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ASSESSMENT OF FOOD HYGIENE AND SAFETY IN BASIC SCHOOLS IN KHARTOUM STATE, SUDAN

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ABSTRACT

The study aimed to assess food hygiene and safety condition in basic-schools, to determine the personnel hygiene of food handlers and to investigate about the sanitary condition of food premises. The study design was a descriptive cross-sectional and experimental study, where 409 schools were randomly selected (out of 2335 schools) as a sample size distributed to boys, girls and Mixed from rural and urban areas and governmental and private schools.

Data were collected using structured questionnaires, interviews with schools headmasters, observation checklist, focus group discussions with pupils were carried out.

Data were processed using the Statistical Package for Social Science (SPSS) version 16. and windows excel 2016, chi-square test and p- values were used to test associations and significance respectively.

The study pointed out that (61.4%) of food handlers in food premises had No medical examination cards, the study demonstrated the existence of vendors (sellers) around the school in (49.5%) of schools and they were selling unsafe very contaminated food placed directly on the ground.

The correlation between the Personal hygiene of food handlers and food handlers having health cards was not significantly ($p > 0.05$) which was affected handled food.

The study showed that 22.5% of schools did not have health education program regarding food handling, the study revealed that the relationship between pupil's behavior and existence of health education program was not statistically significant $p > 0.05$, which reflected health education program not concerning with food handling.

The study recommended to conduct continuous inspection and monitoring of food premises in schools to rectify the limitations, and activate the role of the teachers and students to take care about the food premises facilities.

KEY WORDS: *Food safety, Food vendor, Food handling.*

INTRODUCTION

Food safety is an essential public health issue for all countries. Foodborne diseases due to microbial pathogens, biotoxins and chemical contaminants in food represent serious threats to health of thousands of millions of people (FAO, 2008).

It is important to be aware that food-borne illness is always a possibility when food is served in schools. Failure to safely prepare or store food may cause bacteria in food to multiply and could result in a food-borne illness if the food is consumed. The symptoms of food-borne illness can include nausea, vomiting and/or diarrhea and can result in serious health concerns.

Ensure that everyone involved with food preparation, serving, or storage of food has training in safe food handling. Remember frequent hand washing is one of the best ways to prevent the spread of food-borne illness.

Everyone needs a healthy diet, but for children it is especially important.

Eating healthily improves the short-term health of children, allows them to grow and develop properly, and helps to avoid chronic disease later in life. It can also help improve children's concentration, achievement and behavior.

Health and nutrition are an important part of the national curriculum. There is increasing recognition of the importance of healthy eating to public health and children must be educated so they can make informed healthy eating choices now and in the future. Sadly, the lessons of the classroom and the meals provided in school often carry contradictory messages.

FOOD STORAGE AND PREPARATION

Food for school children and staff is stored and prepared so as to minimize the risk of diseases transmission.

Indicators:

Food handling and preparation is done with utmost cleanliness.

Contact between raw foodstuffs and cooked food is avoided.

Food is cooked thoroughly.

Food is kept at safe temperatures.

Safe water and raw ingredients are used.

Guidance notes food handlers:

Food handlers must wash their hands after using the toilet and whenever they start work, change tasks, or return after an interruption. Soap and water should be available at all times during food preparation and handling, to ensure that hand washing can be done conveniently.

Food handlers should be trained in basic food safety.

Kitchen staff and carers with colds, influenza, diarrhoea, vomiting and throat and skin infections) or

who have suffered from diarrhoea and vomiting within the last 48 hours, should not handle food unless it is packaged. All infections should be reported and sick staff should not be penalised for this.

Eating utensils should be washed immediately after each use with hot water and detergent, and air dried. The sooner utensils are cleaned; the easier they are to wash. Drying cloths should not be used, as they can spread contamination.

Food-preparation premises should be kept meticulously clean. Surfaces used for food preparation should be washed with detergent and safe water and then rinsed, or wiped with a clean cloth that is frequently washed. Scraps of food should be disposed of rapidly, as they are potential reservoirs for bacteria and can attract insects and rodents. Refuse should be kept in covered bins and disposed of quickly and safely. (M. Adams, 1999)

Food should be protected from insects, rodents and other animals, which frequently carry pathogenic organisms and are a potential source of contamination of food. Separate equipment and utensils such as knives and cutting boards should be used for handling raw foods or they should be washed and sanitized in between use.

Food should be stored in containers to avoid contact between raw and prepared foods. It is particularly important to separate raw meat, poultry and seafood from other foods.

All parts of foods cooked must reach 70 °C to kill dangerous microorganisms. To ensure this, soups and stews should be brought to boiling, and meat should be heated until juices are clear, not pink.

Cooked food must be reheated thoroughly to steaming hot all the way through.

Cooked food to be served should be kept hot (more than 60°C) prior to serving.

Cooked food and perishable food should not be left at room temperature for more than 2 hours, and should be prepared or supplied fresh each day. All food should be kept covered to protect it from flies and dust.

Only safe water should be used for food preparation, hand washing and cleaning.

Fruit and vegetables should be washed with safe water. If there is any doubt about the cleanliness of raw fruit and vegetables, they should be peeled or cooked just before serving.

Non-perishable foods should be stored safely in a closed, dry, well-ventilated store and protected from rodents and insects. They should not be stored in the same room as pesticides, disinfectants or any other toxic chemicals. Containers that have previously held toxic chemicals should not be used for storing foodstuffs.

