THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT ON THE ADVANCED CERTIFICATE OF SECONDARY EDUCATION (ACSEE) 2023

FOOD AND HUMAN NUTRITION

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155 FOOD AND HUMAN NUTRITION

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FOREWORD

The National Examinations Council of Tanzania is pleased to issue this report on Candidates' Item Response Analysis (CIRA) on the Advanced Certificate of Secondary Education Examination (ACSEE) 2023. This report is aimed at providing feedback to educational administrators, school managers, heads of schools, teachers, students, school quality assurers, and other educational stakeholders on the performance of the candidates who sat for 155 Food and Human Nutrition examination.

The Advanced Certificate of Secondary Education Examination measures the effectiveness and efficiency of the educational system in general, and educational delivery in particular. Basically, the analysis of candidates' responses to the examination questions shows the extent to which the competencies meant to be achieved by students in the subject of Food and Human Nutrition were attained in the two years of advanced secondary education.

The report highlights the factors for the candidates' good performance in most of the topics. The factors include the candidates' ability to interpret the demands of the questions, good mastery of the competencies stipulated in the syllabus, and sufficient practical skills. Likewise, the report highlights the reasons for the weak performance on the few topics. These include inability to interpret the demands of the questions, lack of mastery of the subject content and inadequate practical skills.

The feedback provided in this report is expected to enable educational stakeholders to take appropriate measures to improve teaching and learning in this subject. This will eventually improve the candidates' performance in the coming years.

Finally, the National Examinations Council of Tanzania is grateful to all who participated in the preparation of this report.

Dr Said Ally Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report analyses the performance of the candidates who sat for the Advanced Certificate of Secondary Education Examination (ACSEE) 2023 in Food and Human Nutrition paper 1, 2 and 3. The examination was set in accordance with the 2019 ACSEE Food and Human Nutrition format based on the 2009 Advanced Certificate of Secondary Education Examination (ACSEE) Food and Human Nutrition syllabus.

The number of candidates who sat for this examination was 281. Among them, 279 (99.29%) candidates passed by scoring grades B (4), C (95), D (133), E (42) and S (5). However, 2 (0.71%) candidates failed the examination by scoring grade F. Statistics show that the candidates' performance in 2023 has slightly dropped by 0.37 per cent from the performance of 2022 where 289 (99.66%) passed. The comparison of the candidates' performance between 2022 and 2023 is illustrated in Appendix C. Section 2 is on the analysis of the candidates' performance in each question.

The performance is analysed into three categories for each question or topic. The performance is considered good if the percentage of the candidates who passed ranges from 60 to 100, average if it ranges from 35 to 59, and weak if is from 0 to 34. Furthermore, green, yellow and red colours are used in figures, tables, and appendices to indicate good, average and weak performance respectively.

The candidates' performance in each topic is analysed in section 3.

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN EACH QUESTION

The performance of the candidates in each question is analysed by indicating the topic, the demand of the question, candidates' performance and how they responded. The analysis also highlights the strengths and weaknesses observed in candidates' responses and some possible reasons. Samples of responses extracted from the candidates' scripts are inserted to support the explanation on how the candidates responded. In addition, figures and tables that indicate the distribution of candidates' scores are used for illustration. The analysis for each question is provided under the following sub-sections:

2.1 155/1 FOOD AND HUMAN NUTRITION PAPER 1

This paper consisted of two sections namely: A and B. Section A comprised 6 (1 - 6) short - answer questions carrying 10 marks each. Section B comprised 3 (7 - 9) essay questions which carried 20 marks each.

2.1.1 Question 1: Food Quality and Safety

This question measured the candidates' competence on food quality. The question stated;

In order to produce high quality and safe food products, a proper control in the whole chain of production starting from raw materials to the final products is very important. In view of this statement, briefly explain:

(a) The role of the following agents in ensuring that food quality and safety is met and maintained.

(i) the government

(ii) food companies

(iii)customers.

(b) The rationale for quality management systems to a food production organization. *Give two points*.

The question was attempted by all 281 (100%) candidates. Data show that 3 (1.10%) candidates scored from 6.0 to 7.0 marks and 101 (35.90 %) scored from 3.5 to 5.5 marks. Furthermore, 177 (63.00%) candidates scored from 0.0 to 3.0 marks. This performance is summarised in Figure 1.

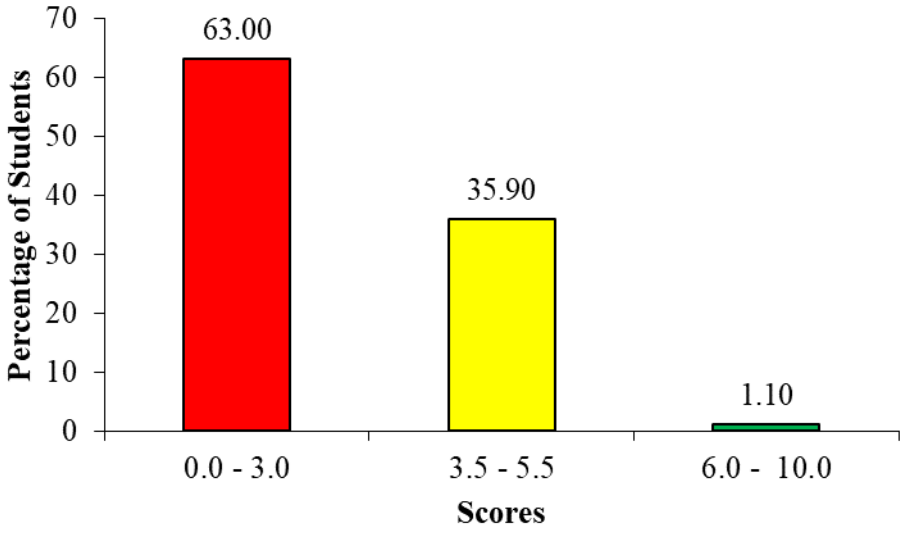


Figure 1: *Candidates' Performance on Question 1*

Figure 1 shows average performance since only 37.00 per cent of the candidates passed by scoring from 3.5 to 10.0 marks. The data indicate that the highest score was 7.0 marks.

