ADDIS ABABA UNIVERSITY

HEALTH SCIENCE COLLEGE SCHOOL OF PUBLIC HEALTH

ENVIRONMENTAL HEALTH CONDITIONS AND ASSOCIATED HEALTH THREATS IN SOMALI NATIONAL REGIONAL STATE EASTERN REFUGEE CAMP; KEBRIBEYAH, ETHIOPIA

A Thesis Submitted to the School of Public Health of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Public Health (MPH Degree) in General Public health study.

By

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Assessment on the Environmental Health Conditions and Associated Health Threats in Kebribeyhae Refuge Camp Somali National Regional State, Ethiopia

By

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A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE SCHOOL OF PUBLIC HEALTH.

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Abstract

Introduction: The living conditions and wellbeing of refugees can be evaluated from different perspectives. One is the assessment against absolute standards that can be identified as acceptable levels. To guide and monitor its mandated activities, UNHCR uses a set of such standards, which are largely in line with SPHERE standards and recommendations of other UN agencies.

Methods: A cross-sectional study was conducted to assess the environmental health conditions and associated health threats in Kebribeyah Refugee camp; Somali National Regional State; Ethiopia from October to June, 2010. Four hundred and twenty two households were recruited as a study population. Standardized and structured questionnaire, observational and key informant checklists were used for data collection. Data was entered; cleaned and analyzed using statistical software (EPI-INFO, Window version 3.5.1) and Statistical Package for the Social Sciences (SPSS, version 11 and 15) were utilized for data management. Data were analyzed descriptively with simple frequency distribution, cross tabs, odds ratio, binary and multivariate regression.

Results: it was found that only 33% of the individuals in the sample households met the minimum 15 liter per-capita daily water consumption standard requirement of Sphere Project. Seventy one percent of the households had a traditional pit latrine. Twenty eight percent of the respondents perceived that their shelter is adequate for all purpose. Moreover from the sampled occupants' shelter, 288 (68.2%) were infested with at least one type of public health important insects. The solid waste administration and management practice met the UNHCR indicated standards.

Conclusions: The aggregate values computed for adequacy of shelter, water supply, sanitary latrine coverage, insect and vector control and the health provision programs did not meet the UNHCR and Sphere project standards. Therefore, maximal endeavors are requiring for improving the overwhelming circumstances. Generally the concerned refugee administration should be integrating all the activities in the forth coming strategic plan.

Key wards: Environmental health, shelter conditions, water supply, sanitation, personal hygiene, public health important vectors, Refugees, Kebribeyah, Somali national regional state, Ethiopia

1. Introduction

1.1 Background

As a broad component and synonymous of environmental health, environmental sanitation is viewed as the control of all those factors in man's physical environment which exercise a deleterious effect on his physical development, health and survival. Accordingly, Environmental sanitation includes water supply, safe disposal of human waste, waste water and solid waste management, control of vectors of diseases, domestic and personal hygiene, food safety, sanitation, housing etc. It is also vital for protecting the environment, improving health, alleviating poverty, enhancing quality of life and raising productivity all of which are essential for sustainable development (17, 19).

The location of most refugee camps are often influenced by the political, social, economic or military realities of the host countries, and relief agencies must often choose from among a few sites that may not be optimum. People affected by emergencies often suffer from malnourishment, stress, fatigue and other ailments including injuries. These conditions, coupled with unsanitary living conditions such as substandard sanitation, inadequate water supplies and poor hygiene, make disaster-affected people vulnerable to disease. (2,5,9)

The Administration for Refugee and Returnee Affairs (ARRA), an institution established by the Ethiopian government and part of the Ministry of Home Affairs, is the main implementing partner of UNHCR. ARRA is in charge of food distribution, security issues in the camps, and other programs on health, education, etc. Refugee influxes in Ethiopia are primarily results of ongoing political and civil unrest as well as recurring natural disasters in neighboring countries. Ethiopia hosts a large population of refugees from many African countries including Somalia, Sudan, Eritrea, Rwanda, Burundi, Angola, Liberia, Djibouti, Uganda, South Africa, and Yemen (14)

The ultimate goal of this assessment **was** to explore the appropriate environmental health service provisions in the camp, what health threats are associated with the environmental health and to attest the availability of harmonized and comprehensive hygiene and environmental sanitation promotion and education packages.

1.2 Rationale of the Study

Timely and adequate provision of safe water and sanitation to refugee community is of special importance because they often face discrimination, difficulties in fully exercising their rights, and are prone to exploitation. Therefore baseline data need be available for management, policy decisions making and interventions. The issue of environmental conditions in the Ethiopian refugee camps has not been adequately discussed. The study will have a paramount importance in the setting health promotion and diseases prevention activities of Public Health in general and environmental health in particular.

The result of this study enables to have important consideration that is amenable for holistic approach in the management and administration of refugee in Ethiopia. The ultimate outcome of this research undertaking is to explore and produce adequate information related to environmental health situation, identify the most prevalent Environmental Health related disease and determinant health risks that will help for better management, advocacy, policy decisions and future planning and measuring interventions' impacts for refuge administration.

Kebribeyah was selected as study area because it is one of the oldest refugee camps, which helps to explore the most prevailing and chronic refugees' environmental health conditions that demand maximal effort and to draw best lessons and options in correcting the existing problems and the establishment of new refuge settings.

2. Literature Review

A refugee is a person who is outside his or her country of nationality and is unable to return due to a well-founded fear of persecution because of his or her race, religion, nationality, political opinion, or membership in a particular social group. By receiving refugee status, individuals are guaranteed protection of their basic human rights, and cannot be forced to return to a country where they fear persecution.

The 2009 global trend report indicated that globally there are 15.2 million refugees. The major originations of countries of refugee are Afghanistan 2,887,100, Iraq 1,785, 200 and Somalia 678,300. Pakistan has hosted 1,740, 000, as the same time the Islamic republic of Iran similarly hosted 1,070, 500 and Syrian Arab republic hosted 1,054, 500 refuges. Country specific data has shown in Ethiopia there are 102,620 refuges which comprises Somali refugee 55,200, Sudan 23,000, Eritrea 21, 000 Kenya, 1,420 and 1780 various country originated refugee (36). Access to clean water and improved sanitation are essential to life, health and dignity. They are, therefore, basic human rights.

The Universal Declaration of Human Rights, 1948, Article 25 states that everyone has the right to a standard of living adequate for the health and well-being of himself and his family. UN Committee on Economic, Social and Cultural Rights, 2002, urges state parties to ensure refugees, asylum-seekers, internally displaced persons and returnees have access to adequate drinking water whether they stay in camps or in urban area should be granted the right to water in the same conditions as nationals. (9,17). UNHCR and Sphere Project have indicated that refugee people should get maximum 20 both and Sphere minimal 15 liters of water per-person per-day; the water point proximity should be located within 200 meters distance. Similar guideline indicated that the latrine coverage in the camp should be 100% and the shelter adequacy to be 100%.

In the case of environmental health, the indicators that are most relevant are those that represent the link between environment and health. This link can be looked at in two ways: 'backwards' from health to environment, or 'forwards' as the link from environment to health. The former focuses on the environmental contribution to the health outcome of

concern; the latter considers the potential risks to health from exposures to a specific environmental hazard (15, 26, 29).

2.1 Water supply and environmental sanitation

Timely and adequate provision of clean water to refugee community is of special importance because they often face discrimination, difficulties in fully exercising their rights, and are prone to exploitation. One of the first priorities in emergencies and camps is the immediate provision of adequate amounts of water. It needs to be safe and appropriate for drinking, cooking and personal hygiene.

The Sphere Project sets up three different key standards for water supply in camps: All people have safe access to a sufficient quantity of water for drinking, cooking and personal hygiene. Public water points are sufficiently close to shelters to allow use of the minimum requirement. Water at the point of collection is potable and of sufficient quality to be drunk and used for personal and domestic hygiene. Nepal, Tanzania and Kenya take an intermediate position as far as water-related indicators are concerned. The camps in the former two countries made significant improvements in the period 2004-2007 in terms of the quantity of water available. In Tanzania this is probably related to the decrease in the refugee population rather than an increase of water supply. Also the access indicators in this country showed an improvement over time: from 162 down to 97 users per tap and from 82 up to 93 percent of the population living within 200 meters from a water point.

Household surveys showed how gaps in poor water and sanitation were affecting refugee wellbeing and health. The overall median and average values for both water supply and latrine coverage across UNHCR refugee operations from 2003 to 2005 meet the UNHCR standards but there are still large numbers of camps where the average water supply is inadequate and there are not enough latrines for the population.

2.2 Safe human waste disposal

Safe disposal of human waste and excreta is a priority from the very beginning of a camp set-up. Particularly, in longer-term emergencies, adequate sanitation is as important as a sufficient supply of water. Human waste is a major source of pollution and water contamination, and is often responsible for various health problems and diseases such as

diarrhoea, dysentery and cholera. Therefore, the provision of proper sanitation services needs to be seen as closely related to health care and of vital importance (15, 29).

The Sphere Project sets two key standards for human excreta disposal in camps. They aim to ensure that people have sufficient numbers of latrines, sufficiently close to their dwellings to allow them rapid, safe and acceptable access at all times of the day and night. Secondly, they have a right to be able to access toilets which are designed, constructed and maintained in such a way as to be comfortable, hygienic and safe to use.

2.3 Solid waste storage, collection and disposal practice

Solid waste refers to all non-liquid waste produced by households, medical facilities, market places, food distribution points and other sources. It does not refer to human excreta. Poor or no disposal of garbage and waste increases serious risks such as the pollution of surface water, groundwater and the environment in general. This is a perfect breeding ground for flies and will attract rats and other rodents that are vectors for various diseases.

Assessments of solid waste generation and practices should be determined the type and quantity of waste produced. Based on assessment information, options for solid waste management should be explored with the community and local officials. Options for improving solid waste management practices include onsite and offsite disposal methods and strategies aimed at waste reduction, reuse and recycling. Inappropriately disposed solid waste poses significant health problems. Poorly managed solid wastes provide good places for disease-causing insects and rodents to live and breed (10, 15).

The Sphere project sets two key standards for solid waste management, aiming to ensure that people a) have an environment acceptably free of solid waste contamination, including medical wastes and b) have the means to dispose of their domestic waste conveniently and effectively.

2.4 Environmental health associated health threats

Health status in a refuge is a complex issue, in which disease agents interact in various ways. Refuge and displaced persons may change the local environment or bring new or

different strains of infectious agents. In addition, they may have low immunity to infections due to poor physical or nutritional status, underlying diseases, or poverty. Some individuals are more vulnerable to infectious diseases or the more severe form of the illness. Unlike genetic diseases, which individuals are predisposed to, acquiring water, sanitation and hygiene related diseases are controllable and preventable. The spread of these diseases depends on environmental conditions and behavior in the household and community.. Precise information about diseases and injuries, their incidences, their consequence, their causation and their trend is more than ever necessary to inform policy-making (4, 21). The location of disaster relief and refugee camps has been shown to have significant effect on the rates of diseases associated with the environment (ARI, diarrhea, tuberculosis and malaria) (9, 15).