Bought food should not be used beyond its expiry date. (M. Adams, 1999)

In many situations, schoolchildren bring food from home to school with them. In these cases, the school hygiene committee or equivalent should seek ways with the families of the schoolchildren to ensure that food is prepared hygienically and that they avoid foods that carry a high risk if stored at ambient temperature.

Food sold to children by street vendors or in cafés may be unsafe. School authorities should seek local solutions to protect schoolchildren from disease from this source. Measures may include discouraging children from buying from such vendors, prohibiting vendors from selling food near schools or encouraging and monitoring improvements in vendors' food hygiene. (M. Adams, 1999)

Food borne diseases:

Food is essential both for growth and for the maintenance of life. It supplies the energy and materials required to build and replace tissues, to carry out work and to maintain the body's defences against disease. Food can also be responsible for ill-health.

Failure to consume enough of the right kind of food will impede growth and impair health. For example, protein-energy malnutrition can lead to a range of clinical manifestations. These vary from marasmus, where consumption of protein, dietary energy and other nutrients are chronically reduced, to kwashiorkor (sometimes thought to be associated with an overreliance on low protein staples) which results in a quantitative and qualitative deficiency of protein.

Even when a diet provides enough protein and energy, it may not supply sufficient essential minerals or vitamins and may thus give rise to characteristic deficiency disorders.

Illness can also result from what a food contains rather than from what it lacks.

Some hazards of this kind are described as being intrinsic to the food in the sense that they are normal and natural constituents of the food. Many common food plants, for instance, contain toxic compounds designed to deter predators or invading microorganisms. Their intake is inevitably higher in those people with a largely vegetarian diet. However, in most cases where the food supply is generally varied and plentiful.

Biological hazards:

The overriding importance of microorganisms in foodborne illness has already been mentioned. Here we briefly introduce the different types of organism responsible and then consider some general features associated with the transmission of microbial foodborne illnesses, particularly those caused by bacteria.

Parasites: These include protozoa and helminths (worms). Though considerably larger and more complex than other organisms conventionally classified as microorganisms, such as bacteria and

viruses, it is often convenient to consider parasites under the same heading. Parasites can cause a variety of illnesses ranging from diarrhoea to liver cancer. Infection with diarrhoeagenic protozoa such as *Giardia lamblia* and *Entamoeba histolytica* is normally the result of faecal contamination of a food or water source and direct person-to-person spread can occur. These protozoa can be killed by thorough cooking. Other protozoa such as *Toxoplasma gondii* and *Sarcocystis hominis* can infect the tissues of meat animals and be transmitted by undercooked meat. (M. Adams, 1999)

OBJECTIVES

- To assess the condition of food hygiene in schools.
- To determine the personnel hygiene of food handlers.
- To investigate about the sanitary condition of food premises.

MATERIAL AND METHODS

Study design and setting:

This cross sectional, descriptive study was conducted in Khartoum, Sudan at governmental and private basics schools.

Sampling Methods:

The total number of the basics schools in Khartoum is 2334 with the 862,180 pupils. The randomly selected schools were 400 schools. Then selected schools were distributed proportionally over the total localities based on the types, 271 governmental schools, and 129 private schools.

Sample size and sampling techniques:

Determination of sample size:

The sample size was calculated by using the formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n= Sample size

N= Total schools

e² = Level of precision = 0.05

$n = \frac{2334}{1+2334(0.0025)}$ = 400 schools

Based on the formula, the total number of schools that were selected for the study was 400 schools.

Data Collection:

The data was collected by using a structured questionnaire designed in close-ended questions, and it was divided to four sections, section one general information data of the schools, section two headmasters of schools, section three regarding research problem data and four for pupils behavior.

Data analysis

The collected data were statistically analyzed by using (SPSS), version 16. and chi-square test was carried out with 95% confidence level to find

associations between the different variables. P-values less than 0.05 were considered statistically significant

the results were presented in tables and graphs.

