

**SCHOOL NUTRITION AND STANDARD HYGIENE REQUIREMENTS IN
THE BUSHBUCKRIDGE SUB-DISTRICT, MPUMALANGA PROVINCE,
SOUTH AFRICA**

by

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DECLARATION

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Master of Public Health in the field of nutrition has not previously been submitted by me for a degree at this or any other university; that is my work in design and in execution, and that all material contained herein has been duly acknowledged.

Signed-----

Date-----

VICTOR CALEB MKHARI

DEDICATION

To my Sovereign Lord who gave me the potency, knowledge, wisdom and understanding; my significant other Lisbeth and my four offspring Pearl, Thamsanqa, Jessica and Nqobile for their love, longsuffering, righteousness, endurance, encouragement and fortification during the study time.

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ABSTRACT

Introduction: An observational study was undertaken to assess the level of compliance of school nutrition with standard hygiene requirements prescribed by Regulations R918 of 30 July 1999.

Aim: To assess the level of compliance of Primary School Nutrition Programme with standard hygiene requirements prescribed by Regulations R918 of 30 July 1999 in Bushbuckridge area.

Study: The study was conducted in primary schools located in Bushbuckridge sub-district with an estimated population of 611.048 and 212 primary schools.

Method: Observational study was conducted in schools and information regarding food preparation area, food storage rooms, environmental hygiene, personal hygiene and food transportation was recorded.

Sampling: A random sampling was conducted to select schools in each circuit. Thirty two percent was used to determine the sample size. Sixty eight primary schools of a population of 212 were select from the various circuits in Bushbuckridge sub-district. Data was gathered using observation method. An observation data gathering tool was developed to collect the data that was needed for the study.

Results: The study revealed that 24.3% of the schools prepare their food in kitchens that meet the standards and the requirements prescribed by the health regulations. However, 75.7% of the schools prepare their food in structures that do not comply with the health regulations. The study on environmental hygiene revealed that 95.7% of the schools do not provide toiletries in their latrines most of which are not waterborne. The study further revealed that 87% of the schools do not provide soap for hand washing in their latrines. The study on personal hygiene revealed that 61.4% of the schools do not provide protective clothing to the food handlers who prepare food for learners. The study on food transportation revealed that 100% of the vehicles used to deliver food in schools do not comply with the standards and the hygiene requirements prescribed by the health regulations.

Conclusion: It can thus be concluded that the level of compliance of the school nutrition programme to the standards and the requirements prescribed by Regulations R918 of 30 July 1999 is minimal. Measures of precautions to safeguard food contaminations that may result in outbreaks are not adequately followed. The level of environmental hygiene responsible for the spread of most of the diseases in children is poor. There is a high percentage of non-compliance to the standards and the requirements prescribed by Regulations R918 of 30 July 1999.

TABLE OF CONTENTS

	PAGE
CHAPTER 1	
INTRODUCTION	1
1.1. BACKGROUND INFORMATION	1
1.2. PROBLEM STATEMENT	2
1.3. RESEARCH QUESTIONS	3
1.4. AIM OF THE STUDY	3
1.5. OBJECTIVES OF THE STUDY	3
1.6. SUBSEQUENT CHAPTERS	3
1.7. CONCLUSION	5
CHAPTER 2	
LITERATURE REVIEW	6
2.1. INTRODUCTION	6
2.2. The Crucial Role of Nutrition in Education	6
2.3. Food Safety	7
2.4. Foodborne diseases	8
2.4.1. Sources of micro Organisms Causing Foodborne Diseases	9
2.4.2. Routes of Contamination	9
2.5. Food Hygiene Practices	9
2.5.1. Food preparation area	10
2.5.2. Food storage rooms	10
2.6. Personal Hygiene Practices	10
2.7. Environmental Hygiene Practices	11
2.8. Food transportation	11
1.9. CONCLUSION	
CHAPTER 3	
RESEARCH METHODOLOGY	12
3.1. INTRODUCTION	12
3.2. Study site	12
3.2.1. Study design	12

3.2.2. Sampling	12
3.2.3. Data collection	13
3.2.4. Data analysis	13
3.2.5. Ethical consideration	13
3.3. CONCLUSION	13
CHAPTER 4	
RESULTS	14
4.1. INTRODUCTION	14
4.2. Food preparation area	14
4.1. Food storage rooms	15
4.2.Environmental hygiene	17
4.3.Personal hygiene	18
4.4.Food transportation	19
4.5.CONCLUSION	21
CHAPTER 5	
DISCUSSION,	22
5.1. INTRODUCTION	22
5.2.1. Food preparation area	22
5.2.1.2. Food storage area	23
5.2.2. Environmental hygiene	24
5.2.3. Personal hygiene	25
5.2.4. Food transportation	25
CHAPTER6	
CONCLUSION AND RECOMMENDATIONS	27
6.1. CONCLUSION RELATED TO THE AIM OF THE STUDY	27
6.1.1. Assessment of the food preparation area	27
6.1.2. Assessment of the storage rooms	27
6.1.3. Assessment of environmental hygiene	28
6.1.4. Assessment of personal hygiene	29

6.1.5. Assessment of food transportation	29
6.2. Limitations	29
6.3. RECOMMENDATIONS	29
6.4. SUMMERY AND CONCLUSION	31
7. REFERENCES	32

DEFINITION OF CONCEPTS AND ABBREVIATIONS

Primary School nutrition programme is a presidential lead project of the Reconstruction and Development Programme introduced in 1994 to alleviate short term hunger by providing 25% of the energy requirements of the child per day (Gunde, 2004).

Nutrition refers to the process of providing or receiving nourishing substances (Fowler et al., 1990).

Food hygiene means all conditions and measures necessary to ensure the safety and suitability of food during transportation, preparation, storage and serving (Kilemi, 2004).

Personal hygiene is the action taken to ensure that food is handled, stored, prepared and served in such a manner as to prevent contamination of food (Kidiku, 2001).

Environmental hygiene refers to a clean environment with clean water, access to toilets, waste water disposal system and refuse storage and removal (Kidiku, 2001).

Foodborne illness means any syndrome that result from ingestion of contaminated foods (Kidiku, 2001).

Hazard Analysis Critical Control Point is a continuous self-inspection process designed to ensure safe food to the school food service consumers (Martin, 1999).

ABBREVIATIONS

PSNP: Primary School Nutrition Programme

WHO: World Health Organization

HACCP: Hazard Analysis Critical Control Point

UNICEF: United Nations International Children's Fund

UNESCO: United Nations Educational, Scientific and Cultural Organization

HIV: Human-Immuno Virus

USA: United States of America

EHO: Environmental Health Officer

SPSS: Statistical Product for Service Solution

SACMEQ: Southern African Consortium for Monitoring Educational Quality

CHAPTER 1

INTRODUCTION

The purpose of this study was to assess the level of compliance of Primary School Nutrition Programme to the standards and the hygiene requirements prescribed by Regulations R918 of 30 July 1999 in Bushbuckridge sub-district, Mpumalanga Province, South Africa.

1.1. BACKGROUND INFORMATION

In South Africa the transportation, preparation, handling and storage of food in schools participating in Primary School Nutrition Programme (PSNP) can result in potential significant health risks for the school children. As much as 70% of diarrhoeal diseases in developing countries are believed to be of food borne origin. Foods in most of the primary schools are transported and prepared under unsanitary conditions and stored for long periods in unsuitable conditions before consumption by learners (World Health Organization, 2005: 1).