The candidates with good performance were aware that the government is responsible for enacting laws and regulations through various established agencies, hence in part (a) (i) they gave correct explanations such as:

> *the government plays a great role since is the one which established the bureau of standards example Tanzania Bureau of Standards (TBS) which is there to inspect all the products, to enact the laws and regulations on food safety and quality, to guide the food companies on how they maintain quality of their products, to make sure that people are not purchasing unsafe foods, the government should establish the institutions to control and monitoring the food industries to ensure that food produced is of good quality and safety to the consumer, to formulate food laws which should be followed by food producers to produce high quality and safe food products.*

In part (a) (ii), they understood that the food company is responsible in making sure that the food is in the recommended quality and is safe. Some of the correct responses were;

> *to make sure that quality assurance on the processing products is maintained and observed, make sure that the produced products is produced though good manufacturing practices by having the good*

stuffs who will produce quality products, *make sure that customers satisfaction is met by producing food of their demand basing on the quality required, food companies should follow the rules and regulations of food processing institutions like TBS in order to ensure that food is of good quality, through producing the food products which are fit for the human consumption, observe the food law and test if there is any unwanted material in the food and eliminate it before it reaches to the customers*.

Similarly, in part (a) (iii), they were aware that in purchasing food products, customers must consider the safety and quality of the foods they purchase and they have to know the instructions on handling, storing, preparing and using the food such as;

to inform the government about the products that does not meet standards according to the established one; by purchasing food products that seem to be approved by TBS; stop buying unapproved food products; read the instruction well about the food in order to know what is the date of expire or what ingredients used to make a certain product; during purchasing should check whether the food is of good quality or not and give out a report to the responsible agent; follow the given instruction on the use of the product to maintain safety of the products, proper storage of the food product.

In part (b), most of the candidates correctly explained the rationale for quality management systems in a food production industry. However, some of the candidates provided partial responses, hence failed to score full marks while others repeated writing the same points. For example, one candidate wrote; *ensure safety of food, control food hazard* which means the same. Another one wrote; *satisfy customers' needs, attracts buyers as meets their desire*, *quality products produced*, *high standard service delivered* which are only two points. It was also observed that others mentioned the correct point but provided incorrect explanation. Extract 1.1 is a sample of partially correct responses from one of the candidates.

1. a) The role of the following agents in ensuring that food quality and safety is met and maintained:

i) The government.

The government has the role of ensuring that all the industries concerned with food manufacturing and processing activities are supervised and are doing all their activities under regulations and legislations that are abiding by the law. These include inspection should be done by authorities such as TBS and TFDA so as to ensure food quality and safety.

ii) Food companies.

The food companies has the role of ensuring that their industries are registered and are known and they are doing their activities legally. Also they are responsible to ensure the safety and quality of the food by the use of correct tools and machines which cannot affect the development process.

iii) Customers.

The customers inorder to ensure the quality and safety of the product, the customer should ensure that the product bought has got all the informations requires on the food label, such as date of manufacture and expiry so as to avoid consoming of either expired or destroyed food.

1. b) i) Quality control.

This enables to ensure that the final product has got no any defects or damages.

ii) Quality assurance.

This enables to facilitate the process of the manufacturing product by avoiding any defect that would occur in the product.

Extract 1.1: A sample of the partially correct responses to Question 1

In Extract 1.1, the candidate managed to explain correctly the role of government, food company and customers in ensuring that food quality and safety is met and maintained in part (a). In part (b), the candidate provided

only one correct rationale for quality management systems to an organisation.

Though the general performance was average, 177 (63.0%) candidates had weak performance. Among them, 26 (9.3%) candidates scored zero. In part (a), some of these candidates misunderstood the demand of the question, hence provided irrelevant responses and others stated the action to be taken by the government, food companies and customers instead of the roles of the mentioned agents in ensuring food quality and safety is improved and maintained. For example, one candidate wrote; *the government to use improving technology which will help on the production of safe processed foods, food companies to avoid the use of harmful environment and customers to avoid the use of harmful environment that will cause harm to the consumer*.

Other candidates provided incorrect responses to all items in part (a) of the question, which means they had insufficient knowledge. For example, one candidate wrote;

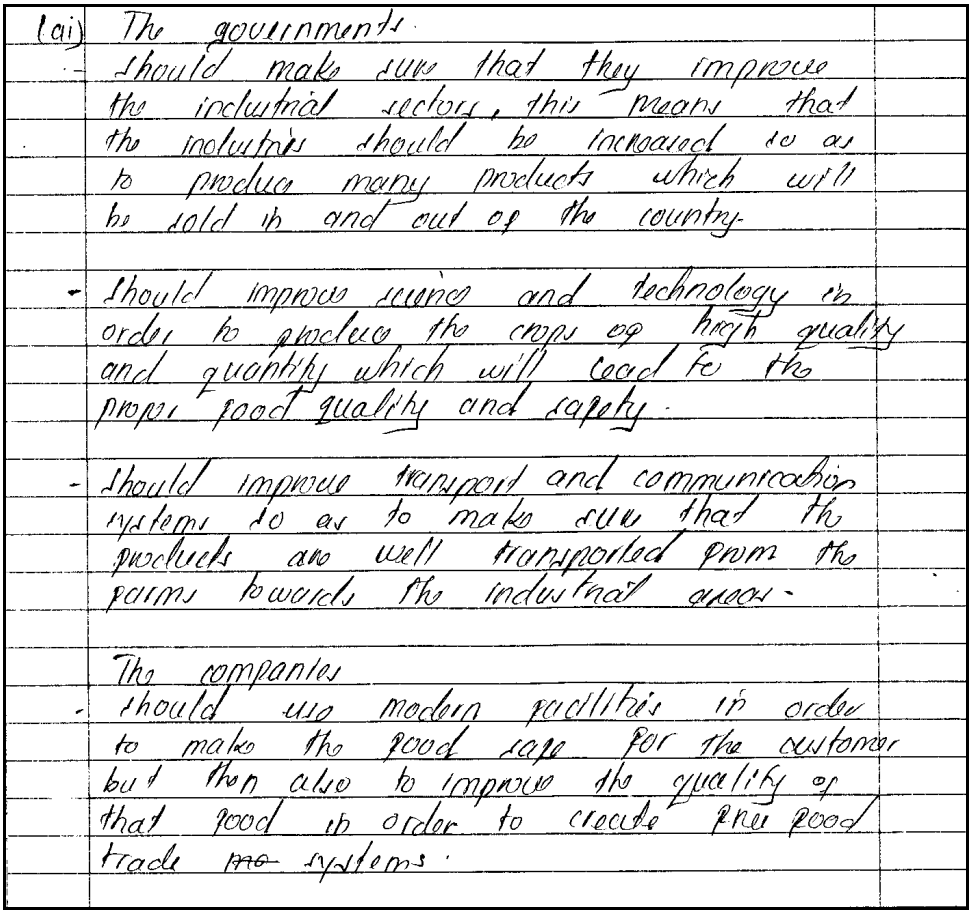
> *provision of education on the use of pest control during the food storage*, *the government to ensure proper storage of the seeds for future use* and government *to provide facilities to remove the microbes*. Another one wrote; *minimization of cost of pesticides*, *government to encourage farmers to produce high amount of food*, *production of pest that will be effective in killing and control pests*.