RESULTS AND DISCUSSION

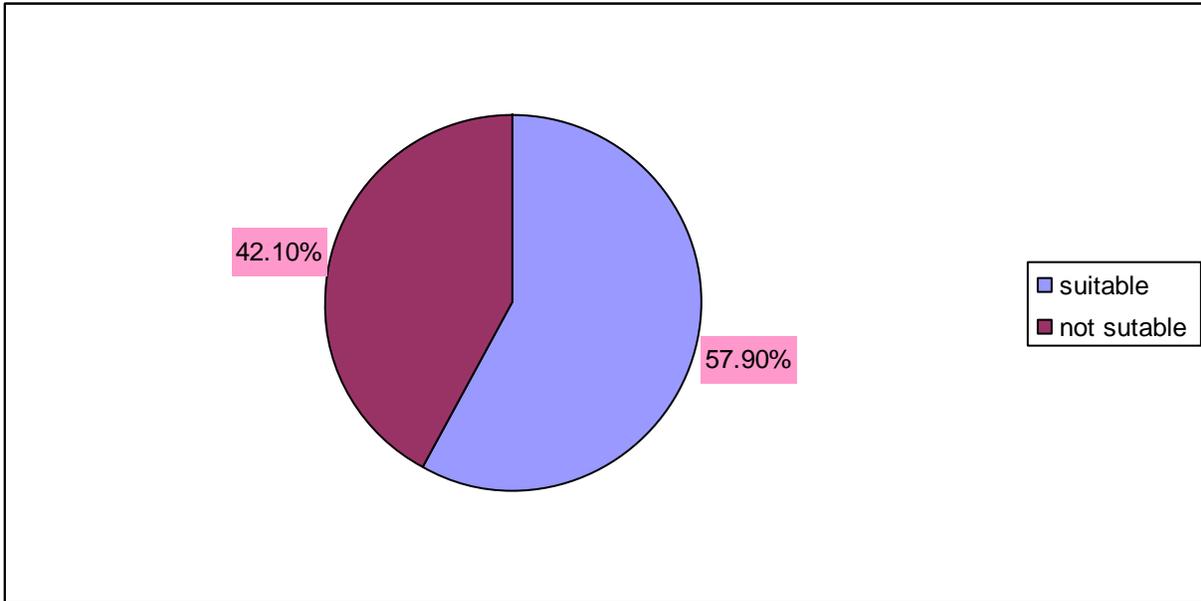


Figure (1): The Area of food premises in the basic schools, Khartoum state, 2018.

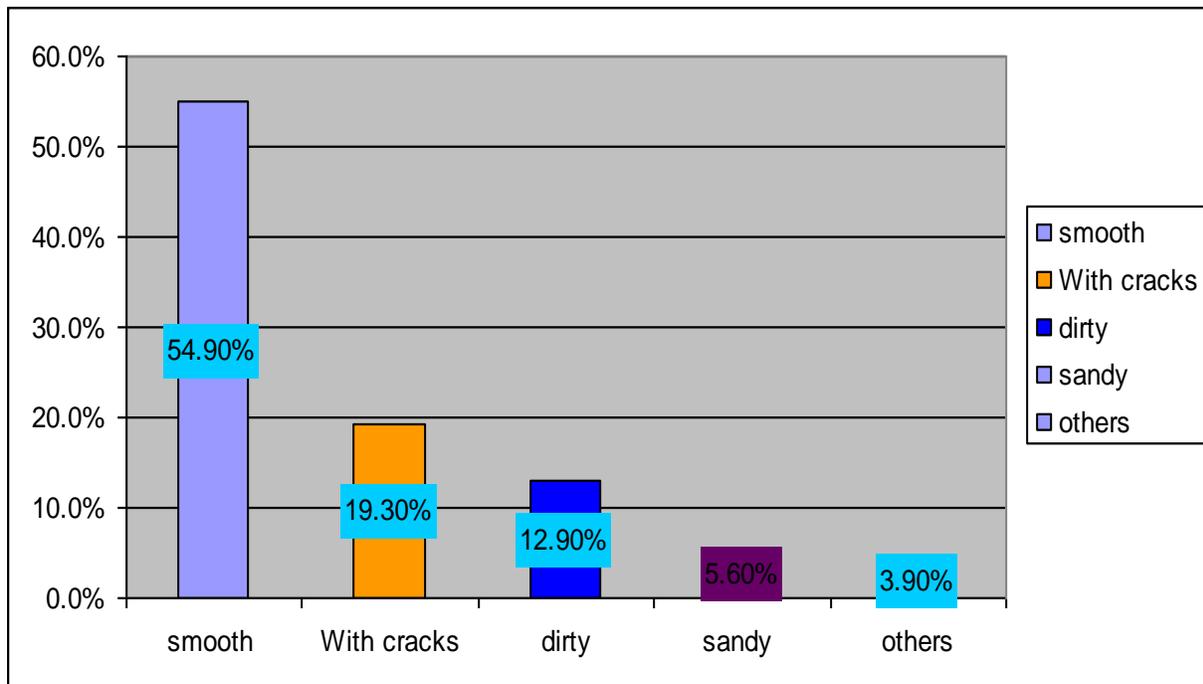


Figure (2): The floor condition of the food premises in the basic schools, Khartoum state, 2018.

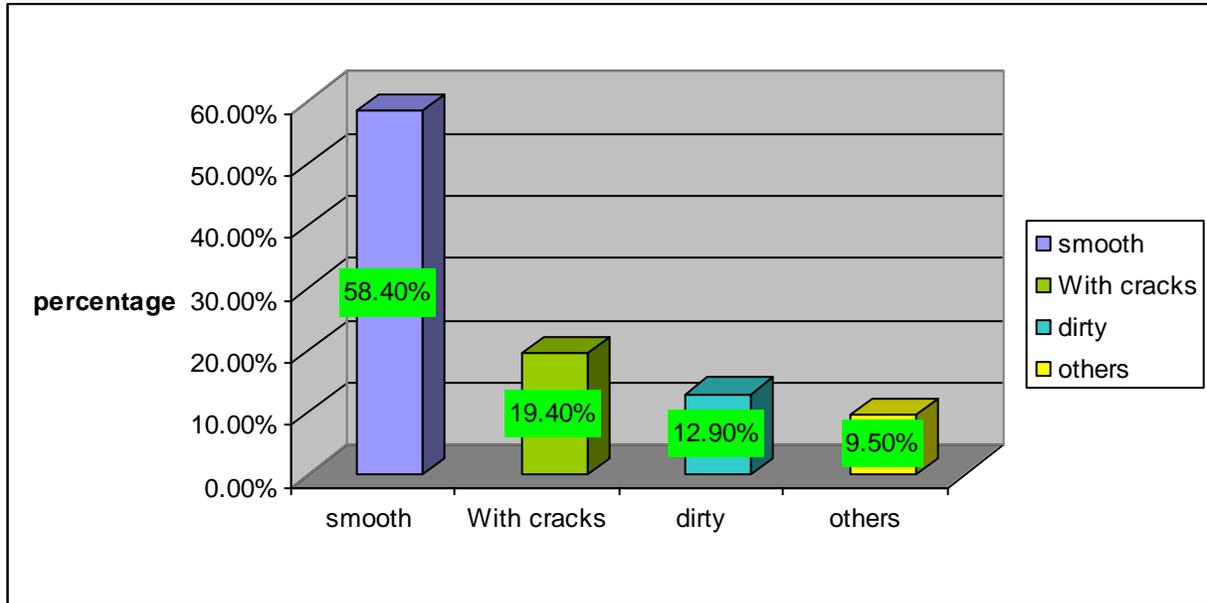


Figure (3): The Walls condition of food premises in basic schools, Khartoum State, 2018.

