



## Environmental health situation analysis in Bisate Health Center

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### Abstract

*The poor status of health is related to various issues such as malnutrition resulting from bad nutritional practices, inadequate number of healthcare facilities, the prevalence of unhealthy lifestyles, low educational levels and limited access to safe water, poor sanitation and the lack of preventive public health intervention. Despite all the progress reported world-wide in recent decades, more than 2.3 billion people still live without access to sanitation facilities and are unable to practice such basic hygiene as washing their hands with soap and water. In 1998, 2.2 million people died because of diarrheal diseases, of which the vast majority were children. Improvement of hygiene and sanitation must go hand in hand with hygiene behaviour change. Access to sanitation facilities is a fundamental right that safeguards health and human dignity. The main causes of morbidity and mortality in Rwanda are mainly communicable or environmental-related diseases which are preventable through hygiene and behaviors change. With regard to prevention and control of nosocomial infection in health facilities, regular water supply, soap for hand washing, disinfectants, adequate equipment and appropriate healthcare waste disposal facilities must always be available. This environmental health situation analysis has revealed the reality on the ground regarding the environmental and public health situation in the health center catchment area. The challenges observed with regard to public and environmental health, arising from inadequate toilets and the presence of flies appear to be observed across the zone of radiation for the health center as a whole.*

**Keywords:** Hygiene and sanitation.

### Introduction

**Description of Bisate Health Center:** Bisate Health Center is located in Musanze District; Kinigi Sector. It started to work in 1973 and worked as a dispensary. Its target population is 17714 persons living in 4415 households. Its catchment area covers 5 cells: Kaguhu, Kabazungu, Bisoke, Nyabigoma and Mugari. It is located in the rural area at the border of Rwanda and Congo. It is located in volcanic region hence it takes the characteristics of a cold climate and this becomes its chance of not frequenting diseases of hot climates. However, it has the problem of water shortage. The main activities in Bisate Health Center's population are agriculture, commerce and tourism.

**General background:** The poor status of health is related to various issues such as malnutrition resulting from unavailability of food, high food prices, and bad nutrition practices, inadequate number of healthcare facilities, the prevalence of unhealthy lifestyles, low educational levels and limited access to safe water, poor sanitation and the lack of preventive public health interventions<sup>1</sup>.

Despite all the progress reported world-wide in recent decades, more than 2.3 billion people still live without access to sanitation facilities and are unable to practice such basic hygiene as washing their hands with soap and water. In 1998, 2.2 million people died because of diarrheal diseases, of which the vast majority were children<sup>1</sup>.

Study done in Nepal has demonstrated a significant reduction in neonatal mortality due to maternal and birth attendant hand washing<sup>2</sup>. Another study showed that using safe water can help in reducing Diarrhea at 15%, promoting health conditions can do at 35% but washing hands using safe water and soap reduce Diarrhea at 47%<sup>3</sup>.

Improvement of hygiene and sanitation must go hand in hand with hygiene behavior change. Access to sanitation facilities is a fundamental right that safeguards health and human dignity. Providing such facilities at schools not only helps to meet that right, it also provides the most favorable setting to encourage behavior change in the school and in the community<sup>4</sup>. A survey conducted by UNICEF in 2002, showed that 70% of schools in Rwanda are not supplied with safe water and have inadequate hygiene and sanitation. Improving school sanitation and hygiene and the development of life skills is an essential investment both in the short and long term for future generations of school children and in their families<sup>5</sup>.

Water and sanitation facilities are recognized as fundamental for hygienic behavior and children's well-being, in practice, the sanitary conditions in most schools are woefully inadequate. Water supply, sanitation and hand washing facilities are either non-existing, or too few or water systems and toilets. Lack of facilities is only part of the problem<sup>6</sup>.

Schools are most important places of learning environment for children and stimulate or initiate change. If sanitary facilities in

schools are available, they can act as a model, and teachers can function as role models. Schools can also influence communities through outreach activities, since through their students; schools are in touch with a large proportion of the households in a community<sup>5</sup>.

**Water supply:** Water supply is essential for life, health and human dignity. In extreme situation there may not be sufficient water available to meet basic needs, and supplying survival level of safe drinking water is of critical importance. In most cases, the main health problems are caused by poor hygiene due to insufficient water and by the consumption of contaminated water<sup>7</sup>.

According to Mr. Arnold said that, a good clean water supply and adequate sanitation system are considered to be the most important factors in ensuring good health in a community. Improved water supply and sanitation systems were major elements of the public health measures that drastically cut death rates and improved health levels in the industrialized countries. Though it is not generally appreciated, these measures have been considerably more important than curative medicine in contributing to good health, long life expectancy and low infant mortality. Infant diarrhea, the largest killer in developing countries, is closely related to poor water quality<sup>8</sup>.