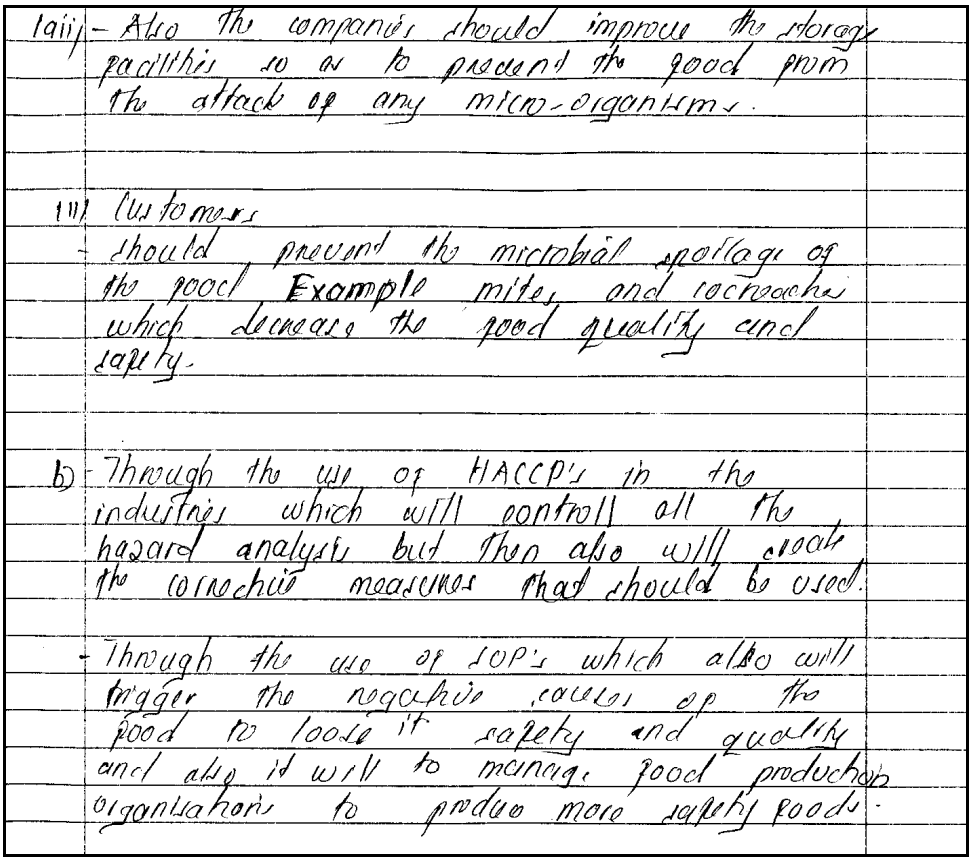
Another wrote; *give limitation on consumption*, *government to provide education about agricultural system*, *the government to emphasize on construction of infrastructure*, *the government should introduce new science and technology* in part (a) (i). In part (a) (ii), one candidate wrote; *food companies should emphasize farmers about the seeds which are good*, *food companies should compete to produce good product*, *the companies to facilitate food fortification*, *the companies should emphasize the farmers in the use of modern fertilizers*. In part (a) (iii), one candidate wrote; *the customer should produce/ consume varieties of food products*, *the customer store food, customers to use food according to the budgeting*, *customers to produce high amount of food*.

In part (b), some of the candidates misunderstood the question, hence they provided incorrect responses. Some of the incorrect responses were;

It helps on ensuring that there is fair food trade as through good quality management system, food production will generally enable on the ensuring of the trade with no any means of the barriers as the food product to be sold are with good quality and are at higher standard, governmental support to the food production organisation, provision of funds to the food production organisation, should be in a well classable part to attain its quality, should be non-toxic to avoid reaction to human body.

Few candidates outlined the ways of keeping food grains safe instead of the rationale for quality management systems in a food production industry. Others left the part unanswered. This shows that these candidates had inadequate knowledge on food quality and safety. Extract 1.2 is a sample of responses from one of the candidates with weak performance.


(ai) The governments
- should make sure that they improve the industrial sectors, this means that the industries should be increased so as to produce many products which will be sold in and out of the country.
- should improve science and technology in order to produce the crops of high quality and quantity which will lead to the proper food quality and safety.
- should improve transport and communication systems so as to make sure that the products are well transported from the farms towards the industrial areas.
- The companies should use modern facilities in order to make the good safe for the customer but then also to improve the quality of that food in order to create new food trade ~~ma~~ systems.



Extract 1.2: A sample of incorrect responses to Question 1

In Extract 1.2, the candidate mentioned the techniques to be used to improve food production in all items in part (a) instead of the rationale for quality management systems in a food production organisation. In part (b) the candidate briefly explained the techniques to be used to maintain food safety and quality.

2.1.2 Question 2: Food Processing and Preservation

This question tested candidates' competence on thermo-processing. The question was;

Suppose you were invited to give a presentation in a short training on thermo-processing of vegetables by canning method. Illustrate five basic steps you would include in your presentation for the industrial production of high quality canned vegetables.

The question was attempted by 281 (100%) candidates. The analysis indicates that 229 (81.50%) candidates scored from 0.0 to 3.0 marks,

among them 86 (30.60%) scored zero. A total of 43 (15.30%) scored from 3.5 from 5.5 marks while 9 (3.20%) scored from 6.0 to 10 0. Figure 2 illustrates this performance.