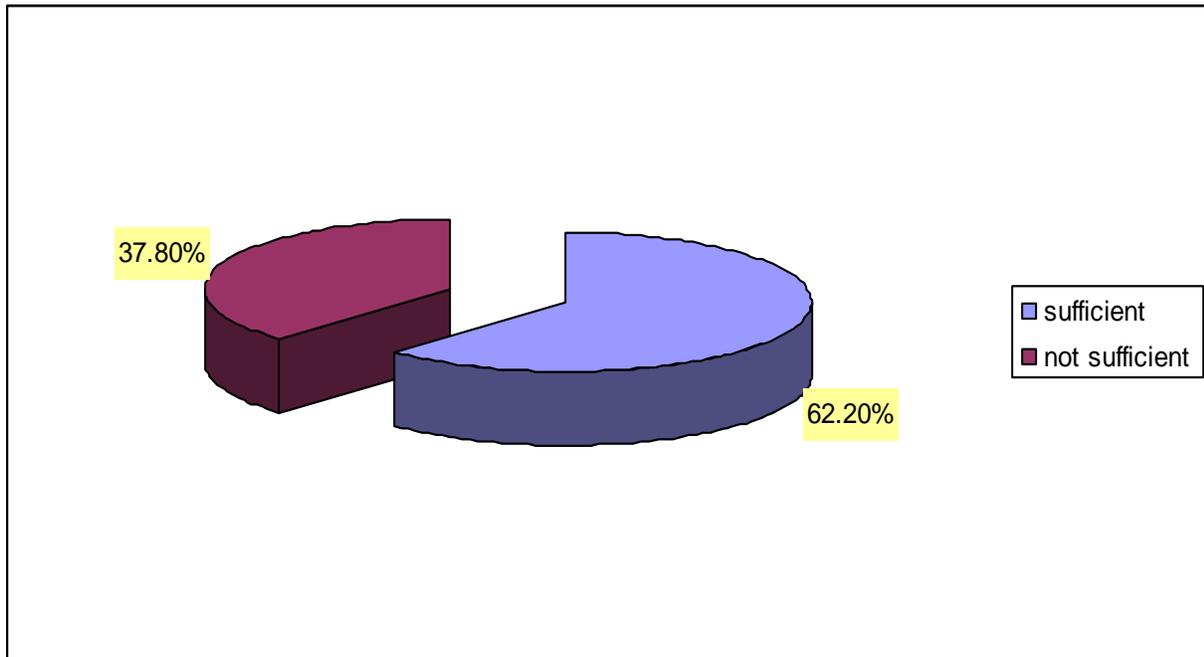


Figure (4): The sufficiency of ventilation in food serving place, in basic schools, Khartoum state, 2018.

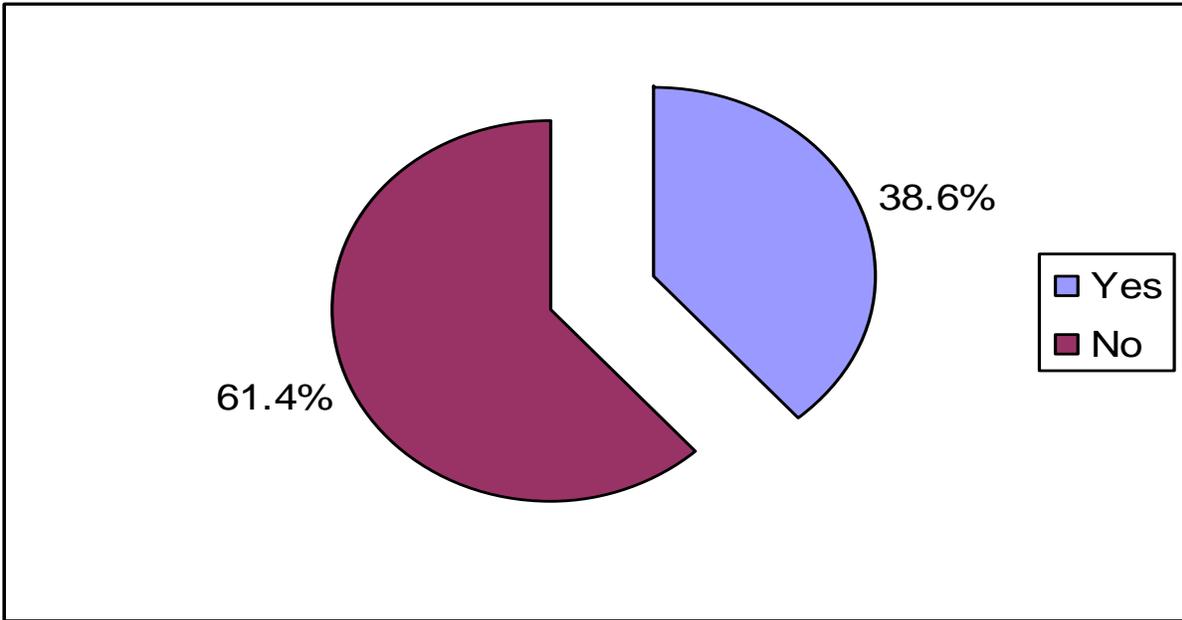


Figure (5): Food handlers having health cards in basic schools, Khartoum state, 2018.