Millions of people fall ill and suffer from serious disorders, long term complications and sometimes die as a result of eating unsafe food. Foodborne and waterborne diarrhoeal diseases are leading causes of illnesses and globally kill an estimated 2.1 million people annually, most of whom are children in schools in developing countries. This situation is a reality that education authorities and parents must face despite the right of learners to safe and suitable food being recognized more than a decade ago (WHO, 2005: 2).

A need exists for controlling the activities of people whose actions are aimed at preparing food intended for consumption by others by means of food laws. To ensure effective food control, it is crucial that the nutrition programme contains food control regulatory activities that are enforced by health authorities or local authorities so as to provide learners with the necessary protection. This requires a safety and sanitation system that will consistently provide the certainty that food is prepared and served under safe and sanitary conditions. This demands the implementation of a food system such as hazard analysis critical control point (HACCP) that prevents problems before they occur (Martin, 1999: 371-373). Implementation of this system will ensure that the Primary School Nutrition Programme is successfully implemented.

School nutrition has been explored extensively by researchers but little research has been conducted from the perspective of food hygiene and its safety (Creswell, 2003: 18). A research conducted in Indonesia concentrated in nutrition education (Februhartanty, 1995: 10). Another research was conducted in Minnesota but it only concentrated in school performance (Glewwe, 1993: 5). Another research was conducted in India but attention was given to improved effects of school meals with micronutrient supplementation (Tara Consultancy Services, 1996: 6). In South Africa a research similar to that conducted by the researcher was conducted in the Free State Province. The research concentrated on the microbiological composition and related hygiene practices of the Primary School Nutrition Programme. The research that was conducted in Bushbuckridge sub-district, Mpumalanga Province, concentrated on the level of compliance of the Primary School Nutrition Programme to the standards and the hygiene requirements prescribed by Regulations R918 of 30 July 1999 (Pierre et al., 2003: 1-3).

Lack of knowledge on good hygiene practices is the main source of foodborne diseases which impact negatively on the education of learners. Good hygiene practices ensure that foods provided to learners are safe and free from biological hazards which are responsible for food poisoning outbreaks or foodborne illness in schools. Policies are needed at the school level to support and provide the necessary guidelines for the effective implementation of the school nutrition programme. The policies will ensure that appropriate food safety practices are followed in the schools where the programme is implemented. A supportive environment to ensure safe food storage, preparation, transportation and consumption is needed in all schools. Well constructed kitchens and storage rooms are needed to ensure hygienic food preparation and storage (WHO, 1997: 1-4).

This study attempts to contribute to the knowledge base by assessing the level of compliance of the Primary School Nutrition Programme (PSNP) to standard hygiene requirements. This study assesses the measures of precautions taken in primary schools to safeguard food contaminations during transportation, preparation, handling and storage when the programme is rolled out (Creswell, 2003: 76).

1.2. PROBLEM STATEMENT

In 2006, thirty six food poisoning cases were reported in Bushbuckridge sub-district. A total of 36 learners were treated for food poisoning symptoms in Rolle clinic after consumption of contaminated food. Twenty three (23) food related complaints were reported by parents indicating their concern about the poor quality of food provided to their children. Investigations conducted by the Environmental Health Practitioners revealed that poor hygiene practices were the main source of problems. It was discovered that most of the food poisoning cases were not reported to the health agencies partly because foodborne pathogens were treated at home. This practice is unacceptable because food poisoning can become more serious particularly to young children by causing diarrhoea and vomiting that can result in deaths (Kidiku, 2001: 18).

Food handlers appointed in schools where the programme is rolled out are not trained in good food handling practices. Appropriate infrastructures such as kitchens, storage rooms and dining halls are lacking in many of the schools where the programme is rolled out. Water shortages are experienced in most of the schools and the level of hygiene and food safety in the schools is a great cause for concern. Personal hygiene practices require food handlers in those schools to regularly wash their hands before they can handle any food. As water is a scarce resource in rural areas, probabilities of occurrences of foodborne outbreaks are very high. Research has shown that one in ten South Africans do not wash their hands, the situation is worse in schools where there is no single drop of water (Sapa News24, 2006: 1-5).

1.3. RESEARCH QUESTIONS

- What is the level of compliance of Primary School Nutrition Programme to standard hygiene requirements?
- What precautionary measures are taken by schools to safeguard food contamination during transportation, preparation, handling, and storage?
- What is the level of environmental hygiene in primary schools?

1.4. AIM OF THE STUDY

To assess the level of compliance of Primary School Nutrition Programme with standard hygiene requirements prescribed by Regulations R918 of 30 July 1999 in Bushbuckridge area.

1.5. OBJECTIVES OF THE STUDY

- To assess the level of food hygiene and its safety during transportation, preparation, handling, and storage.
- To determine the existing levels of precautions taken to safeguard food contamination.
- To compare the outcome with the standards and the hygiene requirements prescribed by Regulations R918 of 30 July 1999.

1.6. SUBSEQUENT CHAPTERS

Brief outlines of the chapters are discussed below.

Chapter Two: Literature Review: The purpose of the literature review is to review pertinent literature and to discuss concepts related to school nutrition and standard hygiene requirements in Bushbuckridge sub-district, Mpumalanga Province, in South Africa and elsewhere.

Chapter Three: Research Methodology: The chapter describes the research methodology, study site, study design, ethical consideration, sampling, data collection and data analysis used in this study.

Chapter Four: Results: This chapter deals with the analysis of the data collected for this study. The data that was collected is compared with the standards and the hygiene requirements prescribed by Regulations R918 of 30 July 1999.

Chapter five: Discussion: The findings from the review of the literature are incorporated in this chapter with the results obtained from the analysis in order to address the aims and the objectives of the study.

Chapter Six: Conclusions and Recommendations: This constitutes the last chapter of this study of the report and derives conclusions from the research related to the objectives of this study. It makes

recommendations and advocates areas for future research in the effective implementation of the Primary School Nutrition Programme in schools.

1.7. CONCLUSION

The background to the research has been discussed. The research questions, aim of the study, the objectives of the study and the subsequent chapters were clearly defined in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

The world and the people at large are faced with serious challenges of food poisoning outbreaks that wipe both men and women. There are increased numbers of children who die from food poisoning outbreaks throughout the entire universe. The reasons for the high increase in deaths have been described by many researchers to result from poor handling of food. In developing countries like South Africa, deaths are more common in primary schools where children are provided with food to supplement their dietary needs. It is therefore necessary to determine the level of compliance of the Primary School Nutrition Programme to the standards and the hygiene requirements provided by the South African authorities through their health regulations. The health regulations were developed to serve as a tool that will guide people who prepare food for public consumption. Compliance to the health regulations will ensure that food prepared for human consumption is safe and healthy. Compliance will ensure that innocent lives such as that of children in primary schools are saved and unnecessary deaths are prevented.

In this chapter we further highlight the crucial role of school nutrition; food safety; foodborne diseases; sources of microorganisms causing foodborne diseases; routes of contaminations; prevention of foodborne diseases; food hygiene practices; food preparation area; food storage rooms; personal hygiene practices; environmental hygiene practices and food transportation.

2.2. The crucial role of nutrition in education

Primary School Nutrition Programme (PSNP) was introduced on a national scale in South African since 1994 as one of the presidential lead projects of the Reconstruction and Development Programme (RDP). One of its main aims was to alleviate hunger by providing twenty five percent of the energy requirements of the child per day solely because sound nutrition is a basic human right guaranteed in South Africa's Constitution through the Bill of Rights (Gunde, 2004: 1-2). Studies have shown that nutrition plays a crucial role to children's education in schools. Studies have also shown that improved

health and nutritional status in children contributes to high enrolments, better school attendance, lower rates of dropout, improved performance in academic work, health promotion, diseases prevention, social equity and economic growth as healthy persons have the energy to work. It has been pointed out in history that investment in education is very crucial for the growth of any economy. Investment in education should be accompanied by investment in the health and nutrition of learners (Martin, 1999: 710).