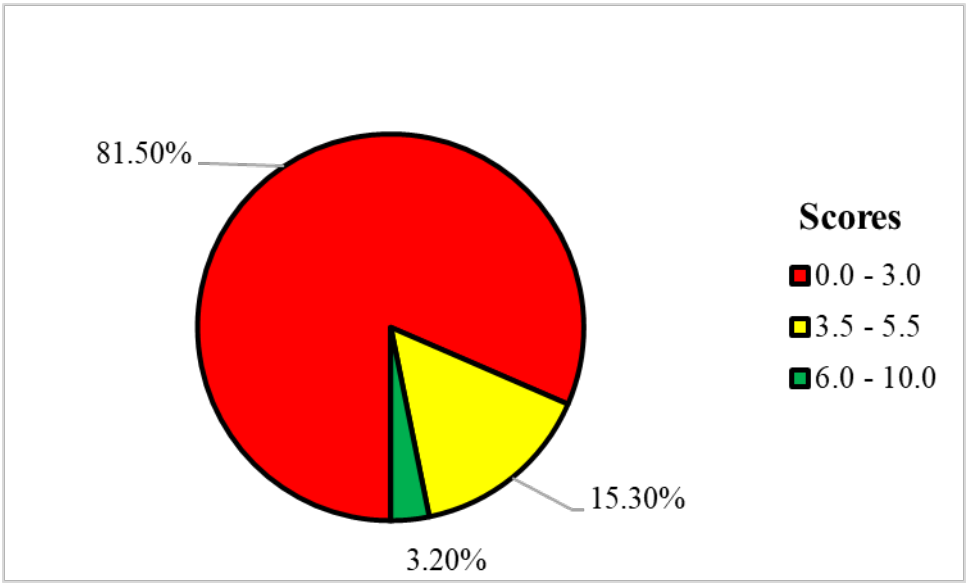
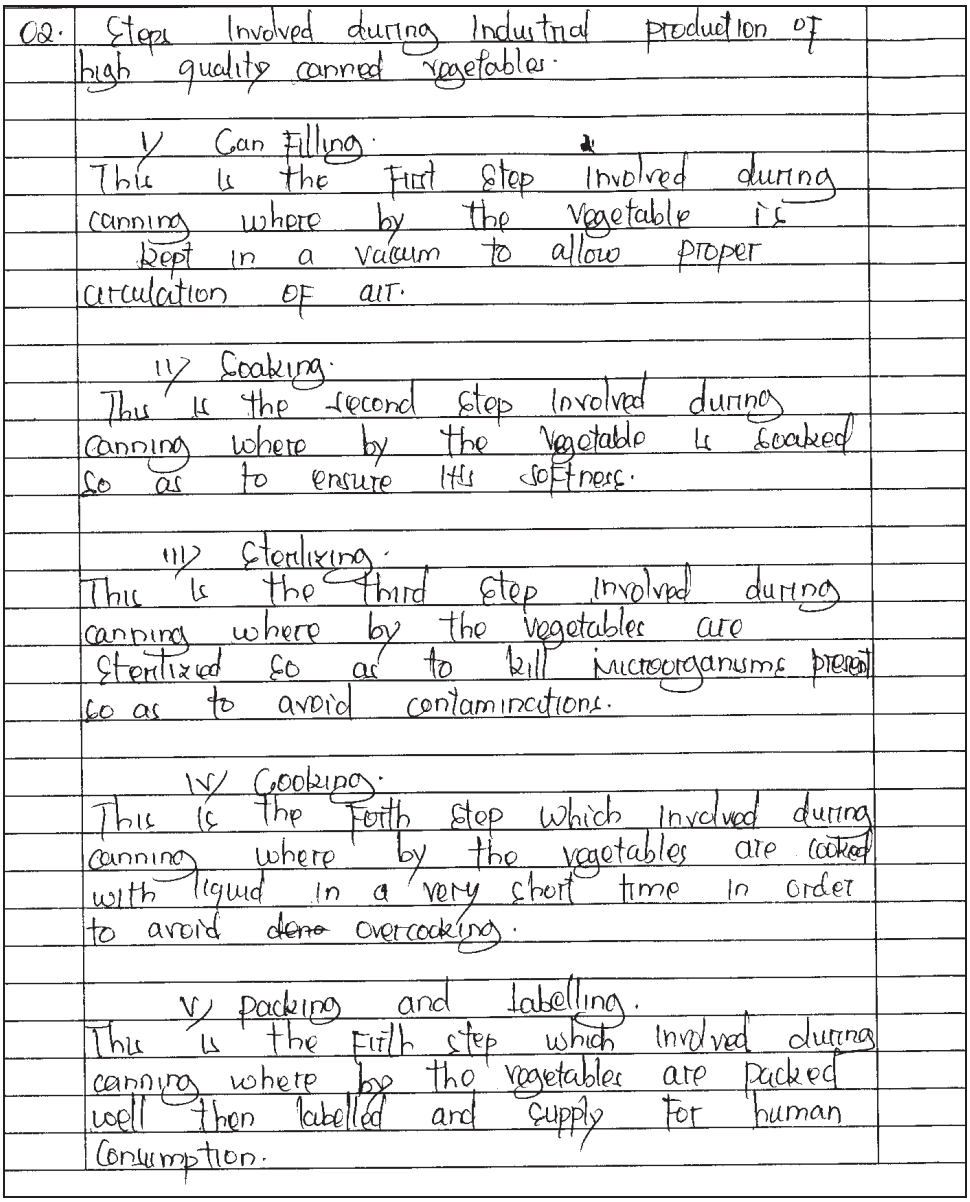


Figure 2: *Candidates' Performance on Question 2*

Figure 2 shows that the general performance of the candidates was weak, since 81.50 per cent had weak performance.

Candidates' responses indicate that the majority of the candidates with weak performance (0.0 to 3.0 marks) provided responses that were not in a sequential order. This means they were not aware that thermo-processing is a series of actions conducted in a certain order, thus the steps should be arranged chronologically. These candidates mixed up the steps, hence they scored low marks. For example, one candidate wrote; *can filling*, *brining*, *sterilization*, *cooking*, *packing*. Another candidate wrote; *washing*, *preparation*, *soaking*, *sterilization*, *labelling and packing*. A few of them misinterpreted the demand of the question. For instance, one of the candidates explained the basic principles of Hazard Analysis and Critical Control Points such as; *Conduct hazard analysis and identification, determine critical control point, establish critical limit, establish monitoring procedure, establish corrective action* instead of that steps that are to be followed in thermo-processing of vegetables by canning method. Other candidates provided responses which are not related to the steps to be followed in thermo-processing. For example, one of the candidates wrote; *removing of the unwanted vegetables and rotted ones*, *washing of the*

vegetables using running water, cut the vegetables using a sharp knife, applying the food preservations in the vegetables and use clean and aluminium container to store the vegetables. This candidate demonstrated inadequate knowledge about thermo-processing of vegetables. Extract 2.1 illustrates such responses.


Q2. Steps Involved during Industrial production of high quality canned vegetables.

I/ Can Filling.
This is the First Step Involved during canning where by the vegetable is kept in a vacuum to allow proper circulation of air.

II/ Soaking.
This is the second step involved during canning where by the vegetable is soaked so as to ensure its softness.

III/ Sterilizing.
This is the third step involved during canning where by the vegetables are sterilized so as to kill microorganisms present so as to avoid contaminations.

