ADDIS ABABA UNIVERISTY

FACULTY OF MEDICINE
SCHOOL OF PUBLIC HEALTH

ASSESSMENT OF ENVIRONMENTAL HEALTH STATUS OF DUKAM TOWN, OROMIA REGION

By:

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Acronyms

AOR	Adjusted Odd Ratio
DHS	Demographic and Health Survey
EDHS	Ethiopian Demographic and Health Survey
EFY	Ethiopian Fiscal Year
EHD	Environmental Health Department
EPINFO	Epidemiological Information
ETB	Ethiopian Birr
FMOH	Federal Ministry of Heath
JMP	Joint Monitoring Program
MDG	Millennium Development Goal
MoU	Memorandum of Understanding
OR	Odd Ratio
RHB	Regional Health Bureau
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
UNICEF	United Nation children's Emergency Fund
Who	Woreda Health Office
WHO	World Health Organization
WSP	Water Supply and Sanitation Program
ZHD	Zonal Health Department

Abstract

Back ground: Access to healthfully housing, improved water supply, sanitation and hygienic practices in general and urban sanitation in particular is one of the major issues in public health protection and survival of human being. The ever increasing unplanned urbanization and poor access to safe water supply, sanitation and unhealthful living and working environment leads to tremendous communicable & none communicable diseases.

Objective of the study: The general objective of the study was to assess environmental health status of Dukam town and generate relevant information for informed decision making process of town officials and concerned stakeholders.

Methods: A community based cross-sectional study was conducted in Dukam town from March to May, 2010. Using systematic random sampling methods a total of 409 households were selected for quantitative information while physical observation was made to see sanitary status of municipal water system, solid and liquid waste management and housing condition of the town. Quantitative data collected using pre-tested and standardized questionnaire was entered using EPI-Info version 6.04 and exported to SPSS 16.0 window version for cleaning and analysis. Frequencies, proportions and summary statistics were employed to describe the study population in relation to the objective of the study. Logistic regression analysis was also employed to examine association among major dependent and independent variables.

Result: The findings of this study revealed that over all access to healthful- housing, improved water sources, latrine facility and appropriate solid and liquid waste management system were found very low and significantly associated to educational status, income and ownership of the households.

Conclusions and Recommendations: Given that Dukam is currently expanding, considerable portion of inhabitants are currently living in poor housing condition and out of access to safe and adequate water supply, improved sanitation and hygienic conditions. Hence, considering existing challenges and opportunities to community at large, the town administration should plan upgrading or slum clearance of seriously affected old housing structures and put in place sanitary housing enforcements. Furthermore, with good private and public sector involvements, municipal water supply, solid and liquid waste system must be made accessible to all residents of the town hand in hand with promotion of participatory hygiene and sanitation information.

Key words: Environmental health, healthful housing, improved water supply, sanitation, Solid and liquid waste mgt and hygiene practices.

1. Introduction

1.1. Background Information

Environmental health in general and urban sanitation in particular is one of the vital services that need to be addressed for public health protection and survival. The ever increasing unplanned urbanization and poor access to safe water supply, sanitation and unhealthy living and working condition could be the reason for the exposure to tremendous health problems of the inhabitants. Availability and appropriate utilization of safe and adequate water supply, sanitary facilities within living and working environment is mandatory both in urban and rural community of the nation in general and specific locality in particular (1).

1.2. Statement of the Problem

The ever increasing and unplanned urbanization and industrializations has far-reaching environmental health consequences and challenges (2).Dukam is one of the semi-urban towns with severe environmental health challenges concerning availability and utilization of safe and adequate water supply, solid and liquid management, and health condition of housing, personal and environmental hygiene practices. In addition to existing environmental health constraints, new challenges are emerging due to unplanned expansion of the town and the development of working and living environment. The Town health office annual report revealed that, recurrent diarrheal diseases, upper respiratory tract infections, intestinal parasites, skin and eye infections are common among community members, especially in children under five (3).

1.3. Significance of the Study

In spite of the fact that Dukam is rapidly growing, reliable information with regard to current status of safe and adequate water supply, solid and liquid waste management, and healthful housing is lacking. Furthermore, the town development plan is currently under revision and the output of this assessment might be used as an input to the effort made to address environmental health aspect of the town as per national environmental health strategy and protocol (21, 22). Furthermore, the output of the study might be used as benchmarking information for planning and evaluation of future progress of the program. On top of this, the findings of this study might be used as baseline information for currently launched urban health extension program of the town in general specific Kebeles in particular.

Hence, this assessment has considerable importance both for generation of reliable information and making informed decisions to address existing and emerging environmental health challenge of the town.

1.4. Literature review

Global situation of Environmental health

The problem of environmental sanitation is universal, particularly in the developing countries. WHO/UNICEF joint monitoring program on mid-term assessment of Millennium Development Goal (MDG) for drinking water and sanitation indicates, worldwide greater than 2.4 Billion people do not have access to improved sanitation while about 2 million people die every year due to diarrhea diseases. Furthermore, in sub-Saharan Africa, about 42% of the population has not yet accessed to improved water source while only 36% have proper waste disposal facilities (4).

Water Supply and Sanitation Collaboration Council (WSSCC) annual report for the year 2008, also indicated that, an estimated 2.6 billion people (half of the developing world) lack access to improved sanitation. Urban and rural population globally using improved sanitation in 2004 are represented by figures: 80%, and 39%, respectively, despite major progress in South Asia, little more than a third of its population use improved sanitation; access to adequate sanitation in sub-Saharan Africa is only 37% while roughly 90% sewage is discharged untreated in the rivers(5).

A population that does not take hygiene into consideration is at risk of infections and subsequent illnesses. Improved housing, improved nutrition and improved hygiene are the essential components for the war against infectious diseases (6).Many people living in poor urban areas experience that they practice personal hygiene not as frequent as it is desired. Lack of resources, such as water, results in poor hygiene levels; toilets cannot be washed and there is not enough water to shower (7).

The quality of environment is lowered mostly due to mismanagement of funds, insufficient waste disposal systems, overpopulation or overcrowding, inadequate planning as well as other human practices. People living in areas with poor

sanitation and hygiene conditions are more prone to illnesses. Many diseases are associated with inadequate water resources, sanitation and hygiene (7). As per the United Nation Habitat (2006), sanitation and hygiene challenges in slums is described in terms of poor basic services results in lack of access to sanitation facilities or safe water sources. Substandard and inadequate houses have been built in slums with temporary materials which are unsuitable for conditions such as straw roofs, mud, earthen floors and plaster. Overcrowding and congestion result in too little space per person, expensive housing rates. One room-unit in slums is often shared by five people, using the same room for cooking, sleeping and living (8).

Environmental health situation of the country

In Ethiopia Environmental health/sanitation services delivery system has formally established under the Ministry of interior in 1942. In spite of this early start, environmental health service indeed did not show significant improvement for the whole country (9).

In regard to policy context, the country has made considerable effort to formulate and materialize number of policy directions and strategies concerning water supply, sanitation and hygiene promotion. The Ethiopian Water Resources strategy map the road for extension of water supply and sanitation coverage to large segments of the society for achievement of improved environmental health conditions of urban and rural communities (10). The National Health Policy and Public Health proclamation of the Government of Ethiopia considered environmental health interventions as cross cutting issue in promotive and preventive aspect of rural and urban environmental health interventions (11, 20). With respect to Oromia Regional State, the regional public health proclamation has laid down the foundation to enforce environmental health service delivery and promotion both at urban and rural communities (12). Despite existing policy and strategy inputs, significant improvement is not yet materialized in the country in

general and Oromia region in particular. Consequently, communicable diseases that are attributed to poor environmental health status are still highly prevalent among majority of rural and urban residents (13).

Water supply:

Ethiopian Demographic and Health Survey (2005) revealed that, the majority (61%) of households in Ethiopia have access to an improved source of drinking water with access in urban areas much higher than in rural areas (94 % for Urban and 56 % for Rural). In urban 90 % are accessed to pipe water while rural is only 13 percent. The major source of improved drinking water in rural areas is a protected spring (39%).The proportion of households with access to piped water has increased from about 14 percent in 1994 (CSA, 1999) to 18 percent in 2000 and 24 percent in 2005 (14).

Sanitation:

Based on Ethiopian Demographic Health Survey (2005), sixty-two percent of Ethiopian households do not have a toilet facility. Overall a small proportion (7 %) of households use improved toilets that are not shared. Urban households are more than three times as likely as rural households to have access to improved toilet facilities. In urban areas, a pit latrine with a slab (12%) is the commonest type of improved toilet facility (14).

In Oromia, households accessed to sanitary facility are estimated around 53 % while data for the study locality is not available (13).

As study conducted in Gondar town, half of the habitants (50.8%) of the town are using open field defecation as major means of human waste disposal due to low attention given for urban sanitation and development. Overcrowding of houses and miss management of urban land claimed as contributing factors for worsening of urban sanitation services in the town (15).

Hygienic practices:

As per Knowledge, Attitude, Practice (KAP) survey conducted by Federal Ministry of Health/Environmental Health Department in 1997, among selected Woredas of the country, 37.5% of the study subjects were claimed that they have took a bath at an interval between one and five days, 47.7% at interval of 3 to 30 days: 14.1 % once after 30 days. About2.6 % claimed that they have not taken any bath at all. Furthermore, this study demonstrated that the majority of the study subjects claimed that they have not got any information in regard to hygiene education (16). Based on one extensive literature review made to assess an overview of environmental health status in Ethiopia, the overall socio-economic, behavioral, environmental and personal factors of the people are claimed to be the main reasons for current status of poor environmental health condition of the country (17).

Healthful Housing condition

Ethiopian Demographic and Health Survey report for 2005 revealed that, 5% of households have earth or sand floors and 25 % have dung floors, while over three fourths of households (75%) have no bedrooms for sleeping and only 3 % have three or more rooms for sleeping. Urban households are more likely than rural households to have two or more rooms for sleeping. Concerning house hold fuel, the overwhelming majority of households (84 %) use wood for cooking (90% at rural and 49% at urban localities), followed by kerosene (26 percent) and charcoal (18 percent). Slightly over two-thirds of households (68 percent) cooked their meals in the house, while over a quarter used a separate building for cooking (26 percent). Slightly over half the households in urban areas (54 percent) used a separate building for cooking. Almost all households (99 percent) used a biomass fuel for cooking, that is, kerosene, charcoal, dung and wood/straw, which generate smoke that is unhealthy for inhalation. In these households, almost all cooking is done over an open fire or stove which characterized by absence of chimney (14).

A cross-sectional survey undertaken in one rural part of Jimma zone, Southwestern Ethiopia revealed that, 90% of households shared living space with

domestic animals, less than 10% of households had latrine, and nearly 40% of all water was obtained from unprotected springs and rivers (18). As per national Hygiene and sanitation strategy and on-site sanitation protocol of the county, 100% adaptation of improved sanitation is highly advocated (21, 22).

2. Objectives:

2.1. General objective:

To assess environmental health status of Dukam Town, Oromia Region State, in order to generate relevant information for concerned town and regional decision makers.

2.2. Specific Objectives:

- To assess existing status of improved safe water supply, solid and liquid waste management and health condition of housing and hygienic practice of the residents.
- To identify factors that attribute to the poor/good environmental health status of the inhabitants.

3. Methodology of the study

3.1. Study area and period

This assessment was conducted at Dukam town, Oromia Regional State from March 2010 to May 2010. Dukam is one of the towns that aggressively growing and characterized with both urban and rural settings. It is situated at the main road from Addis to Adama and Hawasa The town is endowed with convenient weather condition throughout the year. Dukam was created at the turn of the 20^{th} century near a rail way station. It was created and survived in a place where a historic *Oda Nabe* and other important Gada sites are situated. River Dukam is also of great historical and cultural value (24).

Dukam lies between $8^0$45'25''N-$8^0$50'30''N latitudes and $38^0$51'55''E-$38^0$56'5''E longitudes and situated at a distance of 37 Kilometer from Addis Ababa, the capital city of Ethiopia (24). Administratively, the town is divided in to one urban (Dukam 01) and three semi-urban Kebeles (Dukam Gogecha, Dukam Tedecha and Dukam Koticha).

Dukam is bounded with Bishoftu Town at East, Gelan Town at North and Akaki District at West and North East. The total population of the town is estimated to be around 24,222 (with 12,537 males and11, 685 females). Town health office annual performance report, indicates that Dukam is with 28 restaurants, 34 hotels, 15 Bars, 16 butcher shops, 35 large and 11 small factories and other many businesses enterprises. Furthermore, the town has one health center and two clinics and two drug shops as well as one high school and three primary schools(3).

3.2. Study design:

Community-based survey design was employed from March 2010 to May 2010, using both quantitative and qualitative methods.

3.3. Source population

The source population for the quantitative cross-sectional assessment was all households existing in the boundary of Dukam Town Administration. For qualitative in-depth interview, all line offices concerned with municipal water supply, sanitation and hygiene promotion (WASH) were included.

3.4. Study population

The study population was all heads/spouses of selected households and professionals working in health, water and municipality of the town.

3.5. Sample size determination

The sample size (n) was determined using a single population proportion formula (19). Since there was no any previous study that shows prevalence of sanitation to the study locality, regional urban sanitation coverage (13) was used as sanitation coverage or prevalence (p) of the town.

$$n = \frac{(Z\,\alpha/2)^2\,(p)\,(1-p)}{d^2} \qquad n = \frac{(1.96)^2 \times 0.53(1-.53)}{(0.05*0.05)}$$

$$= 383$$

Where,

- n= the required minimum sample size
- Z α/2= a standard score corresponding to 95% certainty, and thus equal to 1.96
- p = is the proportion of household with sanitation coverage, which was taken as 53%, the regional urban sanitation coverage for 2008(13).
- d- The margin of error between the sample and population, taken to be 5 %.
- q = (1-p) =which was calculated to be 47%.

Since the population to be study was less than 10,000 (4843) then the finite population correction formula was used.

$$n = \frac{n_0}{(1 + n_0/N)} = \frac{383}{(1+383/4843)} = 355+ 35 = 409$$

Therefore, the total sample size determined including 15% of non-response was 409.

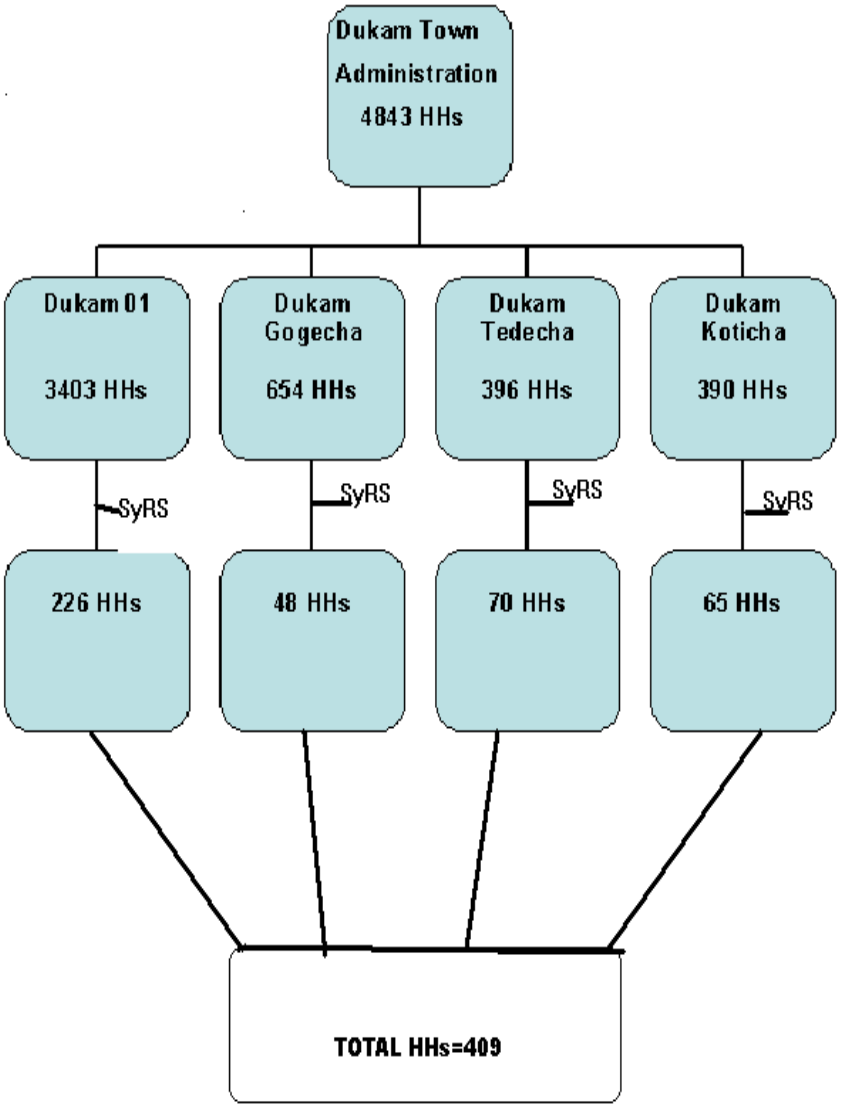
3.6. Sampling procedure:

As per administrative structure of the town, first the town was divided into four Kebeles (Gendas) namely, Dukam 01, Dukam Gogecha, Dukam Tedecha and Dukam Koticha Kebeles. Then all Kebeles of the town were considered for the assessment inorder to render an equal opportunity to all households of the town.