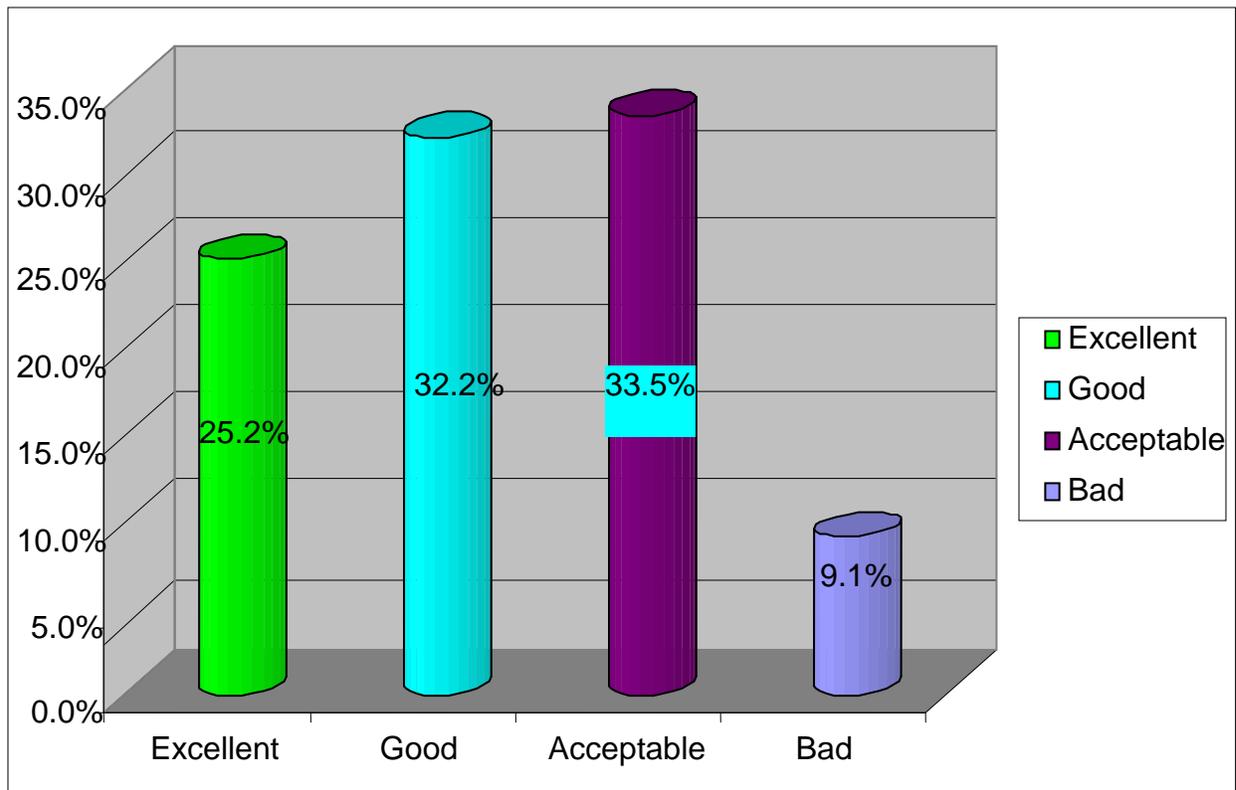


Figure (6): Personal hygiene of food handlers in basic schools, Khartoum state, 2018.