**Drinking water:** A child needs to drink 2-4 liters a day to sustain these levels or they become dehydrated. This is serious because without water, none of the essential body functions can take place<sup>9</sup>.

Drinking-water should be provided at clearly marked point, separately from water provided for hand washing and other purposes, even if it is from the same supply<sup>10</sup>.

**Health problem caused by intestinal worm infections:** Worm infections are one of the major health problems confronting millions of school-aged children. These parasites consume nutrients from the children they infect, thus aggravating malnutrition and retarding physical development. They also destroy the tissues and organs in which they live. They cause abdominal pain, diarrhea, intestinal obstruction, anemia, ulcers and various other health problems. These ailments can impair learning and slow cognitive development, ultimately resulting in poor school performances of a child<sup>11</sup>.

**Statement:** The Ministry of health is committed to put in place adequate measures to insure hygiene and sanitation in health facilities, public places and in households. However the hygiene in Rwandan population is still a major problem for health development. It is in this background concern that, the Ministry of Health has made hygiene and sanitation a priority.

## Methodology

The overall objective of this survey is to assess the hygiene practice in the arena covered by Bisate Health Center. It aims to

improve the quality of hygiene and sanitation, protect and reduce exposure to hygiene related diseases and malnutrition for the purpose of building a healthy community in a health environment.

**Specific objective:** The objectives of the survey are: i. To collect data on the practice of hygiene in households and in public places, ii. To evaluate the practice of Kitchen garden as a nutritional practice indicator and to evaluate diseases frequent in the community. iii. To evaluate the level of nosocomial infection prevention at Health Center level.

**Rational:** The situation analysis will serve as basic information identifying challenges and areas that need improvements.

**Methodology:** The sample size was 366 households selected from 4415 households, 1 center from two main centers (Bisate center and Bingaro center) both from Bisate Health Center catchment area and the Health Center construction site and services were surveyed.

The Sample size was calculated using the Cochran formula  $n = \frac{N}{1+N(e^2)}$  where N: is the study population, n: is the sample size, 1: equals the desired confidence level. E.g., 95% and e: is the desired level of precision sometimes called sampling error (e.g., ±5 percent)<sup>12</sup>.

$$N = \frac{3824}{1+3824(0.05^2)} = 363.$$

A purposive quantitative and qualitative survey was used for the purpose of delivering the message related to the surveyed parameters for the community. The household, Public and observational questionnaire was used in households, Public places and at the Health center respectively. Both questionnaires were developed according to the principal guidelines of hygiene. Data was collected by the surveyor himself. The sample size was taken from both 5 cells and 29 villages which compose the Health Center in order to obtain the adequate representation of both cells and villages. A random sampling of households was used. All predicted household to be surveyed was completed. Depending on the time that was predicted to be used in delivering the associated message, each village was designed to be completed within one day. The researcher calculated the average number of households to be taken in each village and was equal to 13 households. So the survey was carried out in 400 households. Data were processed using SPSS.

**Problems and limitation:** Major challenges were encountered in collecting reliable data (secondary data collection: readings) and in obtaining relevant and up-to-date information for an environmental health situation analysis. As a result, the assessment may not cover all the components for a comprehensive situation analysis.

**The message of hygiene:** Hygiene and sanitation encloses the hygiene of toilets, hygiene of water, hygiene of food, hygiene of

hand, the hygiene of body, the hygiene of bed and clothes, the hygiene of roads, the hygiene of play grounds and all other thing which can help human to prevent poor hygiene related diseases.

The study showed that using safe water can help in reducing Diarrhea at 15%, promoting health conditions can do at 35% but washing hand using safe water and soap reduce Diarrhea at 47%<sup>3</sup>. Another study done in Nepal has demonstrated a significant reduction in neonatal mortality due to maternal and birth attendant hand washing<sup>2</sup>. This important finding could be significant in accelerating countries' attempts to reach the Millennium Development Goals to reduce the under-5 children by two-thirds by 2015. About 4 million newborns die every year in low and middle-income countries. A third of these deaths are due to infections. Current evidence suggests that low cost, high-impact infection prevention and management interventions could reduce the death rate significantly. Hand washing has been demonstrated to reduce the risk of gastrointestinal infections, pneumonia and nosocomial infections among children under-5<sup>13</sup>. Studies have shown that proper hand-washing with soap or ash can reduce the incidence of diarrhea disease by 42-47%. However, lack of access to both piped water supply and soap, is a barrier to hand washing. "Tip Taps" are simple and economical hand washing stations, made with commonly available materials and not dependent on a piped water supply<sup>3</sup>.