To achieve the nutrition objectives of providing healthy meals that contribute to the health and wellbeing of children and to help them develop healthy food behaviour, school nutrition professionals need learners eating healthy meals. The primary purpose of the Primary School Nutrition Programme (PSNP) is to meet the nutrition needs of all children during the time they are under the supervision of the schools. To achieve the primary goal requires an understanding of the interrelatedness of every part of the food service system beginning with transportation, preparation, storage, food handling and ending with serving of food that is safe to the children (Martin, 1999: 716).

2.3. Food safety

The safety of food during transportation, storage, preparation, handling and serving is a priority for every child nutrition programme. Children are more vulnerable to foodborne pathogens. Foodborne and waterborne diarrhoeal diseases are leading causes of illnesses that globally kill an estimated 2.1 million people annually most of whom are said to be children in schools in developing countries. Care should therefore be taken to ensure food safety and sanitation in schools. (WHO, 2005: 2).

In Russia the deputy Health Care Minister Olga Sharapova has indicated that poor hygiene and sanitation at schools was often to blame for poor child health. Countrywide health surveys carried out in 2002 found that only 33% of the 31.6 million Russians aged 18 and under were in good health. The results have shown a health decline of 7% in children (Sapa News24, 2003: 4).

In New York schools, it was reported that lack of clean water caused millions of children to suffer needlessly from diseases. It was pointed out that millions of girls were deterred from getting education because of dearth of sanitation facilities in schools. It was reported that lack of access to clean water caused waterborne illnesses that annually killed more than 1.6 million young children. Lack of separate and decent sanitation facilities at schools often forced girls to drop out of primary school. (UNICEF news line, 2003: 3).

In the South African Region 46,560 sixth grade students from 2,493 schools were surveyed by the Southern African Consortium for Monitoring Educational Quality (SACMEQ). The results suggested that 15% of the schools surveyed did not have water supply. Implementation of the Primary Schools Nutrition Programme in such schools would bring negative impacts in the health of learners (UNESCO press, 2002: 1).

In South Africa 18 million people were supposed to be provided with adequate sanitation by 2010. It has been reported in 2011 that an estimated 2115 schools still do not have sanitation facilities. Research has shown that food poisoning outbreaks are prone where schools do not have access to sanitary facilities (Sapa News24, 2002: 2). An international survey on hand washing conducted in South Africa found that almost half (fifty percent) of the South African population underestimated the effectiveness of hand washing in preventing the spread of diseases. A global hygiene survey conducted in 2006 in South Africa, United Kingdom, Germany, United Arab Emirates, India and Malaysia revealed that fifty percent of those surveyed do not believe in hand washing. The results showed that simple hand washing is still rated as an ineffective method of disease prevention (Sapa News24, 2006: 7).

2.4. Foodborne diseases

Outbreaks of Foodborne diseases that result from ingestion of contaminated foods occur in many of our primary schools. There are a number of factors that contribute to occurrences of food poisoning outbreaks in schools. It may be due to failure to cook food thoroughly; holding food at ambient temperature; poor handling or storage of cooked food; cross contamination of cooked food from raw foods especially of animal origin; lack of good hygienic practices; and inadequate cleaning of utensils (WHO, 1989: 5).

When PSNP was introduced in schools, food handlers were appointed from the communities to ensure the effective implementation of the programme. The food handlers were appointed without formal training on food hygiene and food safety. Food handling personnel may play an important role in ensuring food safety during transportation, preparation and storage if training is properly given. Mishandling and disregarding of hygienic measures on their part may enable pathogens to come into contact with food and multiply in sufficient numbers to cause illnesses to the learners (WHO, 1989: 6). It is essential that food hygiene principles are continuously applied by the appointed food handlers if

the children are to receive the protection they are entitled to. School food handlers need training in basic food hygiene prior to appointment in order to prevent occurrences of foodborne diseases that can impact negatively on learners who are the target of the Primary School Nutrition Programme (Wilson Disease, 2008: 2).

2.4.1. Sources of micro organisms causing foodborne diseases

The greatest source of organisms that cause outbreaks of foodborne diseases is said to be man. It is crucial that food handlers be trained in food hygiene principles as a way of providing food security to the learners. Most of the bacteria in man are said to be found in the intestinal tract, respiratory tract, infected cuts, sores, boils and in contaminated utensils used by man hence maintenance of good personal hygiene is very crucial (Kidiku, 2001: 20).

2.4.2. Routes of contamination

Food is the primary source for the transmission of disease causing bacteria. It is said that bacteria can be transferred to food from unclean hands, carriers, infected persons, improperly washed utensils and equipments. It is therefore crucial that food handlers be knowledgeable about the routes of food contaminations. If adequate measures to guard against food contaminations and cross infections are not taken, the health of the learners who are the target of the Primary School Nutrition Programme will be negatively impacted (Kidiku, 2001: 18).

2.5 Food hygiene practices

These are the measures necessary to ensure the safety and wholesomeness of food at all stages until its final consumption by the learners. The single most important factor in the prevention of foodborne diseases through proper hygiene practices is the human element. If the food handlers in schools do not practice proper hygiene, a high number of food poisoning incidences may be experienced (Department of health, 2003: 13). Food must be obtained from approved sources especially products of animal origin. Storage of food in appropriate store rooms and at the right temperature before and during food preparation is important. Proper food hygiene practices must be adhered to in order to prevent foodborne diseases that may affect the learners who are the main targets of the programme (Kidiku, 2001: 28).

2.5.1. Food preparation area

The standards and the requirements for food premises are prescribed in section 5 of Regulations R918 of 30 July 1999. These are the regulations governing general hygiene requirements for food premises and the transportation of food. The kitchen where food is prepared for the learners must meet certain standards and requirements that are prescribed by the health regulations. Regulation 5(3) of Regulation R918 of 30 July 1999 prescribe that food premises should be constructed such that it does not cause any health hazard and should be constructed of face bricks, non-absorbent and non-corrosive materials (Regulations R918, 1999: 7).

2.5.2. Food storage rooms

Regulation 5(3) of Regulations R918 of 30 July 1999 prescribes that storage rooms should be constructed of facebricks, non-absorbent and non-corrosive materials. The sub-regulation further prescribes that the storage space for all kinds of food should be hygienic. The health regulations prohibit the storage of food in storage facilities that do not meet the standards and the requirements prescribed in regulation 5(3) of Regulations R918 of 30 July 1999 (Regulations R918, 1999: 7).

2.6. Personal hygiene practices

Personal hygiene plays an important role in minimizing the transmission of infections. Every opportunity to reinforce the importance of personal hygiene should be taken by those in the nutrition programme including the provision of adequate hand washing facilities (Department of Health, 1996: 4). Good personal hygiene should be practiced by food handlers in schools so as to protect their own health and that of the learners. Primary schools participating in the nutrition programme should meet the following personal hygiene requirements:

- Food handlers with cold, sore throat, diarrhoea, infected cuts should not be allowed to handle food and should go for treatment.
- Personal cleanliness requires daily bath or shower.
- Men should always be clean-shaven; have short clean hair and wear a cap over the head.
- Women should have their hair clean and should wear a hair net or other suitable covering.
- All food handlers should wear protective clothing that is maintained clean.
- Hands should be maintained clean and nails kept short while handling food (Department of Health, 2000: 6).

