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GIZ IMMERSIVE RESEARCH INTO NUTRITION & WASH DEVELOPMENT PATHWAYS

FINAL REPORT

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ACKNOWLEDGEMENTS

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1. SUMMARY

This report provides an overview of the status, attitudes and practices relating to nutrition and water, sanitation, and hygiene (WaSH) within the Afar region. Villages included in the programme are Adkoma, Mesgid, Muli, Gura'ale, Bilaloda and Gita-gile. The findings of this research will serve as a toolkit for future interventions to improve nutrition and WaSH outcomes in these villages, particularly among vulnerable groups and caregivers of young children. The overview was drawn using a quantitative household survey and qualitative methods including PhotoVoice, one-on-one interviews and focus group discussions, as well as participatory community action planning sessions.

Despite significant external factors impeding the project, more than 2400 people were reached through direct engagement in the project and wider impact through the ripple effect of engaging community leaders, religious leaders, government officials, health experts and other individuals that were part of formerly dormant structures. However, the COVID-19 pandemic and following civil unrest significantly impacted the ability of the project to reach the desired number of participants.

Participants were able to identify key issues and barriers to improved nutrition and WaSH in their communities and design action plans, including assigning accountabilities for implementation, to be driven by the communities themselves, without additional donor support. This can be largely attributed to the use of PhotoVoice as the primary participatory research methodology. The use of photography as a way to discuss nutrition and WaSH was incredibly effective in engaging those with low levels of literacy, vulnerable and marginalized members of the community.

Key findings highlighted areas where future interventions may have the most success, either because they would directly address a gap in knowledge or because they would take advantage of the community's appetite to address cultural factors already acknowledged.

- Focus on nutrition education: the household survey indicated that most people lacked understanding of what constituted a nutritionally complete diet, particularly when it came to children. Most people said they believed adding meat or milk was what made a diet more nutritious. Notably, they did not believe adding fruit or vegetables would make a difference. Additionally, people did not appreciate the long-term impacts of childhood malnutrition and the importance of feeding in early years.
- Address cultural factors: all communities involved in the final focus groups saw women's heavy workload and pre-lacteal feeding practices as key points for change. Indeed, it was the communities themselves that highlighted cultural factors as barriers to improved nutrition and WaSH. Future interventions must begin by drawing participants into discussions regarding cultural practices, as those signify the underlying beliefs that guide behaviour. Therefore, participatory approaches, such as PhotoVoice, can be very effective in driving change.

- Improve hygiene in children's play and eating areas: The amount of concern and attention paid to hygiene for infants and children when it came to playing and eating was minimal in the intervention communities. There should be a greater focus on establishing and maintaining a healthy living environment for children (and adults) through managing exposure to dust and animal dung, improving access to soap and water and setting up clean areas for children to eat. Further attention should be paid to baby WaSH and other children's hygiene practices.

Finding existing structures, networks and community leaders and managing to reactivate, reimagine and reinvigorate those initiatives allows for greater continuity and ownership over action plans. Working with existing nutritional task forces meant the project was able to use the language that communities were already familiar with and ultimately brought those groups out of dormancy by allowing them to evolve into the new work. These groups were multi-disciplinary and brought together different departments, approaches, and sectors of the community.

Specifically, women's voices are often absent from community narratives around WaSH and nutrition, even though women are primarily responsible for managing both. Cultural issues, such as women's workload, that present a barrier to improved nutrition and WaSH were uncovered, discussed, and agreed by communities. Leveraging existing networks and structures such as the nutritional task forces, hiring community members that did not have the typical qualifications for engagement on such projects and using PhotoVoice, resulted in increased and meaningful participation of women within these communities.

2. ACRONYMS

DD	Dietary diversity
FGD	Focus Group Discussion
GIZ	Gesellschaft für Internationale Zusammenarbeit
HH	Household
IQR	Interquartile range
JMP	Joint monitoring program from WHO and UNICEF
NGO	Non-governmental organisation
SD	Standard deviation
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organisation
WaSH	Water, sanitation, and hygiene

3. INTRODUCTION

This report provides an overview of the status, attitudes and practices relating to water, sanitation, and hygiene (WaSH) and nutrition within the Adkoma, Mesgid, Muli, Gura'ale, Bilaloda and Gita-gile villages in Afar region, Ethiopia. A major marker of a community's health is its rate of child mortality and stunting. Stunting, the phenomenon of a child being too short for their age, reflects long-term malnutrition and can have multiple causes including diarrhoea (which can itself contribute to child mortality), inadequate food intake, and maternal malnutrition. In the Afar region of Ethiopia, which has the country's highest rate of child mortality, the prevalence of stunting in children under two is 41.1%. 17.7% of children under five also suffer from acute undernutrition, being too thin. The prevalence of diarrhoea in this region is also high at an estimated 11.5%.

Because of these distressing numbers, the German Gesellschaft für Internationale Zusammenarbeit (GIZ) has initiated the SDR-ASL Strengthening Drought Resilience in Arid and Semi-Arid Lowlands Programme (SDR-ASAL) to improve the food security and livelihoods of people in the Afar region. This program aims to improve the nutritional status of vulnerable groups and the nutritional and hygiene behaviours of caregivers.

Fostvedt-Mills Consulting (FMC) supported this program by implementing a research study focusing on two of the three program activities:

1. Aim to improve access to water and water quality, raise awareness of the importance of clean water and hygiene, and encourage safer food preparation, storage, and utilisation.
2. Aim to improve access to food and fodder by creating and managing tree nurseries and tree protection zones, promote the sale of local products such as fruit, forage grasses and meat, and provide information and training on the nutrition and care practices.

The following research questions were formulated to guide the overview on nutrition and WaSH status, attitudes, and practices:

- What is the nutritional status of children under the age of five and what type of nutrition practices are performed in the studied villages?
- Is there a difference in nutritional status and practices between villages and age categories of children?
- What type of WaSH facilities are used and what type of WaSH practices are performed in the studied villages, and do they differ between villages?
- Is there an association between WaSH practices or facilities and diarrhoea incidence in children under the age of five?

- Is there an association between nutritional practices and dietary diversity (DD) of children under the age of five?
- What are the social and gender-based factors determining the nutrition and WaSH practices of the community?
- How are the social and gender-based factors affecting the nutrition and WaSH practices of the community?

The findings of this research will serve as a foundation for future interventions in these villages to improve the nutritional status of vulnerable groups and the nutritional and hygiene behaviour of caregivers.

4. LITERATURE REVIEW

Nutrition and WaSH practices in the Afar region of Ethiopia are in need of improvement. According to the latest demographic health survey (DHS 2016), 53% of people in rural areas in Ethiopia use unimproved water sources. With only 6% using appropriate water treatment methods to clean their water; 39% of households have toilet facilities and 7% of rural households use soap when washing their hands.

The Afar region is rural with many pastoral populations. Ethiopia is in the lowest wealth quintile; and poverty along with food insecurity and poor WaSH coverages are significant factors behind malnutrition among young children. Additional factors such as low education levels; lack of infrastructure; and lack of access to markets, quality affordable food and materials are significant components in the high levels of stunting in Afar.

Numerous studies have linked mothers' education levels to child nutrition outcomes. Low education levels in Afar not only affect nutrition outcomes but are also likely to significantly inhibit the success of interventions to combat poor nutrition and WaSH practices. According to the DHS, only 3% of Afar women aged between 15-49 completed secondary education, compared to 10% of men. 75% of women in Afar are illiterate. High illiteracy levels in the region are compounded with gender discrimination when it comes to access to education. Research and interventions in Afar around nutrition need to be tailored to work within the context of poor literacy rates and low infrastructure allocations.

Taking these influential factors into account, the Nut-WaSH project aims to:

3. Develop a thorough contextual understanding of nutrition and WaSH in GIZ's pastoralist communities of intervention by:
    - Researching *with* communities, rather than *on* communities, to create trust and shared understanding.
    - Engaging stakeholders not only at the community level, but also at the district, regional and national government levels to identify challenges and potential solutions that reflect real user needs; and responding to the current reality on the ground.
4. Develop a context-specific and tailored nutrition pilot intervention for the target communities by:
    - Building solutions that meet the current needs, knowledge, and capacity of GIZ's target populations.
    - Improving awareness and knowledge, and supporting behaviours towards better nutrition for children, caregivers, and communities at large.

5. METHODOLOGY OVERVIEW

This section provides a short overview of the data collection and analysis methodology. More elaborate descriptions of the data collection methods, handling and analyses can be found in Appendix 1 (Quantitative) and Appendix 2 (Qualitative).

Both the quantitative and qualitative data collection took place i six different woredas, with one village per woreda. Adkoma, Messaged, Muli, Gura'ale, Bilaloda, and Gita 'gile were purposely selected, as the pilot implementation of the nutrition and WaSH intervention will take place in these villages. All data collection was done in the local Afari language. Pilot data was collected in October 2020 and full data collection was performed in January and February 2021. Final workshops, including data validation with participants and action planning were held in May 2021.

5.1 QUANTITATIVE METHODOLOGY

A household (HH) survey was conducted as part of the quantitative study. Households were classified into different groups using predefined and validated tools of different United Nations departments. For example, one tool to evaluate the feeding practices for children under five is child DD. The child DD was calculated using the World Health Organisation's (WHO) designation of a minimum of four food groups as the minimal acceptable diet for children.[1] HH food production was also evaluated using the number of HHs owning livestock or land for agricultural production. The production of the WHO food groups was similarly evaluated, and the HHs' WaSH facilities were measured using the WHO and United Nations International Children's Emergency Fund (UNICEF) Joint Monitoring Program (JMP) categories, also known as the WaSH ladders[2].

Data collection was conducted using the MWater tool. Data cleaning and analysis was conducted using IBM SPSS statistics 26. A significance level of 95% was used to evaluate if there was an association between different variables.

5.2 QUALITATIVE METHODOLOGY

Qualitative data collection utilized PhotoVoice, focus group discussions (FGD) and one-on-one interviews. PhotoVoice is a participatory research method that allows community members to uncover their lived experiences and highlight what is significant to them through photography. This methodology puts the task of data collection among community members and guides narrative development. A total of 36 community representatives participated in the PhotoVoice data collection. This group includes 18 moth-

1 WHO. (2007). *Indicators for assessing infant and young child feeding practices*. Reviewed from https://apps.who.int/iris/bitstream/handle/10665/43895/9789241596664_eng.pdf;jsessionid=F61D472B108571 17D919B904DB8BB05B?sequence=1
2 WHO, UNICEF. (2018). *JMP methodology 2017 update and SDG baseline*. Reviewed from https://WaSHdata.org/report/jmp-methodology-2017-update

ers with under-five children, 12 female natural leaders and six kebele administrators (six villages = six administrators). The criteria for recruitment were purposive and included those who would be exposed to the nutrition and WaSH intervention. To keep the conversation rich and manageable for the PhotoVoice discussions, participants were limited to an average of 6 individuals (HHs) in each village. The HHs selected for the PhotoVoice were excluded from the quantitative survey.

All interviews and FGDs were audio-recorded and transcribed using verbatim transcription and translation. Data analysis was done by two WaSH and nutrition experts with rich experience in qualitative data analysis. For more details on the qualitative methodology, please see appendix 2.

Finally, workshops were held in each woreda with nutrition task force members and community members to share the results and generate community-led action plans to handover the intervention from GIZ to the communities themselves.

6. IMPACT

6.1 EXTERNAL FACTORS: COVID-19 AND CIVIL UNREST

This project was affected by unforeseen and disruptive external factors. The original methodological design relied on researchers being embedded in communities for longer periods of time and greater participatory involvement in workshop design, planning and implementation. With the emergence of COVID-19 and pandemic related restrictions on movement and gatherings, the project was adapted to include different methods of data collection, including PhotoVoice and mobile data collection. Focus groups were kept small to allow for social distancing; and workshops and presentations were moved to outdoor spaces for better ventilation and to support distancing. This meant less opportunities to interact directly with communities, smaller numbers of participants to support health and safety protocols and less ability to use traditional methods of information sharing such as presentations using projectors.

Civil unrest in Tigray began in the autumn of 2020 and spilled into Afar region, causing instability, food insecurity and forcing some pastoralist communities to relocate. Follow up with various participants was simply impossible as there was no way to reach them and many of the action plans may have been stalled as a result of the conflict. Ultimately, between the pandemic and the ongoing civil unrest, the project was unable to assess the success in achieving the target of 60% of 7800 people.

6.2 PEOPLE REACHED

Between the household survey, PhotoVoice, focus group discussions, task forces and government officials engaged during the study, FMC was able to engage a total of 366 households and 36 PhotoVoice researchers. With an average of six members of each household, the project directly impacted 2412 people across the six communities.

Beyond this, the project was successful in reinvigorating dormant structures to support ongoing education and community-led initiatives to improve nutrition and sanitation. Several experts, government staff and community and spiritual leaders were engaged in the process, raising the scope of the impact, and contributing to the sustainability of the results. The action planning in the larger community groups composed of health extension workers, school directors, women, and youth representatives, Kebele leaders, agriculture representatives, religious leaders, clan leaders, and some PhotoVoice participants will have a ripple effect that will serve to reach a much broader audience.

7. QUANTITATIVE RESULTS

The population characteristics (Table 1) in the total study population per village and the P-value for the differences between villages were explored. In total, 366 HHs were included in the analysis. Most of the respondents were female but most HHs were male-headed HHs. 59% of the HHs had a HH member below the age of five. Furthermore, 87% of the HHs own livestock but only 37% of the HHs have access to agricultural land. The results also show that the number of female respondents, number of female-headed HHs, number of interviewees able to read, religion, number of HHs with access to agricultural land, number of HHs owning livestock and number of HHs with a child under five years varied significantly between the different villages.