In our country Rwanda, approximately 80% of diseases in Rwanda population are preventable through hygiene promotion practice. 21% of children mortality is due to Diarrhea and other poor hygiene related diseases like typhoid fever, cholera and intestinal worms such as Tania, Amoebiasis, and schistosomiasis etc. Others poor hygiene or poor environmental management related diseases are: malaria, infectious hepatitis, tuberculosis, trachoma, oral diseases, respiratory diseases and skin diseases like skin lesion etc. Those are the causes of poor health conditions and death for both children and adults and also the obstacle of the sustainable development. Although this problem happens, some practices are to be emphasized so that we can prevent this burden including personal hygiene and hand washing with potable water and soap, to have and properly use toilet, hygiene of drinking water, hygiene of drinks and foods, hygiene of materials using in cooking, eating and drinking, hygiene of workstations and to seek medical treatment at time<sup>14</sup>.

The Rwanda health survey conducted in 2008 showed that, 90% of all cause of consultation in rural health facilities are preventable and constitute the burden of 10 top leading causes of morbidity and mortality. The same survey was conducted in schools revealed that 66% of students were infected by intestinal worms, among them 44% were infected by Amoebiasis. Some of the causes of this burden are lack and inadequate hygiene of toilets, lack of appropriate sewerage, waste water and solid waste management and also the lack of culture of hand washing using safe water and soap. It is in that background that, behavioral change in hygiene practice should

be focal in all activities involving water and sanitation. Basing on different studies conducted, it is clear that hand washing can help in reducing the top leading morbidity and mortality in under five children like pneumonia which is at the peak in our country.

The role of hand washing is to clean hand by removing dirty from all parts of hand. Steps of hand washing are the following: the first one is to use water only, the 2<sup>nd</sup> to use soap, the 3<sup>th</sup> is to use water for the purpose of removing soap, the 4<sup>th</sup> is to use soap again, the 5<sup>th</sup> is to use water for removing soap, then allow hand to dry by putting them in downward position.

**Consequences of poor hand washing practices and the general public Health concerns of intestinal worms:** In all the daily activities of the day you accumulate germs on your hands from a variety of sources, such as direct contact with people (e.g. greeting), contaminated surfaces, foods, even animals and animal waste. If you don't wash your hands frequently enough, you can infect yourself with these germs by touching your eyes, nose or mouth. And you can spread these germs to others by touching them or by touching surfaces that they also touch.

Soil-transmitted helminths and bacteria are the most considered pollutant contents. Soil-transmitted helminths (STH) infections are endemic in communities where poor environmental sanitation and poor personal hygiene are prevalent, as occurs in the majority of developing countries. Yonli et al. showed that environmental pollution, sanitary condition and human behavior play an important role in the transmission of STH infection<sup>15</sup>.

Soil-Transmitted Helminths (STH) are endemic in Rwanda with points of infections of schistosomiasis mainly caused by *Schistosoma mansoni*, around the Lake Kivu, and Lake Burera, Ruhondo, and Muhazi and Mimuri swamp<sup>16</sup>. From a study conducted by TRAC Plus in collaboration with ACCESS Project, 65.8% of schoolchildren are infected with STHs, and 2.7% of intestinal schistosomiasis<sup>16</sup>.

The common STH are *Ascaris*, *Ankylostoma*, *Schistosoma*, *Trichocephale*, *Taenia* and schistosomiasis. The route of infection for soil-transmitted helminths begins with eggs in human faeces containing the soil. People are infected when they ingest the eggs from unwashed food or hands, or-in the case of hookworms, which penetrate the skin-from walking barefoot or any other direct contact with infested soil. Children are likely to be infected from the time they begin to crawl-and will be continually re-infected for the rest of their lives.

Examples of pollutants that may be excreted in faeces (can be transmitted through water and improper sanitation)<sup>17</sup> i.e examples and symptoms they cause:

**Bacteria pollutants:** *Aeromonas* spp: Enteritis; *Campylobacter jejuni / coli*: Diarrhea, cramping, abdominal pain, fever, nausea, and joint pain; *Escherichia coli*: Enteritis; *Plesiomonas*

shigeloides: Enteritis; Salmonella typhi / paratyphi: Fever-headache, malaise, anorexia, slow pulse, enlarged spleen, cough; Salmonella spp: Diarrhea, fever, abdominal cramping; Shigella spp: dysentery (bloody diarrhea), Vomiting, cramps, fever; Vibrio cholera: cholera-watery diarrhea, lethal if severe and untreated; Yersinia spp: Fever, abdominal pain, diarrhea, rash and joint pain<sup>17</sup>.