Diarrhoeal diseases, acute respiratory infection, measles, malaria and malnutrition are the most common causes of death in emergencies and migration. All these causes of death are preventable. The majority of these preventive measures are related to environmental conditions which comprises appropriate shelter and site planning, clean water, good sanitation, vector control, personal protection, personal hygiene and health promotion. These measures address conditions in the environmental risk factors which can cause disease. It is important to understand the relationship between disease and environmental risk factors because interventions must target risk factors properly. (7, 12)

Diseases associated with poor environmental health are still a public health threat reflecting local endemicity patterns. Prevalence data for the Gaza Strip and the West Bank in 2008 revealed a striking difference in the rates of water- and food-borne infections such as acute hepatitis (81.0 per 100 000 in the Gaza Strip and 23.7 per 100 000 in the West Bank) and typhoid fever (10.6 per 100 000 and zero, respectively). The incidence of both conditions increased from 2003 to 2007 by more than 1.5 cases per 100 000 in the Gaza Strip. In the West Bank viral hepatitis prevalence decreased by more than 1.5 cases per 100000 and cases of typhoid fever remained at zero reporting levels throughout the period (5)

The deteriorated environmental conditions in the refugee camps in Lebanon include problems related to improper solid waste management, quantity and quality of water supply, distribution system conditions, and high population density as well. Study focuses on Ein-El-Helweh camp, the largest camp in Lebanon, as a case study, and it overviews the water supply and sanitation conditions, as the camp experienced incidence of waterborne diseases, which was ascribed to the poor water supply and sanitation conditions. (13)
UNHCR's standards also set absolute targets for refugee situations. For the indicator of the number of persons per primary health care (PHC) facility, it is evident that in the period 2004-2007 a significant gap existed between the standard of 10,000 clients per health centre and the actual situation in the field. 47 percent of the cases in the observation period, the refugee camps reported that this target was met and at country level only three countries – Thailand, Uganda and Nepal – achieved the standard.

2.5 Hygiene education and promotion

In refugee centers water and sanitation programmes must be implemented together with proper hygiene promotion and implementation activities to ensure effective prevention of diseases and death. Hygiene promotion encourages all the hygienic conditions and behaviors that can contribute towards health. It aims to stimulate and facilitate the right behavior change. Research has shown that hygiene- related practices such as safe disposal of faeces and hand washing after contact with faecal material can reduce the rates of intestinal infection considerably.

A comparative pre and post environmental sanitation and hygiene promotion program intervention assessment has shown that the percentage of mothers who reported those children's hands should be always washed improved considerably by the end of the program (23.4%, baseline study, 35%, post-test study). It was reported that the relative risks of disease associated with not washing hands ranges from 29.8 to 0.50. Same research has revealed highest percentage (41.3%) shifts that mothers has taken the responsibility for transferring house solid waste rather than sons and daughters. Similarly the percentage of mothers who reported that their hands should be always washed improved significantly by

the end of the program, from 61.2% in the baseline study to 85% in the post-test results (5).

2.6 Shelter general structure, condition and insect and vector infestation.

Adequate shelter is relevant to protect people against the elements, allow them to live in a dignified manner and reduce the exposure to communicable diseases. The definition of adequacy can only be established within the specific context of the refugee settlement, because of variations in climate, local building customs and cultural concerns. UNHCR information shows that quality of refugee dwellings in Nepal and Thailand is practically everywhere adequate. However, it fell short of the 100 percent UNHCR standard in the other countries, even by up to three quarters of the dwellings in Kenya and Bangladesh. Whereas, in Uganda the share of dwellings considered adequate rose from 54 percent in 2004 to 93 percent in 2007.

Study conducted in Jalazone Refugee Camp housing conditions were poor and found a statistically significant relationship between certain respiratory diseases and the housing conditions. It is essential to satisfy the present housing needs of the refugees, thus relieving problems of overcrowding and inadequate facilities. Dampness was present in 72.5% of houses, 50.5% had mould and 37.0% had leakage. Only 41.5% were exposed to the sun. Smokers were present in 74.0% of the households. Acute respiratory infections, Diarrhoeal diseases and malaria are the top killers of children accounting for approximately 40 per cent of under-five child death. These categories of disease are closely related to environmental factors. Overall, environmental conditions are responsible for 33 per cent of the global burden of disease. Age categorical data indicated that 15.4 percent of the global burden of disease associated with environmental factors is borne by children under the age of 15. (8)

Refuge populations often have an increased risk of vector-borne diseases, even for diseases that may not have been present in the area before they arrived. Even if, there has been no history of any particular disease outbreak in the area does not mean that it can never occur. Immunity and disease status, increased exposure to vectors, increased

number of breeding sites, temporary nature of the camp site and reduced peri-domestic hygiene, interruption of vector control measures, access to basic treatment factors that make displaced populations more susceptible to vector-borne diseases

Common vectors in emergencies include mosquitoes, non-biting flies, biting flies, lice mites, fleas and rodents. Bed bugs, ticks, snails are also other problematic medical vectors. Vector control strategies can range from simple treatments to more complex measures that require participation from vector control experts. Controlling vectors is a complex problem and often requires an integrated strategy that uses more than one control method. Vector-borne diseases can be controlled through a variety of initiatives, including appropriate site selection and shelter provision, appropriate water supply, excreta disposal, solid waste management and drainage, the provision of health services (including community mobilization and health promotion), the use of chemical controls, family and individual protection and the effective protection of food stores (8, 9,17).

3. GENERAL and SPECIFIC OBJECTIVES:

3.1 General Objective

To assess the environmental health situations and consequently determine the associated prevalent health threats in; Kebribeyhae Refugee Camp; Somali National Regional State;, Ethiopia

3.2 Specific Objectives

1. To assess the type of water source, accessibility, adequacy, sustainability and water handling practice.
2. To assess the sanitary latrine availability, type, construction, maintenance and utilization
3. To determine the type of solid waste generation, storage, collection and disposal practice.
4. To Asses the hygiene practice and the hygiene promotion and education activities.
5. To investigate whether the shelter general structure, construction conditions are healthy and to explore shelter associated insect and vector infestation.
6. To identify the prevalent environmental health associated diseases in the refugee.

4. METHODOS and MATERIALS

4.1 Study design: A descriptive cross - sectional study was conducted from December 2009 to May 2010 to asses the environmental health situation and associated health threats in Kebribeyhae Refugee Camp, Somali National Regional State; Ethiopia.

4.2 Study area and Population

Somali refugees began arriving in Ethiopia following the Ogaden war of 1977/8 and again after the fall of the Siyad Barre government in Somalia. Currently, three camps are operational in the Eastern zone these are namely Kebribeyhae, Sheder and Awubere/Tefereber. The Kebribeyah refugee camp was opened in February 1991. It is located at a distance of 685 km. from Addis Ababa and an altitude of 1660 meters above sea level. Most of the refugees in the camp were fled from the civil war in Somalia and the instability that followed the fall of Siad Barre in 1991. The majority of the refugees is from rural areas in Southern Somalia and has a pastoral economic base. As of June 2009 global refugee trend report, there were 7999 Male & 8355 Female refugee in the camp. The health care setting in the area includes one health center with 22 different health professions that serves for all public and clinical health services.

4.3 Source & Study Population

4.3.1 Source of Population

All refugee persons who are residing in the respective refugee camps of Eastern zone Somali National Regional State during the assessment period.

4.3.2 Study Population

The study population included all systematically sampled refugee household heads at Kebribeyhae refugee camp, Eastern zone; Somali National Regional State.

4.4 Exclusion criteria:

Individual who was not willing to participate and unable to provide consent; reside in the camp less than six month; person below 18 years old; and having socially identified mental health problems were excluded from the study.

4.5 Sample size determination:

Sample size (n) was determined based on the assumption of a 50% proportion (P) of the environmental health service provision minimum standards were met according to UNHCR/Sphere Project criteria, 0.05 expected margins of error (d), and with 95 % confidence level (Zα/2)2 and 10% contingency was also considered for non response. Accordingly the required sample size was 422.

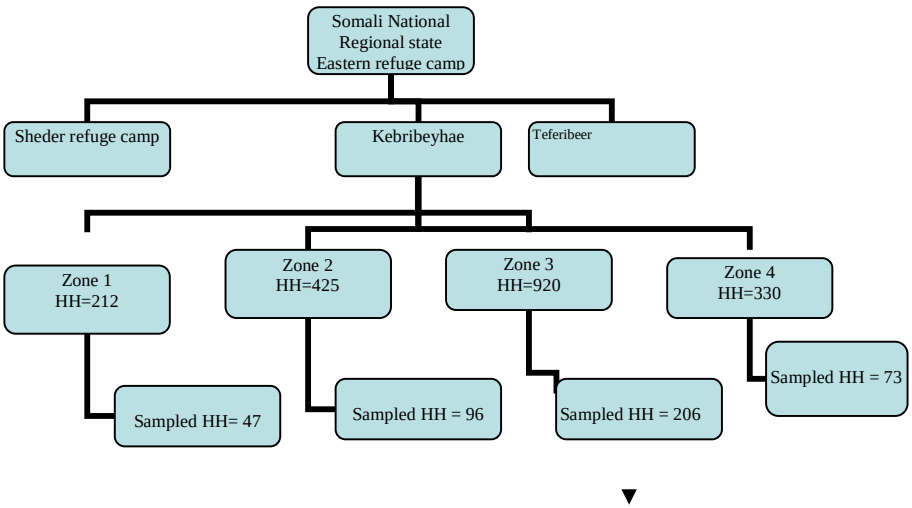
$$n = \frac{(Z\ \alpha/2)^2 * P\ (1-P),}{(d)^2}$$

$$n = \frac{(1.96)^2\ 0.5(0.5)}{(0.05)^2} = 384$$

Therefore the actual sample size will be 384 plus 10% of contingency total reached to be n = 384+ 38= 422 households

4.6 Sampling procedures

Systematic random sampling technique was employed to select the 422 sampling population. In order to get a representative sample from each zone camp population proportion sample (PPS) was calculated.



4.7 Data collection:

4.7.1 Variables

4.7.1.1 Dependent variable

Adequate environment health facility provisions

Household Outpatient Department visit self reported

4.7.1.2 Independent variable

- Socio-demography:-, educational status, marital status, and family size
- Environmental health facility provisions:-Adequate shelter, potable water supply, availability of sanitary latrine, accessibility to water point and hygiene education.

4.7.2 Operational Definition

Adequacy of shelter- adequate shelter should inter alias provide a covered area with a degree of privacy; have sufficient thermal comfort with ventilation for air circulation; and provide protection from the elements and natural hazards.

Conduciveness of the environment health condition: an aggregate and wholesome environmental health service provisions that favorably support the entire refugee to become healthy.

Adequate environment health facility provisions: is the access of the refugee people to appropriate environmental health service provisions according to the UNHCR and Sphere project environmental guideline for water supply, sanitary latrine, adequate shelter and solid waste disposal.

Environmental health associated health threats: are health hazard/risks and/or diseases that are directly or indirectly confounded with the environment. This includes biological/microbiological, physical, chemical and social environment conditions.

Environmental health: that addresses all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviors.

***H*ygiene:** practices related to keeping water supplies safe, personal hygiene practices, keeping household environments free of excreta and solid waste.