Table 1: Number and percentage or mean and standard deviation of background characteristics over the total study population and per village.

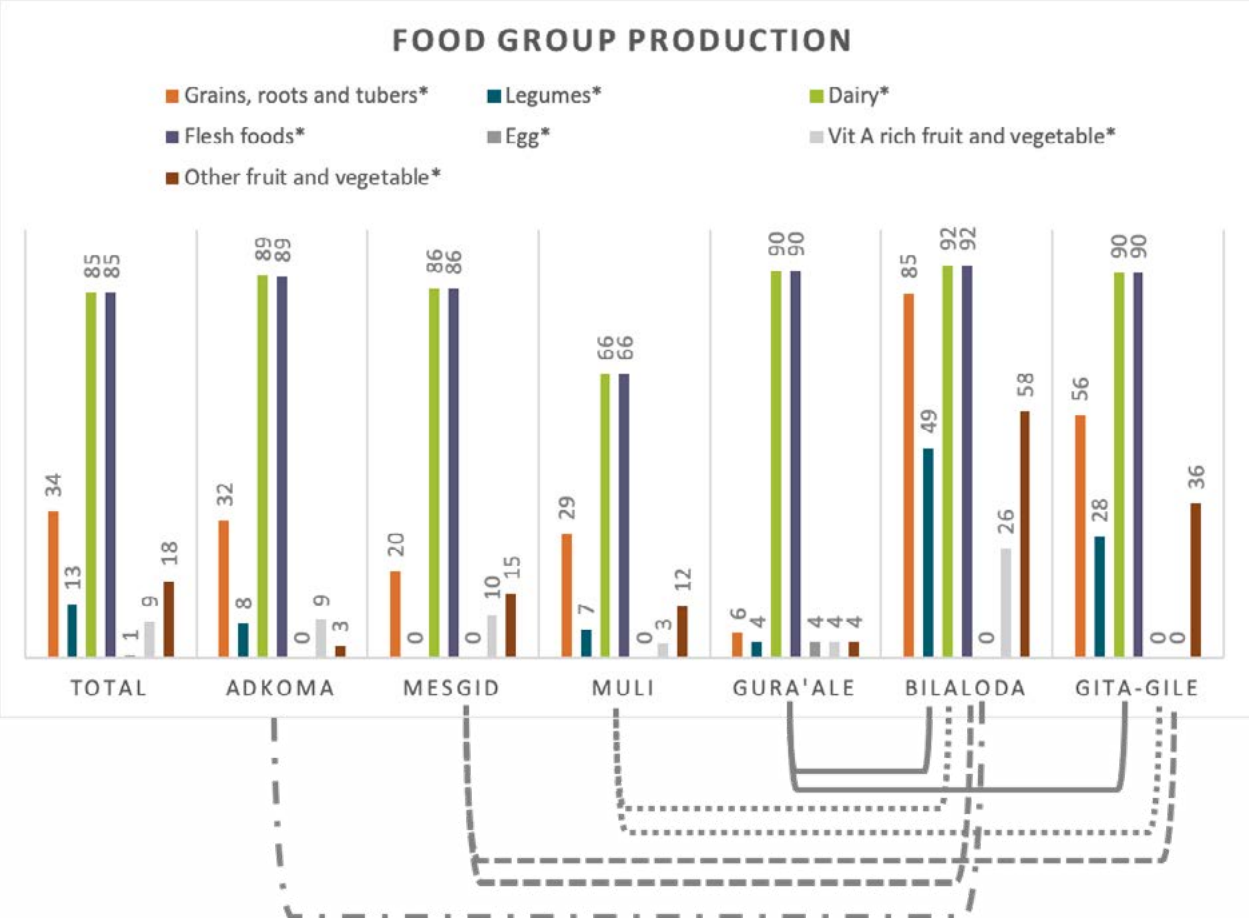
P-value calculated with the Pearson's chi-square test and the one-way ANOVA.

	Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-Gile	P-value
N of HH (%)	366 (100)	75 (20.5)	94 (25.7)	59 (16.1)	52 (14.2)	47 (12.8)	39 (10.7)	
Female respondent (%)	289 (79.0)	52 (69.3)	84 (89.4)	34 (57.6)	45 (86.5)	37 (78.7)	37 (94.9)	<0.001
Female headed HH (%)	84 (23.0)	22 (29.3)	19 (20.2)	22 (37.3)	15 (28.8)	3 (6.4)	3 (7.7)	<0.001
Married (%)	340 (92.9)	68 (90.7)	89 (94.7)	51 (86.4)	48 (92.3)	46 (97.9)	38 (97.4)	0.268+
Able to read (%)	56 (15.3)	6 (8.0)	17 (18.1)	3 (5.1)	7 (13.5)	12 (25.5)	11 (28.2)	0.004
Muslim (%)	358 (97.8)	75 (100)	94 (100)	58 (98.3)	52 (100)	47 (100)	32 (82.1)	<0.001+
Vulnerable HH member (%)	105 (34.2)	28 (37.3)	34 (36.2)	-	18 (34.6)	12 (25.5)	13 (33.3)	0.722
Access to agricultural land	137 (37.4)	26 (34.7)	27 (28.7)	18 (30.5)	3 (5.8)	40 (85.1)	23 (59.0)	<0.001
Livestock ownership	317 (86.6)	67 (89.3)	82 (87.2)	39 (66.1)	49 (94.2)	44 (93.6)	36 (92.3)	<0.001
Child < 5 (%)	217 (59.3)	38 (50.7)	52 (55.3)	25 (42.4)	37 (71.2)	36 (76.6)	29 (74.4)	<0.001
Female child <5 (%)	111 (51.2)	17 (44.7)	25 (48.1)	17 (68.0)	13 (35.1)	21 (58.3)	18 (62.1)	0.088
Mean age respondent (SD)	33.6 (11.2)	36.4 (11.8)	31.2 (10.2)	32.9 (11.2)	35.1 (9.5)	32.7 (11.4)	34.1 (13.2)	0.056
Mean age (months) child <5 (SD)	26.3 (12.0)	27.5 (13.1)	26.6 (13.1)	27.9 (10.1)	24.3 (12.7)	24.8 (11.7)	26.9 (9.3)	0.497

+ > twenty percent of the cells with an expected count below five, violating the chi-square test assumption

7.1 HH FOOD PRODUCTION

Figure 1: Percentage of HH producing a food group



** Indicates significant (alfa=0.05) difference in the n of HH producing a food group between villages tested with the Pearson's chi-square test. Connecting lines indicate a significant (alfa=0.05) difference between HH production score between villages tested with pairwise comparisons adjusted for multiple testing.*

Figure 1 shows the percentage of HHs producing a food group, in total and per village. Dairy and flesh foods, such as chicken, were the most produced food groups, produced by 85% of HHs. Eggs were the least produced food group, with only one HH producing eggs. The chi-square test indicates that the production of all food groups significantly differs over the different villages.

Table 2: Median HH production score in total and per village.

P-value calculated with the Kruskal-Wallis H test.

	Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Median HH production score (IQR)	2 (1.0)	2.0 (1.0)	2.0 (0.25)	2.0 (2.0)	2.0 (0.0)	5.0 (2.0)	3.0 (3.0)	<0.001

The median HH production score and the interquartile range of the total study population and per village are shown in table 2. The Kruskal-Wallis H test showed that the median HH production scores differed

significantly between the villages. To investigate which villages significantly differed in their HH production score, a pairwise comparison (adjusted for multiple testing) was conducted. The results for this comparison are reflected in Figure 1 by the connecting lines between villages. These results show that the village of Bilaloda had a significantly different HH production score than all other villages except for Gita-gile. Secondly, Gita-gile had a significantly different HH production score compared with Gura'ale, Muli and Mesgid. The village Adkoma had only a significantly different HH production score compared to Bilaloda.

7.2 CHILD FEEDING PRACTICES

The following results for U5 child feeding practices were obtained from HHs with a child below the age of five.

Table 3: Number of children per village and per age category

	Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile
N children aged 6-11 months (%)	21 (9.7)	4 (10.5)	7 (13.5)	1 (4.0)	4 (10.8)	5 (13.9)	0 (0.0)
N children aged 12-17 months (%)	36 (16.6)	5 (13.2)	7 (13.5)	2 (8.0)	11 (29.7)	6 (16.7)	5 (17.2)
N children aged 18-23 months (%)	9 (4.1)	2 (5.3)	3 (5.8)	1 (4.0)	0 (0.0)	1 (2.8)	2 (6.9)
N children aged 24-58 months (%)	151 (69.6)	27 (71.1)	35 (67.3)	21 (84.0)	22 (59.5)	24 (66.7)	22 (75.9)
Total children < 58 months (%)	217 (100)	38 (100)	52 (100)	25 (100)	37 (100)	36 (100)	29 (100)

Table 3 shows the distribution of children under five per village. Most children in this survey fell in the age category of 24-58 months. The lowest percentage of children were found in the age category of 18-23 months. The chi-square test showed no significant difference in the distribution of children over the age categories for the different villages.

7.2.1 Breastfeeding practices

Table 4: Number of children ever breastfed, still breastfed and consuming solid food for the total study population and per village

P-value calculated using the Pearson's chi-square test.

	Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
N ever breastfed (%)	209 (96.3)	38 (100.0)	52 (100.0)	22 (88.0)	35 (94.6)	34 (94.4)	28 (96.6)	0.110+
N still breastfed (%)	92 (42.4)	11(28.9)	25 (48.1)	14 (56.0)	18 (48.6)	16 (44.4)	8 (27.6)	0.124
N solid food consumption (%)	156 (71.9)	30 (78.9)	38 (73.1)	14 (56.0)	23 (62.2)	26 (72.2)	25 (86.2)	0.118

+ > twenty percent of the cells with an expected count below five, violating the chi-square test assumption

The majority (96.3%) of the children in the study population were breastfed at one point in time. No significant differences between the villages and the number of children ever breastfed were observed. Also, the number of children breastfed at the moment of interviewing was not significantly different between the villages. On average, 71.9% of all children between the age of 6 and 58 months old consumed solid food the day before the interview.

Table 5: Number of children ever breastfed, still breastfed and consuming solid food per age category

P-value calculated using the Pearson's chi-square test.

	6-11 months	12-17 months	18-23 months	24-58 months	P-value
Ever breastfed (%)	21 (100)	36 (100)	9 (100)	143 (94.7)	0.304+
Still breastfed (%)	20 (95.2)	33 (91.7)	7 (77.8)	32 (21.2)	<0.001
Solid food consumption (%)	7 (33.3)	17 (47.2)	7 (77.8)	125 (82.8)	<0.001

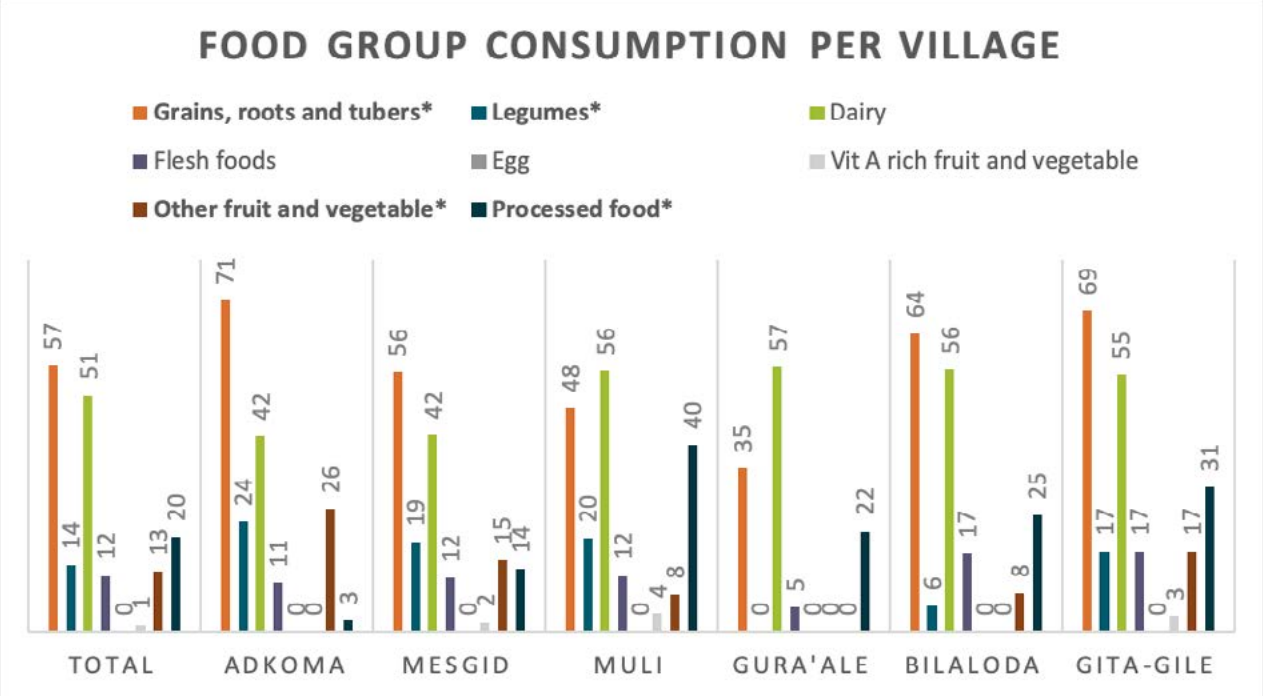
+ > twenty percent of the cells with an expected count below five, violating the chi-square test assumption

Table 5 shows the number and percentage of children ever breastfed and still breastfed, divided by age category. Only the age category 24-58 months old includes children that were never breastfed. Children in all other age categories received breastmilk at one point in time. No significant difference was observed in the different age categories between the numbers of children ever breastfed. The number of children still being breastfed decreases when the age increases. A significant difference was observed between the number of children still receiving breastmilk and age categories. Furthermore, the percentage of children consuming solid foods increased over the age categories and a significant difference was observed between the numbers of children consuming solid foods in different age categories.