**Virus pollutants:** Enteric adenovirus 40 and 41: Enteritis; Astrovirus: Enteritis; Calicivirus: Enteritis; Coxsackievirus: Enteritis, respiratory illness and viral meningitis; Echovirus: Aseptic meningitis, encephalitis, often asymptomatic; Enterovirus types 68-78: meningitis, encephalitis and paralysis; Hepatitis A; fever, malaise, anorexia, nausea, abdominal discomfort, jaundice; Poliovirus: often asymptomatic, fever, nausea, vomiting, headache, paralysis; Rotavirus: Enteritis<sup>17</sup>.

**Parasitic protozoa:** Cryptosporidium parvum/hominis: watery diarrhea, abdominal cramps, and pain; Cyclospora cayetanensis: Often asymptomatic, diarrhea, abdominal pain; Entamoeba histolytica: Often asymptomatic, fever, dysentery, abdominal discomfort, chills; Giardia intestinalis: Diarrhea, abdominal cramps, malaise, weight loss<sup>17</sup>.

**Helminth:** Ascaris lumbricoides: generally no or few symptoms, wheezing, coughing, fever, enteritis, pulmonary eosinophilia; Teniasolium/saginata; Trichuris trichiura: unapparent though vague digestive tract, distress to emaciation with dry skin and diarrhea; Hookworm: Itch, rash, cough, anaemia, protein deficiency; Shistosomiasis spp.

The cited examples of pollutants that may be excreted in faeces was listed in the research conducted by Schonning and Ottosson<sup>17</sup>.

Examples of infection risk associated with consumption of crops fertilized with urine: Campylobacter jejuni, cryptosporidium parvum and Rotavirus. Those pollutants are risky when urine are use without being stored until a period of 6 months i.e when stored less than 6 months or simply not stored. So we should wait that period of six months to minimize risks associated with that kind of fertilizers<sup>18</sup>.

The assessment will focus on the following environmental health components: hygiene, water supply, human waste disposal, solid waste management, vector and vermin control, food hygiene, institutional hygiene, water pollution and occupational hygiene.

## Results and discussion

**Situation at the health center: Situation of waste management in the Health Center:** On this topic the survey observed the separation of waste and the presence of disinfectant in services where required. The study focused in services where separation of waste is very mandatory essential

such as in dressing ward, in maternity ward, in laboratory ward, in Voluntary Treatment and Canceling (VCT) and in Prevention for Mother to Child Transmission (PMTCT) ward.

The surveyor would like to congratulate the services in which the checked points were organized as required. Only VCT and PMTCT were successful for the study. Another point to congratulate is the presence of disinfectant in services wards where obliged or necessary. The garden was managed and no medical waste scatted in the Health Center.

Nevertheless some services separate waste as it is included in medical waste management guidelines, there still problem in waste separation for some services. The following are the errors obtained in services rooms as they are detailed below.

In dressing ward, they mix the combustible part of the needle (its cover) with the needle both in safety box. In laboratory ward, the noticed problem is to combine the needle cover, the needle itself and the used alcohol pad in the same container. In maternity ward, the problem is to mix combustible waste (caouchouc) with receptacle and also mixing the needle with their cover in the same container. Even though in the services room above, there is a general problem of mixing wastes, the issue is not at high level, it seems as forgetting to put each type of waste in its appropriate place. But for medical career, a small error equal to the loss of life for many people so it cannot be tolerated. There should be a recall for waste separation to overcome the observed wrong situation. Also there is an issue of bad smell in some services wards. We needle to apply all possible mechanism to prevent either the source or the issue itself.

Bisate Health Center has 17 toilets including 6 pit latrines, 9mobile toilet and 2 VIP toilets. Clients were not mobilized to bring basins and hygiene for personal hygiene and toilet hygiene respectively when hospitalized. It also had equipped with incinerator from August 2013. The approximate dimensions of that incinerator are: two chambers have 1.5m height, 0.5 width, 1.5m length and the other has 1.5m height, 1m width, 1.5m length. Bisate Health Center has 31 bed including 29 beds for client hospitalization and 2 for night clients surveillance nurses.

Liquid waste is well managed but the big problem here is that in maternity ward they are chained but not toward a specific hole, we need to dig and construct a specific hole for covering that issue. Also in some toilet, bad smell is still smells but a correction is required.

**Water availability:** Water is a basic and essential need for all health facilities. Although the Health Center is well and sufficiently equipped for maximum rain water harvesting to insure permanent water supply in the Health Center, water is among the major problem followed by energy resources (electricity). When the rainfall is rare and in dry season, the Health Center experience the problem of water shortage and the

community neighboring the Health Center as well. This issue drives the community to the extent of cutting the pipe bringing water from Bisoke volcano to support rain water in order to fulfill their need of water. So a sustainable solution for this problem is required and be prioritized as possible.

The lack of fence for Health Center results in accessibility of the population to the Health Center for the reason of fetching water from the Health Center. Nearly, a sustainable solution of this problem of water was obtained by bringing water from EWSA. The only remaining challenge is the intermittence of safe water in services which happen sometimes because the machine which filters water use solar power energy (electricity) and most of the time the weather is cloudy depending of the season. This hinders the functioning of the machine.