As to sampling procedure of the study units, systematic sampling method was used to select study households from all four Kebeles. The sample interval was calculated dividing the total number of households in each Kebele by the corresponding number of households to be interviewed in each Kebele. The first household to be interviewed in each Kebele was identified from Kebele house number through simple random method.

Accordingly, a total of 226 households were selected from Dukam 01 Kebele while 183 households were represented from other three semi-urban Kebeles of the town, i.e. Dukam Gogecha, Dukam Tedecha and Dukam Koticha Kebeles. Considering access to household information, head of the household was approached for interview while in case of his/her absences, the spouse of the head of the household or any adult members of the households were approached. In case of no one was not found, a repeat visit was made. When target respondent is not found in the second revisits, the next household was included. For clarity and simplistic understanding, pictorial sampling procedure is shown here below (Figure 1)

Schematic representation of sampling procedure, Dukam Town, June 2010



HHs= Households

SyRS=Systematic Random Sampling

Figure l. Schematic diagram of sampling procedure, Dukam Town, June, 2010.

3.7. Study Variables:

Indicator (Dependent) variables:

- Proportion of households accessed to improved water sources
- Proportion of households accessed to latrine facilities
- Proportion of households accessed to safe waste disposal system

Independent variables:

1. Socio-demographic characteristic such as sex, age, marital status, occupation, educational status, ownership of the house
2. Socio-economic characteristics such as monthly family income, social class, etc
3. Geographic setting such as urban and semi-urban localities

Inclusion criteria: - All households available within the Dukam town administration boundary and currently used as residential quarter (living home).

Exclusion criteria:-Households currently under construction and that not occupied with residents and not used for residential purposes was excluded from the study process based on assumption that including such households might leads to wrong conclusions.

3.8. Operational definitions (5, 14, 23)

- **A household** was defined as a person or group of related and unrelated persons who live together in the same dwelling unit(s) or in connected premises, who acknowledge one adult member as head of the household, and who have common arrangements for cooking and eating.
- **Improved water sources are:** a piped water supply into the dwelling; piped water to a yard/plot; a public tap/standpipe; a tube well/borehole; a protected dug well/a protected spring.
- **Unimproved water sources are:** an unprotected dug well; an unprotected spring; a cart with a small tank/drum; a water tanker-truck; and unprotected surface water.
- **Improved sanitation facilities:** include a flush/pour-flush toilet or latrine that flushes to a sewer, septic tank or pit. A ventilated improved pit (VIP) latrine, pit latrines with the pit well covered by a slab.
- **Unimproved sanitation facilities:** Open pits or latrines without a proper slab to cover the pit and hanging latrines, which deposit untreated excreta directly into bodies of water or in the open field.
- **Controlled solid waste management:** Managing solid waste in municipally system or buried at yard.
- **Personal hygiene:** - those protective measures primarily with the responsibility of individuals which promote health and limit the spread of infectious disease chiefly those transmitted by direct contact. Such measures encompass washing hands with soap and water and keeping the body and cloths clean, water bath, finger cleanliness and nail trimming.
- **Per capita water consumption;** is calculated by considering volume of water (in liters) collected for domestic use per day by all households in the sample divided by total number of household members.
- **Cleanliness of yard**; shall mean absence of dust particles, unsightly condition and accumulation of waste items and human excrement in the yard.

3.9. Data collection procedures:

3.1.1. Quantitative Data

A structured questionnaire was prepared first in English referring to similar studies and relevant literatures (23). The English version questionnaire was then translated to Amharic language and finally back to English to ensure its consistency. The questionnaire was pre-tested at nearby town (Bishoftu town) while necessary adjustment was made as needs important. A team of five data collectors and one supervisor was established for actual data collection process. As to educational status of data collectors and supervisor, all data collectors were completed high school education (grade 10/12) while supervisor was the third year university student. The supervisor and principal investigator were responsible for supervising the data collectors, checking for the completeness of the questionnaire and correcting any mistake or problem encountered. To check for the consistency of data collection, 5% of the households were re-interviewed by the supervisor and the principal investigator.

3.1.2. *Qualitative Data*

Qualitative information was collected on existing status of municipal solid and liquid waste management, water supply and housing condition of the town. The physical observation was guided using checklist prepared for this purpose. Furthermore, key informants were interviewed from town health office, municipal water supply and sewerage authority, town land and environmental protection authority and concerned stakeholders. The qualitative information was used both to strengthen quantitative findings of the assessment and stand alone to describe environmental health condition of the town.

3.10. Data Analysis

After checking for completeness and consistency, quantitative data was entered using EPI INFO version 6.04 statistical package. Then it was exported to SPSS 16.0 statistical package for cleaning and analysis of descriptive and statistical inferences. Descriptive statistics such as per capita water consumption, proportion of households accessed to improved water sources, improved sanitary facilities, health full housing and an appropriate management of solid and liquid waste was employed. In addition, crude and adjusted odd ratios were employed to determine existence of association between different dependent and independent variables. Contingency tables were used to see the association between the explanatory and outcome variables. P-value <0.05 was used for test of significance. Data was presented using tables, figures, graphs and photographs.

Qualitative data from physical observation and key informant interview were summarized alone and also used to explain quantitative findings in effort made to describe current status of municipal water source, solid and liquid waste management system and hygienic practices of the inhabitants.

3.11. Data Quality Management

To assure data quality, data collators and supervisor were trained for one day using training manual developed for this purpose. Trainees were well acquainted with interviewing skills and methods. Pretesting of the questionnaire was made at nearby town, Bishoftu, in order to check language clarity, duration of data collection, and completeness of information.

Completeness, accuracy and consistency of the collected data was also checked & corrected on daily bases both by supervisor and the principal investigator. Data was edited and coded before data entry. Data cleansing and coding were done carefully by the principal investigator and rechecked entering 5% of the total data.

3.12. Ethical Consideration:

Ethical clearance for the study was secured from Addis Ababa University, School of Public Health. Permission was obtained from town administration and health office. Oral consent was obtained from each respondent before an interview was conducted. In order to curb privacy problem, the respondents were interviewed within secured location, in such a way that their privacy was respected to the outmost. All individual and official documents were kept confidential and used only for the study purpose.

3.13. Dissemination of Results:

The draft finding of the assessment was submitted to School of Public Health Faculty of Medicine, Addis Ababa University, Dukam Town Administration and other concerned zonal and regional offices. Furthermore, this report will be presented on workshop to town administration and members of council, line bureaus heads and concerned stakeholders for their information and intervention. Effort will be made to publish the finding on either local or international journals.

4. Results

A total of 409 households were included in the study and the response rate was 100 %. A detail finding of the assessment is presented thematically as per objective of the study and methodology employed.

4.1. Socio-economic and demographic profile of study subjects

Age and sex distribution

As depicted in Table 1 below, more than half (59.4 %) of the study participants were females, while majority (30.8%) of them were in age group of 30-39 year. The mean (±SD) age of the respondents was 38.5±13.5 years.

Marital status

More than one-third (67.7%) of the study participants were married, while considerable portions of study population were widowed, unmarried, divorced and separated, accounting 11.5%, 12.2%, 6.6% and 2% of the total, repressively.

Ethnic group and Religion

Given that Dukam is one of the towns proximate to the capital city of the country, more than half (67%) of head/spouse of the study households were from Oromo ethnic group. Amahara ethnic group constituted more than quartet (26.4%) of study participants while other nation and nationalities have had a share of less than ten percent (6.6%).

As to the religion of the respondents, the majority of study subjects (88.8%) were an Orthodox Church follower, while less than ten percent (8.1%) was Muslims. Member to other faiths accounted less than one percent.

Educational back ground

As to educational status, more than half of the respondents (63.4 %) were reported as having certain level of formal education while more than quarter (27.6%) was found illiterate. Out of those who are able to specify their education level, almost a quarter (23.7%) of them had a primary school education, including grade 1 to 6,

while one third (33.3%) of them had a secondary school level education (grade 7-12). Small segment (6.4%) of study participants had tertiary or college level of education (Diploma and Degree).

Source and level of family income

In regard to source of income, almost one-third (28.4%) of study subjects were engaged on small scale business while almost an equal proportion was dependent on agricultural sector (20.8%). The majority of households (61.1%) claimed earning monthly income of less than 500 Birr, which is approximately equal to 36 USD. As to this finding, considerable portion of households at study locality were depended on monthly income less than 100 ETB. The mean (SD) monthly family income of the study participants was found 691.55(± 633) ETB.

Family size of the households

As to findings of this assessment, almost half (49.1 3%) of the study households have had at least five or more persons while similar number of households were with more than 5 persons. The mean (SD) family size of study locality was found 4.59 (± 2.04).

Table 1: Demographic & Socio economic characteristics of respondents, Dukam Town, Oromia Regional State, June, 2010(n=409).

Socio-Demographic Characteristic	Number	%
Sex		
Male	166	40.6
Female	243	59.4
Age		
18-29	114	27.9
30-39	126	30.8
40-49	83	20.3
50-59	41	10.0
60 and above	45	11.0
Marital status		
Single	50	12.2
Married	277	67.7
Divorced	27	6.6
Separated	8	2.0
Widowed	47	11.5
Ethnicity		
Oromo	274	67.0
Amahara	108	26.4
Guraghe	11	2.7
Tigre	8	2.0
Others	8	2.0
Religion		
Christians	396	96.9
Muslims	12	2.9
Education		
Illiterate	113	27.6
Read & write	37	9.0
Grade 1-6	97	23.7
Grade 7-12	136	33.3
College & Above	26	6.4
Occupation		
Merchant	116	28.4
Farmer	85	20.8
Daily laborer	51	12.5
Government employee	34	8.3
House wife	79	19.3
Other	44	10.8
Monthly income		
Below 500	248	61.1
501-1000	105	25.9
1001-2000	36	8.9
2001 and above	17	4.2
Mean ($\pm$SD)	691.55 $\pm$ 633	
Family size		
< 5	208	50.9
> 5	201	49.1

4.2. Housing conditions

Table 2 below indicates the ownership of housing structure, age of housing, purpose of the house, number of living and bedding rooms and over all sanitary status of housing. The finding of this assessment indicated that, majority (67.7 %) of the houses were privately owned, while considerable number of houses (31%) was rented either from individuals or Kebeles (local government structure).

Majority of households (83.6%) were used exclusively as a living quarter while very few (14.4%) were used both for living and business purposes. Almost, quarter (14.4%) of bed rooms have no any form of window or apparatuses and consequently not accessed to in-door and out-door air circulations. As per response of study participants, more than half (62.6%) of existing housing structures were constructed in the last ten years while more than quarter (28.6%) of them were very old and aged more than twenty years.

As to the roofing of housing structures, almost all houses (96.8%) were made of corrugated iron sheet (CIS) while very few (3.2%) was found made of grass and leaf. Given that Dukam is currently growing very fast, the majority (63.4%) of existing living houses was found with cracked walls and none cemented floorings (65.2%). Furthermore, more than quarter of them (30%) were also found a single roomed for all purposes.

This assessment revealed that, more than half of households (61.3 %) have no an emergency door while almost all (97%) of the households were accessed to electric power. As informal communication with some of inhabitants, a frequent interruption of electric power to the town was common during the study period.

Table 2: Housing characteristics of Dukam Town, Oromia Regional state, June, 2010

Housing characteristics /Variables (n=409)	Frequency	%
Ownership of the house		
Private	277	67.7
Rented (from private)	55	13.4
Rented (Government)	72	17.6
Others	5	1.2
Purpose of the house		
For living	342	83.6
For commercial/ Business	9	2.2
For both	58	14.2
Year of construction		
Within 0-4 years	126	30.8
5-10 years	130	31.8
11-20	36	8.8
>20 years	117	28.6
Availability of separate room for living And bed room(n=402)		
Yes	284	70
No	118	30
Number of bed rooms (n=284)		
1-2 rooms	277	97.5
3 and +	7	2.5
No of window/s per bed rooms(n=284)		
None(0)	42	14.7
1-2 windows	232	81.7
3 and +	10	3.5
Roofing of house(408)		
Corrugated Iron Sheet (CIS)	395	96.8
Thatch/leaf	13	3.2
Walling of the house (n=407)		
Well plastered and to the standard	141	34.6
Cracked and in need of repair	258	63.4
Others	8	2.0
Flooring(n=408)		
Cemented	139	34.1
Soil	266	65.2
Others	3	0.7
Availability of emergency doors(403)		
Yes	156	38.7
No	247	61.3

Household fuel and kitchen condition

As to this finding, more than (59.8 %) of study households were found with sort of kitchen for cooking and food preparation. Out of existing kitchens, more than half (66.8%) were with out any type of chimney. Furthermore, more than half (55.1%) of them lack window for ventilation and air circulation. Almost one quarter (22.1%) of existing kitchen were found connected to main houses and bed structures.

As to this assessment, the majority (80.9 %) of the study households were found using wood as sole source of household fuel while very few (16.1%) was depending on kerosene as alternative source of energy. The remaining share is left to other types of energy sources like charcoal and electric power.

Table3: Sources of household fuel and environmental health status of kitchen, Dukam Town, June, 2010.

Variable	#	%
Availability of separate kitchens (n=408)		
Yes	244	59.8
No	164	40.2
Connection with living room (n=244)		
Yes	54	22.1
No	190	77.9
Availability of window (n=243)		
Yes	108	44.4
No	134	55.1
Availability of chimney (n=244)		
Yes	81	33.2
No	163	66.8
Source of household fuel (n=409)*		
Wood	331	80.9
Cow dung	270	66.0
Charcoal	190	46.5
Kerosene	66	16.1
Electricity	44	10.8

❖ *Multiply response was possible*

Infestation with public health important insect

Study participants were asked whether public health important insects and rodents were a challenge to their households. Accordingly, almost all (89.4%) households complained for existences of certain types of insects and rodents. As to types of dominant insets, the majority of the households were claimed for high infestation of house flies (86.8%), cockroaches (81.6 %), fleas (67.6%) and rats (66.9%). In spite of the fact that actual inset count was not made, generally infestation with the house flies were found very serious and to the extent that one can not eat food out of door in the town (Table 4).

Table 4: Housing infestation with public health import insect and rodents, Dukam Town, Oromia, June 2010.

Infested with insects and rodents (n=396)	**No**	**%**
Households infested with flies(n=364)		
Yes	**316**	**86.8**
No	**48**	**13.2**
Infestation of flea(n=364)		
Yes	**246**	**67.6**
No	**118**	**32.4**
Infestation of cockroaches(n=365)		
Yes	**298**	**81.6**
No	**67**	**18.4**
Household claimed having rats problem (n=363)		
Yes	**243**	**66.9**
No	**120**	**33.1**

Domestic animals availability and management

Out of those found having domestic animals, considerable portion of the households (19.2%) were claimed sharing living and bedrooms with domestic animals (Table 5).

Table 5: Domestic animals handling, Dukam Town, June 2010

Variable	Frequency(#)	Percent (%)
Availability of domestic animals		
Yes	**184**	**45.2**
No	**223**	**54.8**
Have separate rooms		
Yes	**153**	**84.5**
No	**29**	**15.5**
Living with human beings		
Yes	**28**	**19.2**
No	**118**	**80.8**

4.3. Access to improved water supply

Main source of drinking water

Almost all (92.9 %) of the study households were accessed to improved water supply system (piped municipal) either directly from private owned water tap or water vendors or communal public distribution points. On the other hand, certain portion of the inhabitants (7.1%) was found depending on unimproved water sources such as rivers and unprotected community/ private wells.

As to physical observation and discussion made with town water office head, it was learnt that the town has three motorized boreholes and currently one new scheme is under installation to meet the demand of the residents. Water quality test for chemical and biological quality status was not done in the last six months.

Main reasons behind usage of unimproved water source

Study participants who had claimed using unprotected water sources were asked for reasons behind using unprotected waters sources. To this effect, more than half of the study participants (55.5%) claimed unavailability of improved water sources in community while considerable proportion (37.1 %) claimed problems related to geographical proximity to protected sources.

Distance and responsible person to fetch water

Average (±SD) time taken to fetch water across study communities was 11.6 (± 15.1) minutes. In spite of the fact that calculated mean time seems acceptable, one has to realize that considerable portion of households was found in serious challenge of distance to fetch water for its household.

As to person responsible for water fetching, it was found that adult female age more than 15 year were found the sole responsible individuals to fetch water at the study households.

Physical observation made to support quantitative findings of the study, revealed that female adults and female children were found the sole responsible persons in most households of the study locality. Figure 3 below, indicates how some adult women and children are queuing to fetch water from public water point available at Dukam Kebele 01.