Refugee shelters: include the most basic kind of structure created in the aftermath of a conflict or natural disaster as a temporary residence for victims who have lost or abandoned their homes. Refugee camp: is a temporary camp built to receive refugees

Adequate lighting: - is to mean that a person can see and read the designed questionnaire without any difficulty or easily identify objects in the room comfortably without straining of the eye.

Adequate ventilation: - is to mean that a room is free of reasonably disagreeable foul and sensible odors and have window and egress.

Properly utilized latrine: - is a latrine which is clean (no dirty materials like faeces or urine around the squat hole) the vicinity was found free of children stools and other litters. Besides users were safely handled tissue/anal cleansing material, have no insect access and other vermin access.

4.7.3 Quantitative data

Standardized and structured questionnaire was developed for the purpose of data collection after reviewing relevant literature and views of professionals in this area. The questionnaire was designed to be administered by an interviewer. It was prepared in English and the consent form was translated into Somali and Amharic language.

The questionnaire was designed to obtain information on socio-demographic characteristics of the respondents, the shelter structure and condition, adequate water supply, provision human originated and liquid waste disposal facilities, spent water and solid waste management, arthropods, or other vector control practices, hygiene promotion and education and environmental health threats and household perception's on the adequate environmental health facility provisions.

Data collectors and supervisors were trained for one and a half day and they were provided with a training manual. After the training, the questionnaire was pre-tested in the local community who resided in the adjacent vicinity that was not included in the actual study. In order to ensure the quality and validity of data, supervisors and the principal investigator were made regular supervision, recall data, spot checking and reviewing the completed questionnaire.

Each data collector had completed an average of ten questionnaires a day. The actual data collection work took 6 days excluding the training and pre-testing time.

A two week morbidity data was collected from the refugee health centre weather the environmental health condition exerted a negative health outcomes. Four Hundred and twenty two heads of the household interviewed face-to-face, and the questionnaire is completed during the interview. The information obtained under the assessment was compared against the UNHCR and the Sphere project standards.

4.7.4 Qualitative data

Qualitative data were used to enrich the quantitative part; hence, qualitative discussion guiding questions were developed to explore the view of key informants and a walkthrough observation was made about the environmental health service provision adequateness and camp sanitation conditions. Five key informants were interviewed and discussed about the environmental health conditions and health service provisions. The principal investigator had conducted a site observation and key informant interviews.

4.8 Data processing analysis

The data was entered and cleaned by using Epidemiological Information (EPI-INFO, Window 2002) and analyzed by using Statistical Package for the Social Sciences (SPSS, version 11 and 15.0). The principal investigator performed data entry and cleaning. The data validity was maintained by reentering 17% of the questionnaire by data encoder and 5% rechecked by the principal investigator. Descriptive statistics for frequency distributions cross tab as well as chi-square and Odds Ratio with 95% confidence interval for selected variables were calculated as appropriate.

4.9 Data quality management:

Data quality was maintained by designing a structured questionnaire and explained it to local understandable language. Pre-testing and coding of research questionnaire were carryout , The quality of data was ensured through training of data collectors, close supervision and prompt feedback, reviewing each of completed questionnaires daily. Moreover, a daily accomplished activity evaluation means was established to correct

problems that could face during the course of data collection. The consent for the survey and the assurance of confidentiality were delivered to improve the quality of data. Manual data cleansing was done before data entry and analysis. Data consistency and completeness were made all the way during data collection, data entry and analysis.

4.10 Ethical Considerations

In this research process all the ethics principles were strictly adhered. The principal investigator has sought the relevant administrative consent and support from all refuge Administrative concerned organizations. The research participant involvement was based on full information and voluntary bases. Ethical clearance was secured from Addis Ababa University Medical Faculty Institutional Review Board. The participant had got full opportunity and encouragement to ask questions. Participants consent was obtained after the prospective research participant had adequate knowledge of the relevant facts, the consequences of participation, and had sufficient opportunity to consider participation. A written informed consent was obtained from the potential research participants. There was no any protocol violation; and minimal adverse effect occurred linked with this study.

4.11 Dissemination of results

The final report of the study will be presented and discussed it with the School of Public Health, Faculty of Medicine; Addis Ababa University. The researcher is responsible for dissemination of findings and fully accountable to provide feedback to the refuge administration. Maximum effort will be made to publish it in scientific reputable journal.

5. Results

5.1 Socio-demographic characteristics of respondents

A total of 422 Refuge Households were interviewed to obtain the necessary information on environmental health situation and associated health threats. Two hundred and thirty seven (32.5%) of the interviewed population were male and 285 (67.5%) of the respondent were female. The mean age of the respondent was 44.6 years and the mean (±SD) age was 44.6 ± 10.5 ranging from 18 -73. Religion wise all the respondents 422 (100%) were Muslims. The respondent marital status showed that 9(2.1%) were single, 386 (91.5%) married, 5(1.2%) divorced, 6(1.4%) separated and 16 (3.8%) widowed from their previous marital life.

The education status of the respondents revealed that the majority 353 (83.6%) were illiterate (did not able to read and write) and only 69 (16.4%) were literate (include: those with formal education able to read and writes). The average family size accounted 9.2 people per household. The median family size was 9.2 and the mean (±SD) family size was 9.2± 3.3 that ranging from one to seventeen members in a single family (Table 1).

Based on the response of the interviewee, the adequateness of the environmental health service provisions and the educational status, 80 (58.4%) of the male and 172 (60.4%) of the female respondent replied that the condition met the criteria but this has no a significant association Crude Odd Ratio (COR) [0.949 (0.773, 1.165)]. Gender difference and adequateness of the service also had shown no significant association Crude Odd Ratio COR= [1.08 (0.717, 1.641)]. In this analysis the household family size also has no any significant association between the meeting need of the appropriate environmental health provisions. Respondent underline that 37 (69.8%), 139 (60.7%), 69 (53.5%), 7(63.6%) household family size 1-5, 6-10, 11-15, 16-20 has stated that they were met the appropriate environmental health provisions respectively..

Table 1: Socio demographic characteristics of Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Description of category		Frequency n=422	Percent
Sex			
	Male	137	32.5
	female	285	67.5
Age			
	18-27	35	8.3
	28-37	49	11.6
	38-47	175	41.5
	48-57	120	28.4
	58-67	38	9.0
	68-77	5	1.2
Marital status			
	Single	9	2.1
	Married	386	91.5
	Separate/divorced	6	2.6
	Widowed	21	3.8
Religion			
	Christian	0	0
	Muslims	422	100
Family size			
	1-5	53	12.6
	6-10	229	54.3
	11-15	129	30.6
	16-20	11	2.6
Educational status			
	Illiterate	353	83.6
	Elementary	11	2.6
	Intermediate	28	6.6
	High school	21	5.0
	Tertiary	9	2.1

4.2 water source, accessibility, adequacy and water handling practice

All interviewed households 100% were accessed to pipe water supply using stand pipe water distribution points. The distance traveled to fetch water varied according to the location of the household and the distance of the water points. In this context 297 (70.4%) of the respondent were accessed to a given water distribution point within 200 meter. According to the UNHCR and Sphere project indicators guideline, the average individual per-head and per-day water consumption was very law which accounted 6.68 liters that entailed only 15% of the individuals are full filled the required recommendations. Water collection and transportation practice from the water distribution point to home revealed those 36 (8.5%) children less than 15 years of age, 355 (84.1%) adult women, 11 (2.6%) adult male and 20 (4.7%) all member of the household collected and transported water from the source to the respective home. Four hundred and fourteen (99.8%) were transported by human being carrying or holding on the container, 8(1.9%) used handcarts for transportation. All of the interviewee 100% responded that they did not spend money for water.

The individual household water collection transport and storage practice showed that all 422 (100%) used 5, 10 and 20 liters water containing capacity plastic Jeri-cans. The water drawing practice from storage containers also indicated that 79 (18.7%) drawing by dipping and 172(40.8%) by pouring from the container 171 (40.5%) practiced both dipping and pouring methods. All the 422 household respondents were scored that 100 % they covered the water storage containers. The individual exposure to any topic related to safe water handling practice health education; 341 (80.8 %) attended any session and 81(19.2%) did not attend any topic. Their knowledge regarding to identification of disease that are transmitted through contaminated water has shown that 315 (74.6%) diarrhea, 71 (16.8%) skin disease, 46 (10.9%) could able to identify malaria, 66 (15.6%) eye disease, 46 (10.9%) malaria, 12 (2.8%) identified bilharzias, 6 (1.4%) intestinal parasite, 6(1.4%) stated that water has no any harm and 48 (11.4%) replied did not know any disease related unsafe water.

The individual awareness was assessed to identify as to what would be the possible means that water will get contaminated at shelter level stated as 36 (8.5%)unclean

dipper, 139 (32.9%) uncovered container, 32 (7.6%)unclean containers and 215(50.9%) combination of all the stated issues can be the cause of contamination.

Table 2: Household water supply utilization, collection, transport and handling practice of Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Characteristics	Frequency n=422	Percent
Per head water consumption (litters)		
0-9	320	75.8
10-19	87	20.6
20-29	14	3.3
30-39	1	0.2
Distance to water point		
0-200	297	(70.4)
201-400	59	14.0
401-600	29	6.9
601-800	12	2.8
801-1000	25	5.9
Household Water collectors		
Children < 15 years	36	8.5
Adult women	355	84.1
Adult male	11	2.6
All other member	20	4.7
Water transport means		
Hold on by hand and/or backs	114	99.8
Using hand carts	8	1.9
Water		
Water drawing practice		
Pouring	79	18.7
drawing	172	40.8
Both	171	40.5

4.3 Sanitary handling of human excreta and spent water disposal

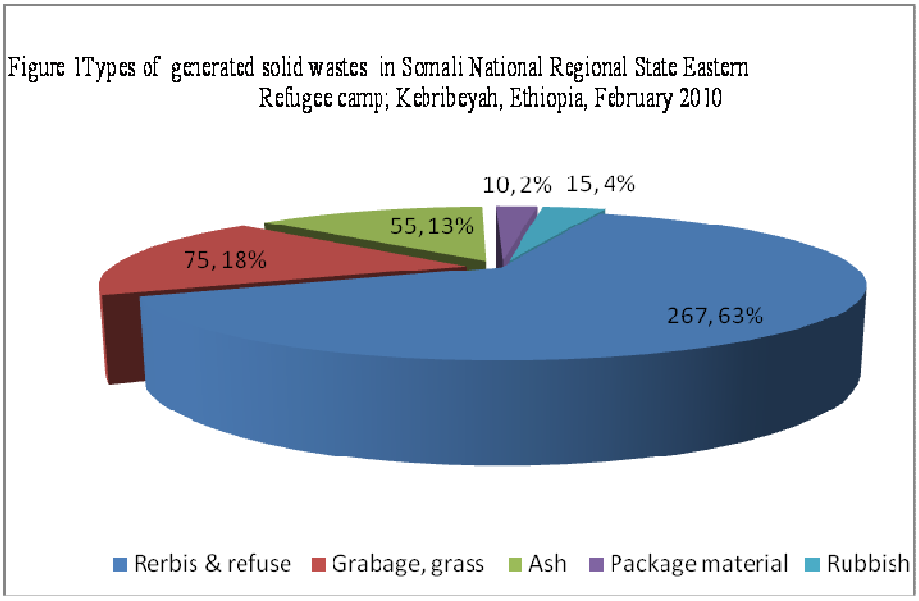
Sanitary latrine availability and utilization indicated that 303 (71.8%) of the respondents had latrine. The facility structure type varied from pit latrine 206(67.9%) and 97 (32.1%) household shared pit latrines. Of those the available structure plenty of them 261 (86.1%) were properly utilized. The distance of the latrine from the shelter differed 211 (69.6%), 88(29.0%) and 4 (1.3%) were situated at 0-15, 16-34 and over 35 meters respectively. Almost all 278 (91.4%) of the existing structure necessitate maintenance and rehabilitation. The domestic liquid water disposal practice is noticed that 108 (25.6 %) latrine, waste pit 136 (32.2%) and 178 (42.2 %) splash on the foot path or fence of the compound (Table 3).