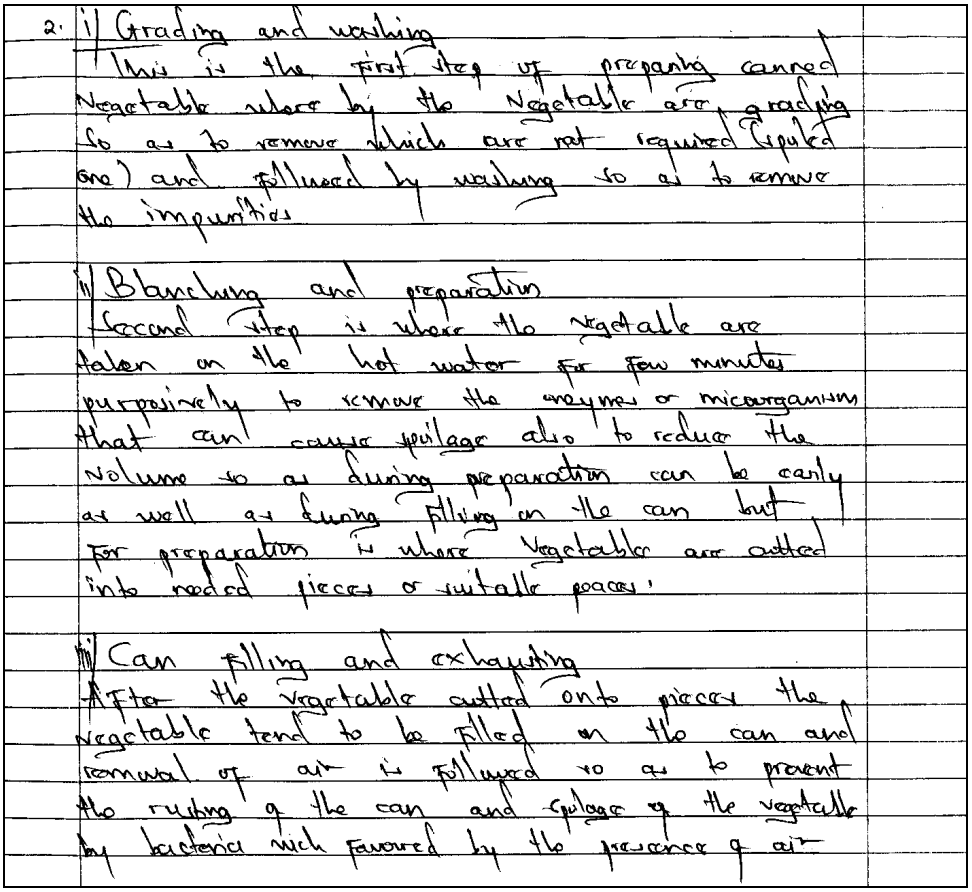
IV/ Cooking.
This is the Forth step which involved during canning where by the vegetables are cooked with liquid in a very short time in order to avoid ~~done~~ overcooking.

V/ packing and labelling.
This is the Fifth step which involved during canning where by the vegetables are packed well then labelled and supply for human consumption.

Extract 2:1: A sample of incorrect responses to Question 2

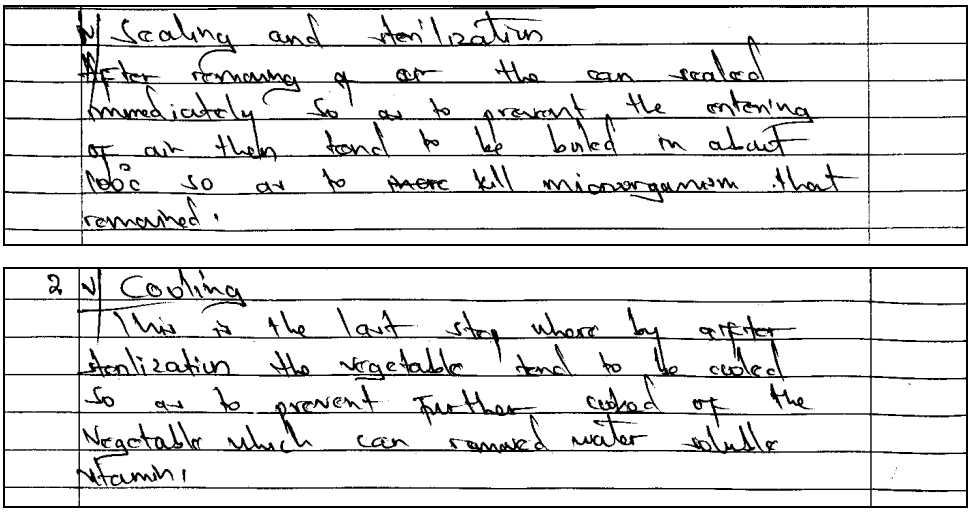
In Extract 2.1, the candidate misinterpreted the question. Hence, he/she provided some activities which can be done by canning instead of the basic steps of processing vegetable by canning.

Moreover, the analysis shows that 18.50 per cent of the candidates who scored from 3.5 to 10.0 marks had adequate knowledge about thermo-processing of vegetables by canning method. These candidates were knowledgeable of the basic steps to be followed and they managed to state them clearly. For example, one of the candidates wrote; *washing or cleaning*, *preparation*, *can filling*, *sealing and heat processing and cooling*. However, some of them failed to provide the required number of correct points. Others managed to mention the correct steps but they wrongly explained them. Extract 2.2 is a sample of correct responses from one of the candidates.


2. i) Grading and washing
This is the first step of preparing canned Vegetable where by the Vegetable are grading so as to remove which are not required (spoiled one) and followed by washing so as to remove the impurities

ii) Blanching and preparation
Second step is where the vegetable are taken on the hot water for few minutes purposively to remove the enzymes or microorganisms that can cause spoilage also to reduce the volume so as during preparation can be easily as well as during filling on the can but for preparation is where Vegetables are cutted into needed pieces or suitable pieces.

iii) Can filling and exhausting
After the vegetable cutted onto pieces the vegetable tend to be filled on the can and removal of air is followed so as to prevent the rusting of the can and spoilage of the vegetable by bacteria wich favoured by the presence of air



Extract 2.2: A sample of the correct responses to Question 2

In Extract 2.2, the candidate managed to illustrate some correct basic steps to be followed in thermo-processing of canned vegetables.

2.1.3 Question 3: Food Production

This question measured candidates' competence on food security. The question stated;

Household food security is an important aspect in achieving good nutritional status. Support this statement by;

(a) briefly explaining three basic components of household food security.

(b) Identifying four qualitative conditions for adequate nutrients supply for active and health life.