Figure 2: Adult and child women waiting to fetch water from pubic tap, Dukam, 2010

Status of drinking water handling

As to drinking water handling, majority (69.5%) of observed study homes was found with good status of water handling at home while considerable portion of the inhabitant (29.5%) was at poor condition. It meant that in more than a quarter of visited households, drinking water was poorly stored and handled in such a way that contaminants could be accessed to pollute water at home.

Materials used to fetch and store drinking water

The overwhelming majority of observed households (94.9 %) were found using plastic Jerry-cans to fetch water at water sources and store at home. Material such as bucket, pot and leather bags were also used in some households both for water fetching and storage purposes.

Per capita per day water consumption and monthly water fee

The mean (±SD) per capita water consumption was found 15.8 (±7.5) liters. During key informant interview, it was learnt that, currently considerable effort was made to address existing gaps between water demand and supply of the habitants.

As to monthly water bill, the overwhelming majority of households (63%) were found currently paying monthly water bill costing less than thirty Ethiopian Birr (which was equivalent to 2 US$ dollars).

Access to health information and its major sources

Study participants were asked whether accessed to any sort of information on how to keep water safe at home and sources of these information. To this effect, more than half of study participants (67.6 %) were accessed to information on how to keep water safe at home.

As to sources of health information, more than half (56.8%) of information was claimed coming from health professionals. Media and school have contributed for more than one third (38.7%) and school contributed for more than half of the cases (37.8%).

Table 6: Source, per-capita consumption and status of handling safe water supply at households, Dukam Town, June 2010

Variables	Frequency	Percent
Source of water supply(n=408)		
Piped water (private)	86	21.1
Piped water (shared)	101	24.8
Piped water (public stand post)	31	7.6
Piped water from vendors.	161	39.5
Unprotected well/spring	1	0.2
Unprotected surface water /River	26	6.4
Others	2	0.5
Reasons for using unprotected sources (n=27)		
Not available	15	55.5
Distance	10	37.1
Cost	2	7.4
Time inconvenience	0	0
Perceived has no difference	0	0
Condition of water storage at home (n=407)		
Covered	283	69.5
Uncovered	118	29.0
Others	6	1.5
Material used to fetch water (n=403)		
Plastic Jerry can	387	96.0
Bucket	10	2.5
Other	6	1.5
Person usually collecting water (n=409)		
Female Child <15 years)	41	10.0
Male child(<15 years)	49	12.0
Adult Woman	252	61.6
Adult man	67	16.4
Per capita water consumption (n=403)		
< 10 liters/capita/day	109	27.0
11-20 liters/capita/day	221	54.8
21-30 liter/capita/day	56	13.9
31+ liter/capita/day	17	4.2
Mean (SD)	**15.8(±7.5)l/c/d**	
Payment for water supply (n=407)		
Yes	363	89.1
No	44	10.9
Payment per month (n=363)		
< 30 Birr	229	63.1
> 30 Birr	134	36.9
Get health information(401)		
Yes	271	67.6
No	130	32.4
Source of health education (n=271)*		
Health personnel	154	56.8
Mass media	105	38.7
School	97	37.8
Others	7	2.6

- Multiple responses was possible

Household based Water Treatment and Related Practices

Finding of this assessment indicated that only 22.9 % of the households reported using or practicing water treatment at home to make water safe for drinking. To this end, more than three-forth (79.6%) of those practicing home water treatment uses chemical such as Wuha Agar while less than quarter(14.9%) are practicing boiling method.

Prevalence of water born diseases (Diarrhea)

Table 7 below shows prevalence of all type of diarrhea diseases observed in the study period preceding two weeks to survey period. As to response of study households, considerable portion of study households (13.2%) were claimed for existence of diarrhea disease among family members of the household proceeding to two weeks to the study period. Out of all diarrheas cases, more than half (58.5%) was happened among children while share to adult was found less than half (41.5%) of what happened to children.

Table 7: Status of household water treatment, knowledge o water born diseases and prevalence of diarrhea diseases among the family members, Dukam Town, June 2010

Variable	Frequency	Percent
Treat water at home to make safer to drink (n=407)		
Yes	93	22.9
No	314	77.1
Drinking water treatment options at home (n=93)		
Boil	12	14.9
Add chlorine	74	79.6
Filter with clean cloth	7	7.1
Knowledge to diseases related to contaminated water (n=409)		
Diarrhea diseases	352	86.1
Abdominal cramp	125	30.6
Parasite worms	175	42.8
Skin diseases	72	17.6
Other diseases	28	6.8
Don't know	17	4.2
Anyone in the family with diarrhea diseases within the last two weeks (two weeks ahead of survey date) **(n=402)**		
Yes	53	13.2
No	349	86.8
Age distribution of affected persons(n=53)		
child under fie years	23	43.4
Child 5-15	8	15.1
Adult > 15 years	22	41.5

4.4. Status of household sanitation of the study locality

Availability and status of sanitary toilet facilities

Almost three-fourth (70.4 %) of visited households had some kind of latrine facilities. As to this assessment, a significant portion (29.6%) of the households was found with out any type of excreta disposal system and practicing an open defecation. Out of existing toilets, the overwhelming majority (75%) of existing toilets /latrines were found traditional type and with out an appropriate structures for privacy and contamination to external environment.

More than one-third of existing latrine (38.2%) facilities were shared among different households while more than half (55.2%) of existing toilet /latrine facilities was poorly constructed, maintained and handled and being a good source of disease causing vectors and bad smells.

Availability and status of Hand washing facilities

The majority (78.9%) of household has no any type of hand washing system. Out of those with hand washing facility insignificant proportion of the respondents (2.4%) did not wash their hands after visits to toilet. Furthermore, almost ten percent (9.2%) of those with hand washing facility usually wash, their hands with plain water (with out soap).

Major reasons behind not having toilet facility

Given that multiple responses were possible, more than half (34.3%) of the study participants claimed financial constraints as major issue for not having larine while less than ten percent (9.6%) of respondents not felt important to have latrine. Lack of space and technical know how of construction materials accounted for 10%, 5.1% and 2.5%, respectively.

Management of stool of child under five years

In relation to disposal of a child's feces, almost three-fourth (72.7%) of the household with child under five managed child feces in toilet/latrine while more than a quarter (27.3 %) disposed it any where in the open field.

Table 8: Availability, type and status of toilet facility, Dukam Town, June, 2010

Variables		Frequency	Percent
Availability of latrine (n=409)			
	Yes	288	70.4
	No	121	29.6
Type of latrine (n=288)			
Improved traditional pit latrine		54	18.8
Unimproved traditional pit latrine		214	74.3
Improved flush toilet		11	3.8
Un improved flush toilet		3	1.0
Others		6	2.1
Share toilet facility with other household (n=288)			
Yes		110	38.2
No		178	61.8
Cleanness of the latrine (n=288)			
Clean		129	44.8
Unclean		159	55.2
Availability of hand washing facility (n=408)			
Yes		86	21.1
No		322	78.9
Hand washing practice after toilet (86)			
Using soap with water		79	90.8
Using ash with water		0	0
Water only		7	9.2
Child stool disposal practice (n=231)			
Properly contained		168	72.7
Disposed in open field		63	27.3
Major reasons for not having latrine facility (n=221)			
Lack of space in the compound		20	16.5
Financial problem		68	56.2
Lack of construction materials		10	8.3
Lack of know-how		5	4.1
Not felt important		18	14.9

Reasons and source of information for having latrine facilities

To this effect, more than half of study participants (63.7%) claimed that they were for the need to prevent communicable diseases while almost similar proportion were given to the side of avoiding unsightly condition of living and working environment.

As to sources of information, health personnel, mass media, and schools were found mentioned by most respondents as main sources of information for having individual latrine.

Table 9: **knowledge and source of information on need of latrine, Dukam Town, June, 2010**

Variable	Frequency	Percent
Knowledge on importance of having a latrine (n=408)		
To avoid unsightly condition	229	56.1
To have privacy	99	24.3
To control communicable diseases	260	63.7
Others	10	2.5
Source of information for importance of latrine for the first time (n=403)		
Mass media	178	44.2
Health personnel	188	46.7
School	158	39.2
Agricultural agent	13	3.2
Imitation from persons and/or places	28	6.9

4.5. Liquid and solid waste management status of the town

It was documented fact that good management of solid and liquid waste is precondition for the sanitary status of any urban and rural residents. Table 10 below indicates status of sold and liquid waste management of Dukem town.

Liquid waste management condition

Overwhelming majority (96.1%) of study households generated liquid waste constituting detergents used as a result of food utensils cleaning and washing of cloth. As per informal communication with inhabitants of the town, almost all households (85.3%) of individuals disposed liquid waste in open field there by contaminating living and working environment of the residents of the town. As well realized in observation of the town hazardous institutional liquid waste such as latrine over flow and industrial waste were found indiscriminately disposed in nearby water bodies.

Table 10: Major type and usual way of disposing liquid waste, at Dukam Town, June, 2010

Variable	Variable	Frequency
Major components of liquid waste		
Household detergents	393	96.1
Food debris	150	36.7
Overflow of toilet wastes	26	6.4
chemical and toxic products	15	3.7
Other	13	3.2
Usually means of disposing(n=407)		
Controlled disposal system	60	14.7
Uncontrolled disposal system	347	85.3
Specific option of disposal(n=407)		
Septic tank/sewer connection	6	1.5
Seepage pit/sock-away pit	7	1.7
Latrine	47	11.5
Open field	272	66.5
Open ditch	63	15.4
To near by water body	7	1.7
Others	7	1.7

Solid waste management status of the town

Concerning solid waste management, the quantitative study result revealed that 74% of the households were with out any type of solid waste management system and consequently used open-field as means of disposal site. As to this assessment, insignificant portion of households (9%) claimed using municipality waste management system, while about 13% used backyard waste pits as final disposal system.

Organic and inorganic wastes were found disposed indiscriminately in all part of the study localities and created unsightly condition to the town. Majority of wastes were generated from butcher shops, hotels, private enterprises and households while industrial waste was the emerging challenge to the town. More than half (68.3 %) of individual resident compounds/yards were found unclean and full of garbage and refuse.

Table 11: Environmental health condition of solid waste management system, Dukam Town, June 2010

Variable		Variable	Frequency
Types of solid waste generated in HH*			
Animal dung		97	23.7
Grass		83	20.3
Ash		281	68.9
Vegetable cover		211	51.7
Rubbish		135	33.1
Left over foods		30	7.4
Others		6	1.5
Type of Solid waste disposal system (409)			
Collect by municipality		26	6.4
Back yard waste pit		63	15.4
Disposed in pit latrine		60	14.7
Open field/		133	32.5
Used in agricultural fields		127	31.1
Other		21	5.1
Over all cleanness of compound (n=400)			
	Clean	127	31.7
	Unclean	273	68.3

*Multiple responses was possible

Personal Hygiene practices

Table 12 below indicates personal hygiene practice of respondents in regard to availability & utilization of bathing facilities, frequency of taking bath and knowledge of stating certain diseases related to poor personal hygiene practices in general and bath taking in particular.

Availability and utilization of bathing system

The majority (64.2 %) of the study participants were found having a sort of bathing facilities varying from bucket and basin to modern tubs. The overwhelming majority (83.8%) of the residents were reported taking bath using bucket and basin at home. As to frequency of taking bath, more than half (61.1%) of respondents were claimed taking bath at least once a week. In response to question asked to how frequent under five children were bathed/washed, the overwhelming majority of respondents were practicing under five children baths at least once a day. As to using of soap, almost all (96.8%) of study participants were informed taking bath using soap.

Knowledge of hand washing and ability to mention diseases related to poor personal hygiene

More than half (69.4%) of the respondents mentioned the need to wash hand after toilet visits while nearly all (80.7%) study participants were mentioned washing of hands before eating food. Almost half of them were also listed the need to wash hand before preparing food and feeding children.

As to listing some of health that related to poor personal hygiene practices, more than three-forth (78%) of respondents mentioned the existence of skin diseases and diarrhea, and eye diseases as some of illness related to poor personal hygiene practices.

Table 12: Personal hygiene and hand washing practices of inhabitants, Dukam Town, June 2010

Variable	Frequency	%
Availability of bathing facility (n=405)		
Yes	145	35.8
No	260	64.2
Type of availably bathing facility (n=145)		
Modern bathing tube	9	6
Ordinary shower	33	23
Bucket and basin	96	66
Others	8	5
Where usually take bath (n=405)		
Modern bathing tube	2	0.5
Ordinary shower(private and public)	41	10.4
Bucket and basin	331	83.8
In near by river	12	3.0
Others	9	2.3
Frequency of taking bath(Respondent) (n=228)		
A least once a day	35	12.2
Once a week	177	61.5
Once a month	16	5.6
Once a year	0	0.0
Frequency of washing child under five year (n=179)		
Once a day	143	80
Once a week	36	20
Once a month	-	-
Taking bathing with soap (n=404)		
Yes	391	96.8
No	13	3.2
List of main diseases result due to poor personal hygiene *		
Skin conditions	320	78.2
Eye diseases	111	27.1
Diarrhea diseases	161	39.4
Hand washing *		
Before food preparation	286	69.5
Before feeding children	137	33.5
Before eating food	330	80.7
After visiting toilets	284	69.4

*Multiple responses was possible

4.6. Logistic regression analysis to test association between socio-economic/demographic factors and access to improved water supply, sanitation and hygienic practice

Logistic regression analysis was made for selected socio-economic/demographic factors, condition of facility and reported access to improved water supply, latrine facility and management of solid waste. Detail findings of the assessment will be depicted thematically as follows.

Access to improved water sources

Bivariate analysis employed between family access to improved water sources and selected socio demographic and socio economic factors indicates that, households with educated family were found to be 3.1 times more likely to be accessed to improved water source than their counter parts [OR:3.1, 95% CI: (1.34,7.25)]. After adjusting for other socio- economic variables, it was also found significant. That is, households with educated family members has 4.6 times more likely to accessed to improved water sources than households with uneducated one [AOR: 4.6, 95% CI: (1.7, 12.6)].

Monthly income level of household has also shown a significant association with access to improved water sources. Households with high monthly income level were found 3.25 times more likely to have an access to improved water supply [OR: 3.25, 95% CI: (1.14, 9.94)]. After adjusting for other socioeconomic variables, households with high income has shown 2.17 times more likely to have an access to improved water sources but not statistically significant[AOR: 2.17, 95% CI: (0.67, 7.0)].

Geographic location of the inhabitant also has shown a significant association both in crude and adjusted odd ratios. Urban dwellers of the town have 19.3 times more likely to have access to safe water supply than its semi-urban inhabitants [OR: 19.3, 95% CI: (4.37, 119.2)]. After adjusted, geographic setting was significantly associated with access to improved water sources. Urban inhabitants have 23.7

times likely to protected water sources than semi urban inhabitants [OR: 23.7, 95% CI: (4.8, 116.7)].

As to ownership of the housing structure was concerned, it was found that households with own (private) home has less likely to have an access to improved water sources [OR: 0.07, 95% CI: (0.009, 0.48)]. After adjusted with other variables, it was also statistically significant [AOR: 0.05, 95% CI: (0.006, 0.4)].

Statistically significant association was also found between availability of bathing facility and access to safe water supply. Household accessed to bathing facility were found 26 times more like to accessed to safe water sources [AOR: 26.56, 95% CI: (3.4, 206.7)].

No statistical significant association was found between ethnic group and family size and dependent variable both in bivariate and multivariate tests.

Table 13: Associations of socioeconomic/demographic determinants in relation to household access to improved water source, Dukam Town, June 2010

Variable	Accessed to improved water sources		Crude OR(95% CI)	AOR (95%I)
	Yes	No		
Educational				
Illiterates(r)	131	18	1.00	1.00
Literates	248	11	3.1 (1.34,7.25)*	4.6 (1.70,12.6)**
Residence				
Rural (r)	156	27	1.00	1.00
Urban setting	223	2	19.3(4.37,119.2)**	23.7(4.8,116.7)**
Income level				
Low(r)	226	24	1.00	1.00
High	153	5	3.25(1.14,9.94)*	2.17(0.67,7.0)**
Household Ownership				
Rented(r)	130	1	1.00	1.00
Private	249	28	0.07(.009,0.48)*	0.05(0.006,0.4)**
Sex				
Male(r)	147	19	1.00	1.00
Female	232	10	3.0(1.28,7.14)*	2.44 (0.9,6.5)
Ethnic group				
Oromo(r)	251	22	1.00	1.00
None-Oromo	128	7	1.6 (0.63,4.28)	0.608(0.19,1.84)
Family size				
<5 person/HH	109	8	1.00	1.00
> 5 persons/HH	270	21	0.94 (0.37,2.33)	0.7(0.30,2.33)
Bathing facility				
No	234	28	1.00	1.00
Yes	143	1	17.11(2.43,341)*	26.56(3.4,206.7)**

r- Referent category

* Statistical significance: p <0.05

In regard to access to latrine facilities

Table 14 presents the educational level of the respondents shown a strong association with access to latrine facilities. Household lead by literate head/spouse has 3.39 times likely to having latrine facility than its illiterate counterparts [OR: 3.39, 95% CI: (2.13, 5.41)]. After adjusted with other factors, households with literate family member has 3.07 more likely to be accessed to latrine facility than their counterparts [AOR: 3.07, 95% CI: (1.89, 4.97)].