Table 3: Structure, utilization, maintenance condition of sanitary latrines and wash water disposal of Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Characteristics	Frequency n= 303	Percent
Structure type		
Family Pit latrine	206	67.9
Shared pit latrine	97	32.1
Distance of structure		
0-15	211	69.6
16-34	88	29.0
35-44	4	1.3
Utilization		
Properly	261	86.1
Improper	42	13.9
Require maintenance		
Yes	277	91.4
No	26	8.6
Liquid waste disposal		
latrine	108	25.6
Waste pits	136	32.2
Splash on the path/compound	178	42.2

4.4 Solid waste Storage collection and disposal practice

At the time of the survey the common solid waste generated from the respondent private shelter revealed that 267 (63.3%) refuse and debris material, 75 (17.1%) garbage, grass and leaves 55(13.0) ash, 15 (4%) rubbish and 10 (2.4%) commercial food package material,. Of the interviewed households 342 (81.0%) have non durable solid waste storage receptacles which included plastics bucket and tins 24 (5.7%), Sack 30 (14.2%), Basket 60(7.1%) , cartoon 84 (19.9%), festal144 (34.1%) and no storage material 80(19.0%).



The onsite solid waste collection practice showed the majority 248 (58.8 %) manually, 158 (37.4%) mechanical, and 13 (3.1%) were accustomed both methods and 3 (0.7%) did not collect waste on site. The household dispose the generated waste 24 (5.7%) in the open field, 24(5.7%) burn on the street, 362 (85.8%) in the camp communal waste disposal pits and 4 (0.9%) combusting pits and 8 (1.9%) un-control tipping.

4.5 Insect, Rodent, and Vector management

Of the sampled occupants shelter 288 (68.2%) of them were infested with public health important insects and vectors. Flies 264 (62.6%), cockroaches 175 (41.5%), mosquito 39

(9.2%), bed bug 8 (1.9%), scorpion 2 (0.5%), flea 120 (28.4%), spider 18 (4.3%), termite 14 (3.3%), chigger flea 8 (1.9%), molasscus 16 (3.8%) and ticks 12 (2.8%)

The main causes of infestation were reasoned out as over crowdedness 34 (8.1%), dust 75 (17.8%) and crack wall 21 (5%). Four hundred and fifteen households were controlling infestation of at individual shelter level. The most prevailing control means were good personal hygiene practice 137 (32.5%), good housekeeping 118 (28%), mechanical 173(41.0%) , personal protective and local herpes each counted 1(0.2%) no chemical and biological control means were exercised as an optional control means. Insect infestation and conduciveness of the environment revealed that there is no a significant association at Crude Odd Ratio (COR) = [0.797, (0.526, 1.20)]

4.6 Personal hygiene practices, hygiene education and promotion

Three hundred and ninety-five (93.6) of the respondents had responded that there is a relation between water, sanitation, shelter, vector and disease. An aggregate response on critical personal hygiene practice (hand washing after visiting toilet, hand washing after child's bottom cleansing hand washing before and after meal) showed that 278 (65.9%) of the respondent had practiced it. But the majority was using only water without soap, ash and sand to wash after critical hygiene condition.

The majority of households and their members 415 (98.3%) were using bowel and bucket for bathing in the shelter or kitchen or latrine and a few of respondents 7 (1.7%) used to wash at night time outside the shelter. The most personal hygiene practiced exercised were taking bath regularly, washing hands, washing feet & legs, cutting nails, cutting/dressing hairs, dental and oral hygiene and washing and ironing of clothes.

The media that were accessed by the respondent for hygiene information and communication were 53 (12.6 %) radio, no one mentioned television, 5 (1.2%) Printing media, 203 (48.1 %) camp hygiene and sanitation promoters and local folks, 74 (17.5%) health care provider in the health setting while, 85 (20.1%) did not have any access and other sort of communications including health service and camp IEC/BCC promotional campaigns and routine programs.

4.7 General Housing Structure and Condition

The majority of the household shelters were made of wood and stick and walls and roofs were covered with hard plastic sheet material and mended clothes. The floor area of the shelter measured and 277 (65.6%) had 1-10 square meters, 141 (33.4%) had 11-20 square meter and the rest 4(0.9%) had above 20 square meters. 232(55.0%) respondents had no separate bed room for adolescent and adult members of opposite sex. The numbers of occupants were ranged from 1-18 per household. 273 (64.7%) of the shelter rooms had adequate natural light the adequacy for natural light was also remarked that 258 (61.1%) had windows and eggers for ventilations. Biomass fuel was the main dominant source of energy in all household (charcoal and wood). From all the household surveyed 226 (53.6%) used charcoal 91 (21.6%) used wood and 105 (24.6%) like kerosene. Moreover 346 (82.0%) of the household had a private traditional kitchen, 25 (5.9%) used an open yard place as a kitchen. The kind of stove utilized for all type of baking, cooking and boiling included that traditional open stoves 208 (49.3%), improved mud stoves 19 (4.5%) and improved prefabricated stoves 195 (46.2%).

Hundred percent of the study refugee camp has no electrical supply. The majority of the HH 414 (98.1%) used gas lamp 6 (1.4%) used kerosene and 2 (0.5%) other form of illuminations. Regarding the type of stove utilization traditional, improved and pre fabricated stoves.

The evaluation of space availability for cooking, dining and storage of household belongings showed that 121 (28.7%) were adequate 200 (47.4%) moderately adequate and 101 (23.9%) were in adequate. Concurrently the construction condition of shelter revealed that 47 (11.1%) were satisfactorily, 287 (68.0%) fairly and 88 (20.9%) unsatisfactorily built. The number of normal partitions of rooms observed that 28 (6.6%) no partitions, 346 (82.0%) one partitions and 48 (11.4%) had two partitions of rooms. Thirty four (8.1%) shelters were had detectable dampness, 41 (9.7 %) and 177 (41.7%) visualized mold and leakage respectively.

Table 4: Housing construction conditions and characteristics of Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Characteristics	Frequency n=422	Percent
Area in M^2		
1-10	277	65.6
11-20	141	33.4
21-30	4	9.0
Formal room partitions		
No partitions	28	6.6
Single	346	82
Double	48	11.4
Construction condition		
Strongly built	47	11.1
Fairly built	287	68.0
Unsatisfactory	88	20.9
Adequate light		
Yes	273	64.7
No	149	35.3
Window present		
Yes	258	61.1
No	164	38.9
Accommodation status shelter		
Adequate	121	28.7
Moderate	200	47.4
Inadequate	101	23.9
Availability of kitchen		
Traditional	**346**	**82.0**
Open yard place	**18**	**4.3**
Shared kitchen	**25**	**5.9**
No kitchen	**33**	**7.8**
Artificial illumination		
Electricity	0	0
Kerosene lamp 'Masho'	414	98.1
Gas lamp 'kuraz'	6	1.4
Other (charged battery)	2	0.5

4.8 Relationship of environmental health conditions with the provision of facility with the standard criteria

The aggregate response on the household on the availability of adequate shelter, clean and safe water supply and sanitary latrine and easily access to water points had revealed that 252(59.7) of the respondents ascertained the environmental health service provision was conducive to maintain health. Among the potential determinants examined concerning appropriate environmental health service provisions in Kebribeyhae refugee camp having adequate shelter, water point accessible distance and having latrine were found to be significantly associated with meeting the appropriate provisions of environmental health criteria. However, there were no significant associations in the adequacy of water supply in this study. As shown in Table: 5.

Table 5: The relationship between Environmental Health condition and adequacy to provision of facility Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Characteristics	Environmental health facility provision criteria		Odds Ratio (95% CI)
	Met	Unmet	
Adequacy of shelter 100%			
Yes	117	4	35.96 (12.942,99.957)
No	135	166	1.00
Adequate water supply 15 l/h/d			
Yes	24	9	1.88 (0.853,4.158)
No	228	161	1.00
Distance to water point within 200mts			
Access able	229	68	14.93(8.815,25.302)
In-access able	23	102	1.00
Latrine coverage 100%			
Yes	223	80	8.65 (5.298,14.125)
No	29	90	1.00

There was a significant association between accessibility of water point those within the recommended distance were more likely to meet the criteria as compared to those who are not within the recommended distance, Crude Odds Ratio (COR) 35.96 (12.942, 99.957). Similarly, it was found that the interviewee with having adequate shelter were more likely to meet the recommended criteria than who had no adequate shelter provisions, Crude Odds Ratio (COR), [14.93(8.815, 25.302)]. There was also a significant association between the availability of sanitary latrine and the provision of adequate environmental health service within the criteria, thus those having sanitary latrines were 14.93 times met the proposed criteria compared to than those who did not have the latrine, Crude Odds Ratio [14.93 (8.815, 25.302)].

Household perception for adequate provision of environmental health facility

The individual response indicated that 380 (90%) answered they were accessed to safe water supply, 333 (78.9%) were responded the lived in clean and safe environment, 366 (86.7%) replied got adequate personal hygiene provisions, 337 (79.9%) remarked that they were living in insect and vector free environments and 274 (64.9) education and provision were with good. Whereas as it was indicated there was no a significant relation was observed between the indexed variables and the household perception on the conduciveness of the environmental health service provision.

Table 6: Household perception for adequate provision of environmental health Facility Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Characteristics	Environmental health facility provision n=422		Odds Ratio (95% CI)
	Met the criteria	Unmet the criteria	
Access to safe water supply			
Yes	229	151	1.88 (0.,2.37)
No	24	9	1.00
Clean and safe environment			
Yes	191	142	0.61 (.37, 1.10)
No	61	28	1.00
Adequate provision of personal hygiene material			
Yes	219	147	1.03 (0.58, 1.84)
No	33	23	1.00
Insect and vector free environment			
Yes	206	131	0.71(0.47,1.08)
No	46	39	1.00
Adequate hygiene education			
Yes	156	118	0.75 (0.46, 1.21)
No	96	52	1.00

A two week health center outpatient department based morbidity data has observed and analyzed to check whether the diagnosis and treatment have a relationship with the prevailing environmental health condition. The majority of the reported cases 908 (75%) were directly and indirectly associated with the environmental health condition. The age specific leading cause of illness for the under five group and those person age 5 and above refuge were upper and lower respiratory tract infection constitute 267 (22.1%) and 239 (19.8%) respectively. Besides intestinal worms 88 (7.3%), urinary tract infection 86(7.1%), skin and eye disease each scored 68 (5.6%). The difference distribution has some remarkable differences the stated age group. Sex wise males are a bit prone to the health threats than women were 465 (38.4%) and 443 (36.6%).