This question was attempted by 281 (100%) candidates. Out of them, 120 (42.70%) scored from 0.0 to 3.0 marks, 146 (52.00%) scored from 3.5 to 5.5 marks, and 15 (5.30%) scored from 6.0 to 7.5 out of 10.0 marks. The candidates' performance is summarised in Figure 3.

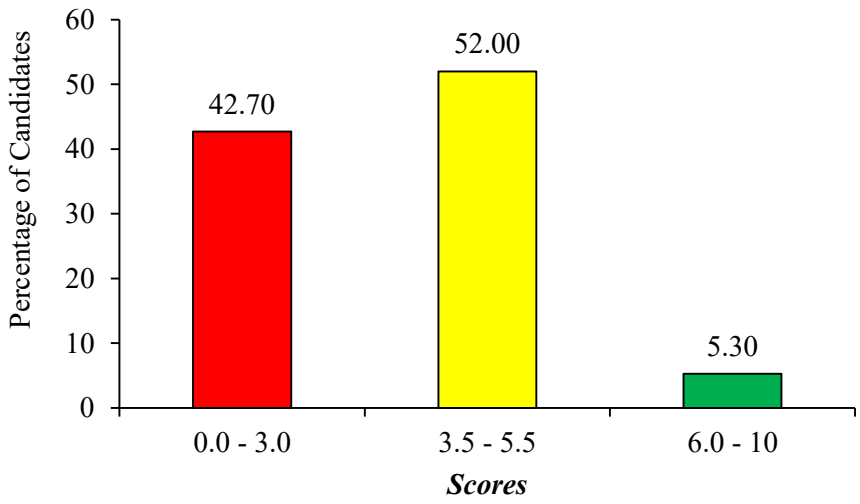


Figure 3: *Candidates' Performance on Question 3*

The distribution of candidates' scores presented in Figure 3 shows that the candidates' performance was average since 57.3 per cent scored above 3.0 marks.

The analysis shows that, the candidates (5.30%) with good performance had adequate knowledge about food production, especially household food security. In part (a), the candidates were aware of the basic components of household food security such as adequate food availability, accessibility of food, stability of food supply, use/consumption and utilization of food within the household. For example, one candidate wrote; *food accessibility, food use* and *food stability*. Another candidate wrote; *food utilization, sustainability* and *food availability*.

In part (b), most of the candidates provided correct explanation on the qualitative conditions for adequate nutrient supply for active and health life. They understood that the food should provide: nutrients suitable for different body activities; nutrients for maintaining good health and nutrients that are not contaminated. Some of the candidates mixed incorrect and correct responses hence, failed to score all the 10 allotted marks in this question. Extract 3.1 is a sample of some correct responses from one of the candidates.

3 that the food will be available in the house as when food production is high also the availability of food is high. Example if the household have a farm and conduct food production and have proper storage faulities to ensure the food is safe this indicate that the family has food availability.

ii) Food accesibility.

This is the accesibility of food socially and economicall to the household.

Social accesibility of food involve the consumption or accesible to the food which have high quality so as when consumed by an individual provide all essential nutrients of a particular food required to have as it has high quality.

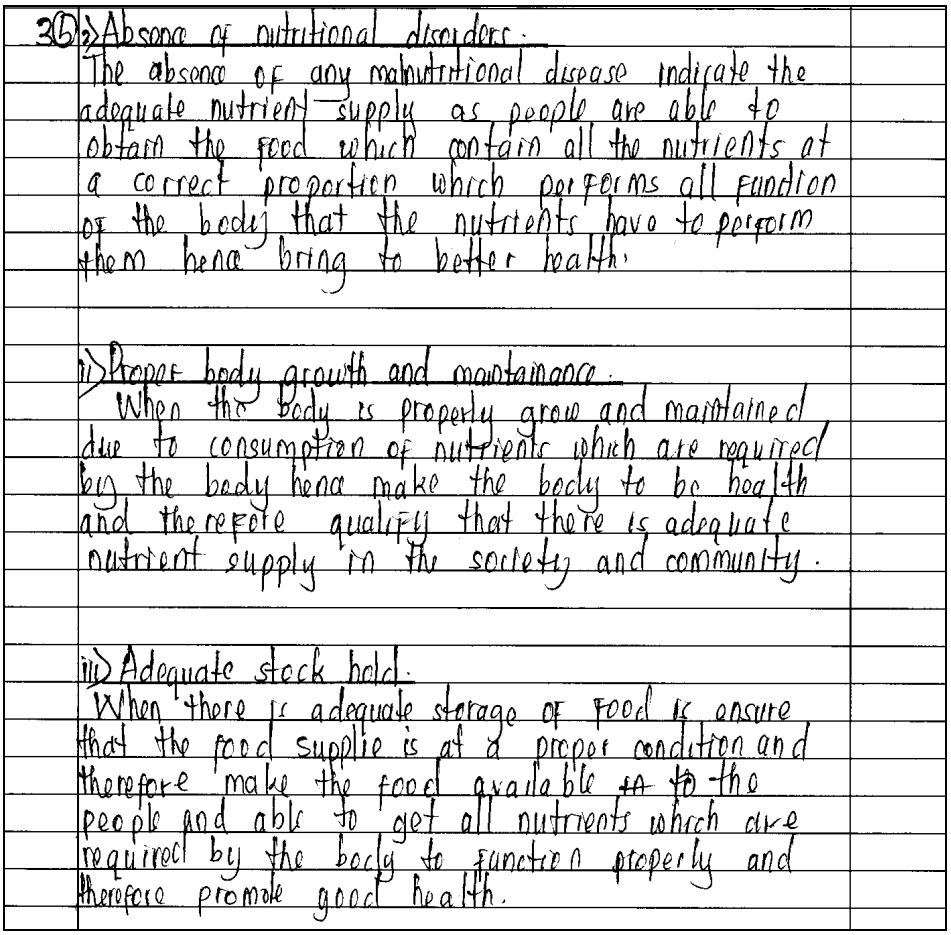
Example: The nutrients found in maize of high quality will be high compared to those with low quality.

In economic accesibility the household have to be with good economic condition to be able to purchase the food everytime when they are in need of and the food of high quality with all nutrients.

iii) Food use and utilization.

This is one among the component of household food security which involve the use of the food properly without wastage of the food for unnecessary uses as well as utilization of the food which

3. contain all the nutrients that the food must have and the body will utilize it and provide the body with several function example help in growth and maintainance, prevention of the body against diseases as well as provide the body with energy.



Extract 3.1: A sample of the correct responses to Question 3

In Extract 3.1 the candidate provided basic components of household food security in part (a), two correct and one incorrect qualitative condition for adequate nutrients supply for active and health life in part (b).