Setting of the inhabitant has not shown a significant association with access to improved latrine facilities both with crude and adjusted odd ratios.

Income level of the household also shown a significant association with availability toilet facility, family with high monthly income has 3.57 times more likely to accessed to latrine facility than their low income earners[OR: 3.57, 95% CI: (2.07, 6.01].

As to ownership to house of the structure, privately owned household has shown strong association with availability of latrine facility. Privately owned household has 1.59 times likely to have an access to latrine [OR: 1.6, 95% CI: (1.0, 2.5)]. But after adjusted with other factors no statistical association was observed. The same was true for bathing facility and access to safe water.

Access to latrine has not shown a statistically significant association with places of residency, sex and family size of the household.

Table 14: Association between access to latrine (toilet) facility and socioeconomic/ demographic determinants of households, Dukam Town, June 2010

Variable	Accessed to latrine facility		Crude OR(95% CI)	AOR (95%I)
	Yes	No		
Educational status				
Illiterates(r)	81	69	1.00	1.00
Literates	207	52	3.39 (2.13,5.41)*	3.07(1.89,4.97)**
Residence				
Rural(r)	126	57	1.00	1.00
Urban	162	64	1.15(0.73,1.79)	1.03(0.6, 1.17)
Income level				
Low(r)	154	97	1.00	1.00
High	134	24	3.57(2.07,6.01)*	2.85(1.65,4.9)**
HH Ownership				
Rented (r)	84	48	1.00	1.00
Private	204	73	1.6(1.0,2.5)*	1.44 (0.87,2.4)
Sex				
Male(r)	114	52	1.00	1.00
Female	174	69	1.15(0.73,1.81)	1.58 (0.95,2.64)
Ethnic group				
Oromo(r)	185	89	1.00	1.00
None-Oromo	103	32	1.55(0.93,2.55)	1.27(0.76,2.15)
Family size				
<5 person/HH	88	29	1.00	1.00
> 5 persons/HH	200	92	0.72 (0.43,1.2)	0.96(0.56,1.65)
Bathing facility				
No	234	28	1.00	1.00
Yes	143	1	17.11(2.45,341.76)*	1.04(0.6,1.7)

r- Referent category

* Statistical significance: p <0.05

Solid was management

Table 15 indicates that association among access to sanitary way of refuse management and income, education, geographic settings and ownership of the households. Education, monthly income, was shown a significant association both in bivariate and multivariate while income and setting of residence do not shown associations at crude and adjusted odd ratios, respectively.

Educational status of head households showed strong association with access to sanitary solid waste management system. Literate headed households were found about 2.55 times likely to accesses to sanitary waste management system than illiterate counterparts [OR: 2.55, 95% CI: (1.42, 4.6)]. After adjusted with other factors, education being also statistically associated with access to improved waste management. Literate household family has 2.67 times more likely to access to sanitary way of waste management [AOR: 2.67, 95% CI: (1.49, 4.78)]

Residential setting of the household has no statistical association with access to sanitary solid waste management system. Income level of the household was statistically significant only after adjusted with other factors [AOR: 2.67, 95% CI: (1.49, 4.7)].

Household privately owned housing structure has 2.3 times likely to be accessed to sanitary waste management. After adjusted with other factors, ownership of home being also statistically associated with access to safe waste management [AOR: 2.3, 95% CI: (1.24, 4.3)]

Table 15: Association between access to sanitary waste management and socioeconomic/demographic condition of households, Dukam Town, June 2010

Variable	Accessed to sanitary waste management system		Crude OR (95% CI)	AOR (95%I)
	Yes	No		
Educational				
Illiterates(r)	19	131	1.00	1.00
Literates	70	189	2.55 (1.42,4.6)*	2.67(1.49,4.78)**
Residence				
Rural (r)	48	135	1.00	1.00
Urban setting	41	185	0.62(0.38,1.03)*	1.03(0.6,1.8)
Income level				
Low(r)	61	190	1.00	1.00
High	28	130	0.67(0.39,1.14)	0.5(0.3,0.9)*
Household Ownership				
Rented(r)	17	115	1.00	1.00
Private	72	205	2.38(1.29,4.41)*	2.3(1.24,4.3)**
Sex				
Male(r)	47	119	1.00	1.00
Female	42	201	0.53(0.32,0.87)*	0.64(0.4,1.09)
Ethnic group				
Oromo(r)	61	213	1.00	1.00
None-Oromo	28	107	0.91 (0.53,1.56)	0.1(0.5,1.7)
Family size				
<5 person/HH	24	93	1.00	1.00
> 5 persons/HH	65	227	1.11(0.64,1.95)	1.12(0.6,1.9)

r- Referent category

* Statistical significance: p <0.05

4.7. Results of In-depth Interview

In addition to quantitative information, in-depth interview was made in order to explore information relevant to current status of water supply, solid and liquid waste management and hygienic conditions of the town.

Accordingly, satisfactory in-depth interview was held with Dukam town environmental health experts, water supply utility head, town land management and environmental protection section head and municipality solid waste management section head. All respondents were with good work experience and have minimum of two years with their respective sector and job attachment. Furthermore, educationally they were with minimum of first degree in and maximum of second degree in their respective profession. Summary of overall findings of the assessment will be presented sector by sector as follows.

Health office of the town

- The town health office has adequate environmental health professionals both for regular and project programs of the town.
- The urban health extension program was launched in all Kebeles of the town.
- A minimum of two health extension workers were assigned per each Kebele of the town and currently delivering the program in house to house approaches.
- Inspection of eating and drinking establishment, factories and other institution is undertaking with environmental health professionals and supporting staff of the town health center.
- Adequate health professionals, including health officers are available both at office and health care units (health center) of the town health system.
- No sectoral collaboration and communication was established as per WASH Memorandum of understanding.
- Legal backing to undertake action was a challenge.

- Environmental health program of the town was in lack of budget for its routine activity and programs.
- Water and sanitation related diseases were found rampant and major challenges to health and well being of community at large (Table 16).

Table 16: Ten Top Diseases, Dukam, 2009.

S. N	Year as EFY				
	1997	1998	1999	2000	2001
1	Ameba	URTI	Ameba		
2	Pneumonia	Pneumonia	URTI		
3	Malaria	Ameba	Pneumonia		
4	URTI	Injury	Typhoid		
5	Typhoid	UTI	Injury		
6	Skin infection	Typhoid	UTI		
7	B. conjunctivitis	Skin infection	Skin infection		
8	Intestinal parasites	B. conjunctivitis	B. conjunctivitis		
9	UTI	Malaria	Malaria		
10	Injury	Intestinal parasites	Menstrual discharge disorders		

Source: Dukam Town Health Office, 2009

Water supply utility of the town

As per in-depth interview made with town water supply utility head:

- Currently the organization is serving more than 2084 clients through private and communal pipe connection and planed to reach more with its service to new customers.
- The utility has four boreholes with motorized pumping system and two water tankers/ reservoirs capable to handle and deliver reasonable amount throughout the year.
- There are eleven public water points (Bonos) situated in high-density populated, low-income areas of the town.
- The town has no any organized sewerage system yet.
- The utility is in lack of human recourse and facility as per newly approved organizational structure and vested power to the sector.
- The utility is managed by board of director which appointed by town council.
- Given that water quality control expert was assigned, routine water quality monitoring was not materialized due to lack of facility and equipments.
- No sectoral collaboration and communication established as per WASH Memorandum of understanding.
- In collaboration with private consultants, the town is on process to undertake feasibility study to facilitate expansion of water line net work within the town and its adjacent rural communities.

Town solid waste management

In regard to solid waste management municipality and town officials were interviewed about current status solid waste management and future plan of the sector. Summary finding was presented as follows;

- Solid waste collection and disposal of the town was inadequate.
- There is only one method to collect solid waste: door-to-door collection.
- Door-to-door solid waste collection is carried out by privately organized individuals and municipality crews.
- The town has one final solid waste disposal site just near newly planned Addis to Adama road.
- The current site is located at approximate 4 km away from the center of the old town.
- The town has no any facility to manage liquid waste generated at individual and institutions as well as working factories.
- Green parks and recreation facilities are organized at certain parts of the town.
- Open defecation is widely practiced, even in places where there are public toilet facilities.

4.8. Results of physical observation

In addition to quantitative and in-depth interview physical observation was employed to municipal water system, solid and liquid waste management and housing condition of the town. Over all finding of the physical observation is summarized as follows.

Municipal Water supply system of the town

Given that the he town has four deep wells, except one, all are situated in the center of the town and exposed to potential contaminants of residential waste (figure 4). For instance a deep well found around Dukam River and slaughterhouse was found potentially exposed to contaminants from near by latrines and solid and liquid waste generated form near by households. Main line of the municipal water system of the town was found seriously exposed to potential contaminants due poor maintenance and operation of the system (figure 3).

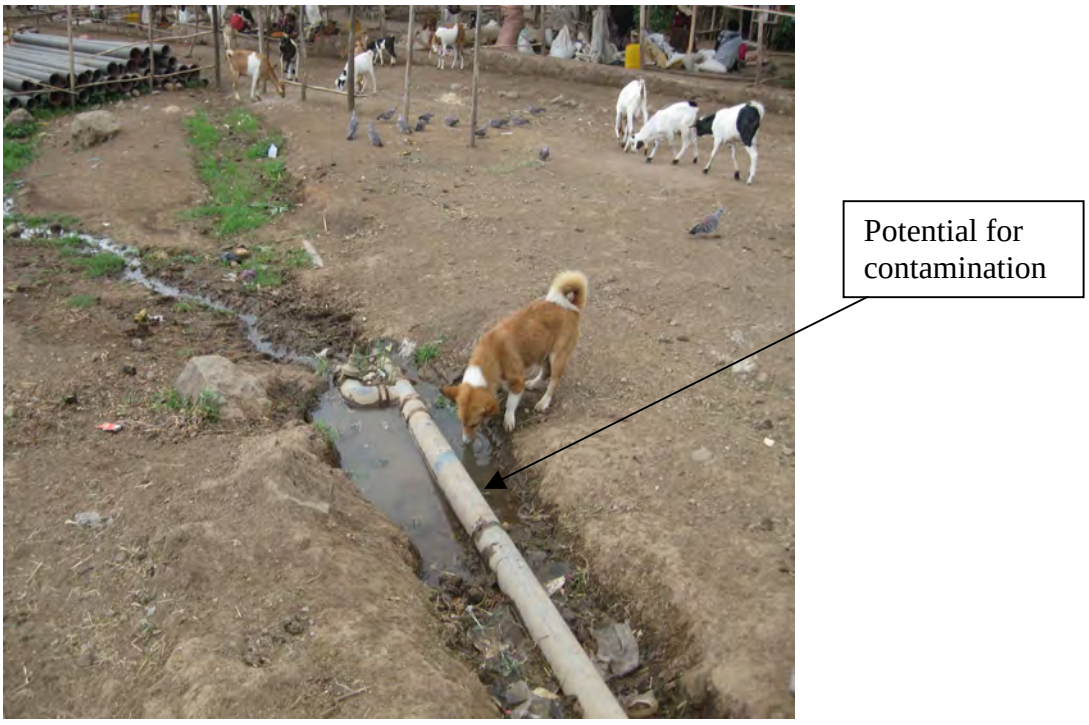


Figure 3: Poor sanitary status of municipal water system, Dukam, 2010

Figures 4 below indicate status of municipal boreholes and potential contamination from guard households both at old and newly constructed wells.

Figure 4: Borehole situated in individual living quarters, Dukam, 2010.

As indicated in figure 5 below, the town water utility has been constructed on new water restorer capable to address water demand of the inhabitants. The sanitary status of the reservoirs was found satisfactory except absence of fencing around the facility.

Figure 5: Old and newly constructed municipal water reservoirs, Dukam, 2010.

Solid waste management

As per physically observed and supported with quantitative part of assessment, the overwhelming majority of the inhabitants were found damping liquid and solid waste any where found open including the main road. Dukam is one of the regional towns with serious challenge of organic and inorganic waste. Figure 4 indicates how solid waste was disposed in the main road from Addis Ababa to Adama and at edge of Dukam River. During field observation, it was realized that the overwhelming majority of inhabitants of the town managed household waste near Dukam river bank. Dukam river is one of domestic water source for the poor and down communities of rural inhabitants of Akaki district.

Figure 6*: Indiscriminate solid waste disposal status of the inhabitants, Dukam, May 2010.*

Housing condition of the town

Given considerable effort was made through regional and town administration, the overwhelming majority of housing structure of the town was found very old and in lack of basic human psychological and physiological requirement. As realized in quantitative aspect of the study most of existing houses were found single roomed and has no appropriate window, flooring, walling and other basic components of housing. Most of households were found sharing home with domestic animals.

Furthermore, a great number of the houses in the study area are made of local materials such as wood and thatch, stone and mud, stone and cement, with corrugated iron sheet roofs and thatches(7).

As per observation of the town, several new housing structures were found under construction in all direction of the town both with private and public involvement. Considerable condominiums and communal apartments were under construction with the town center with financial and technical input of town administration.

Figure 7: Typical housing condition of Dukem Town, May 2010

Status of public latrine

As one can understand from figure 8 below, almost all public latrines available in the town were found poorly constructed and maintained. There was no any person responsible for day to day cleanness of the facilities and consequently abandoned and being nuisances to nearby community. Hence domestic animals are found using as shelter from sun and rain (Figure, 9). As one can observed from photo taken from certain sites almost all public latrine of the town were very dirty and being a serious public health nuisances to the residents of the neighborhoods (Figure 8).

Figure 8: A sanitary statuas of public latrines, Dukam, 2010.

Figure 9: public toilets abandoned to domestic animals and street children, Dukam, 2010.

5. Discussion

The result of this assessment revealed that environmental health status of the town was very poor in regard to access to healthful housing condition, access to improved water supply, latrine facility, and appropriate solid and liquid waste management.

In consistent with previous assessments (16), the majority (67.7%) of housing structures were found privately owned while considerable proportion (31%) was rented from Kebele or individual persons. Almost all (83.6%) of assessed households were serving for residential purposes while mean household size of the study participants was found 4.59 (SD of ± 2.04) persons, which is slightly higher than EDHS (4.2 persons) report for year 2005. This might be explained by current migration of work forces from other places for employment opportunity to the town.

Similar to assessment made on knowledge, attitude and practices on water supply, environmental sanitation hygienic practices of selected districts of Ethiopia, result for Harar and Dire Dawa towns (16), it was found that almost all houses (96.6%) were made of corrugated iron sheet (CIS). Further more, in agreement to Ethiopian Health Survey report to 2005(14), current assessment result indicates that majority (63.4%) of living houses were found with cracked walls and none cemented floorings (65.2%). Nevertheless, in contrary to the same assessment (14) this study showed that more than quarter of the households (28.9%) had a singled room structure for all purposes and more than quarter (34%) was found with cemented floorings. This might be explained by high number of newly constructed houses than few years back. As to window and ventilation system of housings, similar to survey done at most town of the nation, almost all households (88%) were found in lack of appropriate window system for housing structure of the inhabitants.

Furthermore, similar to previous assessment report of towns (14), more than half of (59.8%) residential home are with sort of kitchen for preparation of food and cooking purposes. Similar to housing and census report of 1994, almost all households were in lack of appropriate kitchens for cooking and food preparation. Even Existing facilities were found without out appropriate ventilation and chimney systems. Concerning household fuel usage, similar to other previous surveys (14), firewood was found a major (80.9%) source of household energy for cooking and other heat energy need to inhabitants. Given high biomass utilization for household fuel energy and lack of appropriate ventilation systems, risk for indoor air pollution is inevitable reality among most inhabitants of the town. As one could easily realized from ten top diseases of the town health center report of various years, upper respiratory illness was one of the first or the second ten top diseases of the town and its environs.

In agreement with some study made at some parts of the country(14,31), this study revealed that almost half (45.2%) of study households were found rearing domestic animals while almost quarter of residents were sharing living rooms with domestic animals. On top of this, the majority (86.8%) of sampled households were found infested with public health important insects and rodents. Especially, house flies and cockroaches were found a serious challenge to almost all inhabitants of the town. This might be explained by poor solid and liquid waste handling of the residents and housing condition of the town.

In agreement with similar studies (14, 24, and 27), the overwhelming majority (92%) of the study households were found accessed to municipal water sources. In difference with study made at Gondar and Emdibir Towns, per capita per day water consumption of the study population were found 15.1 litters/capita/ day. This might be explained by existing potential to municipal water system and variation of time for assessment.

Similar to Ethiopian Demographic health survey report for 2005 and MoH, KAP assessment (14, 28), an adult females aged more than fifteen yeas were found the sole responsible persons to fetch water for the households. But contrary to previous studies, average time taken to fetch water across study communities was found very low (11.6 minutes). This can be explained improvement of access to public and private water vendors in the town.