According to Emory University through Access project the quality of water at the health center when the filter system was operational between March and October 2013 was as follow:

**Table-1:** The quality of water at the health center when the filter system was operational.

48 samples collected		
Water quality indicator (WHO guideline)	Number of samples meeting WHO standard	Percentage of samples meeting WHO standard
E. Coli coliforms (0 coliforms per 100ml)	41	85%
Total coliforms (0 coliforms per 100ml)	35	73%
Free Chlorine residual ( $\geq 0.2\text{mg/L}$ )	0	0%

The presence of coliforms may be due to the water sources which are Diane Fossey from volcano where water is contaminated by defecation of gorillas and contaminant from unsafely cleaned containers use in transporting and storing water to be used in case of shortage.

By concluding the topic, the overview of Environmental health situation at the Health Center is not bad at all even though there are some difficulties to conclude a qualitative situation. The shape and the combined visual impact of the Health Center is amazing as it was congratulated before however the issues said above and the iron sheets of some roofs which are rusted come as obstruction.

Final: The main causes of morbidity and mortality in Rwanda are mainly communicable or environmental-related diseases, which are preventable through hygiene and behavior change. With regard to prevention and control of nosocomial infections in health facilities; regular water supply, soap for hand washing. Disinfectants, adequate equipment and appropriate healthcare waste disposal facilities must always be available.

**Situation in centers:** The Table-2 show that 46.2% had the cleaned store of either the pubs' or the restaurants' products whereas 53.8% had not cleaned store. This means that the community needs to be mobilized and monitored about the hygiene of the store of the product that serves the public for consumption.

**Table-2:** The state of cleanliness in store.

Answers	Frequency	Percentage (%)
Yes	6	46.2
No	7	53.8

**Table-3:** The state of general hygiene in refreshment room for pubs and eating room for restaurants.

Answers	Frequency	Percent(%)
Yes	5	38.5
No	8	61.5

The Table-3 show 38.5% of the visited places had cleaned the eating or refreshment rooms against 61.5% which was not cleaned. Means that, most of the visited public places showed poor hygiene conditions. Here the surveyor considered the visual impact or the physical appearance of the place.

**Table-4:** The presence of hand washing facilities.

Answers	Frequency	Percent(%)
No	13	100

The Table-4 show that all the visited places any of them presented hand washing facility. The community is exposed to poor hygiene diseases. This is to be prioritized and emphasized during the education because studies showed that hand washing using safe water and soap reduce Diarrhea at 47%<sup>3</sup>.

**Table-5:** The state of hygiene in kitchen.

Answers	Frequency	Percent(%)
Yes	5	38.5
No	8	61.5

The Table-5 show that 61.5% of kitchens were not swept and 38.5% were swept. In general, any kitchen had at least the minimum hygiene standard for kitchen. All were eligible to be closed if the visit were intended to punish more than to educate. Those kitchens were not paved, had stagnant water used during dishes washing inside and others had the floor of disorganized stones which also had stagnant water on their soil. Those that were swept did not have the floor of stones.

**Table-6:** The presence of toilet.

Answers	Frequency	Percent(%)
Yes	6	46.2
No	7	53.8

Table-6 show that 53.8% of the inspected services did not present toilets against 46.2% which had toilets. This does not mean that all those 53.8% had not the toilet at all, but some of them had toilets that they own together with others, so that toilet was considered to one of those many owners.

**Table-7:** The cleanness of materials washing places.

Answers	Frequency	Percent(%)
No	13	100

Table-7 show that all the visited services had inappropriate material washing places i.e. not paved and does not insure hygiene conditions. The places had stagnant sewages from kitchen and this play a significant role growing bacteria which are the source of many diseases.

**Table-8:** Presence of sufficient water.

Answers	Frequency	Percent(%)
No	13	100

The Table-8 show that all the surveyed places did not have enough water to be used in their daily services that can serve without concern even in case of water shortage of one day. The state of sufficiency in water was measured in proportion with the client that a service can receive per day.

**Table-9:** The state of hygiene in walls of store and refreshment places.

Answers	Frequency	Percent (%)
Yes	5	38.5
No	8	61.5

The Table-9 show that 61.5% of walls of the visited stores and refreshment places were dirty otherwise need to be repainted whereas 38.5% were cleaned.

**Table-10:** The neatness of the floor of the store and the refreshment places.

Answers	Frequency	Percent(%)
Yes	10	76.9
No	3	23.1

Table-10 show that 76.9% floor of the visited store and refreshment places were cleaned with water or swept against 23.1% which was dirty.