Table 7: Health center OPD attendant Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010 N=1210

Diagnosis	AGE Group		Total
	<5 yrs	≥.5 yrs	
Malaria	3(0.6%)	2(.3%)	5(0.4%)
URTI	181(38.2%)	86 (11.7%	267 (22.1%)
LRTI	142(30.0%	97 (8.0%)	239(19.7%)
skin disease	29(6.1%)	39(5.3%)	68 (5.6%)
eye disease	24(5.1%)	44(6.0%)	68 (5.6%)
dental	6(1.3%)	12 (1.6%)	18 (1.5%)
intestinal worms	31 (6.5%)	57(7.7%)	88 (7.3%)
watery diarrhea	42 (8.9%)		42 (3.5%)
bloody diarrhea	2 (0.4%)		2 (0.2%)
STI		7 (.6%)	7 (.6%)
acute malnutrition			2(0.2%)
anemia	10 (2.1%)	23 (3.1%)	33 (2.7%)
chronic disease		11(1.5 %(	11 (0.9%)
mental disease		31 (4.2%)	31 (2.6%)
injuries		27 (3.7%)	27 (2.2%)
UTI		86 (11.7%)	86 (7.1%)
gastritis		64 (8.7%)	64 (5.3%)
HTN		22 (3.0%)	22 (1.8%)
Gynecological		12 (1.6%)	12 (1.0%)
Rheumatism	2(0.4 %)	34 (4.6%)	36 (3.0%)
Others	2(0.4. %)	80 (10.9%)	82 (6.8%)
	474 (100.0%)	736 (100.0%)	1210 (100.0%)

Household based morbidity statistical data showed that 129 (30.4%) of the respondents were visiting the health unit outpatient department (OPD) for various diagnosis and treatment reasons.

In contrary to the health center OPD report the household survey reported data showed that the female group 92 (71.3 %) were more ill than male ones.

The majority of the reported diseases (90.7%) were either directly or indirectly associated with the environmental health conditions. All respiratory tract infection 30 (26.24%), Fever of unknown origin 12 (9.30%), allergic, gastroenteritis 9(6.97%), heart

problem 7(5.42%) allergic 9 (6.97%), malaria 7(4.65%) and diarrhea (4.65)0were stated that the most prevailing complaints and reasons for health care visiting.

Table 8: Household visit to Health Center OPD two weeks prior to study period, Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Reported disease	Frequency N=129	Percent
Respiratory tract infection	30	26.24
Fever	12	9.30
Allergic	9	6.97
Gastroenteritis	9	6.97
Heart disease	7	5.42
Malaria	7	5.42
Diarrhoea	6	4.65
Fatigue	6	4.65
Accident	5	3.87
Mumps	5	3.87
Eye disease	4	3.10
Hepatitis	4	3.10
TB	4	3.10
Typhoid	4	3.10
Rheumatism	3	2.32
Kidney	3	2.32
Measles	3	2.32
ANC	2	1.55
Anaemia	2	1.55
Tonsillitis	2	1.55
Asthma	1	0.77
Typhus	1	0.77

4.9 Relation between the environmental health facilities and OPD visit

Same independent environmental sanitation service provision factors were checked to determine the household outpatient department visit to seek diagnosis and treatment. In this analysis water point accessible distance, having latrine and good personal hygiene practice were found to be significantly associated with the household outpatient department visit to seek diagnosis and treatment. However, there were no significant associations in the adequacy of shelter, water supply, and insect infestation (table 9).

Table 9: Relation between the environmental health service provisions and OPD visit

Kebribeyah Refugee camp; SNRS, Ethiopia, February 2010

Characteristic	Outpatient visit self reported		Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
	Yes	No		
Adequacy of shelter 100%				
Yes	41	80	1.24(0.79, 1.95)	1.10(0.67,1.80)
No	88	213	1.000	**1.00**
Adequate water supply 15 l/h/d				
No	116	273	1.00	1.00
Yes	13	20	0.65(0.35-1.44)	0.59(0.27,1.30)
Distance to water point				
Access able	111	186	1.00	1.00
In-access able	18	107	3.55(2.04,6.16	3.36(1.88,5.98)
Latrine coverage 100%				
No	45	74	1.00	1.00
Yes	84	219	1.59(1.01,2.48)	1.47(0.91,2.38)
Rodent & insect infestation				
No	35	99	1.00	1.00
Yes	94	194	1.37 (0.87,2.17)	1.23 (0.73,2.07)
performing critical time personal hygiene practice				
No	63	81	1.00	1.00
Yes	66	212	2.49(1.63,3.84)	2.50 (1.57,3.99)

There was a significant association between accessibility of water point and got illness and reported to outpatient department. Under, this circumstance those who were not residing within the recommended distance of water point were 3.55 times more likely to be exposed to disease and report to outpatient department visit when compared to those who were residing within the recommended distance, Crude Odds Ratio (COR) [3.55(2.04,6.16)]. Similarly, it was found that the interviewee who no sanitary latrine

were 0.63 times more likely to be ill and report to outpatient department visit when compared to those who had sanitary latrine, Crude Odds Ratio (COR), [1.59(1.01,2.48)]

Moreover analysis also revealed that those who had no good personal hygiene practice during the critical period were urged to get diagnosis and treatment. Thus household members who had not exercised good hygiene practice were 2.49 time more likely to be exposed to disease and report to outpatient department visit when compared to those who had good practice, Crude Odds Ratio (COR) [2.49(1.63,3.84)].

A multivariate analysis also have shown there is a significant association between distant to water point Crude Odds Ratio (COR), [3.36(1.88,5.98)] and performing critical time personal hygiene practices Crude Odds Ratio (COR), [2.50 (1.57,3.99)].

4.10 Key informants and observational findings

4.10.1 Environmental health program implementation

- Main Environmental health activities undertaken in the refuge program component were reported safe water supply, management of human excreta disposal and solid waste, hygiene education and environmental sanitation promotion. The majority except one reported that there was no environment related income generation activities.
- Most of the discussant has underlined the main environmental health problems in the refuge as water supply, vector & rodent infestation, in adequate shelter for supporting healthful living. Young ladies in the refugee and program provider talked that sanitary package kits were distributed bi-annually to young and adult women. The informants disclosed adolescents were fully accepted and utilized with no objection whereas a few adult women were not accepting hearty.
- Key informant has also said that overcrowding, poor quality of shelter, poor drainage, extreme of climate and weather environmental health situations were negatively excreted to the refugee health.

4.10.2 Insect and vector infestation

- No chemical spray techniques were employed in the camp vector and insect control program. One higher program coordinator has stated people might not honestly talk the presence of problem, but there is high infestation of arthropods including lice. Malaria is not a problem in the area and bed net distribution is not undertaken.

4.10.3 Environmental Health threats

- Intestinal parasite, Skin disease, GI and WD
- The health personnel reported that Respiratory tract infection, Intestinal parasite, Skin disease, gastroenteritis and watery diarrhoea were the most predominant disease.
- Flipcharts, notice board messages, posters, billboards and camp site environmental sanitation and hygiene promotion are the main health promotional Medias in the refugee.

- The community involvement in the management and maintenance of water source and latrine is very low.
- The refuge is access to adequate cooking utensils lidded water containers, soap and access to health facilities.

4.10.4 Water supply accessibility and adequacy

- There were 54 usable water taps. Most of the time water is available and not faced such urgency. The flow rate and yield of water at distribution point was 1minute and 50 seconds to fill 20 litres holding capacity jeri-cans. The refugee administrations very rarely used truck as transportation and distribution means during scares seasons.
- Discussant underlined the possible means that water to be contaminated at house hold level includes physical and biological related contaminations especially associated with the cleanness of container.
- All group and vulnerable segments of the population like elderly, disabled, and women have equitable access to water service.
- The water source is not at risk of microbiological and chemical/radiological contamination. A routine chlorination, electrolyte ionization (reduce hardness) and seasonal water quality assessment were carried out. There was possibility that water to be contaminating during storage and transport.
- Health program said that people have enough water containers of the right size and type. Plastic Jeri-cans of different size were utilized for water collection and transportation. This day's water is not a problem but the actual water utilization rate is low around 5.4 l/h/d.

4.10.5 Sanitary latrine availability and utilization

- Family based pit latrine and household shared communal pit latrines were abundant facilities. All are used and operating successfully but structurally the mass were not sufficient. Most were built from plastic sheet, sacks, thin sticks and a few were made from corrugated iron sheets. Open field defecation traditionally and culturally not acceptable. The camp program coordinator has reported that latrine promotion

would be maximally exercised. Corrugated iron sheets and slabs were distributed to those people who were volunteer to prepare the sub structure.

- Health personnel identified, unless a correction action taken this prevailing condition might be to become a threat to health .Beyond the critical time hand wash promotion trail, hand washing facilities after latrines visit was scarce. Paper and water were used for anal cleansing.
- No groups all gender disparity of access to latrine facilities, vulnerable groups like elderly, disabled, women; children have easy access to the facilities.
- A few people were trained and familiar to the latrine construction. The soil is permeable and it can be dug easily by hand.

4.10.6 Solid waste management

- Solid waste management and administration was not a problem. The refugee administration had prepared a communal disposal sites in each zones and sub sections.
- The generated and collected solid waste is disposed off both on and off sites. Commercial package material, festal, demolished shelter material, ash, cartoons, and plastic containers and crashed bottles were the common type of generated solid waste in the camp. However, the communal disposal pits in some sub section requires attentions.
- The solid waste disposal practice observed that a few household used open fields, some burn on the street and fill in to combusting pit the majority was disposing in the camp communal waste disposal pits.
- The medical facilities and activities are producing wastes and these wastes are disposed in the incinerator and disposal pits. The refuge administration and the health unit are responsible in the management of the health center waste.
- Natural slope drainage was devised for disposal of storm water. Diversion ditches were preparing to protect their shelters and latrines from local flooding. There was a lot of storm water surface runoff pool water around the camp. All of the pools were open and observed spoiled with gasoline, plastic and other floated solid waste materials.

5. Discussion

Age and sex are crucial factors in people's needs, options and choices across the life course and positions in society. In refugee situations, where the fabric of society has been altered dramatically, these demographic characteristics are of foremost relevance to identify the vulnerabilities as well as the development potentials of the people concerned. The similarity and departure of the respondent to different literature showed that in this study 67.5% were female refugee groups are typically made of 70% women and over 60% of respondents in other surveys were women. This entails that similarity that female refuge is outweighing to male refugee in Africa. Thus the median household size in this assessment is above Ghana and Kenya which is 6 people per household and the age of the respondent above 60 years are almost within the same African refuge ranges (3% to 5%) (23). The number of the respondent that reported the environment is conducive to health has gender variations. The female respondents 2 fold times found that the environment health provision is conducive to lead healthful life. But in contrary to it the female respondents were almost three fold times outweigh to visit the health service for different diagnosis and treatment. This might be implied that the female were more exposed to different contagious health threats, and this urges them to visit the health service.