In contrary to previous assessment of household water handling and collection trend made through ministry of health (28) current finding indicates that almost all households (94.9 %) were using plastic contenders as main household utensils to collect and store water at home. Bucket, pot and leather bags were also used in certain households both for water fetching and storage purposes and may be explained by adherence to traditional way of life & geographic setting of the town (semi-urban settings).

Overwhelming majority of households (63%) were found currently paying monthly water bill costing less than thirty Ethiopian Birr. It is high charge when compared to water bill being paid to other town of the country (27). This may be explained by local water tariff setting condition of the town.

With regard to access to information, more than half of study households were found accessed to health information on how to keep water clean at home. Sanitary status of drinking water handling to the majority (69.5%) of study homes was also found satisfactory. Major source of health information was found health professionals, as elsewhere in the nation (28, 29, and 31).

As to household water treatment and safe storage, almost quarter of study households (22.9 %) were reported practicing water treatment at home to make water safe for drinking. The result of this assessment was in contrast to most assessment undertaken in other part of the nation (14, 28, and 29). This might be

due to information disseminated some moths back to contain acute watery diarrhea out break observed in the locality.

As to prevalence of diarrhea, in contrast to national EDHS report (14) for prevalence of diarrheal diseases which was 18%, current study for two weeks prevalence indicated only 13.2%. It was also less than assessment undertaken at East Gojam (31). This might be explained by current household water treatment practice and seasonal condition of the current study period.

In agreement with other studies (14, 31,), a significant association was found among access to improved water source and educational status of the respondents. Accordingly, household lead with educated family head were found 4.6 times more likely to be accessed to improved water sources than their counter parts [AOR: 4.6, 95% CI: (1.7, 12.6)]. Family monthly income level has also shown a significant association with access to improved water sources. Households with high monthly income level were found 3.25 times more likely to have an access to improved water supply [OR: 3.25, 95% CI: (1.14, 9.9)]. Geographic setting of the inhabitant has shown a significant association both in crude and adjusted odd ratios. Urban inhabitants have 19.3 times likely to be accessed to protected water sources than semi urban inhabitants [OR: 19.3, 95% CI: (4.3, 119.2)]. Furthermore, it was found that households with own (private) home, sex of respondent and availability of bathing facility were found associated with an access to improved water sources.

In contrary to study made at Gondar town (7), this study indicates that almost three-fourth (70.4 %) of visited households were with a sort of latrine facilities while a significant portion (29.6%) of the households was found with out any type of excreta disposal system and consequently practicing an open defecation. In consistence with EDHS and a community based survey at Emdibir town (14, 27), the overwhelming majority (75%) of existing latrine facilities were found unimproved and below minimum national standard of requirement (21, 22).

Similar to EDHS for 2005 and other assessments (2, 14, 17, 24,), more than half of existing toilet facilities were poorly constructed, maintained and handled and being a good breeding media for disease causing vectors. In consistent with base line survey for Amahara learning by doing (29),it was found that the overwhelming majority of under five child faece was managed using latrine while more than a quarter (27.3 %) disposed in any where in the open field.

Similar to findings of other assessments (9, 25, 27, 29), more than half (68%) of the study participants were claimed finance constraints as major reasons behind lacking toilet facility. On top of this, significant number of respondents was found not felt important to have latrine and it can be explained with low status of awareness to health effect and benefit of human excitement. In line with other studies (16), pertinent sources of health information were found health personnel, mass media, and schools.

Given that the majority (78.7%) of HHs were found with out any type of hand washing system, significant proportion of the respondent (2.4%) was not wash their hands after visits to toilet.

Similar to sanitary survey done to Gonder town (15), educational status, monthly income of the households have shown a strong association with access to latrine facilities. Households lead by literate heads/spouses were found 3.4 times likely to having latrine facility than its illiterate counterparts [OR: 3.4, 95% CI: (2.1, 5.4)]. Furthermore, income level of the household has shown a significant association with availability toilet facility, it mean that household with high monthly income has 2.8 times more likely to accessed to improved sanitation facility than their counterparts [AOR: 2.85, 95% CI: (1.6, 4.9)].

Moreover, privately owned housing structure has shown strong association with availability of latrine facility. Privately owned households have 1.6 times likely to be

accessed to latrine [OR: 1.6, 95% CI: (1.0, 2.5)].Contrary to theoretical expectations, setting of the inhabitant has not shown a significant association with access to improved latrine facilities both with crude and adjusted odd ratios. This might be explained by almost similarity of both setting in regard to access to latrine facility. As to the communal/public latrines, all public toilet available in the town were found poorly managed and abandoned for domestic and wild animals. It needs urgent decision of the municipality whether to properly manage or privatized to for profit enterprises. There are considerable experiences regionally in Uganda, Kenya and Burkina Faso how manage and operate public latrines to gain efficiency, quality and ability to raise fund (32).

Similar to other assessments (28), it was found that the overwhelming majority (96.1%) of study households was found disposing liquid waste in open field. Household, institutional and industrial liquid waste was found disposed indiscriminately in living and working environment. As to physical observation of this assessment, toilet over flow and industrial waste such as effluents of slaughterhouses were found indiscriminately disposed to Dukam River which is one of major water source for rural community of Akaki District. As physically observed and realized, considerable size of households of the town and the majority of rural inhabitants were found partially or full depending on Dukam River. It was one of the issues that acknowledged and considered among all concerned officials and experts of the town during in depth interview and discussions. Furthermore, the present assessment also revealed that almost all of the inhabitants of the town are currently disposing domestic and commercial wastes in open field indiscriminately and carelessly. Especially, animal carcass from butcher shops and abattoir indiscriminately disposed on the main road crossing the town and being one of a serious pubic nuance to the town.

Similar to other survey, education, monthly income of the study family were found significantly associated with appropriate sold waste handling, transporting and disposing. In current study, setting of residence and ownership of the housing structure not shown any association both for crude and adjusted odd ratios.

Educational status of head households showed strong association with access to sanitary solid waste management system. Households with literate has shown about 2.7 times likely to accesses to sanitary waste management system than illiterate their counter parts [AOR: 2.67, 95% CI: (1.5, 4.8)].

Similar to other studies (24, 25, 29), over all hygiene awareness and practice of the study households was found to be poor. This study indicates that significant proportion of study households (35.8 %) were found with out any form of bathing facilities and taking bath using bucket and basin. The study shown that more than half (61.1%) of respondents were taking bath at least once a week.

Similar to assessment done in Amahara region (29), hand washing practice at critical period was found poor.

Generally, the over all environmental health status of the town was found poor and below the minimum requirements of urban sanitation.

6. Strengths and limitation of the study

Strength of the study

- This study was the first of its kind in the area in regard to status of access to improved water supply, latrine facility, healthful housing and appropriate management of waste.
- The study includes professional observation to water supply, sanitation and hygienic practices.

Limitation of the study

- Being cross-sectional in design, this study shares drawback of similar designs.
- Due to problems encountered to access to the master plan of the town, status of town in line with residential, business and industrial zoning was not well addressed.
- Recall bias might be prevailed in certain issue which needs to be recalled.

7. Conclusion and Recommendations

7.1. Conclusion

Based on data collected from study area the following conclusion can be drawn.

- Given that the town is situated near the capital city of the nation, the overwhelming majority of inhabitants were found living and working within poorly constructed and maintained housing structure in such a way that the human physiological requirement is seriously compromised.
- In sprite of the fact that considerable effort was made, access to safe water supply and per capita water consumption of inhabitants were found still below acceptable range of national and regional standard.
- Given that some water sources and main water-lines was found poorly maintained and exposed to potential contaminants, regular water quality control and sanitary surveillance was not found in place.
- As per physical observation of sampled households, the over whelming majority of existing latrine facilities were poorly constructed and maintained. Specially, communal/public toilets facilities were found being a serious public health nuisance and challenges to the inhabitants.
- Indiscriminate solid and liquid waste collection, handling and disposal were found common among all individual households, institutions and factories of the town. Consequently the town is currently in serious challenges of managing organic and inorganic wastes of the inhabitants.
- Community and individual hygienic practice of the inhabitants in general and study households in particular were found very poor and in serious status.
- Given that the memorandum of understanding (MoU) was signed among line offices of the federal and regional offices, intersectoral collaboration and coordination was still very poor and insignificant.

7.2. Recommendations

Based on the findings of the assessment, the following are recommended:

1. Towards town administration and municipality

- ✓ Given that a significant association was found among educational status, monthly income level of inhabitants and access to improved water sources, latrine and waste management, it needs to address socio-economic problems of the inhabitants through sustainable urban development plan.
- ✓ In spite of the fact that the town is currently expanding, the town administration needs to consider and facilitate slum upgrading and clearness with full involvement of the poor and private sectors.
- ✓ An appropriate sanitary building codes and enforcement needs to be in place for newly built housing structures of the town.
- ✓ Considering private and public partnership, the town administration and concerned stakeholders should organize sustainable and an appropriate solid and liquid waste management systems to the town.
- ✓ Based on lesson learnt from other countries (32), municipal public latrines should be privatized to micro enterprises for its proper operation and maintenances.
- ✓ As other public services of the town, the town administration should allocate and invest adequate resources to environmental health related infrastructures and services of the town.

2. To town health office

- ✓ Community based hygiene and sanitation behavioral communication strategy should be put in place and be implemented.
- ✓ Unreserved effort must be in place to attain 100% hygiene and sanitation and hand washing facility coverage and promotion of improved facilities as per nation and regional sanitation strategy and protocol.

- ✓ Based on national and regional guidelines and code of practices, the town health office needs to undertake sustainable water quality control and sanitary survey to municipal water system from water source to point of uses.

3. To town water supply and sanitation office

- Strong and sustainable effort must be exerted to increase access to improved water source and consequently per capita water consumption of the inhabitant through an appropriate balance of water demand and supply.
- Community based and managed distribution point needs to be installed in newly formed settlements of the town.
- Routine physiochemical and bacteriological quality of water sources and distribution should be in place and materialized as per national and regional water quality standards and procedures.

4. To concerned stakeholders and community at large

- All local and national concerned stakeholders must play their role in effort made to mitigate environmental health problem of the town
- Last but not least, community at large should be made aware and part of change for making the town one of the areas of health full living and working environment.

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6. ANNEX

6.1. Conceptual Frame work

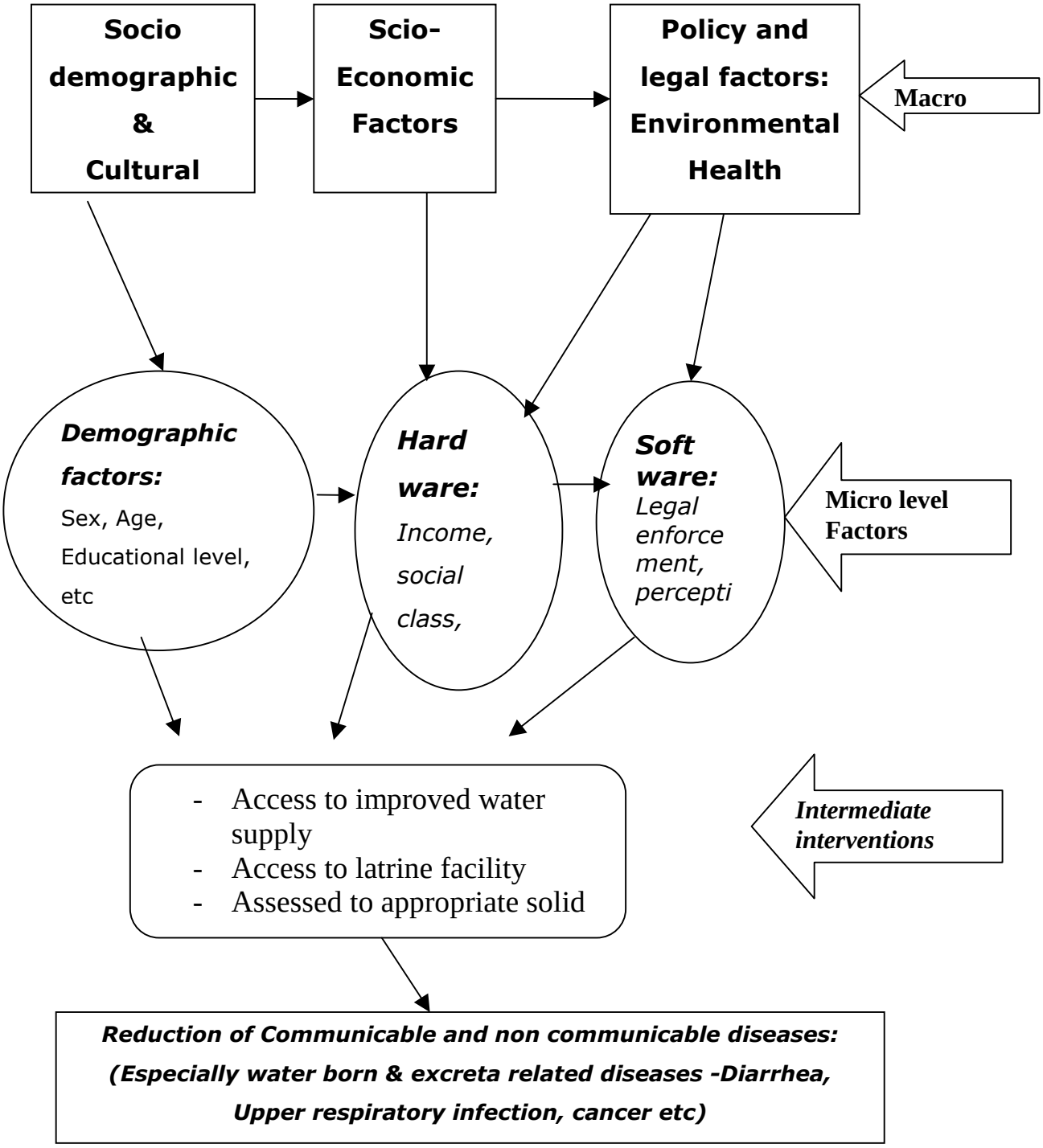


Figure 1: A framework for interrelationship between macro, micro environment & out come manifestation for appropriate environmental health interventions.

6.2. Questionnaire and Informed Consent form

(English version)

Addis Ababa University, Medical Facility, School of Public Health

Informal consent form

Hello, my name is _____. I am working as data collector in a study conducted **by Ato Tesfaye Mekonnen**, a post graduate student at Addis Ababa University, School of Public Health. He is going to undertake assessment of environmental health condition of Dukam community with respect to safe and adequate water supply, proper sanitation and health full housing conditions. The assessment out put will be used as base line information to effort made to mitigate environmental health problem of the community with Town Administration and other concerned stakeholders. I have received permission from Town Administration and Kebele officials to undertake the interview and your house hold is selected for the assessment by chance. Therefore, I am kindly requested your good participation in the interview in completely voluntary and fee manner. This interview will take a maximum of 30-40 minutes. You may skip any question(s) that you don't want to answer and you are also free to stop answering the question at any time you don't want to proceed. On this opportunity I like to conform that, the information that you will provide for the study will be kept completely confidential and used only for this assessment. Your responses to the questions are identified only by number and your honest answers to these questions will help us better to understand about the current status of environmental health condition of the town. So, would you be willing to be interviewed?

INTERVEWER

If, the response is "Yes", Please sign below to certify that the respondent gave his/her oral consent to take part in the study and go to the next page and fill the questionnaire.

If, the response is "No", acknowledge the respondent and stop interviewing the respondent and go to the next household.

Name of interviewer _____Date_____ signature_____

Addis Ababa University, Medical Facility, School of Public Health
Questionnaire for assessment of Environmental Health status of Dukam Town (English Version)

Identification:

- Address of Household: Kebele _____ Ketena (Gotti) _____House number ____
- Zoning area of the household: Residential _Commercial_ Industrial __Other, specify
- Interviewing period:
- Date /month/year :_____/_____/2002EC_____
- starting time: _____ ending time: _____

PART I-Socio-demographic characteristics

General direction: please, ask each question exactly as it is and circle or fill in the provided space as per response of the respondent.

