true for negative promotion activities, the positive promotion activities do interact with each other: The combination of the three most beneficial promotion activities is more effective than applying only one or two beneficial promotion activities. Further and above that, the effect of the positive promotion activities is stronger than that of the negative promotion activities. In other words, the positive effect of the beneficial promotion activities overlays the negative effect of the detrimental activities.

6. Limitations of the study

This study has several limitations. First of all this investigation is a cross-sectional study meaning that no causal relationships between promotion activities and behavior can be revealed. Second, no long-term effects can be determined as the measurement took place rather close to the implementation of the promotion activities. It might also be that there is a recall bias in the memory of our participants perhaps caused by exposure fatigue of some interventions. We also did not consider that some of the promotion activities were targeting special groups of the population , e.g. children, instead we interviewed a sample of the total population. Nevertheless, there are no reasons that these biases should have worked differentially in our sample, meaning that for example high performers of handwashing had a different recall bias than low performers. Therefore these biases should not seriously distort our regression results.

7. Conclusions

In summary, some of the promotion activities which have been applied by OGB, OQ and IO may have a positive influence on behavior (i.e. material distributions, radio spots, theaters, information from friends/neighbors, community clubs and radio programs), some may have a negative influence (hygiene songs, focus groups, hygiene days, stickers, posters, paintings and home visits), while other promotion activities have no effect at all (megaphone, group discussion, hygiene training, cinema show and quiz). Accordingly, some of the promotion activities should be seriously revised and others although successful have still the potential to be improved. This should be done by carefully redesigning the activities, conducting pre-tests, and subsequently protocoling the behavior change effects of the promotion activities in the field. For the reliable effectiveness of the promotion activities it is crucial to have comparable scientific reports about effective behavior change under the conditions of different social, economic, and environmental circumstances.

8. Literature

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Appendix

Appendix 1

Factors explaining behavior change

Behavioral factors	Questions	Answer categories / Range	Descriptive measures
Risk factors			
High/Low diarrhea risk	How high or low do you feel are the chances that you or someone in your family gets diarrhea?	-4 very low 4 very high	*M* = -1.95 *SD* = 2.00
Impact life	Imagine that you contracted diarrhea, how severe would be the impact on your life in general?	0 not severe at all 4 very severe	*M* = 2.43 *SD* = 0.96
High/Low severity child	Imagine that your child under the age of 5 contracted diarrhea, how severe would that be?	0 not severe at all 4 very severe	*M* = 2.64 *SD* = 0.98
High/Low cholera risk	How high or low do you feel are the chances that you or someone in your family gets cholera?	-4 very low 4 very high	*M* = -2.07 *SD* = 1.99
Severity of cholera contagion	Imagine that you contracted cholera, how severe would be the impact on your life in general?	0 not severe at all 4 very severe	*M* = 2.59 *SD* = 1.02
Severity regarding social life	Imagine that you contracted cholera, how severe would be the impact on your social life?	0 not severe at all 4 very severe	*M* = 2.62 *SD* = 0.99
Severity regarding economic situation	Imagine that you contracted cholera, how severe would be the impact on your economic situation?	0 not severe at all 4 very severe	*M* = 2.60 *SD* = 1.04
Cholera effects	What are the effects of cholera on your body?	0 no knowledge 6 max. knowledge	*M* = 2.16 *SD* = 0.96
How to prevent	Can you tell me how you can protect yourself and your family from getting cholera or diarrhea?	0 no knowledge 18 max. knowledge	*M* = 4.14 *SD* = 2.75
How to react	Can you tell me what you have to do if someone gets cholera?	0 no knowledge 6.5 max. knowledge	*M* = 1.98 *SD* = 0.77
Why HWWS	Can you tell me why it is important to wash hands with soap after defecation and before handling food?	0 no knowledge 5.5 max. knowledge	*M* = 1.23 *SD* = 0.63
Attitudinal factors			
HWWS takes time	Do you think that washing hands with soap is time-consuming?	0 not at all 4 very	*M* = 1.71 *SD* = 0.79
HWWS is effortful	Do you think that washing hands with soap is effortful?	0 not at all 4 very	*M* = 2.21 *SD* = 0.99

(continued)

Appendix 1 (continued)