7.2.2 Food group consumption

Figure 2: food group consumption per village

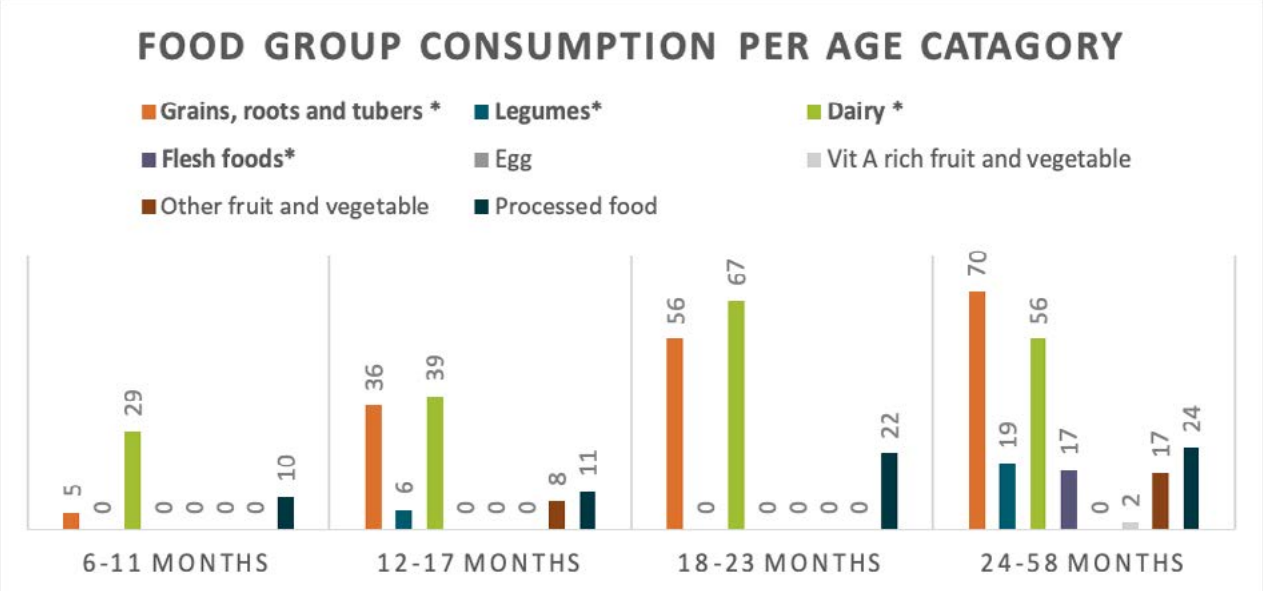
Significant (alfa=0.05) difference in food group consumption between villages tested with the Pearson's chi-square test.



The most consumed food group in almost all villages was grains, roots, and tubers. Eggs were not consumed by any child in the study population. The consumption of the food groups, grains roots and tubers, legumes, other fruit and vegetables and processed food was significantly different between the villages.

Figure 3: Food group consumption per age category

Significant (alfa=0.05) difference in food group consumption between villages tested with the Pearson's chi-square test.



Children aged 6-11 months consumed the least number of food groups while children aged 24-58 months old consumed the most food groups, in terms of different food groups but also in the percentage of children consuming that food group. The consumption of the food groups grains, roots and tubers, legumes, dairy, and flesh foods significantly differed between age categories.

Table 6: Median DD score and the number of children consuming the minimal DD for the total study population and per age category.

P-value calculated with the Kruskal-Wallis H test and the Pearson's chi-square test respectively.

	Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Median DD score (IQR)	1.0 (2.0)	1.5 (1.25)	1.0 (2.0)	1.0 (3.0)	1.0 (2.0)	2.0 (2.0)	1.0 (1.5)	0.212
N children meeting min. DD (%)	21 (9.7)	6 (15.8)	6 (11.5)	3 (12.0)	0 (0.0)	2 (5.6)	4 (13.8)	0.205[+]

[+] *>twenty percent of the cells with an expected count below five, violating the chi-square test assumption*

The median DD score was one for the whole study population and no significant difference was observed between the villages. In total, only 9.7% of the children in the study population met the minimal DD, consuming 4 or more food groups. In this as well, no significant difference was observed between the villages.

Table 7: Median DD score and number of children consuming the minimal DD per age category.
P-value calculated with the Kruskal-Wallis H test and the Pearson's chi-square test respectively.

	6-11 months	12-17 months	18-23 months	24-58 months	P-value
Median DD score (IQR)	0.0 (1.0)	0.0 (2.0)	1.0 (1.5)	2.0 (2.0)	<0.001
N children meeting min. DD (%)	0 (0.0)	2 (5.6)	0 (0.0)	19 (12.6)	0.146

The dietary diversity score was not normally distributed per age category, so the median and interquartile range is presented. The median DD score was significantly different over the age groups. The median DD score was higher in the two older age categories. The percentage of children meeting the minimal DD score of four or more food groups was not significantly different over the age categories.

7.3 WASH PRACTICES

7.3.1 Water source

Figure 4: Percentage of HHs with JMP classifications for drinking water services

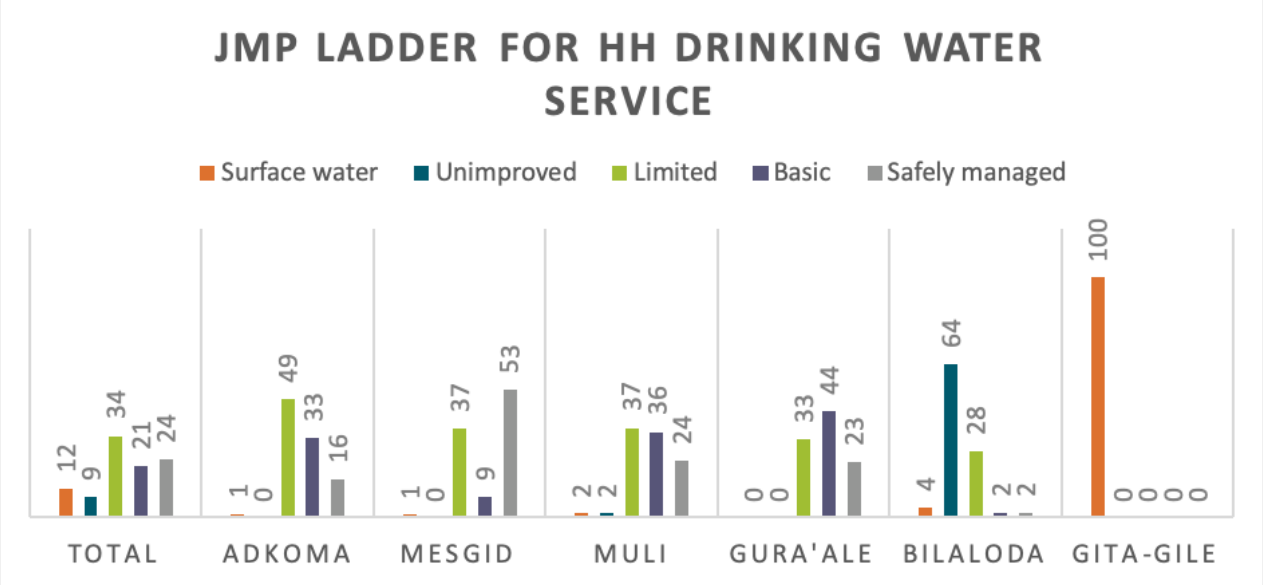


Figure 4 indicates the percentage of HHs falling in the JMP classifications for drinking water services, in total and per village. Results show that overall, 24% of HHs had a safely managed drinking water service. The village of Mesgid had the highest percentage of HHs with a safely managed water service (53%). In the village of Gita-Gile, all HHs used surface water as their main drinking water source. In the village of Bila-loda, the majority of HHs used an unimproved water source as their main source for water. The Pearson's chi-square distribution showed a significant (P-value <0.001) relationship between the JMP categories and villages indicating that the distribution of HHs over the different categories was significantly different between villages.

Table 8: number of HH carrying out specific water-related practices in total and per village.

P-value calculated using the person chi-square test

		Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Main water collector per HH (%)	Adult female	262 (71.6)	49 (65.3)	57 (60.6)	37 (62.7)	46 (88.5)	41 (87.2)	32 (82.1)	<0.001+
	Female child	95 (26.0)	26 (34.7)	32 (34.0)	22 (37.3)	4 (7.7)	6 (12.8)	5 (12.8)	
	Adult male	3 (0.8)	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (5.1)	
	Male child	6 (1.6)	0 (0.0)	4 (4.3)	0 (0.0)	2 (3.8)	0 (0.0)	0 (0.0)	
N HH that treat water (%)	Treat water before using	34 (9.3)	0 (0.0)	5 (5.3)	1 (1.7)	18 (34.6)	5 (10.6)	5 (12.8)	<0.001
	Not treating water before using	332 (90.7)	75 (100)	89 (94.7)	58 (98.3)	34 (65.4)	42 (89.4)	34 (87.2)	
HH water storage type (%)	Open container	27 (7.4)	0 (0.0)	2 (2.1)	12 (20.3)	10 (19.2)	3 (6.4)	0 (0.0)	<0.001
	Closed container	334 (91.5)	74 (98.7)	91 (96.8)	45 (76.3)	42 (80.8)	44 (93.6)	39 (100.0)	
	No storage	4 (1.1)	1 (1.3)	1 (1.1)	2 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	

+ > twenty percent of the cells with an expected count below five, violating the chi-square test assumption

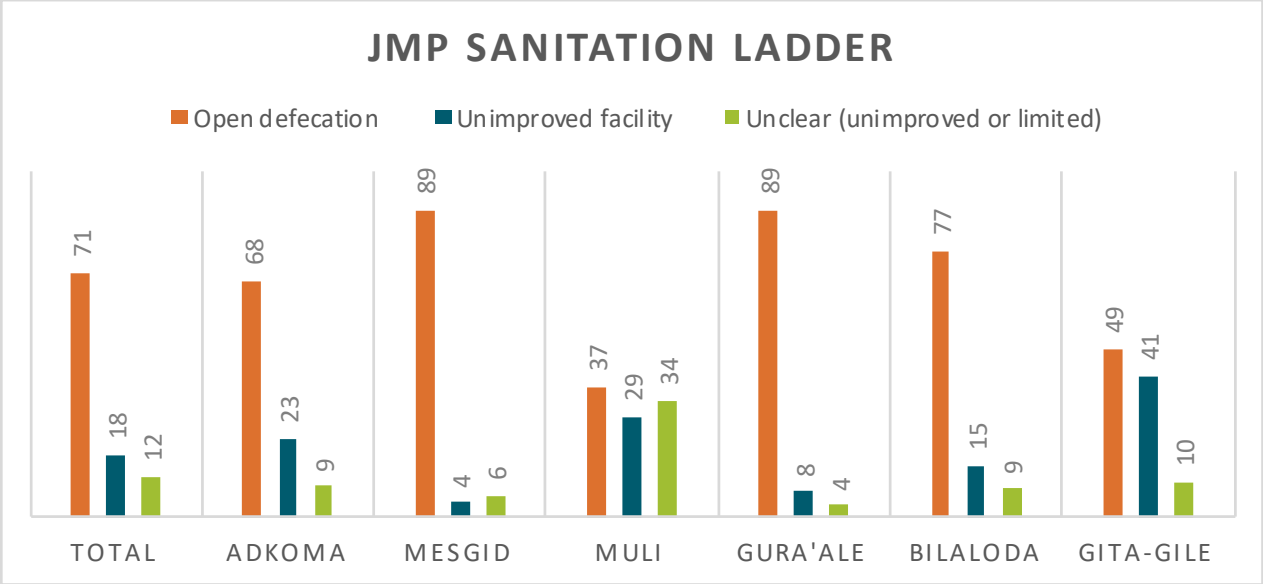
In most HHs (71.6%), the adult female was responsible for water collection. If the adult female was not the main water collector, the female child or children were responsible for the water collection in most HHs. Only 2.4% of the HHs had a male adult or male children responsible for water collection. The main water collector was significantly different over the villages, indicating that not all villages follow the average distribution.

Most of the HHs do not treat their water (90.7%). However, there is a significant difference between villages. In Gura'ale, the highest percentage (34.6%) of HHs treat their water but in Adkoma and Muli only one HH reported treating their water before using it.

Also, most HHs report storing their water. Water is stored in closed containers (91.5%) or open containers (7.4%). HHs in the villages Gita-gile and Adkoma stored all their water in closed containers while in Muli and Gura'ale, almost 20% of the HHs stored their water in open containers.

7.3.2 Sanitation

Figure 5: Percentage of HH within the JMP ladder classification for sanitation



Most HHs (71%) did not use a toilet facility and defecated in the open. The highest percentage of open defecation can be found in the villages Mesgid and Gura'ale, where 89% of the HHs defecate in the open. All HHs that owned a toilet facility owned an unimproved one, without a slab or platform. The highest percentage of HHs with an unimproved toilet facility was found in Gita-gile. Notably, not all HHs could be classified in the JMP classification ladder as in some cases the type of toilet was not reported. These were all HHs reporting to share a toilet facility (either with a neighbour or a public facility). The majority of these HHs probably fall in the category of unimproved since all recorded facilities were unimproved facilities; however, some HHs in this category may practise open defecation. The chi-square distribution showed a significant (P-value <0.001) association between the JMP categories and villages indicating that the distribution of HHs over the different categories was significantly different for the different villages.