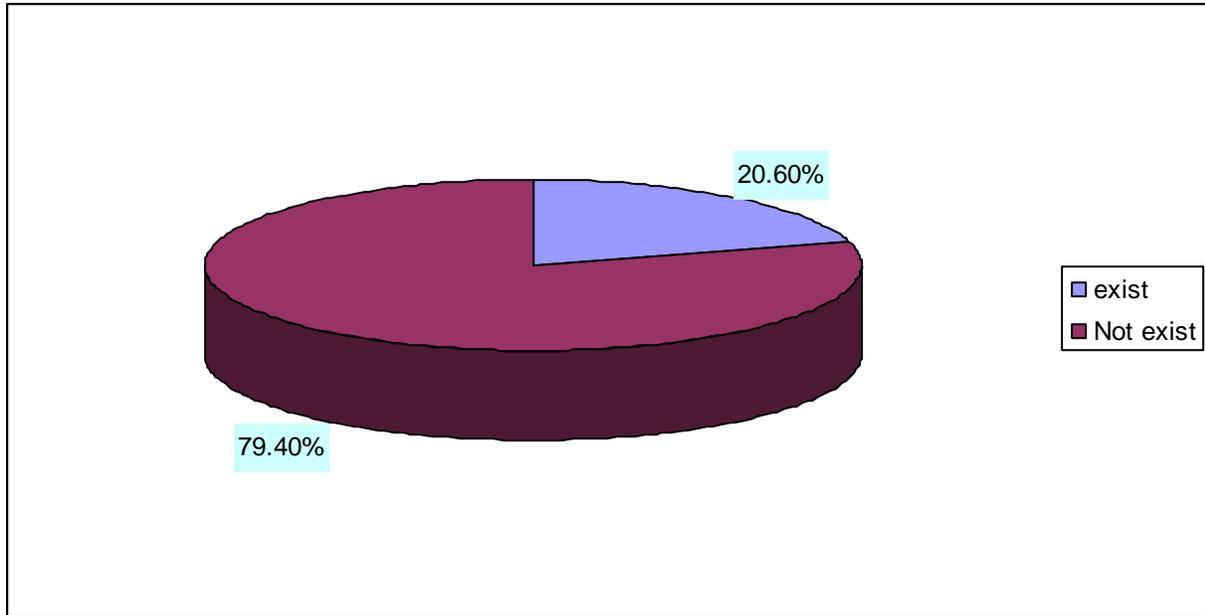


Figure (7): Existence of hand washing facilities in basic schools, Khartoum state, 2018.

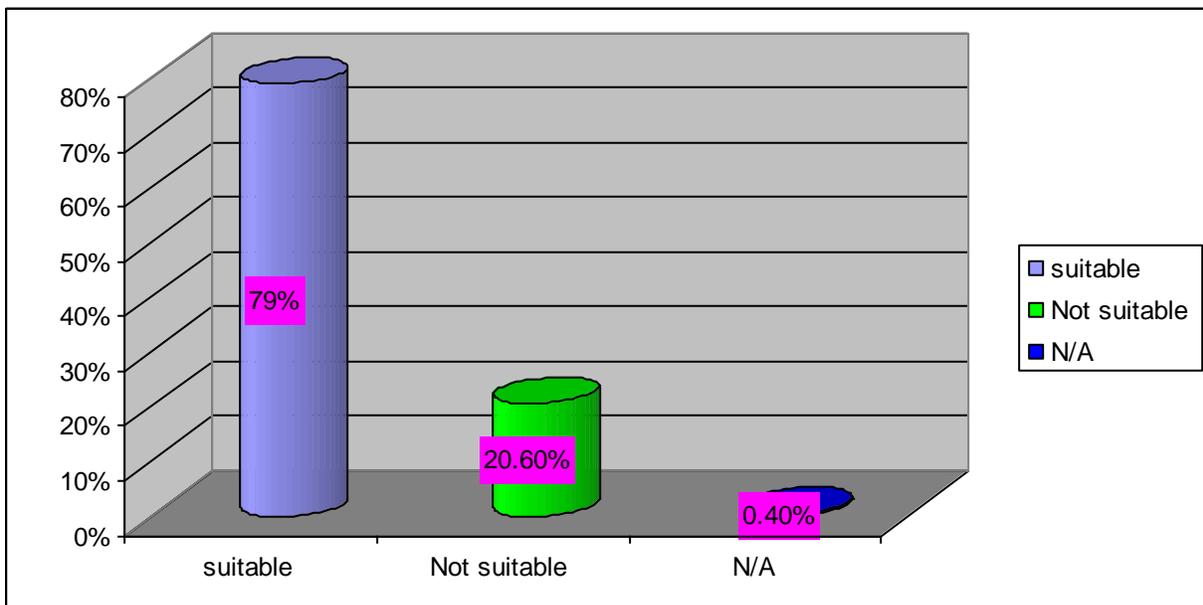


Figure (8): Methods of food storage in the basic schools, Khartoum state, 2018.

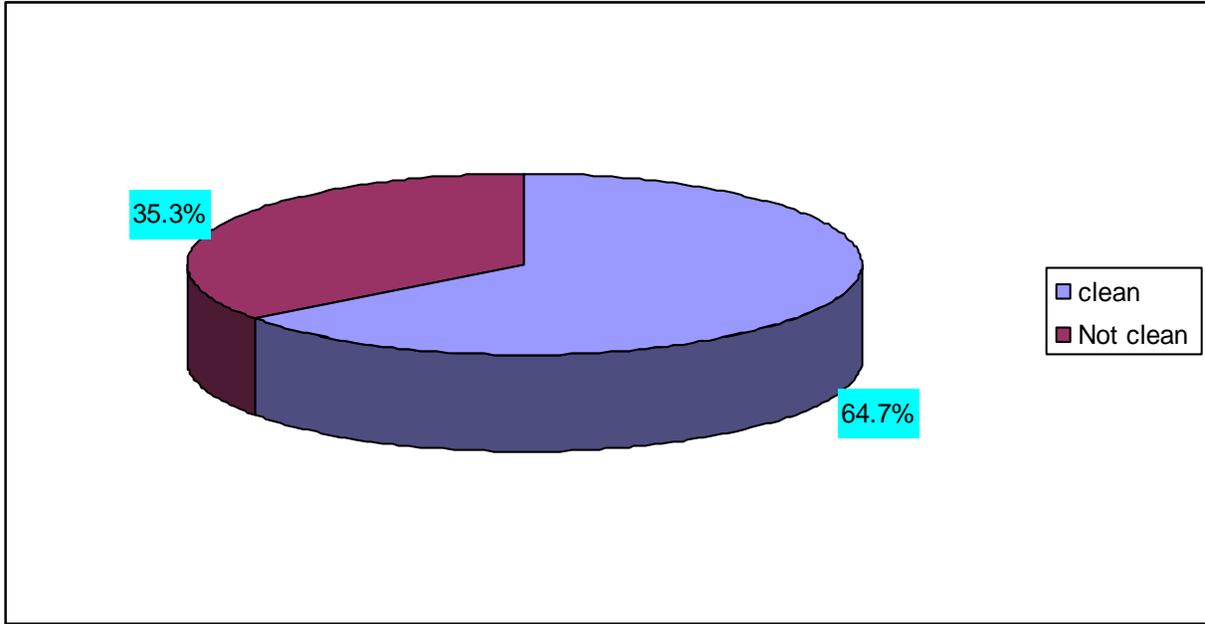


Figure (9): The general cleanliness of the food premises, in basic schools, Khartoum state, 2018.