Behavioral factors	Questions	Answer categories / Range	Descriptive measures
Soap is expensive	Do you think that soap is too expensive for everyday hand washing?	0 not at all 4 very	*M* = 1.16 *SD* = 0.61
Too far away	The hand washing station is too far away to go there every time I should wash my hands.	-4 strongly disagree 4 strongly agree	*M* = -2.05 *SD* = 2.07
Feel attractive	I feel more attractive when I have washed my hands with perfumed soap.	-4 strongly disagree 4 strongly agree	*M* = 1.74 *SD* = 2.39
Children's health	I wash my hands because I would risk the health of my children if I did not wash my hands with soap.	-4 strongly disagree 4 strongly agree	*M* = 2.60 *SD* = 1.53
Good example	I wash my hands because I want to set a good example to the children.	-4 strongly disagree 4 strongly agree	*M* = 3.06 *SD* = 0.83
Teach the children	It is important to teach the children to wash their hands with soap.	-4 strongly disagree 4 strongly agree	*M* = 3.18 *SD* = 0.63
Worthwhile to wash hands	Considering all the benefits and efforts related to washing hands with soap, how much do you think is it worthwhile for you to wash hands with soap?	-4 much more effort than benefit 4 much more benefit than effort	*M* = 2.47 *SD* = 1.57
Liking HWWS	How much do you like or dislike washing hands with soap?	-4 dislike it very much 4 like it very much	*M* = 2.93 *SD* = 0.89
Pleasantness of HWWS	How pleasant or unpleasant do you think is it to wash hands with soap?	-4 very unpleasant 4 very pleasant	*M* = 3.00 *SD* = 0.85
Liking smell of soap	How much do you like or dislike the smell of the soap?	-4 dislike it very much 4 like it very much	*M* = 2.60 *SD* = 1.28
Perfume spoils the taste	If I wash my hands with soap before eating the perfume of the soap spoils the taste of the food.	-4 strongly disagree 4 strongly agree	*M* = -1.47 *SD* = 2.57
No stubborn dirt no need	Soap is only needed when you have stubborn dirt on your hands that you can't remove only with water.	-4 strongly disagree 4 strongly agree	*M* = -2.45 *SD* = 1.95
Feed dirty and smelly	I feel dirty and smelly if I don't wash my hands with soap after visiting the toilet.	-4 strongly disagree 4 strongly agree	*M* = 2.38 *SD* = 1.84
No dirt no need	If you can't see any dirt on your hands after visiting the toilet there is no need to wash them.	-4 strongly disagree 4 strongly agree	*M* = -2.93 *SD* = 1.68
Get dirt into the food	I wash my hands with soap before handling food because it would be disgusting to get dirt into the food and then eat it.	-4 strongly disagree 4 strongly agree	*M* = 2.57 *SD* = 1.57
Attitude cholera patients	What do you think of people who have cholera?	-4 very badly 4 very well	*M* = -0.71 *SD* = 1.99

(continued)

Appendix 1 (continued)

Behavioral factors	Questions	Answer categories / Range	Descriptive measures
Normative factors			
Family members wash hands - feces	How many people of your relatives wash hands with soap after contact with stool?	0 (almost) nobody 4 (almost) all	*M* = 3.63 *SD* = 0.76
Family members wash hands - food	How many people of your relatives wash hands with soap before handling food?	0 (almost) nobody 4 (almost) all	*M* = 3.61 *SD* = 0.80
Community members wash hands - feces	How many people of your community wash hands with soap after contact with stool?	0 (almost) nobody 4 (almost) all	*M* = 2.21 *SD* = 1.21
Community members wash hands - food	How many people of your community wash hands with soap before handling food?	0 (almost) nobody 4 (almost) all	*M* = 2.16 *SD* = 1.18
People support me - feces	Most of the people who are important to me support me in washing hands with soap after contact with stool.	-4 strongly disagree 4 strongly agree	*M* = 2.54 *SD* = 1.51
People support me - food	Most of the people who are important to me support me in washing hands with soap before handling food.	-4 strongly disagree 4 strongly agree	*M* = 2.60 *SD* = 1.38
People think I should - feces	Most of the people who are important to me think I should wash my hands with soap after contact with stool.	-4 strongly disagree 4 strongly agree	*M* = 2.62 *SD* = 1.48
People think I should - food	Most of the people who are important to me think I should wash my hands with soap before handling food.	-4 strongly disagree 4 strongly agree	*M* = 2.60 *SD* = 1.35
Feel obligated to wash hands - feces	I feel a strong personal obligation to wash hands with soap after contact with stool.	-4 strongly disagree 4 strongly agree	*M* = 2.95 *SD* = 0.96
Feel obligated to wash hands - food	I feel a strong personal obligation to wash hands with soap before handling food.	-4 strongly disagree 4 strongly agree	*M* = 2.93 *SD* = 1.01
Feel guilty if not washing hands - feces	I would feel guilty if I didn't wash hands with soap after contact with stool.	-4 strongly disagree 4 strongly agree	*M* = 2.61 *SD* = 1.75
Feel guilty if not washing hands - food	I would feel guilty if I didn't wash hands with soap before handling food.	-4 strongly disagree 4 strongly agree	*M* = 2.54 *SD* = 1.79
Mobilizers told me	I wash my hands with soap because that is what the hygiene mobilizers told us.	-4 strongly disagree 4 strongly agree	*M* = 2.17 *SD* = 1.96