**Table-11:** Possession of urinals.

Answers	Frequency	Percent(%)
Yes	2	15.4
No	11	84.6

Table-11 show that for the visited places only 15.4% possessed urinals and 84.6% had not urinals. This problem creates a consequence of urinating elsewhere around the pubs and it result in the possible transmission of different diseases linking to live in the place where people urinate like schistosomiasis and also bad smell in the surrounding environment.

**Table-12:** Presence of safe water to drink for clients.

Answers	Frequency	Percent(%)
No	9	69.2
Not required	4	30.8

Table-12 show that in all the visited places (69.2%) that drinking water is compulsory did not present safe water for drinking. Here the surveyor checked if they have a specific cleaned container containing water to serve clients. For the visited places 30.8% were pubs without any food preparation where drinking water is not compulsory.

**Table-13:** Use of brochettes more than one time.

Answers	Frequency	Percent (%)
No	9	69.2
Not required	4	30.8

The Table-13 indicate that 69.2% of the surveyed services use brochettes (woods used to prepare meat on a stove) more than one time, 30.8% did not prepare any items related to meat. The use of brochettes more than one time can lead to the transmission of thermo- tolerant bacteria from different persons touched on it as they like items containing proteins including meats.

**Table-14:** Use of plastic plates in serving clients.

Answers	Frequency	Percent(%)
Yes	4	30.8
No	5	38.5
Not Required	4	30.8

The Table-14 establish that 55.6% did not use plastic plates in serving clients and 44.4% use them whereas 30.8% were services which do not have any service relating to the use of plates i.e. pubs only. Normally the hygiene of plastic plates is not easy to insure; this cause poor hygiene from oils which remain on corners of the plates to grow bacteria liking to feed on oil.

**Table-15:** Mixture of the store with inappropriate things.

Answers	Frequency	Percent (%)
Yes	7	53.8
No	6	46.2

Table-15 demonstrate that 53.8% stores of the surveyed places mix items that are not allowed to be mixed for example bread and eggs mixed on the same shelf; eggs are proteins and fats containing foods which are likely to carry contaminants which can be transmitted to breads, 46.2% did not mix the store with inappropriate items during the survey time.

**Table-16:** Aeration in kitchen

Answers	Frequency	Percent(%)
Yes	5	38.5
No	4	30.8
Not Required	4	30.8

Table-16 show that 38.5% of the surveyed services possessed aerated kitchen, 30.8% had insufficient aeration and 30.8% were services which do not use kitchen. The lack of aeration in kitchen results in discomfort conditions and poor hygiene condition from the smoke.

**Table-17:** Use of common straw.

Answers	Frequency	Percent(%)
No	8	61.5
Not Required	5	38.5

Table-17 indicate that for all visited places (100% means 61.5% of the total surveyed: 13 places) any use common straws for clients except 5 services equal to 38.5% which do not have either soft or hard drinks which can involve the use of straws. This is a good indicator of the results of the sensitization about communicable diseases which can be transmitted through sharing on the common straw.

**Table-18:** Hygiene of tables and benches.

Answers	Frequency	Percent (%)
Yes	10	76.9
No	3	23.1

Table-18 show that 23.1% of the visited services had dirty tables and benches against 76.9% which try to clean tables and benches. Although 76.9% of tables and benches were cleaned their hygiene is not sufficiently maintained, there need to be covered by a hygienic rubber in order to facilitate the cleaning. For any services which presented either the cleaned tables or benches; having one among the two said above deemed it to be classified as dirty because the parameter considered both at the same time.

**Table-19:** Hygiene of the ceiling.

Answers	Frequency	Percent(%)
Yes	8	61.5
No	5	38.5

Table-19 indicate that 61.5% of the visited places possessed a neat ceiling against 38.5% which had a dirty roof. The hygiene of the roof is a concern because once not neat it affects the visual impact of the place and also this can be a hide of vectors including spiders, wasps and vermin like rodents or rats which affect public health in different ways.

**Situation in households:** The Table-20 represent that only 11.8% of the asked households reported that they always wash their hand with safe water and soap against 88.2% who wash hand with water only and sometimes eat without washing hand because they use spoons or forks during eating. This a bad habit because the community are leaving even the traditional habit of washing hand before and after eating using at least safe water when soap is not available. So the health education is a priority in the process of behavioral change because the population tends to almost forget the habit of hand washing as it is indicated by the above figures.

**Table-20:** Hand washing with safe water and soap.

Answers	Frequency	Percent (%)
Yes	47	11.8
No	353	88.2

**Table-21:** Presence of compost for waste management in households.

Answers	Frequency	Percent (%)
Yes	189	47.2
No	211	52.8

The Table-21 shows that 52.8% do not have compost i.e they do not have the way of household waste management. Only 47.2% presented compost even though that compost did not comply

with the requirements. Almost of the saw compost was a hole of one chamber and not constructed as it is required instead of made of two chambers and constructed. Poor waste management at households level indicated that there are favor conditions for breeding and growing of either vectors and microorganisms nuisance to human health. By using compost we are sure that there is a control of poor waste management related risks because when waste are collected together any related health risk can be abated by simple means and in less time by cutting of the source.