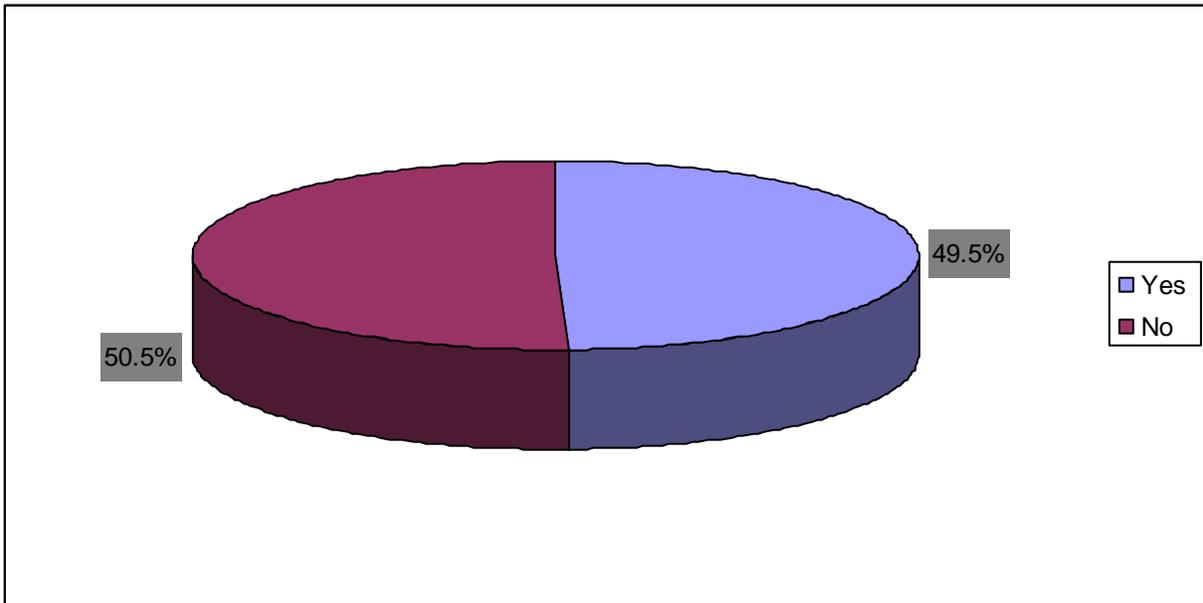


Figure (10): The existence of vendors near the basic schools, Khartoum state, 2018.

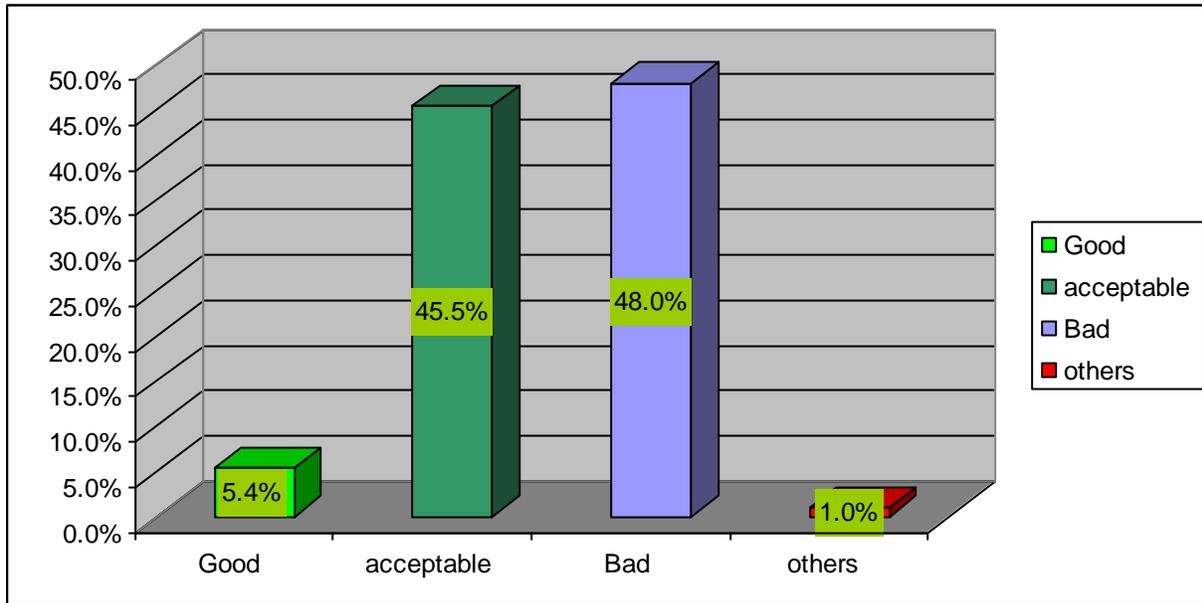


Figure (11): Condition of the foods sold in basic schools, Khartoum state, 2018.