Table 9: number of HH carrying out specific sanitation-related practices in total and per village.
P-value calculated using the person chi-square test

		Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
HH owning a toilet (%)		83 (22.7)	17 (22.7)	9 (9.6)	23 (39.0)	6 (11.5)	9 (19.1)	19 (48.7)	<0.001
Reason for not owning/using own toilet (%)	Too expensive	38 (13.0)	13 (22.8)	14 (15.7)	5 (13.2)	4 (8.5)	2 (5.1)	0 (0.0)	
	Broken down	127 (43.3)	26 (45.6)	49 (55.1)	13 (34.2)	8 (17.0)	20 (51.3)	11 (47.8)	
	Don't know how to build	31 (10.6)	0 (0.0)	8 (9.0)	8 (21.1)	2 (4.3)	9 (23.1)	4 (17.4)	
	No need	94 (32.1)	17 (29.8)	18 (20.2)	12 (31.6)	32 (68.1)	7 (17.9)	8 (34.8)	
	No space	1 (0.3)	1 (1.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
	Other	2 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.1)	1 (2.6)	0 (0.0)	

Disposal infant faeces* (%)	**Bury**	88 (40.6)	6 (15.8)	9 (17.3)	13 (52.0)	17 (45.9)	23 (63.9)	20 (69.0)
	Bush	92 (42.4)	20 (52.6)	29 (55.8)	3 (12.0)	20 (54.1)	11 (33.3)	8 (27.6)
	Toilet	19 (8.8)	6 (15.8)	5 (9.6)	8 (32.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Nothing	18 (8.3)	6 (15.8)	9 (17.3)	1 (4.0)	0 (0.0)	1 (2.8)	1 (3.4)
Disposal animal faeces (%)	**Bury**	63 (17.2)	25 (33.3)	24 (25.5)	10 (16.9)	2 (3.8)	2 (4.3)	0 (0.0)
	Bush	202 (55.2)	22 (29.3)	25 (26.6)	35 (59.3)	48(92.3)	40 (85.1)	32 (82.1)
	Toilet	3 (0.8)	0 (0.0)	1 (1.1)	0 (0.0)	1 (1.9)	1 (2.1)	0 (0.0)
	Leave in the open	64 (17.5)	20 (26.7)	28 (29.8)	4 (6.8)	1 (1.9)	4 (8.5)	7 (17.9)
	Not applicable	30 (8.2)	7 (9.3)	16 (17.0)	7 (11.9)	0 (0.0)	0 (0.0)	0 (0.0)
	River	4 (1.1)	1 (1.3)	0 (0.0)	3 (5.1)	0 (0.0)	0 (0.0)	0 (0.0)
Child with diarrhoea in previous 2 weeks* (%)		26 (12.0)	4 (10.5)	5 (9.6)	2 (8.0)	6 (16.2)	5 (13.9)	4 (13.8)

** Only includes HH with a child < 5 years of age*

In total, only 22.7% of HHs reported owning a toilet. The highest percentage of HHs with a toilet was in the village Gita-gile, where almost half (48.7%) of the HHs owned a toilet. Furthermore, Mesgid reported the lowest percentage of HHs with a private toilet (9.6%).

The most reported reason for not owning a toilet was that it was broken. This reason was mentioned less in the village of Gita-gile, which had the highest percentage of HHs owning a toilet. Furthermore, no need for a toilet was the second most reported reason for not owning a toilet (32.1%). However, Gita-gile deviates from the other villages with 68.1% of the HHs without a toilet facility reporting 'no need' as the main reason for not owning a toilet.

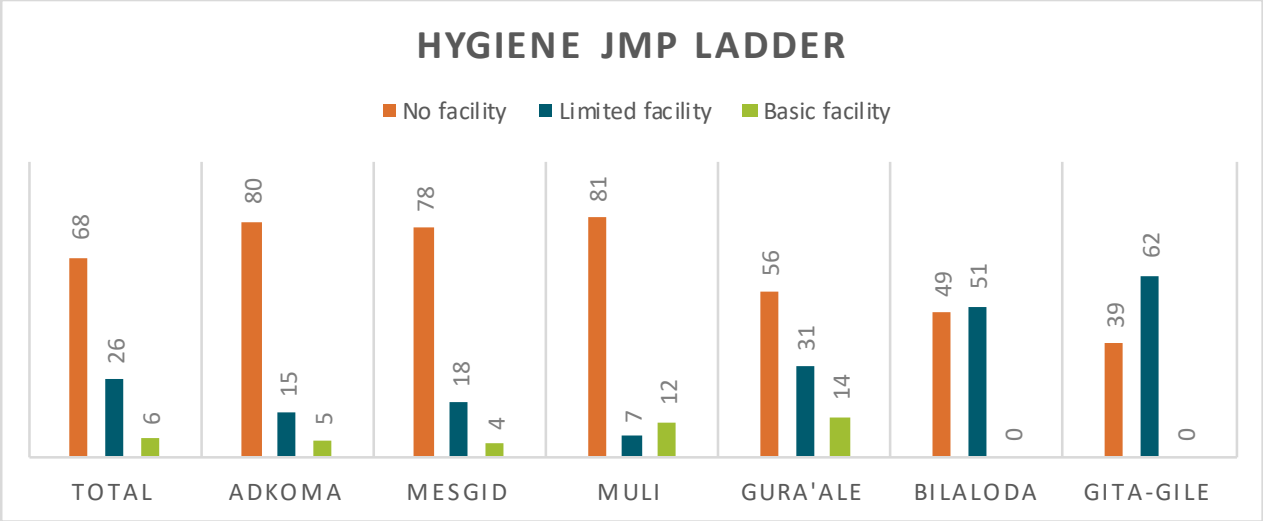
All HHs with a child below the age of five were asked how they dealt with infant faeces. Most HHs reported disposing of them in the bushes (42.4%) or burying the faeces (40.6%). Burying was the most used practise in the villages of Gita-gile and Bilaloda, at 69.0% and 63.9% respectively. Only 8.3% of HHs reported doing nothing with their infant's faeces, with the highest percentage (17.3%) of HHs living in Mesgid.

As animal faeces can come from many animals other than livestock (e.g., dogs), all HHs were asked about animal faeces disposal. Most HHs reported throwing their animal faeces in the bush (55.2%). 17.5% of the HHs left the faeces in the open. 8.3% of HHs reported that this question was not applicable.

Diarrhoea incidence was also investigated by asking if the child under the age of five had suffered from an episode of diarrhoea in the previous two weeks. Diarrhoea was defined as having at least two loose stools within a one-hour timeframe. Results show that twelve percent of the children suffered from diarrhoea, with no significant differences between villages.

7.3.3 Hygiene

Figure 6: Percentage of HH within the JMP ladder classification for hygiene



A limited facility is classified as a handwash facility with water and without soap, and a basic facility is a handwash facility with water and soap. Most HHs in the study population had no handwashing facility in their home (68%). The highest percentages of HHs without any handwash facilities can be found in Adkoma, Mesgid and Muli. The highest percentage of HHs with a basic facility (14%) can be found in Gura'ale. The chi-square distribution showed a significant (P-value <0.001) association between the JMP categories and villages indicating that the distribution of HHs over the different categories was significantly different for the different villages.

Table 10: number of HH carrying out specific hygiene-related practices in total and per village

P-value calculated using the Pearson's chi-square test

		Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Handwashing before eating and child feeding (%)	Water and soap	81 (22.1)	20 (26.7)	26 (27.7)	25 (42.4)	5 (9.6)	2 (4.3)	3 (7.7)	<0.001
	Water only	251 (68.6)	49 (65.3)	59 (62.8)	26 (44.1)	46 (88.5)	37 (78.7)	34 (87.2)	
	Ash	34 (9.3)	6 (8.0)	9 (9.6)	8 (13.6)	8 (17.0)	2 (5.1)	2 (5.1)	
Handwashing previous 24h (%)	Before eating	336 (91.8)	73 (97.3)	87 (92.6)	51 (86.4)	44 (84.6)	45 (95.7)	36 (92.3)	0.077+
	Before cooking	235 (64.2)	53 (70.7)	65 (69.1)	22 (37.3)	28 (53.8)	32 (68.1)	35 (89.7)	<0.001
	Before serving food	172 (47.0)	30 (40.0)	43 (45.7)	19 (32.2)	17 (32.7)	35 (74.5)	28 (71.8)	<0.001
	After defecation	194 (53.0)	37 (49.3)	51 (54.3)	29 (49.2)	29 (55.8)	24 (51.1)	24 (61.5)	0.823
	After cleaning baby*	57 (26.3)	6 (15.8)	14 (26.9)	5 (20.0)	21 (56.8)	6 (16.7)	5 (17.2)	<0.001
	Other; before praying	8 (2.2)	5 (6.7)	3 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)	0(0.0)	0.366+

* *Only includes HH with a child < 5 years of age*

\+ *> twenty percent of the cells with an expected count below five, violating the chi-square test assumption*

Results show that most HHs washed their hands with water only before eating or feeding their child (68.6%). A small minority of the interviewees reported washing their hands with ash (9.4%). In Muli, handwashing with water and soap occurred most frequently (42.4%). Muli also had the highest percentage of HHs with a basic handwash facility. The lowest percentage of HHs washing hands with water and soap before eating or feeding a child lived in Bilaloda (4.3%). The chi-square distribution showed a significant relation between village and handwashing practices, indicating that the handwashing practices were significantly different between the villages.

Furthermore, the handwashing practices of the interviewee in the previous 24 hours were investigated. The total percentage is above 100 as individuals could have washed their hands on multiple occasions in the previous 24 hours. The results show that 91.8% of the interviewees washed their hands before eating. 64.4% of the interviewees reported washing their hands before cooking, 47.0% before serving food, 53.0% after defecation and 26.3% after cleaning a baby. Results for handwashing after baby cleaning was only reported for HHs with a child < 5 years of age. Furthermore, some HHs also reported handwashing before praying, although these numbers should be interpreted with caution since these responses fell under the "other" category—meaning that other interviewees may also have washed their hands before praying but did not think to mention it. The number of interviewees washing their hands before cooking and serving food, and after cleaning a baby was significantly different between villages. However, these figures should also be interpreted with caution since it was unclear if the interviewee was responsible for these tasks within the HH. It could be that the interviewee, for example, did not cook and for that reason did not report washing their hands before cooking while the person responsible for cooking did wash their hands.

7.4 ACCESS TO INFORMATION AND FOOD PRACTICES

7.4.1 Access to information

Table 11: number of HH having access to information and the source of information.
P-value calculated using Pearson's chi-square test

		Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Access to nutrition information (%)		152 (41.5)	22 (29.3)	41 (43.6)	29 (49.2)	18 (34.6)	17 (36.2)	25 (64.1)	0.007
When access; from who (%)	Health worker	107 (70.4)	16 (72.7)	25 (61.0)	14 (48.3)	17 (94.4)	17 (100)	18 (72.0)	
		54 (35.5)	6 (27.3)	16 (39.0)	17 (58.6)	6 (33.3)	5 (29.4)	4 (16.0)	
		18 (11.8)	1 (4.5)	0 (0.0)	0 (0.0)	8 (44.4)	0 (0.0)	9 (36.0)	
		8 (5.3)	0 (0.0)	3 (7.3)	1 (3.4)	3 (16.7)	0 (0.0)	1 (4.0)	
		2 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (8.0)	

Access to food safety information (%)		137 (37.4)	20 (26.7)	44 (46.8)	25 (42.4)	19 (36.5)	15 (31.9)	14 (35.9)	0.130
When access; from who (%)	Health workers	107 (78.7)	16 (80.0)	28 (63.6)	18 (75.0)	16 (84.2)	15 (100)	14 (100)	
		45 (33.1)	5 (25.0)	15 (34.1)	2 (8.3)	8 (42.1)	8 (53.3)	7 (50.0)	
		10 (7.4)	0 (0.0)	0 (0.0)	0 (0.0)	8 (42.1)	0 (0.0)	2 (14.3)	
	Media	4 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	4 (21.1)	0 (0.0)	0 (0.0)	
	Government official	11 (8.1)	0 (0.0)	4 (9.1)	6 (25.0)	0 (0.0)	1 (6.7)	0 (0.0)	
	Community leader	4 (2.9)	0 (0.0)	0 (0.0)	1 (4.2)	1 (5.3)	0 (0.0)	2 (14.3)	
Access to hand wash information (%)		178 (48.6)	24 (32.0)	47 (50.0)	37 (62.7)	24 (46.2)	24 (51.1)	22 (56.4)	0.014
When access; from who (%)	Health worker	118 (66.3)	16 (66.7)	22 (46.8)	21 (56.8)	15 (62.5)	23 (95.8)	21 (95.5)	
	NGO	25 (14.0)	5 (20.8)	14 (29.8)	1 (2.7)	3 (12.5)	1 (4.2)	1 (4.5)	
	School	5 (2.8)	0 (0.0)	0 (0.0)	0 (0.0)	5 (20.8)	0 (0.0)	0 (0.0)	
	Media	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.2)	0 (0.0)	0 (0.0)	
	Government official	18 (10.1)	1 (4.2)	9 (19.1)	8 (21.6)	0 (0.0)	0 (0.0)	0 (0.0)	
	Community leader	9 (5.1)	2 (8.3)	1 (2.1)	6 (16.2)	0 (0.0)	0 (0.0)	0 (0.0)	

In total, 41.5% of the HHs received some sort of nutrition information. However, the chi-square distribution showed a significant association between village and access to nutrition information, indicating that access to nutrition information was significantly different between the villages. In Muli, 49,2% of the HHs reported that they received nutrition information, while in the village of Gura'ale, only 34.6% received information.