(continued)

Appendix 1 (continued)

Behavioral factors	Questions	Answer categories / Range	Descriptive measures
Ability factors			
Easy wash hands - feces	How difficult or easy is it to always wash hands with soap after contact with stool?	-4 very difficult 4 very easy	*M* = 3.01 *SD* = 0.91
Easy wash hands - food	How difficult or easy is it to always wash hands with soap before handling food?	-4 very difficult 4 very easy	*M* = 2.98 *SD* = 1.01
Always able to HWWS - feces	Do you think you are able to always wash hands with soap after contact with stool?	0 not at all 4 very	*M* = 3.20 *SD* = 0.56
Always able to HWWS - food	Do you think you are able to always wash hands with soap before handling food?	0 not at all 4 very	*M* = 3.16 *SD* = 0.59
HWWS prevents	How certain are you that washing hands with soap after defecation and before handling food prevents you and your family from getting diarrhea or cholera?	0 not at all certain 4 very certain	*M* = 3.18 *SD* = 0.70
Hindrance in hand washing	How often does it happen that you want to wash hands with soap but are hindered in doing so?	0 (almost) never 4 (almost) always	*M* = 0.83 *SD* = 0.94
Damage HW station	How often does it happen that the hand washing station is damaged?	0 (almost) never 4 (almost) always	*M* = 0.78 *SD* = 0.94
HW station stolen	How often does it happen that the hand washing station is stolen?	0 (almost) never 4 (almost) always	*M* = 0.59 *SD* = 0.96
No water available	How often does it happen that there is no water available for hand washing?	0 (almost) never 4 (almost) always	*M* = 1.29 *SD* = 1.08
No soap available	How often does it happen that there is no soap available at the hand washing station?	0 (almost) never 1 (almost) always	*M* = 1.71 *SD* = 1.08
Re-start HWWS	Imagine you have stopped washing hands with soap for several days. How confident are you to start washing hands with soap again?	0 not at all 4 very	*M* = 3.11 *SD* = 0.50
Plan how to deal with hindrance	Have you made a detailed plan regarding what to do if the hand washing station is out of order (e.g. damaged, no water or no soap)?	0 no detailed plan at all 4 very detailed plan	*M* = 2.49 *SD* = 0.94
Self-regulation factors			
Forgetting to wash hands - feces	How often does it happen that you forget to wash hands with soap after contact with stool?	0 (almost) never 4 (almost) always	*M* = 0.67 *SD* = 1.00
Forgetting to wash hands - food	How often does it happen that you forget to wash hands with soap before handling food?	0 (almost) never 4 (almost) always	*M* = 0.98 *SD* = 1.03
Plan to avoid forgetting - feces	Have you made a detailed plan regarding how to avoid forgetting to wash hands with soap after contact with stool?	0 no detailed plan at all 4 very detailed plan	*M* = 2.55 *SD* = 0.92
Plan to avoid forgetting - food	Have you made a detailed plan regarding how to avoid forgetting to wash hands with soap before handling food?	0 no detailed plan at all 4 very detailed plan	*M* = 2.45 *SD* = 0.98

Notes: N = 811. *M* = Mean. *SD* = Standard deviation.