Meanwhile, 42.7 per cent of the candidates attained weak performance, hence exhibiting that they had inadequate knowledge about household food security. In part (a), some of them misunderstood the demand of the question. For example, one candidate explained the factors that affect food availability and accessibility at the household level instead of the components of household food security. The responses were; *low food production*, *poor food storage, food use*. Other candidates provided irrelevant responses due to inadequate knowledge on the tested matter such as; *purchasing power or income, storage facilities, food gain, storage power, food production, food storage, poverty, resources, household members, taking care of food available, good storage facilities, good*

economic status, high food production practices. Others provided 1 correct points with unsatisfactory explanations.

In part (b), most of the candidates failed to provide the correct responses. Some of them misinterpreted the question's requirements. For example, a few stated techniques to be applied in order to improve food production instead of the qualitative conditions for adequate supply of nutrients needed for active and health life. Instead, they wrote; *provision of education, proper crop rotation, irrigation system, availability of agricultural inputs, use of insecticides, increase of food production, use high quality seed, apply shift cultivation, use tractor during cultivating.* Others provided irrelevant responses such as *should be non-toxic*, *should not produce any unpleasant flavour and odour*, *should have ability to hold gases*, *should not cause harm when consumed by the people*, *increase production of food*, *food storage*, *price control*, *planting of home garden, good financial status of the family, nutritional education, maintenance of hygiene, good cooking methods*. Besides, some of the candidates left this part unanswered. This is indicative of their lack of enough knowledge on food security. Extract 3.2 is a sample of responses from a candidates under this category.

3. Food security means acess by all people at all times to enough, safe and sufficient food (in terms of quality, quantity) for an active and healthier life.

(a) COMPONETS OF FOOD SECURITY.

(i) Sanitation,

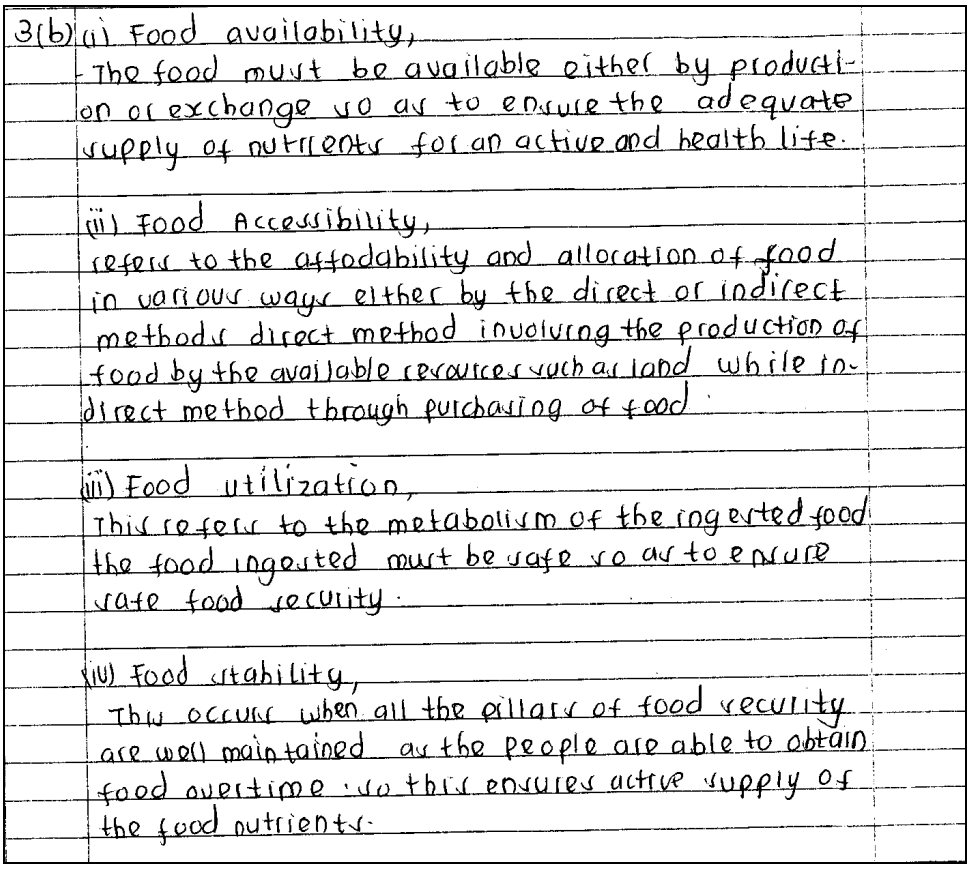
This is one of the most important aspect in food security as the cleanliness should be well practised so as to ensure the food digested and ingested to be safe for consumption.

(ii) Adequate supply of clean and safe water,

- This is among the componets of the food security as water should be readily available and should be safe so as to avoid the spread of diseases and different infections such as typhoid, cholera.

(iii) Adequate health facilities,

- There must be health facilities which are readily available so as to ensure safety among the consumer and in case of any case there should be regular attending of the health facilities.


3(b) (i) Food availability,
The food must be available either by production or exchange so as to ensure the adequate supply of nutrients for an active and health life.

(ii) Food Accessibility,
refers to the affodability and allocation of food in various ways either by the direct or indirect methods direct method involving the production of food by the available resources such as land while indirect method through purchasing of food.

(iii) Food utilization,
This refers to the metabolism of the ingested food the food ingested must be safe so as to ensure safe food security.

(iv) Food stability,
This occurs when all the pillars of food security are well maintained as the people are able to obtain food overtime so this ensures active supply of the food nutrients.

Extract 3.2: A sample of incorrect responses to Question 3

In Extract 3.2, the candidate provided some underlying causes of malnutrition instead of the basic components of household food security in part (a). In part (b), the candidate wrote pillars of food security instead of qualitative conditions for adequate nutrients supply for active and health life.

2.1.4 Question 4: Food Storage

This question measured the candidates' competence on food crop spoilage and deterioration. The question stated;

Farmers in your village are complaining that a large amount of food crops is lost after harvesting as a result of spoilage and deterioration. Assist them to control the situation by briefly explaining;

(a) three causes of food crop spoilage and deterioration.

(b) three indicators of spoiled and deteriorated food crops.

(c) four control measures of food crop spoilage and deterioration.

The question was attempted by 281 (100%) candidates who sat for the examination. The analysis shows that 15 (5.30%) candidates scored from 0.0 to 3.0 marks, of whom 5 (1.80%) scored 0.0. Moreover, 55 (19.60%) candidates scored from 3.5 to 5.5 marks and 211 (75.10%) scored from 6 to 10.0 marks. Figure 4 illustrates the performance.