If HHs received nutrition information, most received it from health workers. The sum of the percentage of all sources of information per village can be above 100 since HHs can have multiple sources of information. Non-governmental organisations (NGOs) were the second most reported source of information. However, the Pearson's chi-square test indicates that there is an association between the village and these two sources of information, indicating that the distribution between HHs reporting getting information from these two sources (if they ever received information) is different per village.

37.4% of all HHs report that they received information about food safety practices. Furthermore, the Pearson's chi-square test indicates that there is no association between the village and receiving information about food safety.

If HHs received information about food safety, most of them received it from health workers (78.7%). NGOs (33.1%) were listed as the second most mentioned source of food safety information. The sum of the percentage of all sources of information per village can be above 100 since HHs can have multiple sources of information.

Almost half of all the HHs in the study population received information about handwashing (48.6%). The Pearson's chi-square test indicates that there is an association between the village and the number of HHs receiving handwashing information, indicating that this average number is not applicable for all villages. The highest percentage of HHs receiving information about handwashing lived in the village of Gita-gile (56.4%). The lowest percentage of HHs receiving hand wash information lived in the village of Adkoma (32.0%).

HHs receiving information about handwashing got this information most often from health workers (66.5%). Especially in the village Gilagoda and Gita-gile, health workers were the main source of handwash information (95.8% and 95.5% respectively). The second most mentioned source of handwash information is NGOs (14.0).

7.4.2 Food practices and beliefs

Table 12: number of HH with specific food practices and believes.

P-value calculated with Pearson's chi-square test. The total percentage of HHs per village is above 100% since HHs could give multiple answers.

		Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Diversified diet meaning (%)	**Don't know**	23 (6.3)	6 (8.0)	6 (6.4)	1 (1.7)	5 (9.6)	1 (2.1)	4 (10.3)	0.317+
	More animal source food	282 (77.0)	63 (84.0)	78 (83.0)	27 (45.8)	39 (75.0)	40 (85.1)	35 (89.7)	<0.001
	Different cereal types	138 (37.7)	17 (22.7)	19 (20.2)	9 (15.3)	23 (44.2)	38 (80.9)	32 (82.1)	<0.001
	Eating as much as possible	88 (24.0)	24 (32.0)	27 (28.7)	26 (44.1)	9 (17.3)	2 (4.3)	0 (0.0)	<0.001
	More fruit and vegetables	65 (17.8)	12 (2.0,)	30 (31.9)	6 (10.2)	12 (23.1)	1 (2.1)	1 (2.6)	<0.001
It is good to give your child different foods every day (%)		270 (73.8)	65 (86.7)	85 (90.4)	37 (62.7)	25 (48.1)	34 (72.3)	24 (61.4)	<0.001
Difficult to give child different foods* (%)	**Not difficult**	105 (48.4)	23 (60.5)	26 (50.0)	15 (60.0)	12 (32.4)	14 (38.9)	15 (51.7)	0.015
	Bit difficult	55 (25.3)	6 (15.8)	10 (19.2)	6 (24.0)	19 (51.4)	8 (22.2)	6 (20.7)	
	Difficult	57 (26.3)	9 (23.7)	16 (30.8)	4 (16.0)	6 (16.2)	14 (38.9)	8 (27.6)	

Discourage sugary foods (%)	**Yes**	76 (20.8)	14 (18.7)	12 (12.8)	4 (6.8)	29 (55.8)	8 (17.0)	9 (23.1)	<0.001
	No	162 (44.3)	28 (37.3)	48 (51.1)	38 (64.4)	8 (15.4)	26 (55.3)	14 (35.9)	
	Don't know	128 (35.0)	33 (44.0)	34 (36.2)	17 (28.8)	15 (28.8)	13 (27.7)	16 (41.0)	
Foods young children should avoid (%)	**Yes**	47 (12.8)	8 (10.7)	18 (19.1)	7 (11.1)	7 (13.5)	5 (10.6)	2 (5.1)	0.001
	No	200 (54.6)	29 (38.7)	43 (45.7)	40 (67.8)	31 (59.6)	27 (57.4)	30 (76.9)	
	Don't know	119 (32.5)	38 (50.7)	33 (35.1)	12 (20.3)	14 (26.9)	15 (31.9)	7 (17.9)	

** Only includes HH with a child < 5 years of age*

+ > twenty percent of the cells with an expected count below five, violating the chi-square test assumption

Only a small percentage of HHs reported having no answer to, or no ideas about, what a diversified diet looks like. Most HHs (77%) reported that a diversified diet means that more animal foods should be consumed. 38% and 27% of HHs respectively interpreted a diverse diet as eating different cereal types like pasta, bread and injera or as consuming as much as possible. Only 18% of the HHs stated that eating more fruit and vegetables or adding fruit and vegetables to the staple diet regularly were ways to achieve a diversified diet. The percentage of HHs giving one of the answers was significantly different for the different villages, except for the answer "don't know".

Most (74%) of the HHs report thinking that it is good to provide your child with different foods every day, but this percentage is significantly different between different villages (P-value <0.001). However, more than half of HHs report that it is a bit difficult or difficult to provide different foods every day (25% and 26% respectively). This percentage was significantly different for the different villages (P-value =0.015). The most mentioned reason why people cannot provide different foods for their child is poverty/lack of money/unable to buy other foods. Sometimes, availability was also given as a reason. Only a few participants gave agricultural reasons such as drought or locust plague.

44% of the interviewees report that consumption of sweets and sugary foods should not be discouraged for young children. Only 21% of the interviewees report that sugary foods should be avoided. These percentages differ significantly over the different villages (P-value <0.001). The most mentioned reason for why children should be discouraged from consuming sugary foods and sweets was that too many sweets could cause diseases or is unhealthy. Diarrhoea, dental problems and common cold were mentioned as possible diseases that could be caused by sweets. Another non-health related reason was that sweets are too costly.

Only a small percentage of the interviewees (13%) stated that there are some foods that small children should not consume. However, the percentage of HHs differed significantly between different villages (P-value=0.001). If the interviewee stated that specific foods should be avoided, the most mentioned food

was meat and if specified, camel meat. Another type of food mentioned was 'heavy bread'. Both foods would be difficult to digest for small children.

7.4.3 Food safety practices

Table 13: number of HH carrying out specific food safety practices.
P-value calculated with Pearson's chi-square test

		Total	Adkoma	Mesgid	Muli	Gura'ale	Bilaloda	Gita-gile	P-value
Storage of perishable foods (%)	**Covered**	327 (89.3)	66 (88.0)	78 (83.0)	46 (78.0)	51 (98.1)	47 (100.0)	39 (100.0)	<0.001
	Separate from other foods	176 (48.1)	31 (41.3)	40 (42.6)	14 (23.7)	37 (71.2)	30 (63.8)	24 (61.5)	<0.001
	Refrigerator	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.1)	0 (0.0)	0.235[+]
	Don't know	10 (2.7)	3 (4.0)	3 (3.2)	4 (6.8)	0 (0.0)	0(0.0)	0 (0.0)	0.154 [+]
	Other	15 (4.1)	6 (8.0)	8 (8.5)	0 (0.0)	1 (1.9)	0 (0.0)	0 (0.0)	0.013 [+]
Preparation of raw fruit & vegetables (%)	**wash with clean water**	269 (73.5)	53 (70.7)	71 (75.5)	42 (71.2)	35 (67.3)	33 (70.2)	35 (89.7)	0.204
	Don't know/ nothing	97 (26.5)	22 (29.3)	23 (24.5)	17 (28.8)	17 (32.7)	14 (29.8)	4 (10.3)	

[+] *> twenty percent of the cells with an expected count below five, violating the chi-square test assumption*

HHs were asked how they stored perishable foods. While only three percent of HHs reported that they did not know how to store perishable foods, this result seems a bit unrealistic and could be due to a registration error. Only one HH reported having a refrigerator. Most HHs (89%) covered the perishable foods and almost half (48%) stored these foods separate from ready to eat or cooked foods. Some HHs reported having 'other' methods to handle perishable foods, usually referring to the drying of meat.

HHs were also asked what they do before eating raw fruit and vegetables. The majority (74%) of HH reported that they wash the food with clean water before consuming it. The other HHs reported doing nothing or not knowing what to do before consuming. There was not a significant difference in this distribution over the different villages (P-value = 0.204).

7.5 ASSOCIATIONS

7.5.1 Factors associated with diarrhoea incidence

Table 14: number of children with diarrhoea per specific WaSH indicator.

P-value calculated using the Pearson's chi-square test.

		N of children with diarrhoea in the previous 2 weeks (%)	P-value
JMP Water ladder	**Surface water**	5 (15.6)	0.672
	Unimproved water source	2 (8.7)	
	Limited water source	8 (12.5)	
	Basic water source	3 (6.7)	
	Safely managed water source	8 (15.1)	
JMP Sanitation ladder	Open defecation	20 (13.1)	0.444
	Unimproved/unclear facility	6 (9.4)	
JMP Hygiene ladder	No facility	13 (10.2)	0.505
	Limited facility	11 (15.7)	
	Basic facility	2 (10.5)	
Access to hand wash information	Yes	12 (10.7)	0.553
	No	14 (13.3)	
Access to food safety information	Yes	18 (13.2)	0.461
	No	8 (9.9)	

+ Cells with an expected count below five

The results show that there were twenty cases of diarrhoea in HHs practising open defecation and only six in HHs using a toilet facility. Also, diarrhoea incidence was only two in HHs with a basic facility but much higher in HHs with no facility of a limited facility. However, the total incidence of diarrhoea was quite low in the total study population. Due to the insignificant P-value, it is not possible to state if the differences in diarrhoea incidence were due to chance or due to different toilet facilities.

In addition, the percentage of HHs having access to information about hand wash practices or access to information about food safety was not significantly different between the children having diarrhoea in the previous two weeks of the data collection (P-value = 0.553 and P-value =0.461).

7.5.2 Factors associated with DD

Table 15: median DD score for different food practices or food availability.

P-value calculated using the Man-Whitney U test.

		n	Median DD score (IQR)	P-value
How good is it to give your child different foods every day	Good	170	2.0 (1.0)	<0.001
	Not sure/not good	47	0.0 (1.0)	
Access to nutrition information	Yes	92	2.0 (2.0)	0.312
	No	125	1.0 (2.0)	
Food avoidance for young children	Yes	29	1.0 (2.0)	0.221
	No/ don't know	188	1.0 (2.0)	
Access to land for crop cultivation	Yes	125	1.0 (2.0)	0.100
	No	92	2.0 (1.0)	
Livestock ownership	Yes	197	1.0 (2.0)	0.727
	No	20	1.0 (2.0)	

Table 15 shows the association between the DD score of children and the belief that giving your child different foods every day is positive, the access to nutrition information and food avoidance for young children. The Mann-Whitney U test indicates that the DD score is higher for HHs that believed that consuming different foods every day is beneficial for a child (P-value < 0.001). DD score was not significantly different for HHs that accessed nutrition information or believed that young children should avoid specific foods. Furthermore, these results also indicate that there was no association between access to land or livestock ownership and the child's DD diversity score.

Table 16: correlation between HH food production score and child DD score.

P-value calculated using Spearman correlation

	Correlation coefficient with child DD score	P-value
HH food production score	0.153	0.025

The correlation coefficient indicates that HH food production score was weak but significantly and positively correlated with child DD score.

8. QUALITATIVE RESULTS

FGDs and individual interviews centred on the ten photos selected by PhotoVoice participants. These images were summarized into four themes: preparation and consumption of food, collection of food items, WaSH, and culture. The detailed findings are presented below.

8.1 PARTICIPANT DEMOGRAPHICS

A total of 36 community leaders (30 women and 6 men) participated in the PhotoVoice research.

Table 17: PhotoVoice participants by gender and community role in study villages

Village	Mothers with children under five	Female natural leaders	Kebele leaders (male)	Total participants per village
Muli	3	2	1	6
Gita-gile	2	2	1	5
Bilaloda	2	2	1	5
Mesgid	5	2	1	8
Gura'ale	3	2	1	6
Adkoma	3	2	1	6
Total	18	12	6	36

8.2 FOOD PREPARATION AND CONSUMPTION

The most commonly eaten food in the Afar pastoralist community is *Mufie*. *Mufie is* a flatbread that is made from unfermented dough of maize/wheat flour. It is served for breakfast, lunch and dinner for all family members including children and preferably eaten with milk. When milk is unavailable *Shiro* sauce is used instead. *Shiro* is a sauce made from pea flour, onion, pepper, oil, and salt. *Injera* has become more common recently as an alternative food to *mufie* although the main ingredients are the same (wheat/maize). *Injera,* is a flatbread that is baked from fermented dough. Like *mufie*, it is served with milk (if available) or *Shiro* sauce. *Injera* seems to be preferred to *mufie* but *mufie* remains a staple food for families in times of food scarcity because it can be eaten without sauce.

Porridge and rice are also sometimes served as an alternative food to *mufie* and *injera*. Like *Mulfie* and *injera*, the main ingredients used to make porridge are maize and wheat flour. This dish uses butter instead of oil. Almost all respondents identified porridge with butter and rice with meat as nutritious foods, good for children. However, both are often unaffordable and/or served only occasionally, for guests and children. Aside from that, coffee and tea beverages are served after a meal (usually lunch) as a routine custom or for a *Dagu* social gathering (described below). Some respondents said that buying sugar for tea is not easily affordable for families.