Appendix 2

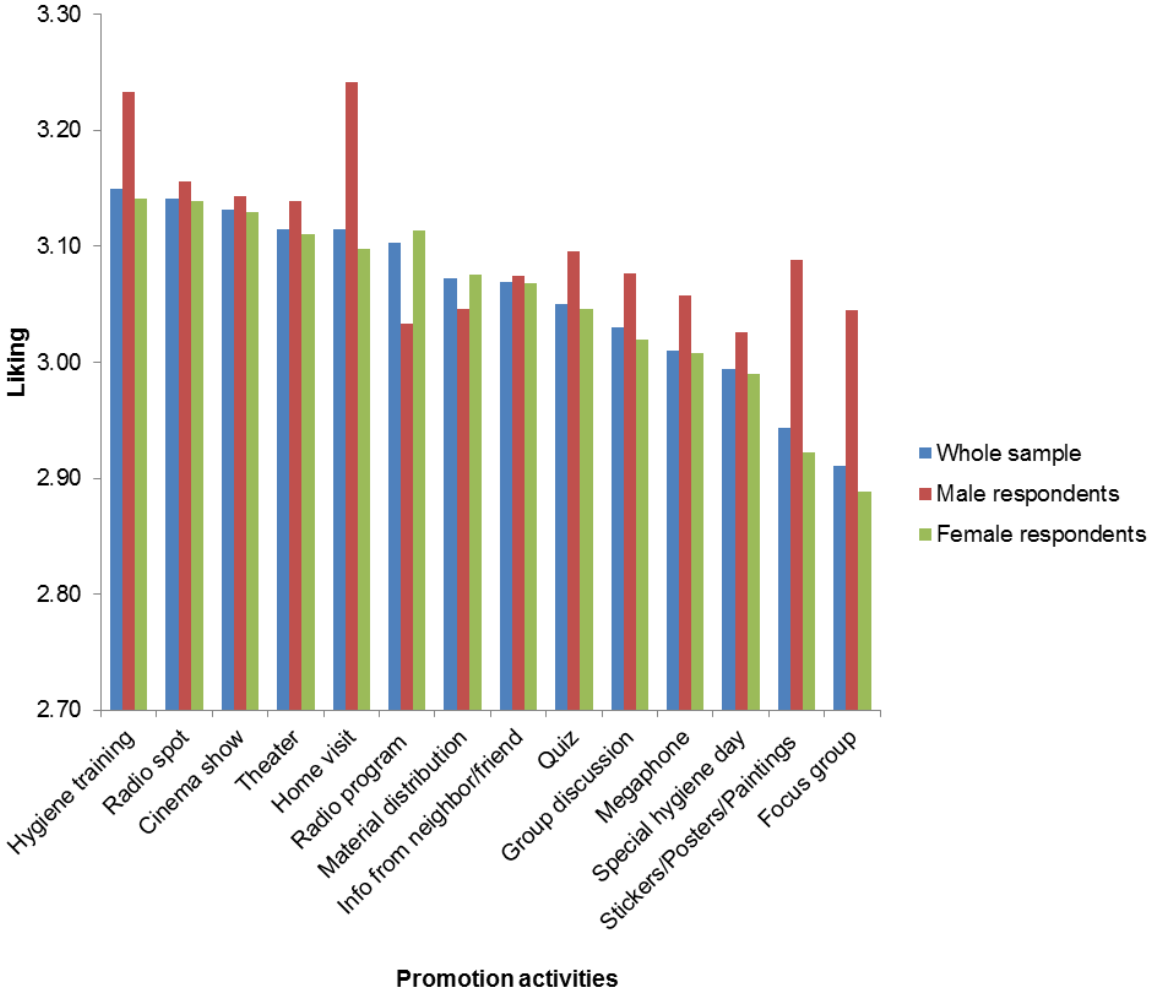
Overview: Questions regarding promotion activities

Promotion channel	Question	Answer categories
Heard radio spot	Did you gain information about it from a radio spot?	no=0 yes=4
Heard radio program	Did you gain information about it from a radio program at which you can call and ask questions?	no=0 yes=4
Information spread by megaphone	Did you gain information about it spread by megaphone in your camp/neighborhood?	no=0 yes=4
Group discussion	Did you participate in a group discussion / communitymeeting where you discussed e.g. good and bad behavior? Maybe picture cards were used.	no=0 yes=4
Hygiene training	Did you participate in a hygiene training lasting for 2-3 days?	no=0 yes=4
Home visit / Face-to-face promotion	Did people from Oxfam or the community come to your home to discuss hygiene behavior with you?	no=0 yes=4
Material distribution with instructions for use	Did you participate in a material distribution where you learned how to use the material?	no=0 yes=4
Information from a neighbor / friend	Did you gain information about it from a neighbor/friend?	no=0 yes=4
Focus group: problem discussion and program evaluation	Did you participate in a Focus group/Discussionmeeting where you discussed problems in the community or gave feedback to the promotion activities?	no=0 yes=4
Cinema show about health issues	Did you watch a film in a cinema show about hygiene, hand washing, cholera or diarrhea?	no=0 yes=4
Theater about health issues	Did you gain information in a theatre about hygiene, hand washing, cholera or diarrhea?	no=0 yes=4
Special hygiene day: e.g. global handwashing day	Did you gain information about it on a special hygiene day (for example hand washing day, national day of water, etc.)?	no=0 yes=4
Quiz	Did you participate in a quiz about hygiene, handwashing, cholera or diarrhea?	no=0 yes=4
Stickers/Posters/Paintings about health issues	Did you gain information from stickers, posters, paintings about hygiene, hand washing, cholera or diarrhea?	no=0 yes=4
Participation in a community club	Do you participate regularly in a community group that discusses about health issues and hygiene? (e. g. Mothers' group)	no=0 yes=4
Hygiene song	Do you know a song about handwashing, hygiene, cholera or diarrhea?	no=0 yes=4