No.	QUESTIONS AND FILTERS	CATEGORIES	CODE	SKIPs
101	Sex of the respondent	Female Male	1 2	
102	What is your responsibility/relation to the household?	Head Spouse Others (specify) _____	1 2 3	
103	What is age of the respondent?	Write in full year	[____] year	
104	What is your marital status?	Married Un married Divorced Separated Widowed	1 2 3 4 5	
105	What is your ethnic group (bi'heresebo mindinew)?	Oromo Amahara Guraghe Tigre Others (specify)_____	1 2 3 4 5	
106	What is your religion?	Orthodox Christian Protestant Catholic Muslim Others (specify)_____	1 2 3 4 5	
107	What is your highest level of education?	Illiterate(Unable to read and write) Only able to read and write primary school (Grade 1-6) Secondary school (Grade 7-12) College and above	1 2 3 4 5	
108	What is your main occupation?	Merchant Farmer Daily laborer Government worker Housewife Others (specify)_____	1 2 3 4 5 6	
109	What is an average monthly family income?	in Ethiopian Birr	[____]	
110	Total Size of the household	Male Female Total	[___] [___] [___]	

PART. II. Issues related to health condition of housing and living environment:				
201	Ownership of the house(s)	It is privately owned It is rented from private It is rented from government Others (specify)_____	1 2 3 4	
202	What is the <u>main purpose</u> of the house(s)	For living For commercial/business For both Others (specify)_____	1 2 3 4	
203	How long is since the house was constructed?	0-4 year 5-10 years 11-20 years More than 20 years	1 2 3 4	
204	Doe the household has separate living and bedding rooms	Yes No	1 2	→ 209
205	Existing number of living rooms	Number of living rooms	[___]	
206	Existing number of bed rooms	Number of bed rooms	[___]	
207	Existing number of windows for living rooms	None 1-2 window 3-4 5-7 8 and above	1 2 3 4 5	
208	Existing number of windows for bed rooms	None 1-2 window 3-4 5-7 8 and above	1 2 3 4 5	
209	Roofing of the main house is made of **(OBSERVE)**	Corrugated Iron Sheet Thatch/Grass/Leaf Others (specify) _____	1 2 3	
210	How is the Wall of the living room(s) **(OBSERVE)**	Plastered and to standard Cracked and needs repair Others (specify) _____	1 2 3	
211	Flooring of the house (living room) **(OBSERVE)**	Cemented Soil Others (specify) _____	1 2 3	
212	Availability of emergency door(s) **(OBSERVE)**	Yes No	1 2	
213	Availability of kitchen **(OBSERVE)**	Yes No	1 2	→ 217
214	If available, is it connected to living rooms? **(OBSERVE)**	Yes No	1 2	
215	Is it with adequate windows for ventilation and natural lighting? **(OBSERVE)**	Yes No	1 2	
216	Is it with an appropriate chimney? **(OBSERVE)**	Yes No	1 2	

217	What is the main source of house hold fuel?	Wood Cow Dung Charcoal Kerosene Others (specify) _____	1 2 3 4 5	
218	Does the house hold have domestic animal(s)?	Yes No	1 2	→ 221
219	If available, do they have separate room? **(OBSERVE)**	Yes No	1 2	
220	If separate room is not there, is/are domestic animal(s) is/are sharing living rooms with human being?	Yes No	1 2	
221	Is the house hold accessed to electric power?	Yes No	1 2	
222	Is the living house is accessed to adequate natural lighting? **(OBSERVE)**	Yes No	1 2	
223	Is there a problem (infestation) of public health important insect and rodents in the household?	Yes No	1 2	→ 301
224	If "yes", specify more dominant public health important insects and rodents?	Flies.....…… Flea…….. Cockroach…… Rats ……..….. Others (specify)……..	1 2 3 4 5	
PART. III. Issues related to status of water supply system				
301	What is the main source of drinking water for your family?	Piped water into dwelling(private) Piped water into compound (shared) Piped water (public tap) Piped water from vendors Protected well/spring Unprotected well/spring Unprotected surface water (such as river/spring/pond & etc) Others (specify) _____	1 2 3 4 5 6 7 8	
302	If your source of water supply is from unprotected source(s), what was the reason behind? **(PROBE & CIRCLE ALL THAT APPLY)**	Protected water is not available Protected source is very far Protected source is expensive have no convenient time to fetch from protected source No difference between protected and unprotected source Others (specify)……..	1 2 3 4 5 6	
303	Who usually collects water?	Female Child(Age <15) Male Child(Age <15) Women adult(Age >15 years) Men adult(Age >15 Years)	1 2 3 4	

304	With what do you usually draw water?	Bucket Pot Plastic Jerry can Donkey carried canvas/leather bag Others (specify) _____	1 2 3 4 5	
305	How long does it take to go the house hold travel to fetch water?	Time in minute	[__]	
306	How many times does the house hold fetch the water?	_____ times per day _____ times per week	[__] [__]	
307	How much does the household collect each time it fetch water? (Observe & estimate volume of the container in liter(s)).	Liters per tripe	[__]	
308	How much does the house hold consume per day and per person/day?(For all purposes)	Liters per household/ day Liters per person /day	[__] [__]	
309	Does the household pay for water?	Yes No	1 2	→ 311
310	If yes, how much does it spend per month?	State in Ethiopian Birr _____	[__]	
311	How is the sanitary condition of water storage at home? **(OBSERVE)**	Covered and kept well Uncovered & kept in unclean Others (specify) _____	1 2 3	
312	Did you or any member of the household have had health information/education on how to keep water safe at home?	Yes No	1 2	→ 314
313	If yes, where did you/member of the household got the health education about water supply for the first time? **(PROBE & CIRCLE ALL THAT APPLY)**	Health personnel Mass media School Others (specify) _____	1 2 3 4	
314	Do you treat your water at home to make it safer to drink?	Yes No	1 2	→ 316
315	What do you do to the water at the home to make it safer to drink? **(PROBE & CIRCLE ALL THAT APPLY)**	Boil Add chlorine/bleach Filter with clean cloth use home made sand filter Other (Specify)_____	1 2 3 4 5	
316	What kind of illness would result if drinking water is not treated well? **(PROBE & CIRCLE ALL THAT APPLY)**	Diarrhea diseases Abdominal cramp Parasite worms Skin diseases Other diseases(specify)_____ I don't know	1 2 3 4 5 6	
317	Is there any one in the family with diarrhea diseases within the last two weeks?	Yes No Not recognized	1 2 3	→ 401
318	If "yes" to the above question, what was the age of the person(s)?	Children < 5 year Children 5-15 Years Adult age >15 year Other diseases(specify)_____	1 2 3 4	

PART. IV. Issues related to human excreta liquid waste management			
401	Does the household have a latrine/toilet facility?	Yes 1 No 2	→ 410
402	If yes, what kinds of toilet facility do you have? (OBSERE)	Improved pit latrine 1 Unimproved pit latrine 2 Improved flush toilet 3 unimproved flush toilet 4 Others (specify)_____ 5	
403	Is this facility located within your dwelling, or yard or compound?	Yes, in dwelling/ yard/compound 1 No, out of side welling/yard/compound 2	
404	Does the household shares toilet facility with other household(s)?	Yes 1 No 2	→ 406
405	If yes, how many family or households shared it?	one 1 two 2 three and above 3	
406	What do you do if the current toilet would be filled?	Construct another facility 1 Remove the sludge & reuse it 2 Will go back to old ways of life (practice open field defecation) 3 Others (specify)_____ 4	
407	What is the current status/condition of the latrine? **(OBSERVE)**	kept well and clean 1 kept poor and unclean 2	
408	Do all household members utilize the toilet facility (including children)?	Yes 1 No 2	
409	What happens with the stools of babies and young children in your household who do not use the toilet facility?	Thrown in the toilet/Latrine 1 covered/Buried in yard 2 Not disposed off/Left on the ground 3 Thrown any where Not applicable 4 Others (specify)_____	
410	If your response at question **401** was "**No**", what was the main reason?	Lack of space in the compound 1 Financial problem 2 Lack of construction materials 3 Lack of know-how/skill 4 Not felt as important 5 Others (specify) _____ 6	
411	Do you have hand washing facility to use after toilet visits?	Yes 1 No 2	→ 414
412	Do you usually wash your hands after defecation?	Yes 1 No 2	
413	What do you usually use to wash your hand after toilet visits?(Observe)	Soap with water 1 Ash with water 2 None 3	
414	To the best of your knowledge, what is the importance of having a latrine? **(PROBE & CIRCLE ALL THAT APPLY)**	To avoid unsightly condition 1 To have privacy 2 To control communicable diseases 3 Don't know 4 Others (specify) _____ 5	

415	How did you come to know the importance of latrine for the first time? **(PROBE & CIRCLE ALL THAT APPLIED)**	Mass media Health personnel School Agricultural agent Imitation from persons and/ places	1 2 3 4 5	
416	Where do you usually dispose of your domestic liquid waste?	Septic tank/sewer connection Seepage pit/sock-away pit Latrine Open field Open ditch to near by water body Others (specify)	1 2 3 4 5 6	
417	What are the major components of liquid waste generating in the household/working place	household detergents Food debris overflow of toilet wastes chemical and toxic products Others (specify) _____	1 2 3 4 5	
PART V. Issues concerning sold waste management				
501	What is the common solid waste/refuse generated from your household? **(PROBE & CIRCLE ALL THAT APPLY)**	Animal dung Grass Ash Vegetable waste Rubbish Left-over food Others (specify) _____	1 2 3 4 5 6 7	
502	How does the household usually dispose of domestic waste?	Collected by municipal Collected and buried in backyard Disposed in the pit latrine Disposed in the open field Disposed in agricultural field Others (specify) _____	1 2 3 4 5 6	
503	Is there any solid waste storage container/dustbin in your compound?	Yes No	1 2	→ 505
504	If yes, is it handled in sanitary manner?	Yes No	1 2	
505	How is the over all sanitary condition of the compound?	Clean Not clean	1 2	
PART VI. Issues concerning personal and environmental hygiene:				
601	Does the household have any bathing facility?	Yes No	1 2	→ 603
602	If yes, what type of the facility it is?	Modern bath tub Ordinary shower Bucket and basin Others (specify) _____	1 2 3 4	
603	Where do you usually take bath (shower)?	in the bath tub(own) in shower(own) in public shower in house with bucket and basin in near by river/lake/spring Others (specify) _____	1 2 3 4 5 6	

604	How often do you take shower/ wash you body? (FILL THE BLANK WHERE APPLY ONLY)	_____Times a day _____Times a week _____Times a month _____Times a year Others (specify) _____	[__] [__] [__] [__] [__]	
605	When was the last time you took a bath (shower)?	Less than five days ago Five to seven days ago Eight to fifteen days ago Sixteen to thirty days ago Over thirty days ago Never take bath at all	1 2 3 4 5 6	
606	How often do you bath your child under five years of age? **(CIRCLE THE NUMBER ANTHAT APPLY & FILLFREQUENCY IN THE TABLE)**	Times a day.....1 Times a week.....2 Times a month.....3 Times a day.....4 No under five child.....5 Others (Specify)_____.....6	[__] [__] [__] [__] [__] [__]	
607	Is there any problem with taking bath (shower)?	Yes No	1 2	→ 608
608	If yes, state them?	Shortage of water Facility where to take bath Other(specify)_____	1 2 3	
609	Do you have soap for household use? (observe)	Yes (observed) Yes (not observed) No	1 2 3	
610	Do you <u>usually</u> use soap when you take bath?	Yes No	1 2	
611	Please, could you list main diseases that would be result due to poor personal hygiene? **(CIRCLE ALL THAT APPLY)**	skin conditions eye diseases Diarrhea diseases Others(specify)_____	1 2 3 4	
612	When do you wash your hands? (**CIRCLE ALL THAT APPLY,DO NOT PROMPT)**	Before food preparation Before feeding children Before eating food After visiting toilet Others (specify) _____	1 2 3 4 5	
This is the end of the question. "Thanks a lot for your unreserved cooperation"				

Full name of enumerator _____ Full name of supervisor _____
Signature _____. Signature _____.
Date _____ Date _____

6.3. Observational checklist:

Dukam Town Water, Sanitation and Hygiene Assessment

1. **Water supply**
    - Current source and status of water supply system
    - Management of water supply (Municipality, water committee, private sector)
    - Reliability of water supply system (through out the year)
    - Quality and wholesomeness of the source(Physical, chemical and microbiological aspect as per provider assessment)
    - Inter sectoral collaboration
2. **Solid and liquid waste management**
    - The current solid waste management status of the Town
    - Its management and ownership
    - Availability and status of final disposal system
    - Direction of the final disposal in relation to future expansion plan of the town
    - Public toilet availability and its management
3. **Housing and zoning**
    - Overall construction and maintenance of living and working houses
    - Zoning condition in line with commercial, industrial, residential quarters
    - Public health related problems and constraints
4. **Drainage**
    - Availability and status of drainage system and treatment plant
5. **Other issues**
    - Licensing and control of investment projects (Factories, hotels, etc) and relevant documents.

6.4. Key stakeholders in- depth interview and discussion checklist

I. Water sector

- Current source and status of water supply system
- Size of clients and level of service delivery
- Structural responsibility of water supply utility
- Adequacy and reliability of water sources
- Routine quality control and sanitary surveillance of water sources.
- Inter sectoral collaboration
- Future plan in relation to town expansion
- Challenges and constraints to the sector

II. Health sector

- The current human resource deployed for the sector
- Status of sanitary inspection of public facilities and utilities
- Current sanitation coverage of the town
- Ten top diseases of the town
- Status of inter sectoral collaboration and coordination (as per signed MoU).
- Major public health related problems and constraints of the town

III. Municipality and town administration

- Administrative structure and size of population
- Current status of municipal solid waste management
- Service coverage and involvement of private sector
- Availability and status of final disposal system
- Municipal abattoir and its status
- Public toilet availability and its status
- Legal framework and overall housing construction and maintenance of the town(Kebele owned)
- Master plan versus its implementation.
- Availability and status of drainage system and treatment plant
- Licensing and control procedures of investment projects.
- Intersectoral collaboration with other line departments.

6.5. Amharic version Questionnaire

<u>በአዲስ አበባ ዩኒቨርስቲ የህክምና ፋኩልቲ የሕዝብ ጤና አጠባበቅ ትምህርት ቤት</u>
የዱከም ከተማ የአካባቢ ጤና አጠባበቅ ሁኔታ ዳሠሣ/ጥናት ተሣታፊ ግለሰብ/ ቤተሰብ ፈቃደኝነት መጠየቅያ ፎርም(Informed Consent Form)

እንደምን ነዎት? ስሜ.....እባላለሁ፡፡ የአዲስ አባባ የኒቨርስቲ የህዝብ ጤና አጠባበቅ ትምህርት ቤት ተማሪ የሆኑት አቶ ተስፋዬ መኮንን ለሁለተኛ ዲግሪ መመረቂያ ጥናት በመረጃ ሰብሣቢነት በመሥራት ላይ እገኛለሁ፡፡ የጥናቱ ዋና ዓላማ የዱከም ከተማ የአካባቢ ጤና አጠባበቅ ደረጃ ማለትም የንፁህ ዉሃ አቅርቦት፤የመጸዳጃ ቤት፤የቆሻሻ አወጋገድና በለሎች ተጓዳኝ ጉዳዮች ላይ ጥናት ለማድረግ ነዉ፡፡ የጥናቱ ዉጤት የከተማዉ አስተዳደርና ጉዳዩ የሚመለከታቸዉ አካላት ችግሩን ለመቅረፍ ለሚያደርጉት ጥረት በግብዓትነት ያገለግላል ተብሎ ይታሰባል፡፡ ይህን ጥናት ለማድረግ ከከተማዉ መስተዳደርና ቀበሌ ሥራ አመራር አካላት ተገቢዉን ፍቃድ ያገኘሁ ሲሆን የእርሶ ቤተሰብም ለጥናቱ በአጋጣሚ (በዕጣ) የተመረጠ መሆኑን በዚህ አጋጣሚ ልገልፅልዎት እወዳለሁ፡፡

ስለዚህ በቃለ-መጠይቁ ሂደት በሙሉ ፈቃደኝነት፤ ፍላጎትና በነፃነት እንዲሳተፉ በትህትና እየጠየቅሁ ቃለ-መጠይቁ በአማካይ ከ30-40 ደቂቃ ዉስጥ እንደሚጠናቀቅ ይገመታል፡፡ ለቃለ- መጠይቁ የሚሰጡኝ ምላሽ ሁሉ በሚስጥር የሚጠበቅና የመላሹ ሰም(ማንነት) በምንም ምክንያት የማይወሰድና የሚሰጡኝ ምላሻም ለዚህ አገልግሎት ብቻ የሚዉል መሆኑን ላረጋግጥልዎ እወዳለሁ፡፡ በቃለ-መጠይቁ ዉስጥ መልስ ለመስጠት ያልፈለጉበት ጉዳይ ካለ ማብራሪያ የመጠየቅ ወይም ሙሉ በሙሉ መጠይቁን የማቋረጥ መብትዎት የተጠበቀ ነዉ፡፡

በዚህ ሁኔታ በጥናቱ ለመሣተፍ ፈቃደኛ ነዎት?