Although the pastoralists are lacking nutritional knowledge on their staples like *mufie* and *injera*, almost all FGD and interview respondents claimed that adding a dairy product makes food more nutritious. Although the main dishes are the same for children and adults, the participants mentioned that they feed more milk and porridge to their children. They stressed that milk is good for children as it is easy for digestion and helps children to grow faster and get stronger. Despite this understanding, participants repeatedly mentioned that their HHs do not have milk on a regular basis as the cows that used to produce the highest share of the community's milk have been wiped out due to frequent droughts.

During an individual interview, a woman explained: "I took this picture because *Mufie* is our everyday food, and we may eat this for weeks without any additional food (breakfast, lunch and dinner). It is made from wheat or maize. We eat it with Shiro or milk."

Figure 7: PhotoVoice picture showing the participant's family eating mufie, a staple of the communities in the study

Another woman stressed the poor diversity of their regular food by comparing it with the food in town: "I ate this food at the hotel in the town. This food has different items like beetroot, potato and the sauce which is made from lentil, onion, oil, and pepper, and the injera is made from *teff* and smooth. So, this is a diversified food, but we couldn't afford such food at home."

Maternal practices regarding food preparation and consumption in the postnatal period are notable.

Mothers seem to eat better during the postnatal period. They also obtain better health care during pregnancy. After a woman gives birth, it is common practice for a goat or sheep to be slaughtered. Meat therefore becomes part of the routine meal to help women recover from their pregnancy and birth. A mother from Bilaloda said: "we got good care when we give birth. We will have meat, pasta, and rice frequently. We also have time for showering and doing steam because we stayed at home for 3 months." However, outside the postnatal period women face a very heavy HH workload, causing some respondents to occasionally miss meals. Another woman explained that because of a result of their workload, "Women may forget to eat regularly or may skip meals because we have a lot of responsibilities and got tired."

With respect to child nutrition, PhotoVoice participants emphasized the importance of exclusive breast-feeding up to the age of 6 months, complementary feeding after 6 months of age, and no pre-lacteal feeding. They claimed that children are prioritized, and they try to feed them foods like milk, porridge, *mufie* with milk, rice, pasta, and meat, all of which are believed to be healthy. However, because of financial limitations to buy different kinds of foods, children usually eat any available food prepared for the entire family, mainly *mufie* with *Shiro,* or milk if available. It was also mentioned that children eat separately from adults as they tend to eat slowly.

Figure 8: One of the participants captures her children having a meal of Mulfie and Shiro

8.3 COLLECTION OF FOOD ITEMS

According to the photos and the interviews and FGDs with PhotoVoice participants, the food items used for making the usual meals in all six communities are similar. The main food types in the community are maize, wheat, rice, and *Shiro*. All the participants, except two respondents from Gita-gile who produce maize themselves, purchase all crops and spices from the local market. Milk and butter are produced from their own livestock. Income is primarily generated by selling livestock, such as goats and sheep. Goats are also the main source of milk. Men usually sell livestock in the market and buy complementary food items from that same food market.

Figure 9: A participant has captured an example of foods available at the market; potatoes and onions

An FGD participant from Muli village who captured a picture of a marketplace said: "This picture shows the marketplace of livestock. I went to the market to sell a goat, and I bought pepper and other things after I sold it. We get money by selling goats and buy everything for the family. We don't harvest and we are supposed to buy every food item. We also buy materials for sanitation and hygiene, like soap for washing, and other materials, like wood for latrine construction." In addition, a few participants also mentioned that they receive a food ration from the government.

The pastoralists claimed that milk productivity has reduced drastically. The frequent droughts in recent years have wiped out most of their cattle, so it has been difficult for pastoralists to acquire cow's milk. Camel productivity, including milk, has also reduced in recent years. Most of the respondents also reported that food insecurity is common in their pastoralist community during dry season. The animals are emaciated due to a shortage of fodder. As a result, milk productivity reduces, and animals are of no value to sell. At this time, HHs cannot produce milk or generate income to purchase food. Almost all respondents

claimed that they are not capable of buying a variety of foods, such as fruits, vegetables, rice, or *teff* (a local grain), despite their being available in the market, even in good seasons. They believed that *teff* is better than maize/wheat, rice, and pasta for feeding children, but they could not afford to buy it.

8.4 WASH

The river is the main water source for HH consumption (drinking, cooking, and washing) and for animals. Unlike other villages, participants from Mesgid and Gura'ale mentioned that they have access to communal tap water, although they also use river water when tap water is unavailable. Springs, open ponds, and wells were also mentioned by a few respondents as water sources. The same water source was shared between humans, for HH consumption, and animals. The participants stressed that water is key to life in the desert, but they do not have access to nearby, safe water. Women usually travel long distances to fetch water from the river. Women who do not own donkeys or camels usually carry water on their back, often for long distances. Carrying water was described as tiresome. Untreated river water is used for drinking due to a lack of water treatment chemicals. One participant from Gita-gile said: "We collect water from the river, but it is not safe. When rains in another area, lots of rubbish come with the flood. We don't use water treatment because it is not available unless we get from the health bureau."

Figure 10: A PhotoVoice picture of women collecting surface water from a water source that is shared with livestock

The community generally cannot get water treatment tablets in the local market, unless local health offices or NGOs distribute them. As a result, some participants claimed that diarrhoea is common in their community due to unsafe drinking water. A woman who had taken a picture of the collection of source water said, "as you know, water is life; we use it for drinking, cooking, handwashing, washing clothes and utilities. Water should be clean (safe), at least for drinking, but as you see the water I was fetching is not clean because animals also drink from it."

The participants also took photos illustrating WaSH practices. They mentioned basic hygiene practices such as hand washing before cooking and eating, handwashing after using the toilet, washing utensils (pot, tray, and plates), washing, and dressing the girls' hair, showering, washing clothes, and the use of soap for washing hands, clothes, and showering. Washing clothes and showering were mentioned as essential practices to prevent skin infections. Although the participants reiteratively mentioned the importance of soap for hygiene, most of them usually did not use soap for handwashing and showering because of financial imitations.

Figure 11: A PhotoVoice participant shares a picture of handwashing

The participants emphasized the importance of compound cleaning and latrine use. However, only one woman took a photo of a latrine, again bringing up the question of their widespread use within these communities. The latrines in the area are built using local materials but since the area is very windy, latrines are usually wiped out by the wind. Hence, most of the HHs did not own latrines. Similarly, while the participants claimed that children wash hands before eating, photos showed children sitting on the dusty or dirty ground while eating: "Children eat separately from adults, and they sit everywhere, either inside the house or outside. They don't have the patience to look for something to sit on, like a mat, and they do not care whether there is shit or not."

Figure 12: Through her photo, a participant shows an example of how children often eat their food on the dirty ground

8.5 CULTURAL ISSUES

Pastoralists build temporary huts that are made using readily available local materials. When they move, the materials are collected and carried for re-use in the next settlement. In the Afar community, most HH activities are the responsibility of women and girls, including fetching water, collecting firewood, constructing huts, cleaning, and cooking. Men are responsible for looking after animals, selling animals to earn money, and buying food ingredients from the market. However, women also help with milking, looking after animals, and going to the market. Most of the participants claimed that there is no gender difference in market activities in the Afar community; although men do it most often, women also sell animals and buy food ingredients. In other words, women carry an overwhelming workload that affects their health and nutrition.

A woman who took a picture while constructing a hut said, "This picture shows how a woman constructs her house. As you see, constructing the house is the responsibility of the women in our community; look! The husband was there while she was constructing the house, but he was not helping her."

Figure 13: PhotoVoice picture of of woman constructing a hut, a task that is exclusive to women in the communities studied

The other main hygiene-related cultural practice in the Afar community is the use of traditional steam. The traditional steam is practised using smoke from special woods with fragrance, to smooth and perfume the skin. Community members also use the smoke as a perfume for their clothes. Additionally, unmarried girls and boys use a traditional method of hair beautification. They use a mixture of suet, hair oil and a special leaf that has a nice smell, to beautify hair and make it curly.

Figure 14: A PhotoVoice picture showing a woman taking a traditional steam bath

A woman who took a picture of herself at the traditional steam said, "…First, we dig a small hole and in it we place the wood, which is used only for beauty purposes. We set the wood on fire and wait untill it starts smoking. Then we sit on a stone on the top of the hole, covered with a blanket, and wait for around one hour till the smoke ends. We couldn't find perfume, and this is the only way to have a good smell. It is also important to have smooth skin. We mostly do it after showering and wear clean clothes afterwards. A woman who doesn't smell good is labelled as 'lazy and unhygienic'."

The coffee ceremony was also identified by all participants in all villages as a big part of their day-to-day life. This is a cultural event where people meet with neighbours after lunch and share information related to issues like security, health, nutrition, WaSH, etc. The coffee ceremony, and sometimes tea-drinking, is used for both social gatherings and the traditional *Dagu* way of exchanging information—when Afar people meet in the streets, villages, grazing fields, markets, or elsewhere, they exchange tales of anything heard, observed or of recent incidents. *Dagu* is a very fast information-sharing mechanism for the Afar people.

9. FINAL WORKSHOP AND COMMUNITY INTERVENTION

Following the completion of data collection and analysis, workshops were held in the six woredas to formalise the handover of the intervention from GIZ to the community itself. Participants included health extension workers, school directors, women, and youth representatives, Kebele leaders, agriculture representatives, religious leaders, clan leaders, and some of PhotoVoice participants.

First, the main findings and analysis were presented to the community for validation and explanation of how the conclusions had been reached. After the presentation, the groups had a chance to review the photo album of PhotoVoice pictures. This served as an icebreaker to help participants discuss problem identification, actions, and potential solutions.

Discussions were facilitated to explore the problems by engaging communities in discussing gender, social and power issues that affect nutrition and WaSH outcomes in the community. Participants were asked about norms and inequalities highlighted in the photos, with a focus on who is affected by inequitable norms and practices, how they and their children are affected and what negative consequences this has for individual and community wellbeing.

Participants spoke about some of the cultural norms that were beginning to change as a result of the intervention. For example, religious and clan leaders explained: "women carry a great workload throughout their life. Before, women were supposed to carry babies when they go to collect firewood and water, but now some husbands will stay with the babies at home until mothers come back from water and firewood collection."

Another participant described how, "before, husbands would beat their wives if there was a single task which women didn't complete because they have been busy, but now they almost stopped doing so. Formerly, we didn't care for women at all, but now we are at least caring them while they give birth."

After a thorough discussion within the groups and recognizing how gender, social, and power norms can negatively affect their community, participants generated action plans to address those cultural norms. They were encouraged to identify why those norms should be changed, how this could happen, who would support or oppose the changes (risks and possible solutions) and who would hold responsibility to implement an action plan. Different communities prioritised certain changes over others, depending on what they saw as their most pressing issues.

Table 18: Activities identified and prioritised by community

Each community identified key activities to improve nutrition and sanitation and then ranked them, with 1 being the highest priority.

Activity	Priority Level by Community					
	Muli	Gura'ale	Adkoma	Mesgid	Bilaloda	Gita-gile
Improving child feeding practice	1	2				3
Improving latrine utilization	2	4	4	4		
Using water treatment options	3	3	3			
Avoiding solid food before weaning	4	5	1	5	2	
Minimizing women's workload	5	1	2	3	3	2
Improving hygiene during food preparation		6		6	5	
Proper solid waste disposal			5			
Improving personal hygiene				1		
Proper water management				2	4	1
Improving maternal nutrition					1	
Serving food for small children separately (from older siblings)						4

This table highlights that, while there were differences between how communities prioritised actions, there was much overlap of key activities. For example, all of the communities identified reducing women's workload as an important activity and all but one regarded avoiding solid food before weaning as significant.

10. ANALYSIS

This section will summarise the most important findings and the methodological implications that should be considered when interpreting the results.

As part of the household survey, we asked people a series of questions designed to assess their understanding of nutrition in terms of food value, dietary diversity and healthy child feeding practices. A total of 366 households (289 female) participated in the study. Of those, 217 (172 female) reported having children under the age of 5. We found that most people believed it was good to give children different kinds of food every day (74%). Despite resource constraints and food availability, nearly half of households said it wasn't difficult at all to feed their children different types of food (48%) or only a bit difficult (25%). In terms of understanding the nutritional value of different foods or the nutritional needs of children, 55% of households did not believe there were any foods that children under 5 should not consume and only 13% thought otherwise, with most reporting that young children should not eat meat. Only 21% of households thought that they should discourage children from consuming sugary foods.

We also asked questions related to what types of food people had fed to their children under 5 years in the preceding day. This reflects resource availability more than nutrition knowledge; however, it is still worth noting that nearly 78% of children had consumed Injera, bread, rice, noodles, porridge, or other foods made from grains such as teff, oats, maize or barley, but only 15% had consumed any vegetables or fruit at all, the same percentage who had consumed any sugary foods such as chocolates, sugar, sugar cane, honey, sweets, candies, cakes, biscuits, or jam. This is reflected in responses to questions about what constitutes a diversified diet, where most people said that eating more animal products meant diverse and very few people thought that eating fruits and vegetables contributed to dietary diversity.

Knowledge about nutrition generally reflected people's access to information, with just under half of all respondents (42% Male/45% Female) reporting having access to information and support through health extension workers and schools in their communities. What became clearer after the community action planning workshops was that many people knew certain practices, such as pre-lacteal feeding, were not beneficial to small children; however, they felt that cultural pressures played a role in perpetuating these practices. Other knowledge related to dietary diversity and nutritional values of certain foods is reflective of availability of those foods combined with resource constraints.