Notes: Introductory question: Since the earthquake, have you gained information about hygiene, hand washing, cholera or diarrhea from the following sources?

Appendix 3

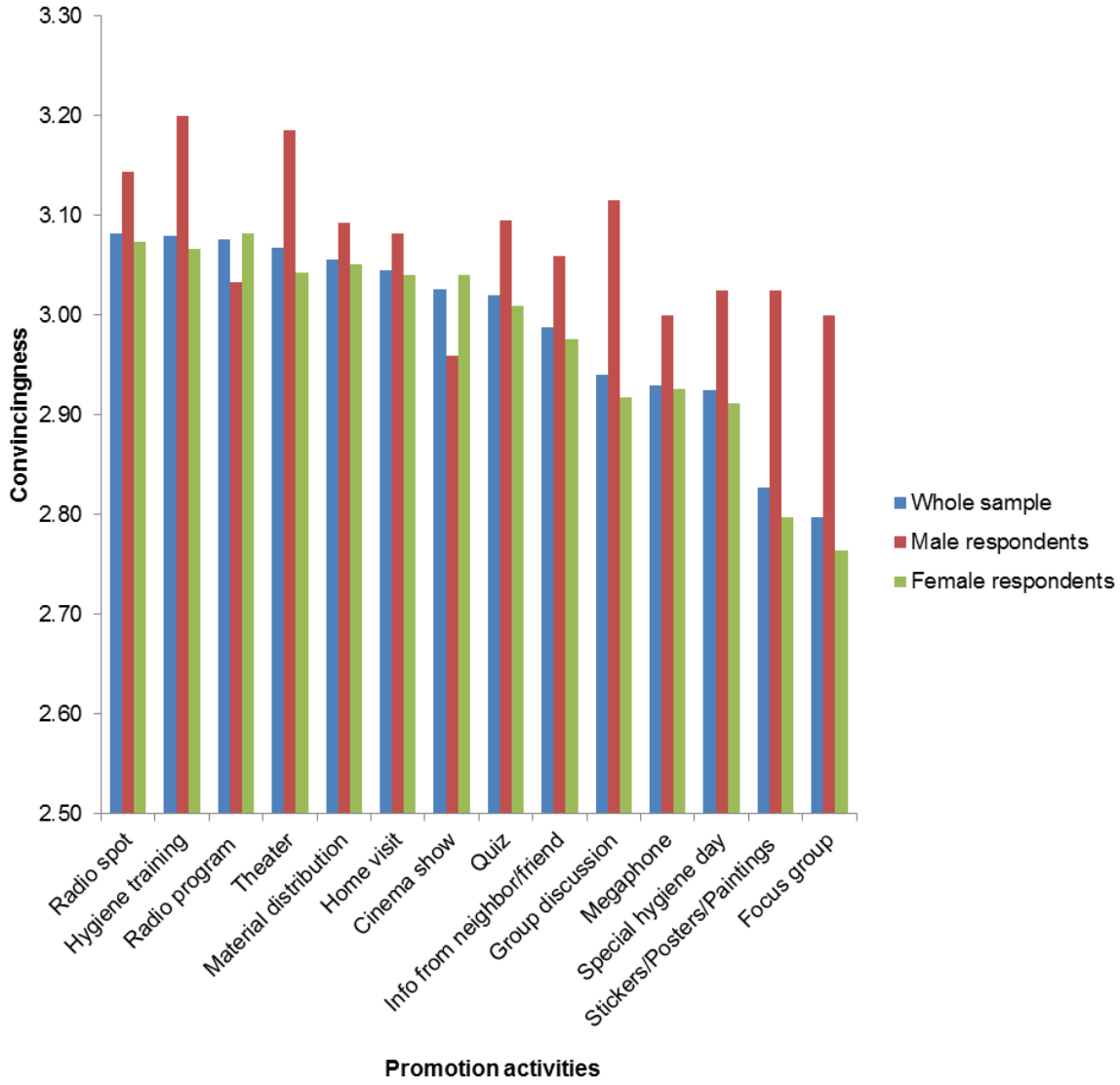
Evaluation of promotion activities by male and female respondents



Liking of promotion activities. Question: Did you like it? 0 – not at all / 4 – very much. *N* = 24 - 744.