<u>ማሰታወሻ ለቃለ-መጠይቅ አቅራቢዉ</u>

መልስ ሰጪዉ /ሰጪዋ በጥናቱ ለመሣተፍ ፍቃደኛ ከሆኑ በቃል እንደተስማሙ ለማረጋገጥ ይረዳ ዘንድ ከዚህ በታች ፊርማዎትን አኑረዉ መጠይቁን መሙላት ይቀጥሉ፡፡ መልስ ሰጪዉ/ሰጭዋ ለመሣተፍ ፍቃደኛ የማይሆኑ ከሆነ ደግሞ ምሥጋና በማቅረብ ቃለ-መጠይቁን በማቋረጥ ወደ ሚቀጥለዉ ቤተሰብ ይሂዱ፡፡

የመረጃ ሰብሳቢዉ ስም----------ቀን----------ፊርማ----------

በአዲስ አበባ ዩኒቨርስቲ የህክምና ፋኩልቲ የሕዝብ ጤና አጠባበቅ ትምህርት ቤት
የዱከም ከተማ የአካባቢ ጤና አጠባበቅ ሁኔታ ዳሠሳ ቃለ-መጠይቅ ቅፅ(አማርኛ ቅጂ)፤

መለያ፡ የቤቱ አድራሻ፡ ቀበሌ:_____ቀጠና/ጎጥ : _____ የቤት ቁጥር_____

- የቤቱ አካባቢ አገልግሎት/ዞን፡ የመኖሪያ ☐ የንግድ ☐ የኢንዱስትሪ ☐ ሌላ(ይገለፅ) ☐
- ቃለ-መጠይቁ የተደረገበት፡
  - ቀን/ወር/ዓመተ ምህረት:_____/_____/ 2002ዓ.ም_____
  - የጀመረበት ሰዓት፡ _____ የተጠናቀቀበት ሰዓት፡ _____

ክፍል I- የጥናቱ ተሳታፊ ማህበራዊና ኢኮኖሚያዊ ሁኔታ፡

አጠቃላይ መመሪያ፡ እባክዎን መጠይቆችን በቀረቡት መሠረት አስተካክለዉ እንዲጠይቁ እየጠቅን ዉስጥ በቀረቡት የእያንዳንዱ ትዕዛዝ መሠረት የተሰጠዉን ምላሽ በትክክል ያክብቡ ወይም በተሰጠ ባዶ ቦታ ይሙሉ፡፡

ተ.ቁ	መጠይቅ	የመጠይቁ መልስ		ወደ.ዝ ለል
101	የተጠያቂዉ/መልስ ሰጪዉ ሰዉ ፆታ	ወንድ ሴት	1 2	
102	ተጠያቂዉ/መልስ ሰጪ በቤተሰቡ ዉስጥ የላቸዉ ሓላፊነት /የሥራ	የቤቱ አባወራ ናቸዉ የቤቱ እማወራ ናቸዉ ሌላ (ካለ ይገለጽ) _____	1 2 3	
103	እድሜዎት ስንት ነዉ?	በሙሉ ቁጥር ይፃፍ	[____] ዓመት	
104	የጋብቻዎ ሁኔታ እንዴት ነዉ?	ያገባ/ች/ ያላገባ/ች/ የፈታ/ች/ የተለያዩ/ች/ ባል/ሚስት የሞተባት/የሞተበት	1 2 3 4 5	
105	እርሶዎ የየትኛዉ ብሔር/ብሔረሰብ አባል ነዎት?	የኦሮሞ የአማራ የጉራጌ የትግሬ ሌላ (ካለ ይገለጽ)_____	1 2 3 4 5	
106	ሃይማኖቶዎ ምንድነዉ?	ኦርቶዶክስ ክርስቲያን ፕሮቴስታንት ካቶሊክ እስላም ሌላ (ካለ ይገለጽ).....	1 2 3 4 5	
107	የትምህርት ደረጃዎ ስንት ነዉ?	ምንም ያልተማረ/ች ማንበብና መፃፍ ብቻ የአንደኛ ደረጃ ትምህርት (ከ1-6 ክፍል) የሁለተኛ ደረጃ ትምህርት (ከ7-12 ክፍል)) የኮሌጅ ዲፕሎማ እና ከዚያ በላይ	1 2 3 4 5	
108	መደበኛ ሥራዎ ምንድ ነዉ?	ንግድ ግብርና የቀን ሥራ የመንግሥት ሠራተኛ የቤት እመቤት ሌላ (ካለ ይገለጽ).....	1 2 3 4 5 6	
109	የቤተሰብዎ አማካይ ወርሃዊ ገቢ ስንት ብር ነዉ?	_____ኢትዮጵያ ብር	[_____ _]ብር	
110	የቤተሰብ አባላት ቁጥር በየታ	ወንድ ሴት በድምር	[____] [____] [____]	

ክፍል II – የመኖሪያ ቤት አካባቢ ጤና አጠባበቅ ሁኔታ በተመለከተ፡			
201	የቤተሰቡ ቤት ይዞታ እንዴት ነዉ(የቤቱ ባለቤት ማነዉ)?	የግል ነዉ 1 የኪራይ(ከግለሰብ) 2 የኪራይ(ከመንግሥት) 3 ሌላ (ካለ ይገለጽ)..... 4	
202	የቤቱ ዋና አገልግሎት ምንድነዉ?	ለመኖሪያ 1 ለንግድ 2 ለሁለቱም 3 ሌላ (ካለ ይገለጽ)..... 4	
203	የመኖሪያ ቤቱ ዕድሜ ምን ያህል ይገመታል? (ቤቱ ከተሠራ ስንት ዓመት ይሆናል?)	ከ 0-4ዓመት 1 ከ 5-10 ዓመት 2 ከ 10-20 ዓመት 3 ከ 20 ዓመት በላይ 4	
204	ምንተሰቡ ለመኖሪያና ለመኝታ አገልግሎት የተለየ ክፍሎች አሉት?	አዎ አለ 1 የለም 2	→ 209
205	ምንቱ ስንት የመኖሪያ ክፍሎች አሉት?	የመኖሪያ ክፍሎች በቁጥር [____]	
206	ምንቱ ስንት የመኝታ ክፍሎች አሉት?	የመኝታ ክፍሎች በቁጥር [____]	
207	የመኖሪያ ክፍሎች ስንት መስኮት አሉት?	ባዶ/ምንም መስኮት የላቸዉም 1 ከ 1-2 መስኮቶች አሉት 2 ከ 3-4 መስኮቶች አሉት 3 ከ 5-7 መስኮቶች አሉት 4 8 መስኮቶች እና ከዚያ በላይ 5	
208	የመኝታ ክፍሎች ስንት መስኮት አሉት?	ባዶ/ምንም መስኮት የላቸዉም 1 ከ 1-2 መስኮቶች አሉት 2 ከ 3-4 መስኮቶች አሉት 3 ከ 5-7 መስኮቶች አሉት 4 8 መስኮቶች እና ከዚያ በላይ 5	
209	የቤቱ ጣሪያ የተሠራበት ቁሳቁስ ምንድነዉ? **(ይመልከቱ)**	ከቆርቆሮ 1 ከሣር 2 ከሌላ(ካለ ይገለጽ)--- 3	
210	የቤቱ ግድግዳ ሁኔታ እንዴት ነዉ? **(ይመልከቱ)**	በደንብ የተለሠነና ደረጃዉን የጠበቀ ነዉ 1 የተሰነጣጠቀና ጥገና የሚሻ ነዉ 2 ሌላ (ካለ ይገለጽ)..... 3	
211	የቤቱ ወለል የተሠራበት ቁሳቁስ ምንድነዉ? **(ይመልከቱ)**	ከስሚንቶ 1 ከአፈር 2 ሌላ (ካለ ይገለጽ)..... 3	
212	ምንቱ የአደጋ ጊዜ መዉጫ በር(በሮች) አለዉን?(Dual egress/outlets) **(ይመልከቱ)**	አለዉ 1 የለዉም 2	
213	ቤቱ የምግብ ማዘጋጃ (ማዕድ) ቤት አለዉን?	አለዉ 1 የለዉም 2	→ 217
214	ቤቱ የማዕድ ቤት ያለዉ ከሆነ ከዋናዉ ቤት ጋር የተያያዘ ነዉን? **(ይመልከቱ)**	አዉ የተያያዘ ነዉ 1 አይደለም 2	
215	ማዕድ ቤቱ ለተፈጥሮ ብርሃንና አየር ማስገቢያ በቂ መስኮት አለዉን? **(ይመልከቱ)**	አለዉ 1 የለዉም 2	
216	የምግብ ማዘጋጃ (ማዕድ) ቤቱ ተገቢዉን የጭስ ማዉጫ አገልግሎት አለዉን? **(ይመልከቱ)**	አለዉ 1 የለዉም 2	

217	በቤት ዉስጥ ዋና የማገዶ/ሃይል ምነጭ ምንድነዉ?	እንጨት 1 የከብት እበት/ኩበት 2 ከሰል 3 ነጭ ጋዝ 4 ኤሌክትሪክ 5 ሌላ (ካለ ይገለጽ)..... 6	
218	ቤተሰቡ የቤት እሰሳት አሉትን?	አለ 1 የለም 2	→ 221
219	ካሉ ለቤት እንሰሳት የተለየ ማደሪያ ክፍል አለን?	አለ 1 የለም 2	
220	የተለየ ማደሪያ ክፍል ከሌላቸዉ የቤት እንሰሳት ከሰዉ ጋር በጋራ ይኖራሉን?	አዉ 1 አይደለም 2	
221	ቤቱ የኤሌክትሪክ አገልግሎት አለዉ?	አለ 1 የለም 2	
222	ቤቱ በቂ ተፈጥሮ ብርሃን አለዉ?	አለ 1 የለም 2	
223	በቤቱ ለህዝብ ጤና አጠባበቅ ጎጂ የሆኑ የተባይና የቆርጣሚዎች ችግር አለን?	አለ 1 የለዉም 2	→ 301
224	በቤተሰቡ ዉስጥ የሚታዩ ዋና ዋና የህዝብ ጤና ጠንቅ የሆኑ የተባይና ቆርጣሚዎች ይዘርዝሩ	ዝንብ------- 1 ቁንጫ------ 2 በረሮ --------- 3 አይጥ--------- 4 ሌላ (ካለ ይገለጽ)..... 5	
ክፍል III – ከዉሃ ንፅህና/ጤና አጠባበቅ ጋር የተያያዘ መረጃ፡			
301	የቤተሰብዎ አባላት <u>በብዛት</u> የመጠጥ ዉሃ ከየት ያገኛሉ? (አንድ መልስ ብቻ ይኖረዋል)	ከቤት የቧንቧ ዉሃ (የግል መስመር) 1 ከግቢ የቧንቧ ዉሃ (ከጋራ መስመር) 2 ከቦኖ ዉሃ (የህዝብ ማከፋፈያ) 3 ከቧንቧ ሆኖ ከቸርቻሪ ግለሰብ 4 ከተጠበቀ የጉድጓድ/የምንጭ ዉሃ 5 **ካልተጠበቀ** የጉድጓድ/የምንጭ 6 <u>ካልተከለሌና ያልተጠበቀ</u> መረት ላይ ዉሃ (ወንዝ ፤ኩሬ ወዘተ) 7 ሌላ (ካለ ይገለጽ)..... 8	
302	የቤተሰቡ የመጠጥ ዉሃ መገኛ ንፅህናዉ ካልተረጋገጠ ቦታ (6 እና 7) ከሆነ ምክንያቱ ምንድነዉ? • *ከአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* • *በማዉጣጣት (ሌላስ....በማለት) ይጠይቁ*	በንፅህና የተጠበቀ የዉሃ አገልግሎት አለመኖሩ 1 በንፅህና የተጠበቀ ዉሃ መገኛ በጣም መራቁ 2 የተጠበቀ ዉሃ ዋጋ ዉድ በመሆኑ 3 የተጠበቀ ዉሃ ለመቅዳት የጊዜ እጥረት በመኖሩ 4 በተጠበቀ ዉሃና ባለተጠበቀ መሃከል ልዩነት አለመኖሩ 5 ሌላ (ካለ ይገለጽ)..... 6	
303	ከቤት ዉስጥ <u>ብዙዉን ጊዜ</u> ዉሃ የሚቀዳ ማነዉ?	ሴት ልጅ (ከ15 ዓመት በታች) 1 ወንድ ልጅ (ከ15 ዓመት በታች) 2 አዋቂ ሴት (ከ15 ዓመት በላይ) 3 አዋቂ ወንድ (ከ15 ዓመት በላይ) 4	
304	<u>ብዙ ጊዜ</u> ዉሃ በምን ይቀዳል?	በባልዲ 1 በእንስራ/ማሰሮ 2 በፕላስቲክ ጀሪከን 3 በአህያ ሥልቻ በተጫነ 4 ሌላ (ካለ ይገለጽ)..... 5	
305	የመጠጥ ዉሃ ለመቅዳት ቤተሰቡ ምን ያህል ጊዜ ይጓዛል?	ጊዜ በደቂቃ [___]	

306	ቤተሰቡ በቀን ስንት ጊዜ ዉሃ ይቀዳል?	_____ ጊዜ በቀን [___] _____ ጊዜ በሣምንት [___]	
307	አንዴ ምን ያክል ዉሃ ይቀዳል? (የመቅጃን በመለየት በሊትር መገመት)	_____በአንድ ዙር ሊትር ዉሃ [___]	
308	የቤተሰብ እና የግለሰብ የቀን አማካይ የዉሃ ፍጆታ በሊትር ስንት ሊትር ይገመታል? ***(በሣጥኑ ዉስጥ ይሙሉ)***	• አማካይ የቤተሰብ የቀን ፍጆታ በሊትር [___] • አማካይ የግለሰብ የቀን ፍጆታ በሊትር [___]	
309	ይህ ቤተሰብ ለመጠጥ ዉሃ አገልግሎት ገንዘብ/ሂሣብ ይከፍላል?	አዎ ይከፍላል 1 አይከፈልም 2	→ 311
310	ገንዘብ የሚከፈል ከሆነ በአማካይ በወር ስንት ብር ይገመታል?	_____ብር ይገመታል [___]	
311	በቤት ዉስጥ የዉሃ ንፅህና አጠባበቅ እንዴት ነዉ? **(ይመልከቱ)**	በንጽህና ተከድኖ የተጠበቀ ነዉ 1 ለብክለት በተጋለጠ ሁኔታ የተጠበቀ ነዉ 2 ሌላ (ካለ ይገለጽ)..... 3	
312	እርሶ ወይም ቤተሰቡ ስለ ቤት ዉስጥ ዉሃ ንጽህ አጠባበቅ ትምህርት አግኝተዉ ያዉቃሉ?	አዎ 1 የለም 2	→ 314
313	መልሶ አዎን ከሆነ ***<u>ለመጀመሪያ ጊዜ</u>*** ትምህርቱን ያገኙት ከማነዉ?	ከጤና ባለሙያተኞች 1 ከብዙሃነ መገናኛ 2 ከትምህርት ቤት 3 ሌላ (ካለ ይገለጽ)..... 4	
314	የመጠጥ ዉሃ ንፅሕና ለማረጋገጥ ዉሃን በቤት ዉስጥ ይታከማል?	አዎ ይታከማል 1 የለም አይታከምም 2	→ 316
315	የመጠጥ ዉሃ ንፅሕና ለማረጋገጥ ዉሃን በቤት ዉስጥ የሚታከም ከሆነ በቤት ዉስጥ ዉሃ ጥራቱን ለማረጋገጥ ምን ያደርጋሉ? *ከአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* *በማዉጣጣት (ሌላስ....በማለት) ይጠይቁ*	ዉሃን በእጣት ላይ ማፍላት 1 ዉሃን በክሎሪን/ዉሃ አጋር ማከም 2 በንፁህ ጨርቅ ማጥለል 3 በቤት ዉስጥ ማጣሪያ ማጣራት 4 ሌላ (ካለ 5 ይገለጽ)..... 6	
316	ንፅሕናዉ ያልተጠበቀ /የተበከለ ዉሃን በመጠጣት የሚከሰቱ የጤና ችግሮች ይዘርዝሩ? • *ከአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* • *በማዉጣጣት (ሌላስ....በማለት)*	የተቅማጥ በሽታዎች 1 የሆድ ቁርጠት 2 የአንጀት ትላትሎች 3 የቆዳ ህመሞች 4 ሌላ (ካለ 5 ይገለጽ)..... 6 ምንም አላዉቅም	
317	ባለፈት ሁለት ሣምንታት ዉስጥ ከቤተሰብ አባላት ዉስጥ በተቅማጥ በሽታ የታመመ/የተጠቃ ሰዉ ነበረን?	አዎ ነበር 1 አይ የለም 2 አልታወቀም 3	401
318	ከላይ ለተጠየቀዉ መጠይቅ መልስዎ "አዎን" ከሆነ በተቅማጥ ህመም የተጠቃ ሰዉ(ሰዎች) እድሜ ክልል ስንት ነበር?	ከ5 ዓመት በታች ያለ ሕፃን ነበር 1 ከ5 ዓመት እስከ 15 ያለ ሕፃን ነበር 2 ከ16 ዓመት በላይ ያለ አዋቅ ነበር 3 ሌላ (ካለ ይገለጽ)..... 4	
ክፍል IV – የሰዉ አይነምድርና ፈሳሽ ቆሻሻ አወጋገድን በተመለከተ:			
401	ቤተሰቡ የመፀዳጃ /ሽንት ቤት አገልግሎት አለዉን?	አለ 1 የለም 2	→ 410