The 366 households surveyed represent the majority of households in the target 6 villages. The only households excluded were those who participated in the PhotoVoice sessions. All those who participated in either the qualitative or quantitative parts of the formative research were asked to recall and provide insights on nutritional awareness and information. From a quantitative perspective, this represents around 80-90% of residents in our 6 target locations and therefore is representative for the population mentioned in the original project indicator.

Despite previously mentioned project constraints including civil unrest and the COVID-19 pandemic, the key indicator has been achieved; 60% of 7800 people who have participated in measures to raise awareness of healthy nutrition and care practices at social gathering points in pastoral communities (markets; schools, etc.), can explain using one example what knowledge they have gained in relation to healthy nutrition and/or care practices.

10.1 HH FOOD PRODUCTION

Participants in the qualitative research stated that keeping livestock is the backbone of the local economy, with most HH income generated by selling mainly goats and sometimes sheep. These findings reflect the results of the quantitative HH survey, in which 87% of the interviewed HHs reported owning some type of livestock and resulting in higher production of dairy and meat. It is interesting to note that ownership of chickens was very limited, resulting in few eggs being available in these communities.

The quantitative HH survey showed that a limited number of HHs (37%) had access to agricultural land and that crop production was less widely practised compared to livestock keeping. The production of vitamin A-rich fruits and vegetables was especially limited (9% of the HHs), but the production of grains, roots, and tubers (34%), legumes (13%), and other fruit or vegetables (18%) were also minimal. However, the number of HHs producing a food group and the total HH production score was different for all villages, indicating that production patterns vary widely between villages. The village of Bilaloda had the highest total HH food production score and the HH production score was significantly higher than all villages except Gita-gile.

The qualitative study showed that the local breads—*mufie* and *injera*—are the main staple foods. Both are made from maize and/or wheat flour. *Mufie* is often eaten with milk or *Shiro*, a sauce made from bean and/or pea flour, onion, pepper, oil, and salt; *injera* is always eaten with *Shiro*. Furthermore, porridge and rice are sometimes served. While also made from wheat and maize, porridge also contains butter. Very occasionally (due to the unaffordability of these ingredients), rice and meat are consumed. The quantitative HH survey showed that ingredients for most of these commonly eaten foods are rarely produced by the HH, which supports the report of the focus groups that most food items are purchased at the local market.

10.2 FOOD INTAKE AND DIETARY DIVERSITY OF CHILDREN BELOW THE AGE OF FIVE

The quantitative HH survey showed that the DD score for all children under five was low: less than 10% of all children met the minimal DD score of four food groups. Especially in the lowest age category (6-11 months old), only dairy, processed food and grain, root and tubers food groups were consumed. For children up to two years, the total DD score was also very low; more than 30% of children in this age group consumed only the food groups grains, roots, tubers, and dairy. While the total DD score was not

significantly different between villages, each had a different consumption of specific food groups, indicating that the villages have different food consumption patterns. Food groups significantly associated with the villages were grains, roots, tubers, legumes, other fruit and vegetables and processed food.

These findings match the narrative drawn from the qualitative study. However, the low consumption of legumes is surprising considering the frequent consumption of *Shiro*. It is possible that *Shiro* has been misclassified as a grain because it is made of pea flour. This is supported by the fact that *Shiro* was not mentioned as an example of food containing legumes. However, the number of food groups consumed remains very limited, even when considering this underestimation of legume consumption.

The qualitative study also showed that children are prioritized for better food practices. However, financial limitations forced families to feed children with the available foods that are prepared for the entire family, mainly *mufie* with *Shiro* sauce or milk if available. These findings are in line with the HH quantitative survey indicating that the food groups grains, roots and tubers and dairy are the most consumed food groups consumed by children under five.

10.3 YOUNG CHILD FEEDING PRACTICES

This study also investigated other young child feeding practices besides DD. The qualitative study showed that participants emphasized the importance of exclusive breastfeeding up to 6 months and complementary feeding after 6 months, as well as the importance of breastmilk being the first food consumed by a new-born. This attitude towards breastfeeding was also reflected by the quantitative HH survey. 95% of all children were breastfed and the percentage of breastfed children was still above 90% for children up to 17 months of age. Solid or semi-solid food consumption in the previous day was very low (33%) in children between the ages of 6 and 12 months. In the older age categories, solid or semi-solid food consumption was also limited (47%, 78% and 83% respectively for the age categories 12-17 months, 18-23 months, and 24-58 months), indicating that many children did not consume any complementary foods in the previous day.

10.4 WATER FACILITIES AND PRACTICES

Results from the quantitative and qualitative study were somewhat conflicting regarding the use of different types of water facilities. The qualitative study showed that most HHs except those in Mesgid and Gura'ale, which had access to communal tap water, used the river as their main water source. Few respondents mentioned the use of springs, open ponds, and wells. The quantitative HH survey partially supported this, showing that all HHs in Gita-gile used surface water as their main source of water, and almost all HHs in Mesgid and Gura'ale used an improved water source (limited, basic, or safely managed). However, the quantitative survey also reported that in addition to surface water, most HHs in Muli and Adkoma used an improved (limited, basic, or safely managed) water source, and that while most HHs in Bilaloda used

an unimproved water source. An explanation for this difference between the qualitative and quantitative studies could be that survey participants provided socially desirable answers, stating inaccurately that they used an improved water source but also (occasionally) other water sources. Another explanation for these different results could be that the qualitative study did not capture the full diversity of the water sources used. Both explanations could be applicable and appearing simultaneously in the data.

Both studies showed that women were responsible for the collection of water, often travelling great distances. Notably, some participants of the focus group discussions stated that diarrhoea is common in their community due to unsafe drinking water, explaining that water was not treated due to a lack of water treatment chemicals. The community could not get water treatment tablets in the local market unless local health offices or NGOs distributed them. This is in line with the findings of the quantitative HH survey that 91% of HHs did not treat their water before using it.

10.5 SANITATION FACILITIES AND PRACTICES

The qualitative study found some discrepancy regarding the use of latrines. Participants emphasized the importance of latrine use. However, only one woman in the PhotoVoice study took a photo of a latrine. The latrine was built using local materials but since the area is very windy, latrines are usually wiped out by the wind. Because of this, most of the HHs did not own latrines. The low ownership of latrines and the low quality of the latrines are also reflected by the HH quantitative survey, which showed that most HHs practised open defecation (71%). All HHs that owned a latrine owned an unimproved one. Furthermore, some of the HHs indicated that they did not own or use a latrine because it was broken down. This aligns with the photo from the PhotoVoice research, which showed a latrine made of materials vulnerable to the harsh winds in the area.

The quantitative HH survey also investigated how HHs handled infant and animal faeces. Most HHs reported disposing of infant faeces in the bushes (42.4%) or burying the faeces (40.6%). Only 8.3% of the HHs reported doing nothing with their infant's faeces, with the highest percentage (17.3%) living in Mesgid. Animal faeces were most often disposed of in the bushes (55.2%), although 17.5% of the HHs left their animal faeces in the open. It is possible that this is correlated to the survey's finding that 12% of all children suffered from diarrhoea in the past two weeks, but no conclusion can necessarily be drawn from this. These findings are in line with the findings of the 2016 demographic and health survey3.

10.6 HYGIENE FACILITIES AND PRACTICES

Participants in the qualitative study discussed hand washing practices before cooking and eating and after using the toilet. However, the use of soap was rarely mentioned. The quantitative HH survey found similar

3 Central statistical agency. (2017, July). *Ethiopia Demographic and Health survey 2016.* Retrieved from https://dhsprogram.com/pubs/pdf/FR328/FR328.pdf

results, with 92% of the participants indicating that they had washed their hands before eating in the previous 24 hours. However, only 53% of the participants reported washing their hands after defecation, and only 26% of the interviewees with a child under five in the HH reported washing their hands after cleaning a baby. Results about handwashing before cooking are less representative since not all interviewees were responsible for cooking. In the majority of HHs (68%), a handwashing facility was not observed, and only 6% of the HHs owned a handwashing station with soap. Furthermore, participants in the qualitative study claimed that children wash their hands before eating, but photos showed children sitting on dusty or dirty grounds while eating, effectively countering any attempts at keeping the eating area sanitary. This suggests that while awareness of the importance of handwashing may be present in the community, the practise and facilities for handwashing are limited.

10.7 FOOD PRACTICES AND BELIEFS

Both qualitative and quantitative studies investigated what a diversified diet meant for the community and perceptions of nutritious foods. The quantitative HH survey showed that for most people, a diversified diet meant that animal-sourced food should be consumed. In the qualitative study, participants claimed that adding milk or dairy to the meal makes it nutritious. Both studies showed that adding fruit or vegetables to the diet was not a common belief or practise to make meals more nutritious.

Participants in the qualitative study stated that the food intake of children should be prioritized and that they should consume foods believed to be more nutritious, like porridge or rice with meat. The quantitative HH survey also showed that most HHs think it is positive to give your child different foods every day. However, the FGD revealed that nutritious foods or foods other than the staple diet of *mufie* and *Shiro* are often unavailable due to limited financial means.

10.8 GENDER-BASED FACTORS

The qualitative study showed that in the Afar community, most HH activities are the responsibility of women and girls, including fetching water, collecting firewood, constructing huts, cleaning, and cooking. This is supported by the qualitative study, which indicated that women are almost always the main water fetchers whereas men are responsible for looking after animals and selling animals to earn money for food ingredients from the market. However, women also help with milking, looking after animals and going to the market. Most of the participants claimed that there is no gender difference in market activity in the Afar community. However, although it is men who go most frequently to the marketplace, women also sell animals and buy food ingredients. Hence, women are not only overburdened with childcare and domestic duties, they also share the duties carried out by men. This affects their health and nutrition, and there are times when women skip their meals due to multiple HH burdens.

The qualitative study also found a positive practice in maternal and child nutrition. Participants stated that

mothers eat better during the postnatal period. Following the birth of the child, a goat or sheep is slaughtered—making meat part of the routine meal during the postnatal period to restore the mothers' bodies.

10.9 PHOTOVOICE AND PARTICIPATORY RESEARCH

The significance of using PhotoVoice as a qualitative methodology cannot be overlooked, in terms of the ability to engage vulnerable populations and marginalized groups. This research worked with communities with extremely low levels of literacy—particularly among women—and communicating primarily in local languages and not in Amharic. Presenting materials in written form can be intimidating to audiences with lower levels of literacy and in some cases serves to shut down conversations, rather than encouraging them. Non-written methods of communicating and conducting analysis with research participants/researchers is essential.

When representing community stories and narratives, using photographs that beneficiaries themselves have taken can be incredibly empowering for them, as well as a powerful way to communicate with donors and funders. The participants expressed that they enjoyed the discussion after the PhotoVoice project and found it helpful. They shared that in the past, researchers and development practitioners simply showed up in their communities and asked them questions. This time they felt that they were actually part of the project: they were able to participate, had some responsibility to participate, were not under the supervision of anyone and felt empowered. One participant expressed this sentiment: "when you have an itch on your back, if I ask you to scratch it, it won't be satisfying. But if I can scratch it myself, it will feel better, and I will feel more satisfied."

Participatory research can be difficult, time consuming and hard to implement in certain contexts and often what is called participatory is simply consultative at best. In this case, real value came from using the PhotoVoice methodology: more women were engaged in a meaningful way, the communities had an opportunity to influence research design and focus and people felt connected to the outcomes and energized to act, even after the end of the project and GIZ left the community.

During the final workshop, participants were energized and excited to build action plans to carry them forward. Because community members had the opportunity to reflect on the results, discuss why certain issues needed to be tackled and design an action plan that reflected resources and interest, the probability of real change is higher. The degree of commitment to continuing work, even knowing that GIZ would not continue funding this work, was encouraging.

11. KEY RECOMMENDATIONS

This study is reflective of the context within which the Afar people live—the environment, the social, economic, and political climate, the pastoralist culture, etc.—and so many of the findings will reflect other studies with similar communities. However, in the intervention communities, results indicate that beyond simply addressing the lack of resources, there are some areas that should be focused on to maximize impact of future interventions.

The action workshops were conducted based on the premise that the communities and the nutrition action groups would be initiating easily achievable and low-cost cultural shifts in the absence of outside help or financial assistance. These can be considered the "low-hanging fruit", or easily achievable targets for future nutrition interventions, which presumably would be easily accepted by the community. These easily accepted cultural shifts can be used as "anchors" for wider community actions.

11.1 FOCUS ON NUTRITION EDUCATION

While lack of resources was cited as the primary factor in poor dietary diversity, it became clear throughout the intervention that people lacked understanding of what constituted a nutritionally complete diet, particularly when it came to children. Most people said they believed adding meat or milk was what made a diet more nutritious, notably they did not believe adding fruit or vegetables would make a difference.

Beyond the lack of resources to support improved nutrition, there is a general lack of knowledge regarding the specific nutritional requirements of children and mothers. People do not necessarily understand the long-term impacts of childhood malnutrition and the importance of focusing on feeding in early years.

11.2 ADDRESS CULTURAL FACTORS

In the final focus group discussions and action planning sessions, virtually all the communities identified women's heavy workload and pre-lacteal feeding practices as key points for change. Indeed, it was the community members themselves that highlighted cultural factors as barriers to improved nutrition and WaSH and led the discussion on how to address such issues.