The standards and the requirements for protective clothing are also prescribed in regulation 9 of Regulations R918 of 30 July 1999. The regulation prohibits food handlers from handling food without the use of suitable protective clothing. Suitable protective clothing includes amongst others light coloured overalls, aprons, head gears and footwear (Regulations R918, 1999: 12).

2.7. Environmental hygiene practices

Regulation 5(3) of Regulations R918 of 30 July 1999 prescribes that food handling premises should have latrines for the use by workers on the food premises and for the use by persons to whom food is served for consumption. Sub-regulation 3 of regulation 5 prescribes that hand washing facilities should be provided with hot and cold running water. The sub-regulation prescribes that soap should be provided for hand washing by workers on the food premises and by the persons to whom food is served. Good house keeping is extremely promoted by the health regulations as a way to ensure food safety and the maintenance of good environmental hygiene. Environmental hygiene plays a crucial role in preventing food and waterborne diseases. Availability of clean toilet facilities and good hand washing practices will ensure that learners consume food free from faecal contaminants (Regulations R918, 1999: 6).

2.8. Food transportation

The standards and requirements for the transportation of food are prescribed in regulations 13(2) and 13(3) of Regulations R918 of 30 July 1999. The regulations prescribe that a vehicle used for the transportation of food should have a freight compartment that is dustproof. The two sub-regulations further prescribe that the food should be transported such that it does not come into contact with the floor of the vehicle, the floor covering or the surface which can be walked on. The sub-regulations prescribe that the food should be transported such that it can not be spoiled or contaminated. The use of open panel vans or trucks is strictly prohibited by the health regulations. A vehicle used to transport food should not be used to transport people (Regulations R918, 1999: 15).

2.9. Conclusion

In this chapter literature related to the research was outlined to show the importance of this research. The impacts related to poor implementation of the Primary School Nutrition Programme were highlighted to show the need for this study. The standards and the requirements prescribed by health regulations were highlighted to guide the purpose of the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. INTRODUCTION

In this chapter we highlight the methodology that was used for the study. We further highlight the study site, study design, sampling, data collection and data analysis.

3.2. Study site

The proposed study was conducted in primary schools in which the Primary Schools Nutrition Programme is rolled out in Bushbuckridge sub-district, Mpumalanga Province, South Africa. Bushbuckridge is a sub-district of Ehlanzeni District situated in the northern part of Mpumalanga Province with an estimated population of 611.048 and with 212 primary schools (Creswell, 2003: 155).

3.2.1. Study design

A direct observational study was conducted in schools and information regarding food preparation area, food storage rooms, environmental hygiene, personal hygiene and food transportation was recorded. The researcher chose observational study as it gave firsthand experience with the schools and the researcher could record information as it was revealed (Creswell, 2003: 179).

3.2.2. Sampling

Cluster sampling was used for the study and the method was found to be more convenient for Bushbuckridge sub-district. Cluster sampling was more convenient in that a list of circuits with primary schools (Clusters) in each circuit was available (Katzenellenbogen et al., 2002: 67). Stoker prescribes that when the population under study is between 200 and 250, thirty two percent of that population should be used to determine the size of the sample (Stoker, 1985: 5). Thirty two percent of a population of 212 schools was used to determine the size of the sample. A sample of sixty eight primary schools was used for the study (Stoker, 1985: 5).

3.2.3. Data collection

Observational data was gathered by the researcher using structured observations (Creswell, 2003: 179-204). The researcher conducted the observation study directly in schools playing the role of a complete participant. The complete participant is one who let people see him only as a participant and not as a researcher (Barbie, 1989: 264-266). The researcher employed the following data-gathering strategies:

- **Structured observational protocol**

A structured observational protocol was developed for data collection. Fixed-alternative close ended questions were used to collect the required data. The answers were standard, and could be compared from school to school. Answers were much easier to code and to analyse (Katzenellenbogen et al., 2002: 66-72).

3.2.4. Data analysis

During data analysis, the data was prepared and organised categorically and chronologically, reviewed repeatedly and continually coded. The data analysis process was aided by the use of a computer package called Statistical Product for Service Solution (SPSS). The data was compared with the standards and the hygiene requirements prescribed by Regulations R918 of 30 July 1999. Interpretation of the data was made by the researcher (Creswell, 2003: 204).

3.2.5. Ethical consideration

Approval to conduct the study was obtained from the University of Limpopo Ethics Committee after the approval of the school health sciences. Authorization to collect data was obtained from Mpumalanga Provincial Government. Participants were not informed about the study for the researcher acted as a complete participant in the study.

3.3. Conclusion

In this chapter we the methodology that was used to conduct the study was discussed. An outline of how the data was gathered and collated was highlighted. The chapter further gave an outline of the study design and the data analysis method used.

CHAPTER 4

RESULTS

4.1. INTRODUCTION

In this chapter we discuss the results of the research which was conducted in primary schools in Bushbuckridge sub-district, Mpumalanga Province. We further discuss food preparation area, types of kitchens, food storage rooms, environmental hygiene, personal hygiene as well as food transportation.

4.2. Food preparation area

The standards and the requirements for food premises are prescribed in regulation 5 of Regulations R918 of July 1999. These are the regulations governing general hygiene requirements for food premises and the transportation of food. The kitchen is a food preparation area which must meet the requirements that are prescribed by the health regulations. The health regulations prescribe in regulation 5(3) that food premises should be constructed such that it does not cause any health hazard and should be made of face bricks, non-absorbent and rust free materials (Regulations R918, 1999: 6).

TABLE 4.1: TYPES OF KITCHENS UTILIZED FOR FOOD PREPARATIONS IN SCHOOLS

Types of kitchens used for food preparations	Number	Percentage
Brick kitchens with smooth surfaces	16	24.3%
Cast irons kitchen	3	4.3%
Wooden kitchen	6	8.6%
Open space	43	62.9%
Total	68	100%

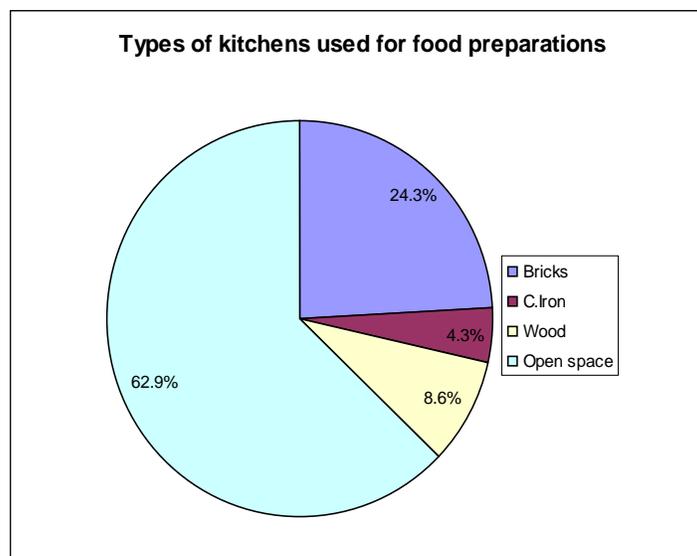


FIGURE 4.1: TYPES OF KITCHENS UTILIZED FOR FOOD PREPARATIONS IN SCHOOLS

Table 4.1 shows the types of kitchens utilized for food preparations by schools with the nutrition programme. The results of the research conducted reveals that 24.3% of the kitchens used for food preparations in schools are constructed of bricks which in accordance with the standards and the requirements prescribed by regulation 5 of Regulations R918 of July 1999. The results further reveal that 4.3% of the kitchens are made of cast irons, 8.6 % made of wood and that 62.9% of the schools use open space for food preparations which is not in accordance with the standards and the requirements prescribed for food premises in section 5 of regulation R918 of July 1999 (Regulations R918, 1999: 6).