Adequate shelter is relevant to protect people against the elements, allow them to live in a dignified manner and reduce the exposure to communicable diseases. The adequacy of shelter in sustaining a healthful life is major concern in refugee circumstances. Construction condition, surface area partitions of rooms for privacy, adequacy for all accommodation, light and ventilation conditions, window and egress and other features were the instant concern to establish the adequacy of the shelter. Therefore, taking this point in to consideration the adequacy of shelter in the study area is remarked as not adequate. This finding congruent to the UNHCR's report three quarters of the dwellings in Kenya and Bangladesh were not adequate (23). In contrary to this assessment similar

information stated shelters in Nepal and Thailand were adequate. Development is shown in Kenya and particularly in Uganda the share of dwellings considered adequate rose from 54 percent in 2004 to 93 percent in 2007 (23). This finding indicated a better shelter conditions were found than the Dadaab's refugees which faced a massive shortage in adequate shelter that most refugees were living in tiny makeshift shelters made of sticks and plastic sheeting.

In this household assessment as signified the dampness and mold situation is low but the availability of leakage is comparable in the previous research undertaking that detecting. This situation might lead the shelter area may not strongly support living and latter prone to the creation and source of aerosol contaminant and favor the breeding of vectors and other respiratory tract related infections. In order to ensure a healthy environment, it is particularly important to undertake regular operational and preventive maintenance in the shelter, neglecting this from the outset can have serious consequence on health.

Good abundance water helps to promote good environmental sanitation, hygiene and environmental sanitation promotion activities. Most of the findings in this assessment were related with the UNHCR water, sanitation and hygiene report that estimates that more than half the refugee camps in the world are not able to provide the recommended minimum daily water requirement of 20 liters per person. Under this estimation the average distance travel to main source of water and the litter per-head per day percentage coverage standards was lower than the finding on human development research that 100%, 99% and 100% Thailand, Bangladesh and Nepal refugee population who got the water point within 200 meters and of these 97%, 63% and 100% coverage of the respective countries meeting the UNHCR standards (23). Earlier research on UNHCR's Standards and indicators indicated that in the period 2003-2005 average per capita water availability for all refugee camps and the average percentage of population in camps meeting the 200 meters distance standard were varied between 72 and 86 percent (23, 28). Similarly the average water usage in Kebribeyhae Refuge community is very little when to compare to household based survey conducted in the six refugee camps in Asia and Africa remarkably 40 litters in Ghana, 39 litters to Thailand and 21 to Tanzania. The

supply of water is not fulfilling the absolute minimum survival quantity 7 litters/ person/day (23, 28).

However; the finding has a better indication than Uganda where 43% within the recommended distance and 2% coverage. The adult male involvement in the water collection tasks is also similarly low as the practice in to Ghana and Kenyan 11% and 6% respectively (23).

The great majority of the interviewee lives in the close proximity when to compare with Sphere project standards within 500 Mts. In remark to this the water point distance and the availability of quantity and the waiting time and the tap flow yield of for collection of water might not be a factor for under utilization.

Apparently there were good coverage of latrine but the structure condition and maintenance of the latrine is not satisfactory. In 2005 Average 83 % of these camps meeting UNHCR excreta disposal standards. Some 30 percent of camps do not have adequate waste disposal and latrine facilities. A global analysis of 2003-2005 Standared and Indicator data showed that a quarter of the camps had an insufficient number of latrines to accommodate the maximum of 20 people per latrine.

Sanitation access is very poor in the West African camp (11%) and much of the water supply is from unprotected sources. Hygiene is certainly better in the East African camp as higher proportions of respondents there had access to hygiene training and refuse disposal points were closer to houses.

Unhygienic conditions and insecure shelters cause an increase in arthropods and domestic rodents, and promote the spread of communicable diseases. These are considered medically important because they can cause annoyance, physical discomfort, or disease in humans. Flies, lice, and fleas are the main vectors and nuisance factors in newly−established refugee camps, whereas bugs, ticks, and domestic rodents do not usually become a problem until the camps have been operating for some time. In the camp the research conducted in showed similar characteristics the high infestation shall leads to generate deadly epidemics of communicable disease that associated with the

environment, particularly in communities weakened by psychological stress, fatigue, and lack of adequate and safe water supply and sanitary provisions and food (27).

Health status, however, is a complex issue, in which disease agents interact in various ways with food supply, water and sanitation, shelter, education, environmental factors and health services. Therefore, it requires a comprehensive approach, including the reliable measurement of impact indicators, such as morbidity and mortality estimates. Conditions such as in refugee camps bring people in overcrowded situations, opening the way to rapid transmission of infectious diseases, often aggravated by compounding factors of poverty, malnutrition and poor hygiene and sanitation. Administration for Refugee and Returnee Affair (ARRA) ensured that all refugees had access to basic health services and medications. There was no outbreak of diseases or any change in the incidence and prevalence of communicable diseases amongst the refugee in the camp. The daily flows of the patient to the outpatient department (OPD) were around 160 patients.

The foremost reported health problems are majorly associated with the environment. Based on the household interview report in the refugee camp respiratory tract infection allergic and fevers of unknown origin malaria and cardiovascular disease were the major cause of sickness, this finding is similar to that assessment conducted in Africa. Resembling to most refuge population, the major causes of morbidity in the study setting has similar situations. Moreover a health center a two weeks measured morbidity data disclosed that respiratory tract infections, diarrheal diseases, intestinal and parasitic infections, skin and eye diseases are the major prevalent causes for OPD morbidity. However, in most refugee camp malaria, acute, malnutrition and measles were highly reported, where as in this camp these disease are less prevalent. A previous evaluation survey conducted in the eastern part of refugee camp similarly had identified respiratory tract infection (31.8%) and Diarrhoeal diseases (27.3%) as major causes of morbidity, but in the present finding the prevalent percentage is lower than the report. Additional report on the diarrhea incidence in the East African camp 17% , 15% West African Regions and Kigamo Tanzania 11% which were marginally higher than the Kebribeyhae. Additional

Morbidity reports OPD Attendances morbidity statistics from Kigoma Refugee Camps also showed similar episode of lower respiratory tract infection, and watery diarrhea (28).
Most of them may result with poor environmental sanitation, shelter conditions, large family size and provisions of supplies and materials and the outdoor environmental pollutant (dust/particulate matter).

According to the UNHCR standard of 10,000 clients per health centre the ideal need of the health facility to population ratio is not met. 6,354 populations lack the desired service. It is evident that in the period 2004-2007 a significant gap existed between the standard of 10,000 clients per health centre and the actual situation in the field. In the above observation period it was only 47% the refugee camps reported that the target was met and at country level only Thailand, Uganda and Nepal – achieved the standard (23).

7. Strength and limitation

7.1 Strengths

- The findings of this study may serve as a baseline data to the good management policy and strategy formulation in the refugee setting of Ethiopia.
- It shall initiate to have similar research undertakings in refuge environment
- Study was conducted by combining both quantitative and qualitative methods

7.2 Limitations

- The cross-sectional nature of the study was difficult to establish actual insights of adequacy of the environmental health service provisions by the participants.
- The study area, Kebribeyhae, was purposively selected.
- Respondents may expose the study for social desirability and information bias.

8. Conclusion and Recommendations

8.1 Conclusion

- The overall objective of fostering environmental health program in the refugee is to make the whole circumstance wholesome to support health; minimize avoidable mortality and morbidity among refugee and to minimize the resulting impact on the local environment. Indicators across the water, sanitation and health sectors in refugee operations show how the quality of service or gaps in one sector has clear impacts on another. Failure in good environmental health endeavour shall have a serious impact on the overall refugee program administration.
- The collective values under discussed in this assessment indicated for shelter structure, construction condition and adequacy, water supply and sanitary latrine coverage, hygiene promotion and education, insect and vector control and the health service coverage did not meet the UNHCR and the Spheres project standards.
- The refuge environmental health program by virtue of its nature it is a crosscutting and invites a multi-joint and coordinated approach. The maximal solution for correction of the most serious environmental health circumstances, the refugee administration needs to integrate all the activities in the forth coming strategic plan and maximize the community participation and involvement.

8.2 Recommendations

1. UNHCR and ARRA and the regional Government should continue to boost water and sanitation projects in operations. This will include the

- rehabilitation and/or upgrading of existing water and sanitation facilities,
- Construction of additional water distribution points to reach in the standard accessibility and increase the utilization coverage and ensure sustainability is also another focus.
- It is also very crucial to prepare an emergency water reservoir to deal with different unforeseen shortcomings.

- An extensive preparation, repair and rehabilitation work, design preparation and construction of manageable storm and waste water disposal drainage are requiring.
- Preparation of communal prefabricated shower units

2. The existing family based pit latrines structurally are not appropriate. Therefore, rehabilitation, reconstruction and preparation of new ones with full sub and superstructure are recommended.
3. The area of the camp is too large (1880 hectares). But the described population at large are living in congested and inadequate shelter environment. This condition shall favour to the outbreak of communicable disease. Therefore as a public health preventive measure the camp shelter needs rehabilitation and rezoning as an urgent corrective measures.
4. The refuge administration should seek an appropriate and integrated system in the control of public health important vectors and insects.
5. The refuge program should give equal emphasis on hygiene and environmental sanitation education and promotion packages as other programs in the refugee.
6. Restructuring and reorganizing of the primary health care service provision according to UNHCR standard and the National Public Health strategy orientation health extension program package. Attention should be give to environmental health related health threats.
7. The successful implementation of such multi-faceted and complex relief, recovery and reconstruction activities should require strong coordination and cooperation amidst multiple stakeholders, including the refugee population, UN agencies, international and local NGOs, the Ethiopian government at large.

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Annex 1: Participant Information Sheet

Environmental Health Conditions & Associated Health Threats in Kebribeyhe Refugee Camp, Somali National Regional State, Ethiopia
Principal Investigator Feleke Kibret
Advisor Dr. Abera Kumie
Coordinating office: Addis Ababa university school of public health

Background: The United Nations has declared that access to safe water and sanitation is a human right that applies in times of peace and in emergencies. In emergency settings, people often leave their homes in search of safer surroundings. In many instances, the water, sanitation and hygiene conditions of new surroundings might not be adequate.

The Objective & significance of this research is to asses the hygiene practice, water and sanitation conditions and associated health threat for future better management of refuge health. This research undertaking is a post graduate Masters of Public Health partial fulfillment research thesis..

Procedure and Participation: The method of the research is a descriptive cross sectional observational study. The expected duration of the participant's contact with the interviewer will be not more than fifty minutes. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the proposed subject matter. Moreover, your particular participation is affirmed by the sampling frame through the procedure of probability sampling technique which provides equal chance of selection. You will be asked about your socio-demography, your hygiene practice, environmental health associated health threats, water collection, storage and handling practice; solid and liquid waste storage collection handling practice; rodent and vermin control; shelter structure and conditions.

Confidentiality: to establish secured safeguards of the confidentiality of research data, the PI will use codes during data collection period instead of using names. The original data will be locked in cabinets until the data analysis carryout and no person shall access except the PI and the advisor for data checking and cleaning purpose. The use of information for any purpose other than that to which participants consented is unethical to the participants. The information you provide is not disclosed in the way it identified your personal characteristics and privacy. After the research defense and final work is approved by the school of public health and academic commission and university senate, the original data questionnaire will be incinerated in secure manner.

Benefit: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and policy makers to have a policy consideration and direction and formulation of strategy and design of environmental health programs based on the recommendations and the findings. Moreover the research work will help as a base line data in the field. If any environmental health associated health threats are identified, the principal investigator will inform the refugee health coordinators to provide the necessary health care or mass interventions.