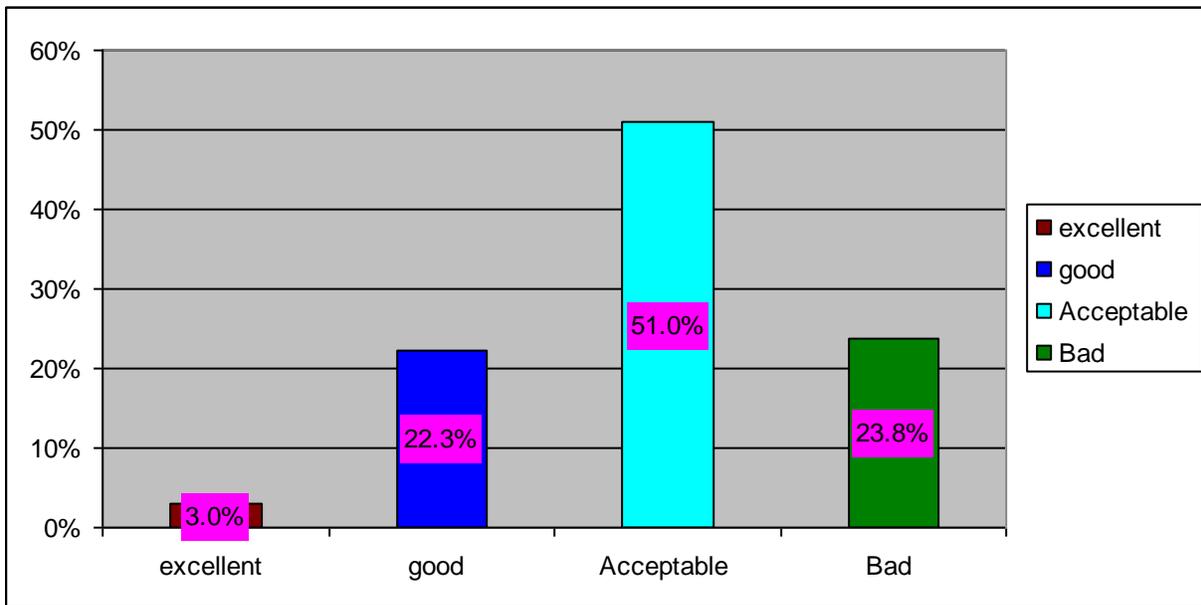


Figure (12): The personal hygiene of vendors near the basic schools, Khartoum state, 2018.

The study pointed out that (61.4%) of food handlers in food premises had No medical examination cards, which could expose consumers to diseases transmitted through food if anyone of workers is infected with a communicable disease. This is contrary to sanitary specification contained in the Food Control Law and regulations for the year 1973, Sudan, which stipulates the need for a health card for workers so as to testify that the workers are free from communicable diseases.

No suitable solid waste storage was found in all food places visited. This provides good

environment for the growth and proliferation of insects that are vectors for diseases if it finds its way to food or drink, or lead to the emission of unpleasant odors inside the place. This is contrary to the sanitary specifications, which state that there should be a means of keeping solid waste. There is no proper sewage disposal way in all schools visited, sewage has been disposed by spread in open area in (72.7%), which leads to the proliferation of insects and bad odors as well as the effect on the aesthetics of the schools. No hands washing facilities (according to the

sanitary standards required in all places visited) were found.

No enough aprons to the workers in all premises visited the required number being 3 aprons for each worker, preferred color is bright white that shows dirt.

Visits to food premises pointed out that the walls of 19.4% of the premises has cracks and this situation leads to attraction of insects and this is to contrary to the sanitary specifications, which state the need to preserve the walls with bleaching cement from internal and abroad. Floor is not paved and does not have ceramics in 45% of the premises, which raises dust that would contaminate the food inside the place. Lack of attention to cleanliness in (35.3%) of the premises, as the existence of dirt and waste was observed within the premises which affects the health of consumers as a result of pollution, as well as the effect on the aesthetics of the place.

The study demonstrated the existence of vendors (sellers) around the school in (49.5%) of schools and they were selling unsafe food placed on the ground, contaminated and had effect on students health and for 25% of them, their personal hygiene was bad. This agree with a survey that was conducted by Alshafa newspaper which pointed out the sale of food on the sidewalks and in front of schools become sources of livelihood for many of the aunts who just do prepare these foods, sweets and sell them to young children at the entrances of schools, and due to a recent significant increase in the incidence of typhoid fever disease, Alshafa had an extensive tour of several basic schools found the health risk of young children, regarding foods and environment of display, were not hygienic for the sold food, because foods were not covered to avoid the contamination but covered by houseflies and dust, also all the foods displayed were not allowed in the school feeding list items approved by ministry of health such as chili ...etc , some mothers are keen to warn their children from buying food from vendors due to the danger of such food for their health.), (*Siddig Ahmed, 2000*)

CONCLUSION AND RECOMMENDATIONS

The study concluded that the sanitary condition of food premises in schools was very poor, personnel hygiene of food handlers not suitable as they were not comply the specifications and standards. The study recommended as to conduct continuous inspection and monitoring of food premises in schools to rectify the limitations, provide all schools with safe food and activate the role of the teachers and students to take care about the food premises facilities.

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