4.3. Food storage rooms

Regulation 5(3) of Regulations R918 of July 1999 prescribes that storage rooms should be constructed of face bricks, non-absorbent and rust free materials. The sub-regulation further prescribes that the storage space for all kinds of food should be hygienic (Regulations R918, 1999: 6).

TABLE 4.2: TYPES OF STORE ROOMS UTILIZED IN SCHOOLS

Types of store rooms used for food storage	Number	Percentage
Brick storages with smooth surfaces	34	50%
Wooden storages	3	4.3%
Offices	16	24.3%
Class rooms	15	21.4%
Total	68	100%

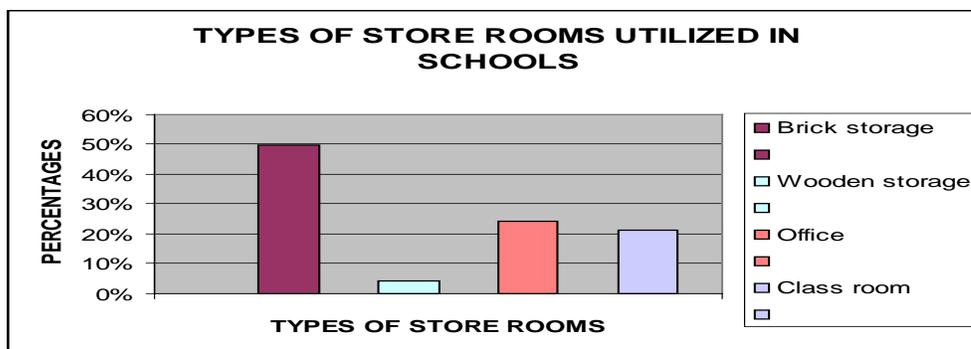


FIGURE 4.2: TYPES OF STORE ROOMS UTILIZED IN SCHOOLS

Table 4.2 shows the types of storage facilities utilized for food storages in schools with the nutrition programme. The results of the research reveals in table 4.2 that 50% of the store rooms meet the standards and the requirements prescribed by regulation 5(3) of Regulations R918 of July 1999 for they are constructed of bricks. The outcome further reveals that 24.3% are offices that were converted into store rooms and 21.4% are class rooms that were converted into store rooms. The results show that 4.3% of the storage rooms are constructed of wood which is not in accordance with the standards and the requirements prescribed in regulation 5(3) of Regulations R918 of July 1999 (Regulations R918, 1999: 6).

4.4. Environmental hygiene

Regulation 5(3) of Regulations R918 of 30 July 1999 prescribes that food handling premises should have latrines for the use by workers on the food premises and for the use by persons to whom food is served for consumption. Toiletries should also be provided for aesthetic reasons. The sub-regulation further prescribes that hand washing facilities should be provided with soap, hot and cold water for hand washing by personnel on the food premises and by the persons to whom food is served (Regulations R918, 1999: 7).

TABLE 4.3: PROVISION OF TOILETRIES AND SOAP FOR HAND WASHING

Provision of toiletries for hand washing in toilets	Number	Percentage	Provision of soap for hand washing in toilets	Number	Percentage
Daily	2	2.9%	Daily	4	5.8%
Once a week	1	1.4%	Once a week	5	7.2%
No provision	65	95.7%	No provision	59	87%
Total	68	100%	Total	68	100%

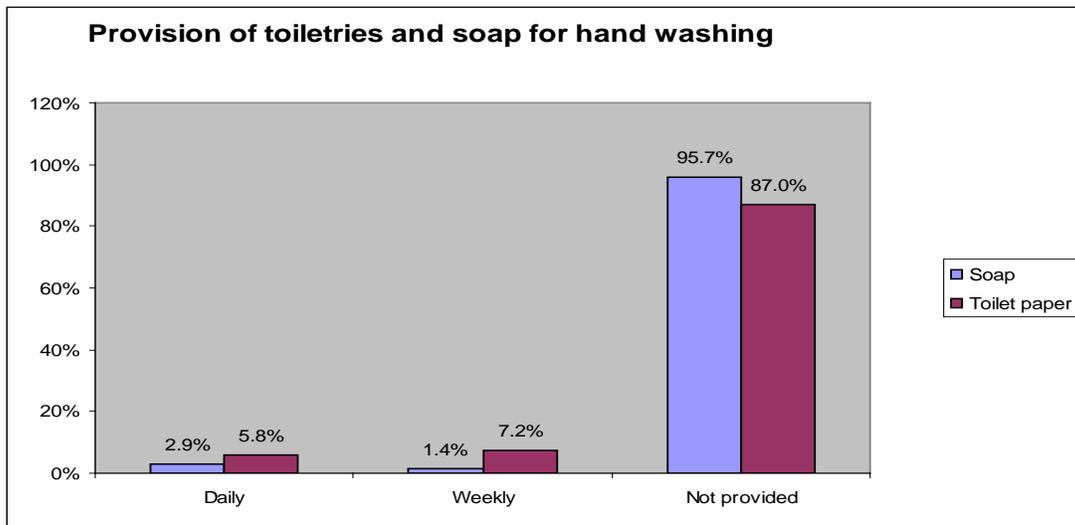


FIGURE 4.3: PROVISION OF TOILETRIES AND SOAP FOR HAND WASHING

Table 4.3 shows provisions of soap and toiletries in latrines available in schools with the nutrition programme. The above table reveals that 2.9% and 5.8% of the schools daily provide soap and toiletries in their latrines. The table further reveals that 1.4% and 7.2% of the schools respectively provide soap and toiletries in their latrines once a week. The table further reveals that 95.7% of the schools do not provide soap for hand washing after visiting the latrines and 87% do not provide toiletries in their latrines. The results reveal that 95.7% of the schools do not meet the standards and the requirements for soap provision needed for hand washing as prescribed by regulations R918 of 30 July 1999. The results also reveal that 87% of the schools do not meet the standards and the requirements for toiletry provisions in latrines prescribed by regulations R918 of 30 July 1999 ((Regulations R918, 1999: 7).

4.5. Personal hygiene

The standards and the requirements for protective clothing are prescribed in section 9 of Regulations R918 of July 1999. The section prohibits food handlers from handling food without the use of suitable protective clothing. Suitable protective clothing includes amongst others light coloured overalls, aprons, head gears and footwear (Regulations R918, 1999: 12).