402	ካለ ምን ዓይነት መፀዳጃ ቤት ነዉ? (ይመልከቱ)	<u>**የተሻሻለ**</u> የተለምዶ ሽንት/መጸዳጃ ቤት ያልተሻሻለ የተለምዶ ሽንት/መጸዳጃ ቤት <u>**የተሻሻለ**</u> በዉሃ የሚሠራ መጸዳጃ ቤት ያልተሻሻለ በዉሃ የሚሠራ መጸዳጃ ቤት ሌላ (ካለ ይገለጽ).....	1 2 3 4 5	
403	የመፀዳጃ አገልግሎቱ በቤት ወይም በግቢ ዉስጥ ነዉን?	አዉ በቤት ወይም በግቢ ዉስጥ ነዉ።። የለም ከቤት ወይም ከግቢ ዉጭ ነዉ።።	1 2	
404	ይህን መፀዳጃ ቤት ለሌላ ቤተሰብ ያጋራሉ (ከሌላ ቤተሰብ ጋር በጋራ ይጠቀማሉ)?	አዎ የለም	1 2	→ 406
405	ከላይ መልሶ አዎን ከሆነ ከስንት ቤተሰብ/አባወራ ጋር በጋራ ይጠቀማሉ?	አንድ አባወራ ሁለት አባወራ ሦስትና ከዚያ በላይ አባወራ	1 2 3	
406	መጸዳጃ ቤቱ ሲሞላ ምን ያደርጋሉ?	ሌላ እገነባለሁ አስመጥጣለሁ ወደ ሚዳ መፀዳዳት ልምዴ እመለሳለሁ ሌላ (ካለ ይገለጽ)..... ምን እንደማደርግ አላዉቅም	1 2 3 4 5	
407	የመጸዳጃ ቤቱ የንፅሕና አያያዙ እንዴት ነዉ? **(የሚታይ)**	በተገቢዉ ሁኔታ ተይዟል በተገቢዉ ሁኔታ አልተያዘም	1 2	
408	ሁሉም የቤተሰብ አባላት (ሕፃናትን ጨምሮ) በመፀዳጃ ቤቱ ይጠቀማሉ/ ይገለገላሉ?	አዎ በሙሉ ይገለገላሉ ሙሉ በሙሉ ይገለገሉም	1 2	
409	በመፀዳጃ ቤት ለመገልገል ያልደረሱ ህፃናት ዓይነምድር እንዴት ይወገዳል?	ተሰብስቦ በመጸዳጃ /ሽንት ቤት ዉስጥ ይጣላል ግቢ ዉስጥ ይቀበራል/ በአፈር ይሸፈናል ምንም አይደረግም/እንዳለ ይተዋል በተገኘ ቦታ ሁሉ ይወገዳል ተግባራዊ ለማድረግ አይቻልም/በቤቱ ሕፃናት የሉም ሌላ (ካለ ይገለጽ).....	1 2 3 4 5	
410	በተራ ቁጥር **401** መጠይቅ መሠረት ቤተሰቡ የመጸዳጃ አገልግሎት ያላደራጀበት ዋና ምክንያት ምንድነዉ?	ቤተሰቡ የግንባታ ቦታ የሌለዉ በመሆኑ የገንዘብ እጥረት/ችግር በመኖሩ የግንባታ ቁሳቁስ ለማግኘት አለመቻሉ የግንባታ እዉቀት/ ክህሎት አለመኖሩ የመፀዳጃ ቤት ጠቀሜታ ያለመታየቱ (አስፈላጊነቱ ስላልታመነበት) ሌላ (ካለ ይገለጽ).....	1 2 3 4 5 6	
411	ከሽንትቤት መልስ የሚያገለግል የእጅ መታጠቢያ አገልግሎት አሎዎት?	አዎ የለም	1 2	→ 414
412	ከመጸዳጃ ቤት መልስ <u>**ሁሌ እጆን**</u> ይታጠባሉ?	አዎ የለም	1 2	
413	ከመፀዳጃ መልስ <u>**ብዙን ጊዜ**</u> እጆዎን በምን ይታጠባሉ?	በዉሃና ሳሙና በአመድና በዉሃ በባዶ(በዉሃ ብቻ)	1 2 3	
414	በእርስዎ አመለካከት የመፀዳጃ አገልግሎት የመኖር ጠቀሜታዉ ምንድነዉ? • *ከአንድ በላይ መልስ ሲኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* • *በማዉጣጣት (ሌላስ....በማለት)*	አፀያፊ እይታና መጥፎ ሽታን ለመከላከል ለግል ከሌላ ለማግኘት ይረዳል(for privacy) የተላላፊ በሽታዎችን ለመከላከል ይረዳል ጥቅሙን አላዉቅም ሌላ (ካለ ይገለጽ).....	1 2 3 4 5	
415	ለመጀመሪያ ጊዜ የመፀዳጃን ቤት ጠቀሜታ እንዴት ለመረዳት ቻሉ? • *ከአንድ በላይ መልስ ሲኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* • *በማዉጣጣት (ሌላስ....በማለት) ይጠይቁ*	ከብዙሃን መገናኛ ከጤና ሙያተኛ ከትምህርት ቤት የግብርና ልማት ወኪል ከሌላ ሰዉ/ቦታ የተከረጀ/የቀዳ	1 2 3 4 5	

416	**<u>ብዙን ጊዜ</u>** ከቤት የሚወጣ ፈሳሽ ቆሻሻ የት ያስወግዳሉ?	በሰፕቲክ ታንክ (Septic tank) በመሬት ማስረግያ አገልግሎት(Seepage pit) በመጸዳጃ ጉድጓድ ዉስጥ በመድፋት በሜዳ ላይ በመድፋት በመንገድ ቦይ ዉስጥ በመድፋት በአቅራቢያዉ ባለ ዉሃ መገኛ ቦታ በመድፋት ሌላ (ካለ ይገለጽ).....	1 2 3 4 5 6 7	
417	ከቤትዎት የሚወጣ የፈሣሽ ቆሻሻ ዋና ዋና ይዘት ምንድነዉ? • *ከአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ*	የሳሙና ዕጣቢ የምግብ ትርፍራፊ ዕጣቢ ከሽንት ቤት ፈሳሽ መርዛማ ቶክስክ ዉጤቶች ሌላ (ካለ ይገለጽ).....	1 2 3 4 5	
ክፍል V-የደረቅ ቆሻሻ አያያዝና አወጋገድን በተመለከተ፡				
501	ከቤት በብዛት የሚወጣ ቆሻሻ ምንድነዉ? • *ከአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* • *በማዉጣጣት (ሌላስ....በማለት) ይጠይቁ*	የከብቶች ፍግ የሣር ዓመድ የአትክልት ልጣጭ ልዩ ልዩ የማይፈለጉ ነገሮች(Rubbish.) የምግብ ትርፍራፊዎች ሌላ (ካለ ይገለጽ).....	1 2 3 4 5 6 7	
502	**<u>አብዛኛዉን ጊዜ</u>** ደረቅ ቆሻሻ እንዴት ያስወግዳሉ? • *ከአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ* • *በማዉጣጣት (ሌላስ....በማለት) ይጠይቁ*	በማዘጋጃ መኪና በመጠቀም ማስነሣት ከተሰበሰበ በኃላ በጓሮ በመቅበር ቦይ ዉስጥ በመጣል በሽንት ቤት ጉድጓድ በመጣል በተገኘ ባዶ ቦታ ሁሉ በመጣል በእርሻ ሜዳ ላይ በመጣል ሌላ (ካለ ይገለጽ).....	1 2 3 4 5 6 7	
503	በቤት ዉስጥ የደረቅ ቆሻሻ ማጠራቀሚያ አገልግሎት (የቆሻሻ መጣያ ቅርጫት) አለዎት?	አለ የለም	1 2	→ 505
504	ካለ በተገቢዉ ሁኔታ ተይዟልን? **(በዓይን ይረጋገጥ)**	አዎ ተይዟል አልተያዘም	1 2	
505	የቤቱና ጊቢዉ አጠቃላይ ንፅህና አያያዝ እንዴት ነዉ? **(በዓይን ይረጋገጥ)**	ንፁህ ነዉ የቆሸሸ ነዉ	1 2	
ክፍል VI-ከግል ንፅህና አጠባበቅ ጋር የተያያዘ መረጃ በተመለከተ፡				
601	ቤተሰቡ የገላ መታጠቢያ አገልግሎት አለዉን?	አለ የለም	1 2	→ 603
602	ካለ ምን ዓይነት አገልግሎት ነዉ?	ዘመናዊ የመታጠቢያ ገንዳ የተለምዶ የገላ መታጠቢያ/ሻወር ቤት በቤት ዉስጥ በሣፋና ባልዲ በመጠቀም ሌላ (ካለ ይገለጽ).....	1 2 3 4	
603	**<u>በብዛት</u>** ገላ የት ትታጠባለህ(ሽ)?	በመታጠቢያ ገንዳ ዉስጥ በሻወር ቤት ዉስጥ በህዝብ ገላ መታጠቢያ በቤት ዉስጥ በባልዲና ሣፊያ ላይ በወንዝ ዉስጥ ሌላ (ካለ ይገለጽ).....	1 2 3 4 5 6	
604	**<u>በብዛት</u>** ገላህን/ገላሽን በምን ያህል ጊዜ ትታጠባለህ? **(በተገቢዉ ቦታ ብቻ ይሞላ)**	በቀን----------ጊዜ ብዛት በሳምንት----------ጊዜ ብዛት በወር---------- ጊዜ ብዛት በበዓመት----------ጊዜ ብዛት ሌላ (ካለ ይገለጽ).....	[___] [___] [___] [___] [___]	

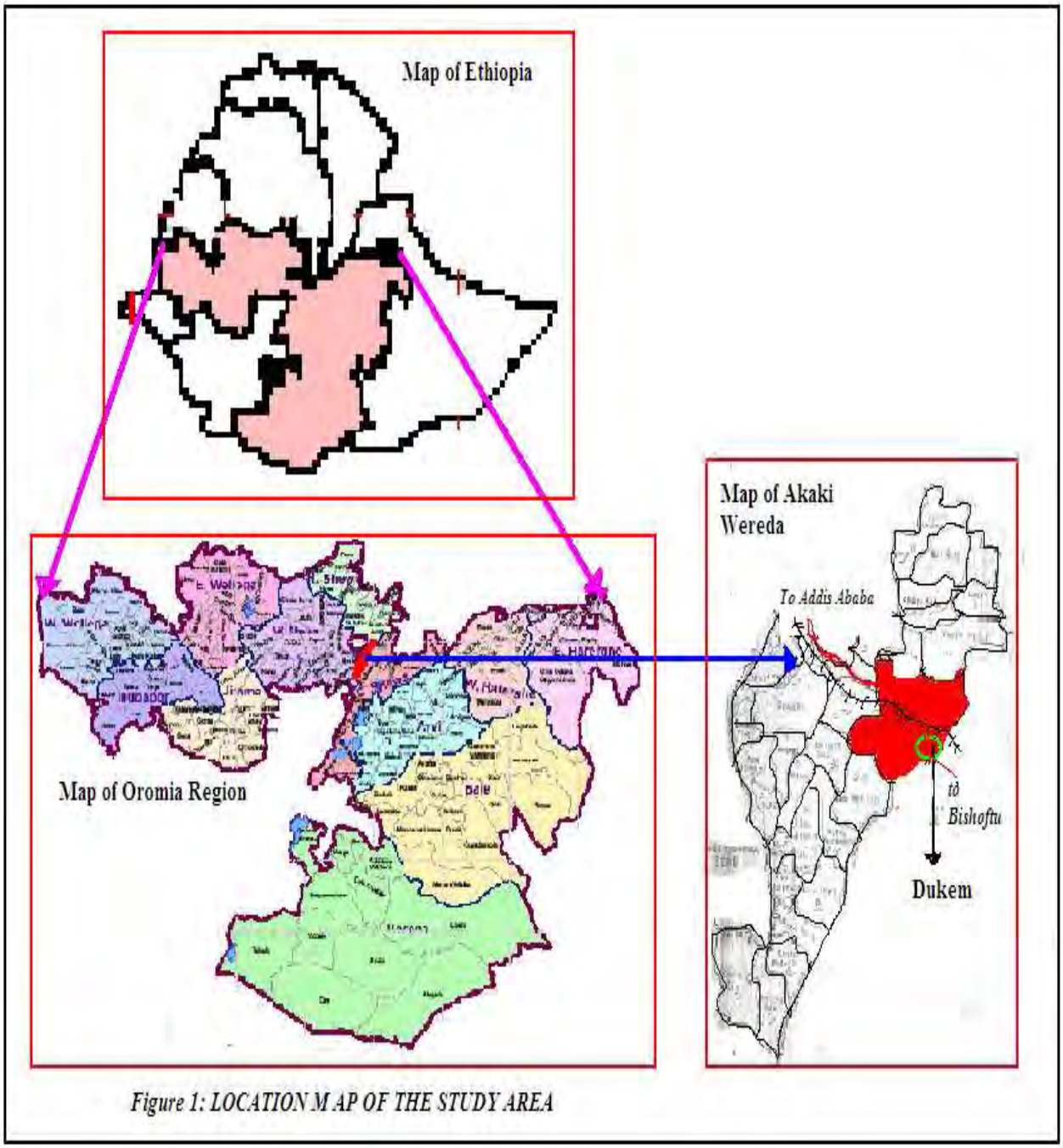
605	ገላዎትን ከታጠቡ ምን ያህል ቀናት ይሆኖል (ገላን ከታጠቡ ስንት ቀናት/ሣምንት/ወር/ዓመት አልፏል?	ከአምስት ቀናት በታች 1 ከአምስት እስከ ሰባት ቀናት 2 ከስምንት እስከ አስራ አምስት ቀናት 3 ከአስራ ስድስት እስከ ሰላሣ ቀናት 4 ከሠላሣ ቀናት በላይ 5 ከዓመት በላይ 6 በጭራሽ ገላዬን ታጥቤ አላዉቅም 7	
606	ከ5 ዓመት በታች ያሉ ህፃናት በምን ያህል ጊዜ ገላ እንዲታጠቡ ያደርጋሉ? **(በተገቢዉ ቁጥር ላይ ያስምሩና የጊዜ ብዛት በባዶ ቦታ ይሙሉ)**	በቀን የሚታጠቡበት የጊዜ ሠዛት.....1 ☐ በሣምንት የሚታጠቡበት የጊዜ ብዛት.....2 ☐ በወር የሚታጠቡበት የጊዜ ብዛት.....3 ☐ በዓመት የሚታጠቡበት የጊዜ ብዛት .....4 ☐ ከ 5 ዓመት በታች ህጸናት የሉም.....5 ☐ ሌላ (ካለ ይገለጽ)..... ☐	
607	ከገላ መታጠብ ጋር የተያያዘ ችግር አለን?	አዉ 1 የለም 2	→ 608
608	ካለ ችግሩ ምንድነዉ?	የዉሃ አቅርቦት 1 የመታጠቢ አገልግሎት 2 ሌላ (ካለ ይገለጽ)..... 3	
609	ለቤተሰብ አገልግሎት ሳሙና አለን? (መኖሩን ይመልከቱ)	አሠ (ታይተዋል) 1 አሠ (አልታየም) 2 የለም 3	
610	ገላን ስታጠቡ **<u>ብዙን</u>** ጊዜ በሣሙና ይጠቀማሉን?	አዉ 1 አይደለም 2	
611	ከግል ንፅህና አጠባበቅ ጉድለት የተነሣ የሚመጡ የጤና ችግሮች ልዘረዝሩልኝ ይችላሉ? • *ለአንድ በላይ መልስ ሊኖር ስለሚችል መልስ ሰጪዉ የሰጡትን መልሶች በሙሉ ያክብቡ*	የቆዳ ህመሞች 1 የዓይን ሕመሞች 2 የተቅማጥ በሽታዎች 3 ሌላ (ካለ ይገለጽ)..... 4	
612	አንድ ሰዉ እጁን መታጠብ ያለበት መች ነዉ ብለዉ ያስባሉ? (ከአንድ በላይ ማስመር ይቻላል)	ከምግብ ዝግጅት በፊት 1 ሕፃናትን ከመመገቡ በፊት 2 ከምግብ በፊትና በኋላ 3 ከመጸዳጃ ቤት መልስ 4 ሌላ (ካለ ይገለጽ)..... 5	
ቃለ-መጠይቁ ተጠናቋል:: ስለ ትብብሮ በጣም አመሰግናለሁ::			

የተቆጣጣሪዉ ሙሉ ስም _____ የመረጃ ሰብሳቢዉ ሙሉ ስም----------

ፊርማ _____. ፊርማ _____.

ቀን _____. ቀን _____

6.6. Map of study locality, Dukam town, June 2010.



Map 1: Location of study locality (source Dukam Municipality)

Declaration

I, the under signed, do hereby honestly declare that the content of this thesis is my original work and it has never been submitted in any other academic institution to fulfill a similar purpose.

Tesfaye Mekonnen _____ _____

Name Signature Date

This thesis has been submitted for examination with my approval as research advisor

Dr Abera Kumie (Ph. D.) Signature _____ Date _____