Risk: The proposed research does not have any inhumane treatment of research participants and no physical harm, social discrimination, psychological trauma and economic loss.

Inducement, incentive and Compensation: This study process has no any form of inducement, coercion and the study does not bring any risks that incur compensation.

Results Dissemination: The researcher is responsible for dissemination of findings moreover fully accountable to provide feedback to the refuge administration and to the policy makers. Maximum effort will be done to publish the finding in scientific reputable journal.

Freedom to withdraw: If you want to participant in the study, you have full right to with draw from the study any time you wish. This would have no effect at all on your health benefit or other administrative effect that you get from the refuge as routine moreover no body will enforce you to explain the reason of withdrawal.

Contact: The participant has the right to ask information that is not clear about the research context and content before and or during the research work. You can contact the principal investigator and his advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa university medical faculty IRB. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm.
If you want more information and check about this project you can contact the following people

Addis Ababa university medical faculty IRB secretary office Tel. 0115512876

Mr. Feleke Kibret Tel: 0911099063

Dr. Abera Kume 091882912

Annex II Informed consent form

Addis Ababa University

Faculty of medicine school of public health

Informed Consent Form

Title Environmental Health Conditions and Associated Health Threats in Somali regional State Eastern Refugee Camp; Kebribeyhe; Ethiopia.

I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU Medical Faculty School of Public Health and the designate principal investigator is Feleke Kibret. I have fully informed in the language I understand about the research project objectives that is to understand the environmental health conditions and associated health threats in refugee.

I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no any risk and no composition. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have acquainted no body will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the refuge.

I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact

Addis Ababa university medical faculty IRB secretary office Tel. 0115512876

Mr. Feleke Kibret Tel: 0911099063

Dr. Abera Kume 0911882912

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Name of the participant _____

Signature _____

Name of researcher _____

Signature _____

Name of witness signature_____

Date _____

Annex III Questionnaire on the Assessment of Environmental Health Condition and Associated Health Threats

Sr. No	Questions and filters	Coding categories	Answer code
I	**Household characteristics**		
101	Sex of the respondent	0= male 1=female	
102	Age of the respondent (indicate No.)		
103	Religion of the head household	0= orthodox 1= protestant 2= Muslim 3= catholic 4= pagan	
104	Marital status	0= single 1= Married 2= Divorced 3= Separated 4= Widowed	
105	Size of HH (indicate the number)		
106	Educational status	0= Illiterate 1= 1-6 2= 7-8 3=. 9-12 4= Certificate/Diploma 5=. Degree	
107	What is your presence daily/monthly income		
II	**SHELTER STRUCTURE & CONDITIONS**		
201	What is the shelter room meter square area measurement	0= 1-5 1= 6-10 3= 11-15 4= 16-20 5= 21-25	
202	How many persons share the unit shelter	Write the number of person	
203	Number of formal partitions of rooms in the shelter	0= 1 1=2 2=3 3= 4 5= No formal partitions	
204	Does the shelter have adequate natural light	0= Yes 1= No	
205	Do the rooms have adequate window and other egress for ventilation & light	0= Yes 1= No	
206	How is the condition of the shelter? (Observe)	0= Strongly built 1=Fairly built 2= Not satisfactorily built	
207	Is there a separate sleeping room for adolescent and adult member of opposite sex?	0= Yes 1=No	
208	What is the status of the house for living,	0= Adequate	

	cooking, dining, storage of family member's goods & personal belongings?	1= Moderate 2= Inadequate	
209	What natural and artificial illumination usually used	0= Electric supply 1= Kerosene lamp 2= Gas lamp/kuraze 3= Solar battery	
210	What type of kitchen does the house hold use?	0=Private kitchen 1= Open field in the yard 2= Shared Kitchen 3= No kitchen 4= Others	
211	What type of fuel do you usually use for cooking?	0= Biogas 1= charcoal 2= wood 3= Electricity 4= Kerosene 5= Others s	
212	Does the room have detectable dampness?	0= Yes 1= No	
213	Does the room have visualized mold?	0= Yes 1= No	
214	Does the room have visualized leakage?	0= Yes 1= No	
215	What kind of stove you are utilizing	0= Traditional open stoves 1= Improved mud stoves 2= Improved and prefabricated stoves.	
III	**Water Supply Source, adequacy Accessibility, Sustainability**		
301	Who often collect water?	0= children (< 15 years age) 1= women adult (> 15 years age) 2= men adult (> 15 years age) 3= all	
302	What material do you usually collect, transport and store water	0= Bucket 1= plastic jeerycan 2= pot 3= pail 4= barrel 5= other	
303	How do you usually transport water?	0= carried by human beings 1= carried on the back of animals 2= donkey cart/ wagon 3= others (specify)	
304	How long do you travel to fetch water Write the distance Mts ----------		
305	How much Litter of water do you use a day	0= 5 jarican lts. 1= 10 lts. jaricans. 2= 20 Lts jaricans. 3= 30 lts. jarican	
306	Do you spend money for water	0= Yes 1= No	
307	What is the condition of water storage at home (observe)	0= covered 1= uncovered	
308	What is the water collection practice from container	0= dipping 1= pouring 2= both	

309	Did you get health education any topic related to water handling practice	0= Yes 1= No	
310	Do you know diseases that are transmitted through contaminated water?	0= Diarrhoea 1= Intestinal parasites 2= Eye disease 3= malaria 4= skin disease 5= Bilharzias 6= I don't know 7= others specify 8= water has no any harm	
311	what are the sources of water contamination at home	0= unclean dipper 1= Uncovered container 2= unclean container 3= others	
IV	**Sanitary handling of excreta and spent Water Disposal**		
401	Do you have sanitary latrines	0= Yes 1= No	
402	How far is the latrine from the shelter (Mts.)	0= 5-14 1= 15-24 2= 25-34 3= 35- 4= 45^{+}	
403	what type of toilet facility do you utilize	0= private pit latrines 1= shared pit latrine 2= trench latrine 3= Communal VIPL 4= Others (specify)	
404	What is the structure condition & maintenance of the latrine (observe)	0= proper 1= improper	
405	If improperly maintained which part is need maintenance	0= Roof 1= Floor 2= Wall 3= Whole structure	
406	Do household members properly utilize the latrine	0= Yes 1= No	
407	Where do you usually dispose of your domestic spent water?	0= latrine 1= Seepage pit 2= Open ditch 3= Splash on the street 4= municipal sewerage	
V	**Solid Waste Storage Collection & Disposal Practice**		
501	What is the common solid wastes/refuse generated from your house? (probe)	0= Grass 1= Ash 2= Rubbish 3= Left over food 4= Animal residue 5= grass/vegetable /khate leave	
502	What practice do the HH use to onsite refuse collection for storage	0= manual collection 1= Mechanical 2= Both 3= no-onsite collection	
503	What material do you use for refuse bin for on	0= Metal/steel	

	site storage	1= Sack 2= Basket 3= Cartoon 4= Festal 5= No storage	
504	Where do you dispose the generated and collected waste	0= Open field 1= Burn on the street 2= Control tipping in the compound 3= Composting pit 4= Municipal disposal field 5= Incinerator	
VI	**Insect, Rodent & Vector Management**		
601	Is there a problem of rodents and arthropod infestation in your house	0= Flies 1= scorpion/ 2= spider/lice 3= bed bug 4 fleas 5= cockroaches 6= mosquito 7=termites 8= ticks 9= molascus 10=chigger fleas	
602	what do you think are the causes for the problem of rodents & arthropods infestation	0= poor home hygiene 1= Over crowdedness 2= crack wall 3= Dusty floor 4= Others specify	
603	Do you control vectors, rodents at home level?	0= Yes 1= No	
604	If yes what method do you use	0= Personal hygiene 1= Good house keeping 2= Mechanical (crashing/beating) 3= Insecticide 4= Biological 5= local herpes 6= Personal protective devices	
VII	**Personal Hygiene practice, hygiene education and promotion**		
701	Is there a relation between water, sanitation, shelter, vector and disease	0= Yes 1= No	
702	Do you wash your hands after visiting toilets	0= Yes 1= No	
703	Do you wash your hands after cleaning of children's bottom	0= Yes 1= No	
704	Does faces children transmit disease	0= Yes 1= No	
705	Do you wash your hands after collecting waste	0= Yes 1= No	
706	Do you wash your hands after sneezing	0= Yes 1= No	
707	Do you wash your hands after tedious work	0= Yes 1= No	
708	Do you wash your hands before and after eating	0= Yes 1= No	
709	What detergent you are using for hand washing?	0= Powder soap 1= bar soap 2= liquid/fluid 3= ash	

		4= sand 5= water only 6= others please specify	
710	Where do you usually take bath/shower?	0= family shower room 1= Public shower 2= Bucket and bowel in the shelter/kitchen 3= stream/lake/pond 4= Night time outside	
711	Do you usually use soap when you take bath?	0= Yes 1= No	
712	What basic hygiene practices that you undertake to keep your personal hygiene (probe)	0= taking bath regularly 1= washing hands 2= Washing legs/feet 3= cutting nail 4= Hair dress/cut 5= Tooth cleaning 6= washing & ironing of clothes	
713	Do you know disease/s that caused by poor personal hygiene? (probe)	0= Dermal disease 1= Skin disease 2= Eye disease 3= dental problem 4= Relapsing fever 5= Fungal disease 6= Diarrhoea 7= Don't know 8= Others specify	
714	What media you are accessing for health information	0= Radio 1= television 2= printing media 3= Local folk media 4= no access 5= Others (specify)	
VIII	**Environmental health threats and conduciveness of the environment**		
801	Did you go to the clinics/health center for treatment for the last two weeks	0= Yes 1= No	
802	What health problem you/family member do fill sick and/ or ill the last two weeks	Register it	
	Is the environmental health condition in this camp conducive to health?		
803	Access to adequate and safe water supply	0= Yes 1= No	
804	Clean and safe shelter immediate environment	0= Yes 1= No	
805	Adequate provision of personal hygiene keeping detergents and cleaning material	0= Yes 1= No	
806	Insect and vector free shelter	0= Yes 1= No	
807	Adequate provision of hygiene education and promotion services	0= Yes 1= No	

Annex- IV *Checklist for observational assessment of environmental health situation in Kebribeyhae refugee camp Somali regional state, Ethiopia*

N0	Question	Codes and choices	Response coding
I. GENERAL DESCRIPTION, WATER QUANTITY, ACCESSIBILITY, STORAGE AND QUALITY			
01	How much water is available per person per day,	0= 5 jarican lts. 1= 10 lts. jaricans. 2= 20 Lts jaricans. 3= 30 lts. jarican	
02	Do all groups (e.g. men, women, localities, castes, etc.) have equitable access to it?	0=yes 1= No	
03	How much water available at the sources check the yield at source and distribution point		
04	Is it enough for short term and long term needs?	0=yes 1= No	
05	Is the current water supply reliable? What may affect this (Seasonality)? How long will it last?	0=yes 1= No	
06	What are the water sources?		
07	Is the water source contaminated or at risk of contamination (microbiological and chemical/radiological)? If so, what are the contaminants?	0=yes 1= No	
08	Is treatment required? Is treatment possible? What type of treatment is necessary?	0=yes 1= No	
09	Is disinfection necessary, even if supply is not contaminated?	0=yes 1= No	
10	Is water contaminated while storage and transportation?	0=yes 1= No	
11	What means do people have to use water hygienically in this situation?	0= Clean container 1= Use clean dipper 2= Use clean hand 3= closed container	
12	How far are water collection points from where people live?	0= < 100 1= 101-500 2= 501-900 3= 901-1300 4= 1301+	
13	Are there any problems of accessibility for vulnerable segments of the population like elderly, disabled, women etc?	0=yes 1= No	
14	Are there any legal or other obstacles to using available supplies	0=yes 1= No	
15	Is it possible to tanker if water sources are inadequate? From where	0=yes 1= No	