TABLE 4.4: PROTECTIVE CLOTHING

Types of protective clothing used by food handlers	Number	Percentage
Light coloured overalls	8	11.4%
Aprons	4	7.1%
Head cover	9	1.4%
Personal clothing	42	61.4%
Dark coloured overalls and personal clothing	8	11.4%
Light coloured overalls with aprons	4	5.7%
Head covers and personal clothing	9	1.4%
Total	68	100%

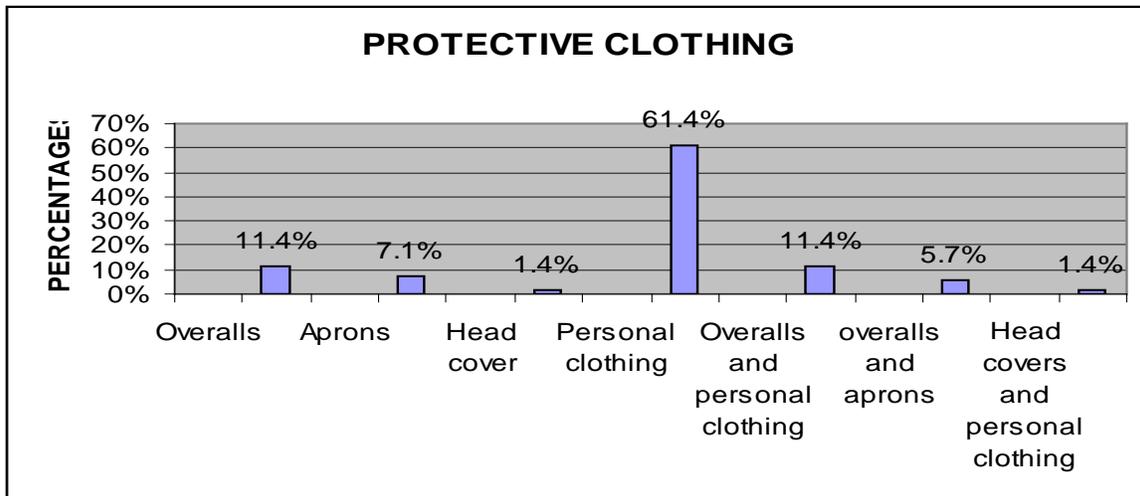


FIGURE 4.4: PROTECTIVE CLOTHING

Table 4.4 reveals the types of protective clothing utilized by food handlers who prepare food for the learners in schools with the nutrition programme. The results reveal that food handlers use various types of protective clothing as afforded to them by their employers. The results further reveal that 61.4% of the food handlers use personal clothing that do not meet the standards and the requirements prescribed in regulation 9 of the health regulations (Regulations R918, 1999: 12).

4.6. Food transportation

The standards and the requirements for the transport of food are prescribed in regulations 13(2) and 13(3) of Regulations R918 of 30 July 1999. The sub-regulations prescribe that a vehicle used for the transportation of food should have a freight compartment that is dustproof. The sub-regulations further prescribe that the food should be transported such that it does not come into contact with the floor of the vehicle, the floor covering or the surface which can be walked on. The sub-regulations continue to prescribe that the food should be transported such that it does not become spoiled or contaminated (Regulations R918, 1999: 15).

TABLE 4.5: TYPES OF TRANSPORT UTILIZED FOR FOOD DELIVERIES

Type of transport utilized for food deliveries	Number	Percentage
Open bakkies	58	85.7%
Mini trucks	10	14.3%
Total	68	100%

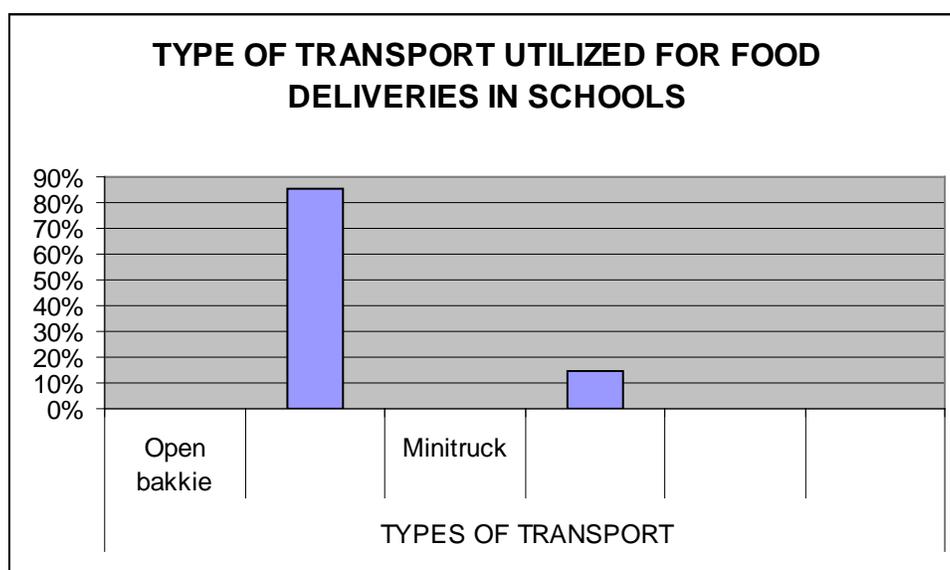


FIGURE 4.5: TYPE OF TRANSPORT UTILIZED FOR FOOD DELIVERIES

Table 4.5 shows the types of transport utilized for the transportation of food to schools with the nutrition programme. The outcome of the research reveals that 85.7% of the food in schools is delivered in panel vans that do not meet the standards and the requirements as prescribed by Regulations R918 of 30 July 1999. The outcome further points out that 14.3% of the food is transported in mini trucks which do not meet the standards and the requirements prescribed by the health regulations (Regulation R918, 1999: 15).

4.7. CONCLUSION

In this chapter an analysis was made based on the standards and the requirements prescribed by Regulation R918 of 30 July 1999. In this chapter an analysis of food preparation area, the types of kitchens used for food preparations, food storage rooms, environmental hygiene, personal hygiene and food transportation was made and was compared with the health regulations to determine the level of compliance to the standards and the hygiene requirements (Regulations R918, 1999: 6-15).

CHAPTER 5

DISCUSSION

5.1. INTRODUCTION

A study to assess the level of compliance of primary school nutrition programme to standard hygiene requirements prescribed by regulations R918 of 30 July 1999 was conducted and an outline is hereby given to show the outcome of the study.

5.2. Food preparation area

The standards and the requirements for food premises are prescribed in regulation 5 of Regulations R918 of 30 July 1999. These are the regulations governing general hygiene requirements for food premises and food transportation. Regulation 5 of the health regulations regards a kitchen as a food handling premises. Regulation 5(3) of Regulation R918 of July 1999 prescribes that food premises should be constructed in ways that do not cause health hazards. The regulations outlines that the kitchens should be constructed of face bricks, non-absorbent and rust free materials (Regulations R918, 1999: 6).

The results in table 4.1 show that the majority of the kitchens utilized in schools do not meet the standards and the requirements prescribed by the health regulations. The table reveals that 4.3% of the kitchens used are constructed of cast irons which are corrosive materials. Regulation 5(3) of Regulations R918 of July 1999 prohibits the use of corrosive materials for building of food handling structures. Corrosive materials can contaminate food during preparations which can cause lead poisoning. The safety of food can not be guaranteed where corrosive materials have been used for the construction of food handling structures such as kitchens (Regulations R918, 1999: 6).

Table 4.1 shows further that 8.6% of the kitchens utilized for food preparations in schools with the nutrition programme are constructed of wooden materials. Regulation 5(3) prescribes that food premises should not be constructed of absorbent material such as wood. A wooden material can absorb contaminants and various forms of bacteria that can cause food poisoning to learners. A wooden material can not be cleansed with ease and will absorb any detergent used for cleansing. Section 5(3)

(a) of Regulations R918 prohibits the handling of food in premises made of materials that are absorbent and are not water resistant (Regulations R918, 1999: 6).

The table further indicates that 62.9% of the kitchens in schools with the nutrition programme prepare their food in open spaces. Food prepared in the open can be contaminated from various contaminants such as dust, gas, vapours, odours, smoke, soot deposits, insects or other agents. Regulation 5(2) (b) of Regulations R918 of July 1999 prohibits the handling of food in open spaces where food can be exposed to contaminants (Regulations R918, 1999: 6-7).