(continued)

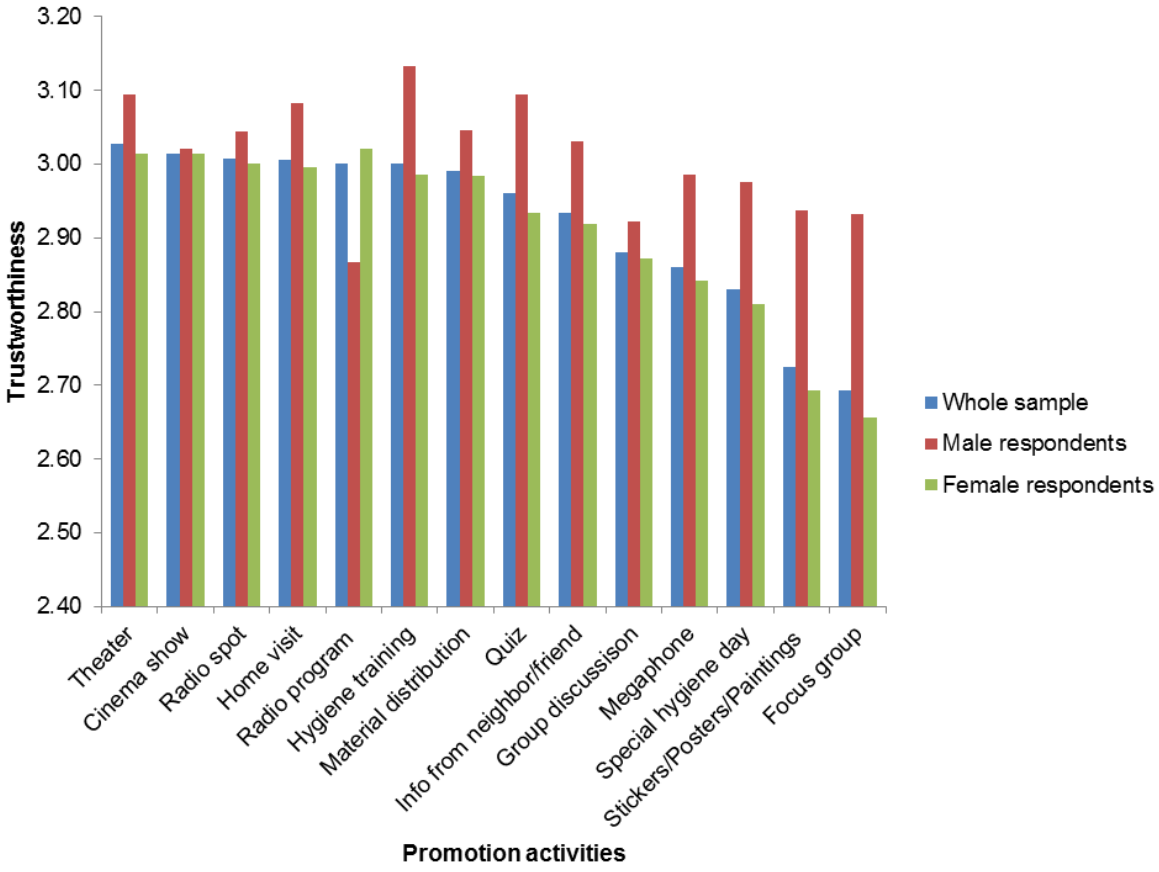
Appendix 3 (continued)



Conviction of promotion activities. Question: Was the information rather unconvincing or convincing? 0 – very unconvincing / 4 – very convincing. *N* = 224 - 745.

(continued)

Appendix 3 (continued)



Trustworthiness of promotion activities. Question: Is the source rather untrustworthy or trustworthy? 0 – very untrustworthy / 4 – very trustworthy. *N* = 224 - 737.