16	What are people using to transport water?		
17	Do people have enough water containers of the right size and type?	0=yes 1= No	
18	Is there a possibility of contamination during storage and transport due to the containers currently in use?	0=yes 1= No	
II	**Excreta disposal, facilities, practice and technical aspects**		
19	Are there any type of sanitary facilities	0=yes 1= No	
20	are they used	0=yes 1= No	
21	are they sufficient	0=yes 1= No	
22	are they operating successfully	0=yes 1= No	
23	Can they be extended or adapted?	0=yes 1= No	
24	Can they be extended or adapted?	0=yes 1= No	
25	Do all groups have equitable access to these facilities	0=yes 1= No	
26	Minimum Standard – toilets no more than 50m from dwellings or no more than 1 minutes work).	0=yes 1= No	
27	Do vulnerable groups like elderly, disabled, women; children have easy access to the facilities?	0=yes 1= No	
28	Are the current defecation practices a threat to health?	0=yes 1= No	
29	What is the current level of awareness of public health risks	0=yes 1= No	
30	Is their hand washing facilities?	0=yes 1= No	
31	Is there sufficient space for defecation fields, pit latrines etc?	0=yes 1= No	
32	What are the current beliefs and traditions concerning excreta disposal especially regarding women's habits and attitude towards child excreta? What material/water is used for anal cleansing? Is it available?		
33	Are both men and women prepared to use defecation fields, communal latrines or family latrines?	0=yes 1= No	
34	Are there any people familiar with the construction of latrines?	0=yes 1= No	
35	How do women deal with menstruation? Are there materials or facilities they need for this?	0=yes 1= No	
36	What is the depth and permeability of the soil, and can it be dug easily by hand	0= sandy 1= rocky 2 = gravel 3= black earth	
37	What is the level of the groundwater table? (Minimum Standard – bottom of any latrine pit is > 1.5m above water table).	0= Low water table 1= High water table	
38	What local materials are available for constructing toilets?	0= Plastic sheet 1= Wood and chicka 2= Stone	

		3= Stick and lumber	
39	When does the seasonal rainfall occur?	0= Summer 1= Winter 2= Autumn 3= Spring	
III	**Solid waste generation, collection and disposal and problem**		
40	Is solid waste a problem?	0=yes 1= No	
41	What type and quantity of solid waste is produced?	0= Grass 1= Ash 2= Rubbish 3= Left over food 4= Animal residue 5= grass/vegetable /khate leave	
42	How do people dispose of their waste? What type and quantity of solid waste is produced?	0= Open field 1= Burn on the street 2= Control tipping in the compound 3= Composting pit 4= Municipal disposal field 5= Incinerator	
43	Can solid waste be disposed of on site, or does it need to be collected and disposed of off site?	0=On site 1= Off site	
44	Are there medical facilities and activities producing waste?	0=yes 1= No	
45	How is this being disposed of?	0=Burn in disposal pit 1= Buried 2= Incinerated 3= Open pit disposal 4= Municipal site	
46	Who is responsible?	0= The health unit 1= The municipality 2= The refugee admin. 3= NGO	
IV	**Wastewater disposal & drainage**		
47	Is there a drainage problem? (Flooding shelters and latrines, vector breeding sites, polluted water contaminating living areas or water supplies)	0=yes 1= No	
48	Are there any stagnant pools of standing water?	0=yes 1= No	
49	Do people have the means to protect their shelters and latrines from local flooding?	0=yes 1= No	
50	Is there enough slope/drainage for disposal of storm water?	0=yes 1= No	

Annex V Checklist for in-depth interview with key informants' in the assessment of environmental health situation in refugee camp

Sr. N0	Question	Codes and choices	Answer coding
1	What environmental health program is undertaken?	0= Disposal human excreta 1= waste water and 2= drainage 3= Solid waste 4= Dust and smoke control 5= insect and rodent control 6=Hygiene education and environmental sanitation promotion	
2	What chemical spray technique is utilized for insect control?	0= Residual 1= spraying 2= Larvaciding 3= Dusting 4= Space spraying 5= Impregnating	
3	Do you have any environmental health income generating activities	0= Yes 1= No	
4	What environmental conservation education and training program the organization is providing	0= Energy conservation 1= Conservation of trees and vegetables 2= Soil conservation 3= Water conservation 3= Environmental health 4= Sustainable shelters 5= Local laws and traditions	
5	What kinds of chemicals, pesticides formulation are utilized for insect/ rodent/vermin controls?	Aerosol Fumigants Residual Spray Dust Trapping	
6	What are the top cause of morbidity and mortality to children?	0= malaria, 1= ART 2= diarrhea dysentery, 3= TB, 4= Meningitis, 5= measles	
7	What are the possible water contaminants at household level	0= Physical 1= Chemical 2= Biological	
8	What are the water trucking/transporting means during scarcity time?	0= Truck 1= Barge 2= Pipeline 3= Animal back carts 4= collected from water venders others	
9	What environmental health situations are negatively excreted to the refugee health?	Overcrowding Poor quality of shelter Poor drainage	

		Polluted water Inadequate sanitation Presence of vector borne disease Extreme of climate and weather	
10	What health related behaviors are contributing to the heath risks faced by the refugee?	0= Yes 1= No	
11	2.6.2 What are the current practices on the key hygiene behaviors like?	0= Yes 1= No	
12	Washing hands after defecation.	0= Yes 1= No	
13	Method of disposal of children's feces.	0= Yes 1= No	
14	Practices for storage and handling of water	0= Yes 1= No	
15	Practices of storage and handling of food.	0= Yes 1= No	
16	How communities dispose their solid waste?	0= Open field 1= Burn on the street 2= Control tipping 3= Composting pit 4= Municipal disposal field 5= Incinerator	
17	Is there an understanding of the relationship between? Water/sanitation/shelter /vectors and disease?	0= Yes 1= No	
18	Dose the refugee access to lidded water containers	0= Yes 1= No	
19	Dose the refugee access to has access to cooking utensils	0= Yes 1= No	
20	Dose the refugee access to mosquito nets	0= Yes 1= No	
21	Dose the refugee access to soap	0= Yes 1= No	
22	Dose the refugee access to Bed sheets blankets	0= Yes 1= No	
23	Dose the refugee access to sanitary protection	0= Yes 1= No	
24	Dose the refugee access to Bathing facilities	0= Yes 1= No	
25	Do the refugee linked with water and sanitation and /or health services?	0= Yes 1= No	
26	Are the users involved in the management and maintenance of water sources and latrines?	0= Yes 1= No	
27	What is the most environmental health associated prevailing problems?	1= Water supply 2= Food hygiene 3= deficient 4= Rampant vector & rodent 5= Shelter 6= Indoor air pollution	
28	What health promotion media are available / accessible to the refugee?	0= Radio, 1= posters / 2= leaflets, 3= local folk media 4= other	

Annex VI Foomka

Foomka heshiiska ka qayb galayaasha daraasadka

Daraasadla baadhis lagu sameeyo xaaladaha caafimaadka iyo dhibaatooyinka kale la waa faqsan caafimaadka, ee aaga, xeeroooyinka ay qaxootiga degan yihiin

Daraasadka waa mid ku saleeysan shuurudaha, logy abaarayo , barnaamijka waxbarashada, digriga labaad, lagu qalin jebin karayo taaso, xawshan lagu fulinayo taageerada, buuxda ay bixinayan isbaxaysiga, jamaacada Adis Ababa iyo fakaalitiga dhakhtarka, iyo waxbarashada caafimaadka bulshada hadaba amigo, ka warhaya , arrintana sare ku xusan la igu war galiyey, waxaan xaqiiqdii ogaaday, in daraasadkan hadafkiisu ku saleeysan yahay si baadhis xaqiiqo raadis laga sameeyo xaaladaha ilaalinta caafimaadka iyo dhibaatooyinka caafimaaddarida lacicdhida ee ka jira xerooyinka ay waxoontiga degan yihiin dhaxdooda waxaa kalo aan agaaday ka qayb galida daraasadka akhbaar biisxa uus heelida ku xidhan tahay rabitan awgeed kaliya.

Hadaba waxaan caddeynay faa'iidadaan si toos ah ama koox ahan, magdhab lacageed aan ka heelayo ka qeyb qadashada daraasadkan haba yeraate in si cad la u sheegay , waxaa kalo intaas dhoer in sir ahan lagu haynayo warbixin kasta aan ka dhibto daraasadkan.

Balse, faahmay in aan jirin dhaado caafimaad daro ka dilaci kara daraasadkan wixii la xidhida taaso waliba xuquuq ahaan, la u sugayo rabitan kayga ka dhiito warbxin kuna taagera u sii, iyo ka jawaab celinta sii halaha aanan raben ka qaabsada xiliga aanka qayb qaadanayo daraasadkam, islamarkaana awoodi karo markasta in kaqeyb qadashadayada, jobjinteeda.

Sidaas awgeed, waxaa kalo faahansan ahay markasto aan ficiladan layimada adeegyada laga aheelo xerada qaxootiga.

Guud ahaan , waxaan xaquuqa ueeyahay in aan weydisan karo arrimaha aan, faahmi wayey daraasadka la xidhida xilika horay uus gudo galida ururinta warbixinta ama xiliga, geedi socodkiisa lagu jiro amigo adeegsanaya ciwaanadan:-

- Ato Felaqe Kebrad Tel. No 0911099063
- Dr Abera Qume Tel. No 0911882912

Boordiga eeimeeynta anshaxa shaqada ee cilmi baadhista waaxda (Fakulitiga) khasuska dhakhtarka ee Kaamaca Adis Ababa kala xidhidi karo teleefoonka 011-5-512870

Ka qeyb galida daraasadka aan akhriyey ama la u akhriyey islamarkaana wixii aan faahansanayn su'aal ahan soo feediyey, jawaab buuxda oo an qanac ah, ka heelay markii looqadayda awgeed , la ugu garaad sirey jugudanbeeyn.

Waxaan sixeexayga ku caddeynaya in aan raali uga ahay, ka qeyb galida daraasadka, siaan, iskayga, iyo rabitaankayaga uu fursadyeesho, warbixin igu filan

- Saxeexa ka qeybgalaha _____
- Wuriyaha warbixinta (isuduha) saxeexisa _____
- Saxeexa maraga_____

Declaration

I the undersigned declare that this thesis is my original work, has never been presented in this or any other university, and that all resources and materials used herein, have been duly acknowledge

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

Name : Abera Kumie (MD,MSc,PhD)
Signature _____