**Table-22:** The presence of washed dishes dry facility.

Answers	Frequency	Percent (%)
Yes	95	23.8
No	305	76.2

The Table-22 indicates that 76.2% of the surveyed households do not disinfect kitchen materials on sun. Only 23.8% of households presented the facility for drying by sun even though they may be not using them. We are expected that the community disinfect kitchen materials on sun in order to minimize food poisoning related problems such as shigellosis, salmonella and staphylococcus related illness.

**Table-23:** The presence of the Kitchen garden (Akarimak' igikoni).

Answers	Frequency	Percent (%)
Yes	178	44.5
No	222	55.5

The Table-23 represent that all 55.5% of the visited households had no Kitchen garden over 44.5% which had it. Although 44.5% showed hot bellies, most of them were not productive i.e there is a big task of teaching the community the way of cultivating a productive Kitchen garden. As Rwandese always use energy yielding food because where they do not mainly cultivate maize and Irish potatoes they cultivate potatoes and cassava. So this indicates that it is important to mobilize the community to use vegetables on their food because they are rich in proteins and vitamins which are missing on the daily food of most ordinary people.

**Table-24:** Presence of container for safe water for drinking.

Answers	Frequency	Percent (%)
Yes	242	60.5
No	158	39.5

The Table-24 indicates that 60.5% of the surveyed households presented containers for safe water to drink against 39.5% who

did not show it. Even though they may be presented those container but they put untreated water, for sure there is a better understanding on safe water management although some presented insufficiently cleaned containers but they had them. A notice here is that water may be highly acidic means that it contains P<sup>H</sup> above the recommended by World Health Organization 6.5-8.5.

The p<sup>H</sup> affects the treatment performance especially if the treatment is done by Chlorine. In addition, Cysts of *Giardia lamblia* and *Entamoeba histolytica* are not killed by chlorine used to treat water which some patient who come at Bisate Health Center are diagnosed even it is not at high level. So in our region Chlorine based treatment is not appreciable. We can emphasize the boiling method. Combining the results of all the above tables, for sure the community is on high risk of falling ill at any little circumstance which can slow the immunity. The only possible and less expensive way to reduce those risks is to improve the situation in the above six tables.

**Table-25:** The cleanliness of the house surrounding.

Answers	Frequency	Percent (%)
Yes	376	94
No	24	6

The Table-25 show that almost of the visited households had a neat surrounding at the level of 94%. The only challenge here is how they manage those removed waste (lack of compost).

**Table-26:** The neatness of the children and of their clothes.

Answers	Frequency	Percent (%)
Yes	250	84.2
No	47	15.8

The Table-26 show that 15.8% of the children saw in the surveyed households had poor hygiene either of the body or clothes. 106 of the surveyed households did not have children means children were observed in 297 households out of 400 surveyed. A comment here is that mothers are developing the habit of not shave (remove hair) for their children. Because when the hair of a child is not removed, it has bad look if no changing color products are applied on that hair. Those mothers are using "Kanta: hair blackish product" which is prohibited for children because it affect the brain development for a child as it is for a non- well lactated child during the first thousand days (1000 days) of the development.

So awareness on the regard of this issue is required; if they prefer hair they should use any product for a child or simply remove hair as it is in our culture.



**Table-27:** Presence of clothes dry facility.

Answers	Frequency	Percent(%)
Yes	302	75.5
No	98	24.5

The Table-27 represent that 24.5% of the surveyed households did not have clothes dry facilities either the appropriate fence which can serve the purpose or the rope.

This is an indicator of poor hygiene of clothes because lack of clothes dry facility is an indirect meaning of difficultly wash clothes nonetheless soap can also act as a barrier. It has been a challenge to conclude the clothes 'hygiene of an adult because they always involved dirty producing activities such as carrying fertilizers producing drops. In general those kinds of clothes are always washed when we go to wash clothes that we wear or dress when we went in public.

**Table-28:** Illness that happen in family.

Answers	Frequency	Percent (%)
IVRS	105	26.2
Worms	207	51.8
Others	88	22

The Table-28 show that the most frequent disease in community is intestinal worms (51.8%) followed by Upper respiratory tract infection (IVRS) and other not listed disease. The cause of the difference between this report and the report of the Health Center is that the community responded that they don't always go to the Health Facility when they suffer from intestinal worms; they go in beds and wait a self-cure. This figure means that there is a big problem of poor hygiene related diseases in our community. So a reinforcement of poor hygiene related health education is an eminent requirement.