Future interventions must begin by drawing participants into discussions regarding cultural practices, as those represent the underlying beliefs that guide behaviour. Therefore, participatory approaches, such as PhotoVoice, can be very effective in making changes.

11.3 IMPROVE HYGIENE IN CHILDREN'S PLAY AND EATING AREAS

The amount of concern and attention paid to hygiene for infants and children when it came to playing and eating was minimal in the intervention communities. There should be a greater focus on establishing and

maintaining a healthy living environment for children (and adults) through managing exposure to dust and animal dung, improving access to soap and water and setting up clean areas for children to eat. Further attention should be paid to baby WaSH and other children's hygiene practices.

12. CONCLUSION

Participatory research methodologies are essential in addressing issues that communities have themselves identified as barriers to improving nutrition and WaSH. However, rather than asking the community to design the methodology, which can be intimidating and ineffective, it is more helpful to present a framework and then invite input and critique of that framework. In this case, the community was presented with several themes for the PhotoVoice project but after discussion, the community identified several cultural issues they felt important to address. Ultimately, the action plans reflected the level of knowledge and capacity of the communities to make tangible changes without the support of outside intervention.

PhotoVoice is a particularly powerful methodology for uncovering issues and triggering discussion. In communities with low levels of literacy or with language barriers, non-written methods of communicating are less intimidating and more inclusive of marginalized groups. Specifically, women's voices are often absent from community narratives around WaSH and nutrition, even though it is women that are primarily responsible for managing both. PhotoVoice opened a different space for women to participate, even when they may have been challenged to speak up in mixed group settings.

Women's workload remains a significant barrier to improved nutrition and WaSH in the study communities. Preparing nutritious food for their children takes resources, such as money and time, which many women simply do not have enough of. Additionally, some women reported not eating at the end of long days due to lack of time or energy. Activities that address distributing workloads more equitably will support improved nutrition by increasing women's time resources.

Finding existing structures, networks and community leaders and managing to reactivate, reimagine and reinvigorate those initiatives allows for greater continuity and ownership over action plans. Working with existing nutritional task forces meant the project was able to use the language that communities were already familiar with and ultimately brought those groups out of dormancy by allowing them to evolve into the new work. The groups were multi-disciplinary and brought together different government bodies, approaches, and sectors of the community.

Finally, it is important to look beyond the usual suspects for employment within development projects and bring people into the discussion who may have not been included previously because their technical expertise was outside of the typical disciplines. Credibility and strong relationships with the communities were brought with new participants, bringing valuable perspectives and knowledge to the discussion and leverage to future programming.

This is an important way to increase women's participation because the qualification threshold for formal participation often excludes women, in particular those who may be older or illiterate. When women are brought on as technical advisors, it serves to break otherwise perpetual economic exclusion of these

valuable, knowledgeable members of the community. Ultimately, it cannot be overstated that ensuring the meaningful participation of women and other marginalized members of communities results in stronger projects and more sustainable results.

13. APPENDIX 1: QUANTITATIVE METHODOLOGY

Quantitative data was collected between 1st October 2020 and 30th January 2021. Six different villages from six woredas (Adkoma, Mesgid, Muli, Gura'ale, Bilaloda, and Gita 'gile) were visited and all the HHs, except the HHs participating in the qualitative data collection, were selected to participate in the quantitative data collection. Data collection was done by five data enumerators. Questions were asked in the Afari language and the MWater tool was used to electronically collect the data.

All data cleaning, variable computing and analyses was done using IBM SPSS statistics 26. Two HHs did not give permission to be included in the study and were removed from further analysis.

13.1 DATA CLEANING, VARIABLE DESCRIPTION, AND COMPUTATION:

13.1.1 Background characteristics:

The questionnaire asked for different background characteristics of the HH. The age of the child under five and the age of the interviewee were self-reported. The age of the interviewee had some outliers, but these were not unrealistic and were therefore not excluded from the analysis. The question about the presence of a vulnerable HH member was not asked in the first version of the questionnaire so no answer was recorded for Muli, the first village to be surveyed.

13.1.2 HH food production:

HH food production was evaluated using the HH food production score. This score was computed by adding up the number of food groups a HH produced. The food groups were based on the WHO classification of food groups for infants and young children4.

The data contained five missing values for the HH production of orange vegetables, green leafy vegetables, starchy root and tubes, cattle, and sheep. These missing values were randomly distributed over the villages Adkoma, Mesgid and Muli and not in the same HHs. Furthermore, 39 missing values were reported for the ownership of a camel. These missing values were mainly for the village of Muli. To be able to include these HHs in the food production score, the missing values were interpreted as zero. However, this could result in an underestimation of the HH production score, especially in the village of Muli.

Furthermore, HHs were classified as dairy producers if they owned cattle, sheep, goats, or camel. The questionnaire did not contain a specific question to determine whether these animals also produced milk. So, the HH production of dairy could be overestimated for all villages.

4 WHO. (2007). *Indicators for assessing infant and young child feeding practices*. Reviewed from https://apps.who.int/iris/bitstream/handle/10665/43895/9789241596664_eng.pdf;jsessionid=F61D472B10857117D919B904DB8BB05B?sequence=1

13.1.3 Child feeding practices:

The questions about child feeding practices were asked and analysed only for HHs with a child below the age of five. One metric of child feeding practices for children above 6 months of age is the consumption of a specific food group in the previous 24 hours. The total of these food groups results in the child dietary diversity (DD) score, i.e. the percentage of children consuming the minimal dietary diversity of four food groups. An additional food group for ultra-processed foods was added, but not considered in the calculation of the DD score. The food group ultra-processed food consisted of sugary foods, snack foods and fruit juices with added sugar. Missing values for the consumption of any food group was due to the respondent reporting that no solid food had been consumed in the previous day. This was interpreted as non-consumption.

13.1.4 WaSH practices:

HH WaSH facilities were categorized using the WHO and United Nations International Children's Emergency Fund (UNICEF) Joint Monitoring Program (JMP) categories, also known as the WaSH ladders[5]. The sanitation classifications are based on the type of toilet a HH uses. However, the type of toilet was not directly observed for all HHs. Since all facilities in the communities were unimproved facilities, respondents could have over-reported using a toilet, giving a socially desirable answer when actually, in reality, practicing open defecation. For these reasons, these HHs were categorized as unclear in this report, as the researchers cannot be conclusive on their classification.

The questions about infant's faeces disposal practices and hand washing after cleaning a baby were only asked for HHs with a child under the age of five.

Another question about handwashing practices asked for all times that the interviewee washed his or her hands in the previous 24 hours. Some answer options to this question were related to handwashing before doing a specific task, namely preparing or serving food and cleaning a baby. Notably, these tasks could potentially be carried out by specific members of the HH. Some interviewees may not perform a task and for that reason, may not have reported handwashing before or after those tasks. In other words, the percentage of people washing their hands before preparing or serving food and after cleaning a baby could have been higher if the question was asked only to the people in the HH performing those tasks.

13.1.5 Access to information and perception of food practices

Questions were asked about the interviewee's access to information, the source or sources of that information, and different food practices and beliefs, including food safety practices. The answers to these questions could depend on the interviewee's understanding of the questions and might have been steered by the formulation of the question. These effects were minimized by standardizing the questionnaire, but

5 WHO, UNICEF. (2018). *JMP methodology 2017 update and SDG baseline.* Reviewed from https://WaSHdata.org/report/jmp-methodology-2017-update

different interpretations could still be present in the results.

13.1.6 Associations

The data analysis also investigated if there were associations between specific practices or beliefs and diarrhoea incidence or child DD score. These associations were hypothesis or literature driven. However, the study population was small and quite heterogenetic since it was sampled from different villages, making advanced analysis difficult. Due to the small sample size, only crude associations were investigated, and no confounding factors were considered, although confounding factors probably influence the associations.

13.2 ANALYSES

Different analyses were carried out to compare variables and investigate whether they were associated. The type of test that was used depended on the type of variable (continuous, ordinal, or categorical), the number of categories for the categorical variables and the distribution of the continuous variables.

The association between two categorical variables was analysed using the Pearson's chi-square test. Almost all analyses met the assumptions for the Pearson's chi-square test[6]. However, some questions could have multiple answers, violating the assumption that a subject fits only in one category. For that reason, these questions (for example: do you wash your hands before cooking yes/no, after defecation yes/no) were analysed for every option separately. Secondly, some analyses also violated the assumption that more than twenty percent of the cells have an expected count of five or higher. This can result in a P-value that is too small, increasing the change of a type I error (invalid rejection of the null hypothesis). If the expected count was below five, the categories of answers were combined where possible. Otherwise, the results were still analysed using the chi-square test, but the P-value was marked when the last assumption was violated and should be interpreted with caution.

Different tests were used to evaluate the association between a continuous dependent variable and a categorical independent variable[7]. The one-way ANOVA was used when the continuous variable was normally distributed and tested with the Shapiro-Wilk test and visual inspection of the Q-Q plot and homoscedasticity could be assumed tested with the Leven's test. If the continuous variable was not normally distributed, a Mann-Witney U test was used when the categorical variable contained only two groups and a Kruskal-Wallis H test if the categorical variable contained more than two groups. It was sometimes of interest to the researchers to investigate which groups significantly differed from each other, when the Kruskal-Wallis or one-way ANOVA indicated an association between the variables. Pairwise comparison, adjusted for multiple testing with the Bonferroni method, was used to evaluate which groups significantly differed from each other.

6 McHugh, M. L. (2013). The chi-square test of independence. *Biochemia medica*, *23*(2), 143-149.
7 Garson, G. D. (2012). Testing statistical assumptions. *Asheboro, NC: Statistical Associates Publishing*.

Lastly, this report also investigates the association between two continuous variables. Both variables were not normally distributed and analysed with the Spearman Rank correlation.

If the association between two categorical variables was investigated, the number of HHs and the percentage was displayed in the table. If the dependent variable was continuous and normally distributed, the mean and standard deviation (SD) were presented. If the dependent variable was continuous but not normally distributed, the median and interquartile range (IQR) was presented.

A significance level of 95% was considered in the interpretation of the analysis. However, this report contains many tests, increasing the change of a type I error (incorrectly rejecting the null hypothesis). The P-values or the significance levels were not adjusted for multiple testing so should be interpreted with caution. Furthermore, to interpret the results, the effect size is often of more importance than the P-value and should be of meaningful difference.

14. APPENDIX 2: QUALITATIVE METHODOLOGY

The qualitative study was conducted in the same villages as the quantitative part of the study. A pilot was conducted in October 2020 in the village of Muli. The PhotoVoice study for the other villages started in January and February 2021.

14.1 THE PHOTOVOICE APPROACH

The community-based participatory 'PhotoVoice' method was used to investigate social, cultural and gender-based aspects of nutrition and WaSH. The study participants from the community were empowered to take photographs that show grassroots social actions reflecting nutrition and WaSH. Afterwards, participants were asked to select the best 10 photos. These photographs were then analysed and interpreted through individual and group discussions and the images were used as catalysts to tell stories, share lived experiences, and develop dialogue and knowledge around nutrition and WaSH.

The PhotoVoice method was conducted in three distinct phases. In the first phase, a trained and experienced research assistant (female) and several local facilitators conducted selection and training of PhotoVoice participants, including the distribution of photo cameras. The training covered how to turn the camera on and off, which button to press to take a photo, how to zoom in and out, how to keep the camera steady to avoid creating blurry images and how to review the photos that had been taken. In the second phase, PhotoVoice participants had two weeks to take pictures to represent nutrition and WaSH practises. In the third phase, the research assistant and the local facilitators once again met the participants in each of the six villages to review and discuss the photos.

14.2 STUDY PARTICIPANTS AND SAMPLING

The study participants in the PhotoVoice exercise were kebele leaders (male), female natural leaders and mothers with under-five children. A total of 36 community representatives participated. The group consisted of 18 mothers with under-five children, twelve female natural leaders and six kebele administrators (six villages = six administrators). The criteria for recruitment was purposive and included only individuals who would be exposed to the nutrition and WaSH intervention. To keep the conversation rich and manageable for the PhotoVoice discussions, the number of participants was limited to an average of six individuals (HHs) in each village. The HHs selected for the PhotoVoice were excluded from the quantitative survey.

14.3 DATA COLLECTION

Two weeks after the PhotoVoice training and the distribution of photo cameras, the qualitative researchers and local facilitators met participants to conduct the data collection. Data was collected through individual one-on-one interviews and focus group discussions (FGD) with each of the study participants

in the six study villages. For the FGDs, all the PhotoVoice participants in each village, including mothers with under-five children, female natural leaders and the kebele administrator, were included. The participants were requested to select the best 10 pictures representing the thematic areas of food collection, food preparation and consumption, WaSH, and culture, and interviews were conducted on each of the 10 photos. Trained local facilitators led the focus groups, ensuring participants felt comfortable sharing their perceptions within a larger group and capturing in-depth data. All the interviews and FGDs were done in the Afar language and audio-recorded.

14.4 ANALYSES

Verbatim transcription of audio-records of FGDs and individual interviews was done by the same FMC qualitative researchers who did the data collection. Transcripts with respective photos were imported into Atlas.ti 7.5 software in Rich Text Format. The analysis was done by two WaSH and nutrition experts who have extensive experience in qualitative study methods. The transcripts were read one by one to familiarize researchers with the contents, context and meanings, and then meaningful analytical units or codes were produced. After coding was completed, a code book with associated definitions was exported to identify codes with duplicate meanings. The codes were then renamed to identify the final list, containing a total of 273 codes, which was summarized into four pre-defined groups: collection of food items, food preparation and consumption, WaSH, and culture. The reports have been presented in textual descriptions with selected direct quotations relevant to the aims of the study.

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