The results, however, show that 24.3% of the kitchens in some of the schools are constructed of the building materials prescribed by the health regulations. Food safety can be guaranteed in such kitchens for measures to safeguard food contaminations can be taken. Food poisoning outbreaks can be easily prevented and outbreaks can be easily contained in such structures (Regulations R918, 1999: 6-7).

5.3. Food storage rooms

Regulations 5(3) of Regulations R918 of 30 July 1999 prescribe that storage rooms must be constructed of facebricks, non-absorbent and non-corrosive materials. The sub-regulation prescribes that the storage space for all kinds of food should be kept in hygienic conditions (Regulations R918, 1999: 6).

The results of the research reveal in table 4.2 that 50% of the storage rooms are constructed of bricks as prescribed by the health regulations. Food safety can be guaranteed in such storage facilities for they can be easily cleansed. Measures to safeguard food from contaminations are taken and food poisoning outbreaks can be minimized. The table indicates further that 24.3% are offices that have been converted into store rooms. Section 5(3) (a) provides that a store room should be of such a nature that it does not contribute to contamination of food. The rapid movements by staff and the storage of other materials in the office can contribute to contamination of food. The outcome reveals that 21.4% of the storage facilities are classes that have been converted into store rooms (Regulations R918, 1999: 6).

The results however show that 4.3% of the store rooms are constructed of wooden materials. The health regulations prescribe in regulation 5(3) (a) of Regulations R918 of 30 July 1999 that cleanable and non absorbent materials should be used for the construction of food handling structures to minimize health hazards. A wooden material can not be cleansed with ease and has the capability of absorbing

poisonous substances. Regulation 5(3) (a) of Regulations R918 of 30 July 1999 prohibits the handling of food in premises constructed of wooden materials. Measures to prevent health hazards can not be guaranteed and food safety is questionable in such structures. Foodborne ailments are prone in such structure for measures to safeguard food contaminations can not be guaranteed (Regulations R918, 1999: 6).

5.4. Environmental hygiene

Regulation 5(3) (c) of Regulations R918 of 30 July 1999 prescribe that food handling premises should be provided with latrines for use by workers on the food premises and for use by persons to whom food is served. The sub-regulation prescribe that hand washing facilities should be provided with soap and with water for hand washing by workers on the food premises and by the persons to whom food is served. Hand washing is critical in the prevention of communicable diseases that can be spreads by contaminated hands. Food poisoning in schools occurs mostly due to poor hygiene in latrines and poor hand washing after toilet visits. It is a requirement that food handlers and food consumers should wash their hands after visiting the toilets. Soap is needed to remove contaminants in the hands of food handlers who prepare food for the learners in all schools. Soap is also needed for hand washing by the learners after visiting the toilets and before the consumption of food (Regulations R918, 1999: 7).

The results reveal in table 4.3 that 5.8% of schools with the nutrition programme daily provide soap in their latrines and that 7.2% provide soap once a week. The results show that 87% of the schools do not provide soap for hand washing. The table further outlines that 2.9% of the schools daily provide toiletries while 1.4% of the schools provide toiletries once in a week. Measures to prevent food contaminations are not taken and food safety can be guaranteed (Regulations R918, 1999: 7).

The table shows that 95.7% of the schools with the nutrition programme do not provide toiletries and that 87% of the schools do not provide soap for hand washing in their latrines. The outcome of the research further reveals that 95.7% of the schools do not provide toiletries for self cleansing after visiting the latrines. Food handlers who prepare the food for the learners can contaminate themselves and further contaminate the food that they prepare for the learners. Probabilities that learners contaminate their hands and consume food with contaminated hands are high. Probabilities of food poisoning outbreaks are high hence food safety can not be guaranteed. The schools do not meet the

standards and environmental hygiene requirements set out for latrines by regulation 5(3) (c) of Regulations R918 of 30 July 1999 (Regulations R918, 1999: 7).

5.5. Personal hygiene

The standards and the requirements for protective clothing are prescribed in regulation 9 of Regulations R918 of 30 July 1999. Regulation 9 of Regulations R918 of July 1999 prescribes that food handlers should be provided with suitable protective clothing of light coloured material. Suitable protective clothing includes amongst others overalls, aprons, head gears and footwear. A light coloured material is needed for the easy identification of stains and dirt. Light coloured protective clothing can not be worn for several days for they quickly show the dirt in them. Head covering is needed to avoid contamination of the food from hair. Aprons are needed to protect the protective clothing from contamination by handling or carrying of the food. Protective clothing is needed to protect the food from contamination by the food handler during food preparation (Regulations R918, 1999: 12).

The results in table 4.4 show the various types of protective clothing used by food handlers during food preparation. The results show that 61.4% of the schools do not provide their food handlers with the required protective clothing as the regulations prescribe. The food handlers in the schools use personal clothing not prescribed by the health regulations. Section 9 of Regulations R918 of 30 July 1999 prohibits any food handler from handling food without the use of the required protective clothing. Adequate measures to guard and protect food from contaminations are not taken hence food safety in the schools can not be guaranteed. Probabilities of food poisoning outbreaks resulting from food contaminations are high (Regulations R918, 1999: 12).

5.6. Food transportation

The standards and the requirements for vehicles used for food transportation are prescribed by regulations 13(2) and 13(3) of Regulations R918 of 30 July 1999. The two sub-regulations prescribe that a vehicle used for food transportation should have a freight compartment that is dustproof. The sub-regulations prescribe that the food should be transported such that it does not come into contact with the floor of the vehicle, the floor covering or any surface that can be walked on. The vehicle in which the food is transported should be of a design that will prevent food spoilages or dust contaminations. Food contaminations may lead to food poisoning outbreaks that can affect learners in

schools. Food that is not protected from spoilage can also cause stomach ailments that can impact negatively on learners (Regulations R918, 1999: 15).

The results show in table 4.5 that 85.5% of the food in schools is transported in open panel vans and 14.3% of the food is transported in open mini trucks. The types of vehicles used for food transportation are not dustproof and do not have freight compartments prescribed by sub-regulations 2 and 3 of regulation 13 of Regulations R918 of 30 July 1999. Food transported in panel vans and in mini trucks is highly exposed to contaminants such as dust, gas, soot deposit, offensive odours and other impurities in the open. The possibilities of food spoilages during transportation are high. The safety of food can not be guaranteed. Learners can be exposed to dangerous diseases if measures to safeguard food contaminations are not taken. Probabilities of the occurrences of food poisoning are high (Regulations R918, 1999: 15).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

This chapter provides an outline of the researcher's findings and comments that are made to assist in further research. The chapter further provides an overview of the findings and the measures of corrections in areas that are of concern to the researcher.

6.1. CONCLUSIONS RELATED TO THE AIM OF THE STUDY

This was an observational study conducted in Bushbuckridge sub-district to assess the levels of compliance of primary school nutrition programme to standard hygiene requirements as prescribed in Regulations R918 of July 1999.

6.1.1. ASSESSMENT OF FOOD PREPARATION AREA

There was 24.3% compliance of food preparation areas. The kitchens where most of the food was prepared were constructed of materials prescribed by Regulations R918 of 30 July 1999. Food safety and good hygiene can be guaranteed in those schools for they met all the standards and requirements that are laid down by regulation 9 of Regulations R918 of July 1999. Adequate measures to guard and protect food from contaminations were taken (Regulations R918, 1999: 6).