**Table-29:** Possession of a toilet.

Answers	Frequency	Percent (%)
Constructed	55	13.8
Not constructed	307	76.8
No toilet	38	9.5

The Table-29 show that 13.8% had a toilet satisfying the minimum conditions of a good toilet, 76.8% had inappropriate wall with no cover roof for water proof other ways they dag a pit only whereas 9.5% had any (no toilets).

**Table-30:** Presence of flies in households.

Answers	Frequency	Percent(%)
Yes	302	75.5
No	98	24.5

The Table-30 show that 75.5% in visited households were flies and in 24.5% were no flies. By the researcher's observation; they may be due to waste from maize and the remaining waste after eating maize because flies breed on a decayed sugar contained waste. To solve this problem, people should be mobilized to have and use compost so that in case of this disease vectors (flies) they may cover the compost with a small layer of land in order to cut off or reduce the breeding cites.

**Table-31:** Presence of anus cleaning in toilet.

Answers	Frequency	Percent (%)
Yes	17	4.2
No	383	95.8

The Table-31 shows that 95.8% of the surveyed community had any anus cleaning facilities in their toilets. This is an issue because a person may go in toilet without holding anus cleaning facility and arrange him/herself either in peaceful way violent way i.e by destroy the surrounding or dirtying the wall if present. Furthermore, there is a high risk of carrying diseases from faeces from the improper cleaning of the anus because any toilet presented the means of hand washing facility after using it. Still on this issue of hand washing facility, the community fears the bad habit of being poisoned through water that they put in tip taps that they experienced when they were mobilized to use it.

**Table-32:** Have heard about hygiene club in their village or elsewhere.

Answers	Frequency	Percent (%)
Yes	14	3.5
No	386	96.5

The Table-32 represent that 96.5% of the surveyed households didn't heard any about Community Health Club or Hygiene Club (CHC) in either their village or elsewhere. Only 3.5% had heard about it. Those 3.5% are from only Rurembo village because in the days nearest the survey, I was installed and officially open it. I profit this occasion to explore some of the main issue that has been shown when I visited the club. They was not sufficiently trained because they was trained only two day for a big book of photos that need interpretations, some of the trained persons abandoned the club, the lack of documents

to note the attendance, low number of men i.e it dominated by women, etc. As appreciation the club had 60 members within one month they started working. An assistance and creation of others in the remaining villages is required as it have been shown that they help in behavioral change in community where they effectively work.

## Conclusion

This environmental health situation analysis has revealed the reality on the ground regarding the environmental and public health situation in the health center catchment area. The challenges observed with regard to public and environmental health, arising from inadequate toilets and the presence of flies appear to be observed across the zone of radiation for the Health Center as a whole. The cause of the use of inadequate toilet (i.e. not constructed with roof) is ignorance (not value it: low level of understanding) and flies are from maize waste remain after eating grains (the solid remaining). In particular, mixing biodegradable solid waste from households and excreta in toilets for Nyarusizi and Myase villages remain a challenge for intestinal worm prevention because they use the mixture immediately after the toilet is full as fertilizer without waiting for 8-9 months recommended for being used. In addition some people construct the dishes drying facility nearer the toilet and house for domestic animals (caw-house), this is prohibited.

There is a critical need for all villages to initiate the use of appropriate toilets, compost, Dishes dry facility and how to make a Kitchen garden (i.e mixing fertilizer with soil on equal level) and its relative positive change. Because of the seasonal flies the community may be advised to use Dishes dry facilities when flies are not present in order to prevent contamination from flies. This will serve as a second line alternative for the issue of flies if to collect those waste attracting flies and covered with a small layer of land failed. This action will be allowed in flies favoring season. The community is concerned about tip tap because they experienced the problem of poisoning water in those tip tap and the fly for dish drying facility. The utmost solution for flies is to have dish drying facility and use it when flies are not more or people should be mobilized to have and use compost so that in case of this disease vectors (flies) they may cover the compost with a small layer of land in order to cut off or reduce the breeding cite. This survey report is a tool that will serve to draft the environmental health situation analysis which will form the basis for the development of a health center environmental health strategy and the local leaders as well.

**Recommendations:** Given that public health problems in the zone is mainly infectious diseases due to poor sanitation, there is an urgent need for immediate and effective interventions to scale up, contain and control some of the health problems. A holistic approach should be adopted to bring about effective use and practices of the surveyed parameters to reduce the impact of poor hygiene related diseases and malnutrition. A partnership between the Health Center and the local leader is highly

required. The Health Center together with local leaders will play a role in community mobilizations on issues related health risks towards the improvements. Then local leaders will play a great role in coordination and follow up of the implementation.

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