There was 75.7% noncompliance of food preparation areas in schools. The most striking record on noncompliance was that 62.9% of schools used open space for food preparation. The schools were not in compliance with any of the standards and the requirements prescribed by regulation 9 of Regulations R918 of 30 July 1999. Measures to safeguard food contaminations from dust, soot, fumes and other dangerous air contaminants were not taken. Measures to ensure food safety were not in place. Learners who consume food prepared in open spaces are at high risks of contracting various kinds of foodborne diseases that can result to unexplained deaths (Regulations R918, 1999: 6).

6.1.2. ASSESSMENT OF THE STORAGE ROOMS

There was 50% total compliance of store rooms in schools with the nutrition programme. The recorded store rooms were constructed of materials that are prescribed by regulation 5 of Regulations R918 of July 1999. The store rooms were properly constructed and were solely utilized for food storage

purposes. The levels of food safety and hygiene were complimentary. Measures taken to safeguard food contaminations were complimentary (Regulations R918, 1999: 7).

In addition to the 50% compliance, there was a partial compliance of 21.4% where class rooms were converted into storage rooms. The class rooms met all the construction standards and requirements prescribed in regulation 5(3) of Regulations R918 of July 1999. Another partial compliance of 24.3% was recorded where offices were converted into storage rooms. Classes and offices met the construction requirements that are laid down by regulation 5 of Regulations R918 of July 1999 (Regulations R918, 1999: 7).

A noncompliance of 4.3% of storage areas was recorded in schools. The storage rooms recorded were constructed of wooden materials prohibited by regulation 5 of Regulations R918 of 1999. Food safety and good hygiene can not be guaranteed where the construction materials are of wood. Measures to safeguard food from contaminations in such store rooms can not be guaranteed. Maintenances of cleanliness in wooden materials can not be guaranteed due to the absorbtion nature of the wood (Regulations R918, 1999: 7).

6.1.3. ASSESSMENT OF ENVIRONMENTAL HYGIENE

There was 87% noncompliance on soap provision needed for hand washing after visiting the toilets in the schools. There was also 95.7% noncompliance on provision of toiletries needed for aesthetic reasons in the toilets. The schools did not meet the requirements that are laid down in regulation 5(3) (c) which prescribes that soap and toiletries are necessities in a toilet. Good hygiene and food safety can not be guaranteed in the schools. There is a high probability that food handlers may prepare food without hand washing. There are probabilities that learners may consume food by hands that are contaminated from faeces which may also result in food poisoning outbreaks in schools. The schools did not take adequate measures to guard and protect food from hand contaminations during preparations, handling and serving (Regulations R918, 1999: 8).

There were compliances of 13% and 4.3% on soap and toiletry provisions in fewer toilets. Food safety and good hygiene can be guaranteed in the schools provided good hand washing practices are followed by both learners and food handlers in the schools (Regulations R918, 1999: 8).

6.1.4. ASSESSMENT OF PERSONAL HYGIENE

There was 61.4% noncompliance on provision of protective clothing to food handlers who prepare food for the learners in schools. The standards and requirements prescribed by regulation 9 of Regulations R918 of July 1999 were not complied with. Measures of precautions to safeguard food from contaminations were not taken by the schools. Food safety was not maintained and good personal hygiene was not practiced in the schools (Regulations R918, 1999: 12).

There was compliance of 38.6% on the provision of protective clothing. Food handlers were provided with the correct types of protective clothing as prescribed by regulation 9 of Regulations R918 of July 1999. Measures of precautions to safeguard food from contaminations were adequately taken. Food safety and personal hygiene can be totally guaranteed (Regulations R918, 1999: 12).

6.1.5. ASSESSMENT OF TRANSPORT

There was 100% noncompliance on the type of transport needed for hygienic transportation of food. The types of transport used did not meet the standards and the requirements that are prescribed in regulations 13(2) and 13(3) of Regulations R918 of 30 July 1999. The types of transport utilized for food transportation did not have freight compartments prescribed by the health regulations. No precautions were taken to safeguard food contaminations and spoilages. Food contaminations and food spoilages can not be guaranteed during transportation (Regulations R918, 1999: 15).

6.2. LIMITATIONS

The major limitations of the study were the unavailability of data on food poisoning incidences in schools. The unavailability of data in schools impacted negatively to the validity of the research. Data was obtained in hospitals and clinics and not from schools.

6.3. RECOMMENDATIONS

6.3.1. The findings of this study can be utilized to plan for future implementation of the programme. It is therefore recommended that the following should be done to improve implementation of the programme in various Provinces:

- All schools should have kitchens that are approved by health authorities and should be constructed of face bricks and of materials that are not corrosive or absorbent.

- All kitchens used for food preparations should have certificates of acceptability issued by health authorities as required by Regulations R918 of 30 July 1999.
- Store rooms should be constructed of face bricks and of materials that are not corrosive or absorbent.
- Soap and toiletries should always be provided in the toilets and should be maintained clean at all times. Hot and cold running water should be made available for hand washing after visiting the toilets.
- All personnel who handle food should be provided with protective clothing.
- All food handlers should undergo training in food hygiene and food safety.
- Vehicles utilized for food transportation should have freight compartments that are dust proof to prevent food spoilages and dust contaminations during transportation. If a panel van is to be used for food transportation, approval should be sought from health authorities as Regulations R918 of 30 July 1999 prescribes.

6.3.2. FUTURE RESEARCH

Further research should be conducted in high school that have recently been included in the programme to determine the levels of compliance of the school nutrition programme to the standards and the requirements of Regulations R918 of 30 July.

6.4. SUMMARY AND CONCLUSION

School nutrition in Bushbuckridge sub-district, Mpumalanga Province, was assessed to determine the level of compliance to standard hygiene requirements prescribed by Regulations R918 of July 1999.

It is concluded that 62.9% of the kitchens utilized for food preparations in schools do not comply with the standards and the requirements of Regulations R918 of July 1999. Food safety and food hygiene are not in acceptable levels that promote health and the necessary protection needed to safeguard food poisoning outbreaks. Assessments of storage rooms were conducted to determine the level of hygiene and food safety. It is concluded that 4.3% of the store rooms utilized for food storages do not comply with the standards and the requirements of Regulations R918 of July 1999. Assessments of soap and toiletry provisions were conducted to determine compliance with the health regulations. It is concluded that 87% of the schools do not comply with the requirements of soap provision for hand washing in the toilets. It can also be concluded that 95.7% of the schools do not comply with the requirement for

provision of toiletries in the toilet (Regulations R918, 1999: 6-15). Measures to safeguard food contaminations that may have negative impacts to the lives of learners in primary schools are not taken into serious consideration.

Assessment of personal hygiene was conducted where provisioning of protective clothing were looked at. It is concluded that 61.4% of the schools do not meet the standards and the requirements for provisioning of protective clothing prescribed in regulation 9 of Regulations R918 30 of July 1999. Personnel appointed to prepare food for learners were not provided with the required protective clothing (Regulations R918, 1999: 6-15). Measures needed to protect food from contaminations from dirty clothing are not taken to minimize food poisoning outbreaks that may occur due to poor personal hygiene on the part of food handlers.

Assessments of transport utilization were conducted to determine the level of compliance with the health regulations. It is concluded that none of the transport utilized for food transportation meet the standards and the requirements prescribed by regulations 13(2) and 13(3) of Regulations R918 of July 1999 (Regulations R918, 1999: 6-15). Measures needed to protect food from contaminations and food spoilages are not taken during food transportation.

It can generally be concluded that primary schools in which Primary Schools Nutrition Programme (PSNP) is implemented fail to comply with the general standards and hygiene requirements of Regulations R918 of 30 July 1999 which is provided as a tool of guidance for food handling premises.

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