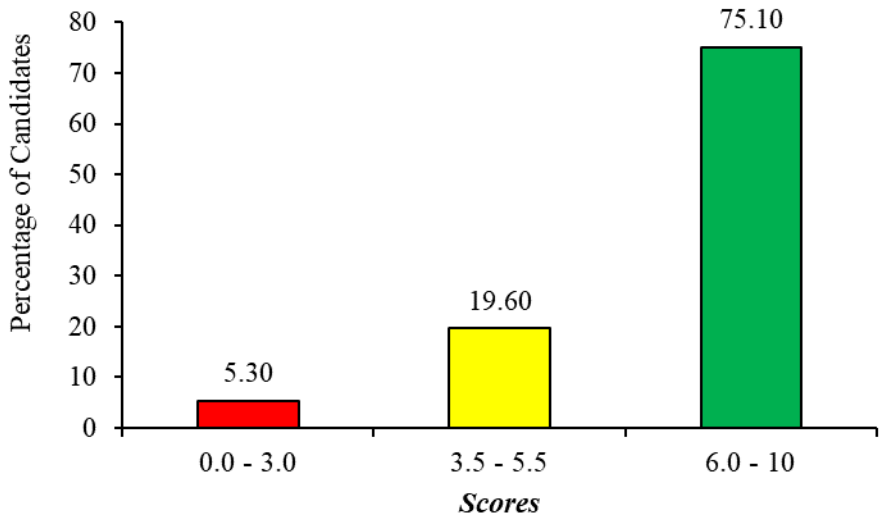


Figure 4: *Candidates' Performance on Question 4*

Based on the analysis in Figure 4, the general performance of the candidates was good as 94.70 per cent of them scored above 3 out of 10.0 marks allocated to this question.

The analysis of the candidates' responses indicates that the candidates (75.10%) with good performance had adequate knowledge about the concept of food crop spoilage and deterioration. In part (a), some candidates were able to explain the causes of food crop spoilage and deterioration. These candidates understood that moisture contents, reaction of the food with oxygen, physical stress or abuse, inappropriate temperature, presence of microorganisms, light and activity of food enzymes cause food spoilage and deterioration. Some of the responses provided were; *biological causes*, *physical causes*, *store food crop with moisture content, poor storage that favour infestation by rodents, poor sanitary measures that cause self-heating by high temperature, activity by enzymes, chemical causes, poor crop management, infestation by pests,*

climatic condition like high temperature, rodents and insects. They also managed to explain indicators of spoiled and deteriorated food crops in part (b). These candidates understood that gas production, sour odours, off odours and tastes, discoloration, slime production on the surface, surface stickiness and fat decomposition are indicators of spoiled and deteriorated food. Some of their responses were; *bad odour*, *bitter or sour flavour, bad texture, different texture from the origin, change in colour, change in texture, change smell, slipper of food, presence of fermented smell, presence of dark sport.* Likewise, in part (c) the candidates managed to explain measures to be taken to prevent food from spoilage and deterioration. They understood that food spoilage is successfully prevented by controlling its causes. Some of their correct responses were *through proper sanitation measures, to prevent rodents, proper storage of food, proper drying of food crops, proper control of insects, rodents, mites during storage, proper storage facilities, proper sanitary measures and hygiene.* Extract 4.1 is a sample of correct responses from one of the candidates

04(a) (i) Microorganisms such as bacteria.
This causes the biological deterioration of which the food crop will be attacked by microorganism

(ii) External factors such as temperature
The high temperature in food

04(a)(ii) it leads to food burning as a result of destruction of food and seed coat. Example in maize and beans.

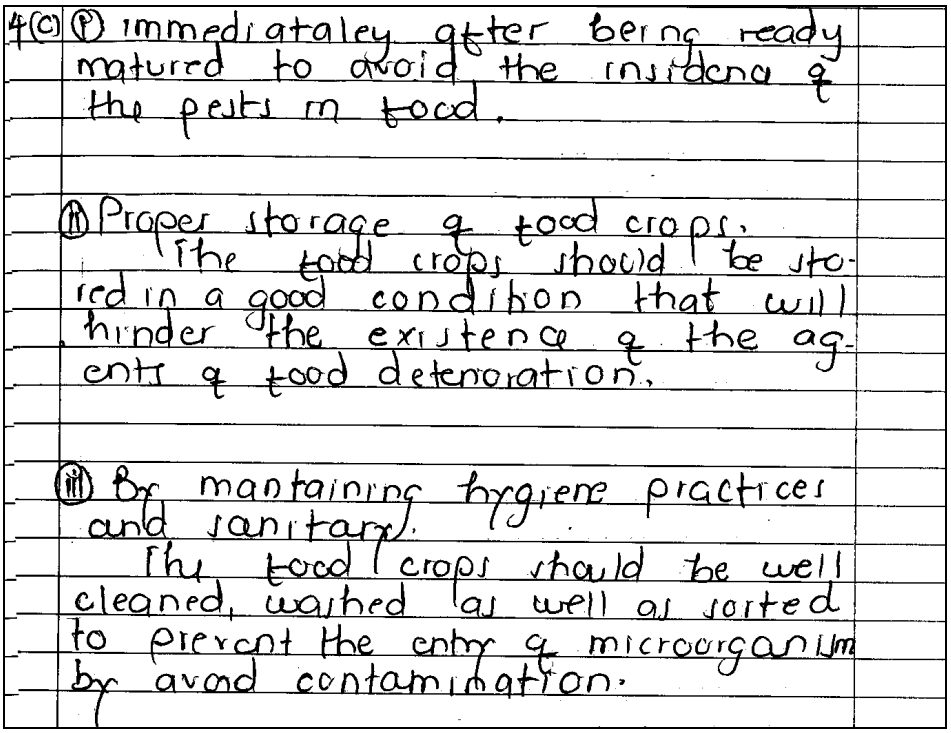
(iii) Natural, physical and chemicals changes that occurs in food. The natural changes occurs without any causes as due to activation of enzymes in food crop.

(b) (i) The change of sensory properties of the food that is colour, smell and taste. Example maize crops became brown with different smell of fresh maize.

(ii) The decrease of size of food crops.
Food crops become with the small size different from its original size due to invidence of insects into the food crop. Example the shrinking of Irish potatoes.

(iii) The presence of germination in some food crops as well as sprouting.
The food crops starts to develop the young of the food crop, this indicate spoiled of food crops. Example the cereals and legumes as well as tubers.

(c)(i) Timely harvest of food crops
The food crops should be harvested



Extract 4.1: A sample of the correct responses to Question 4

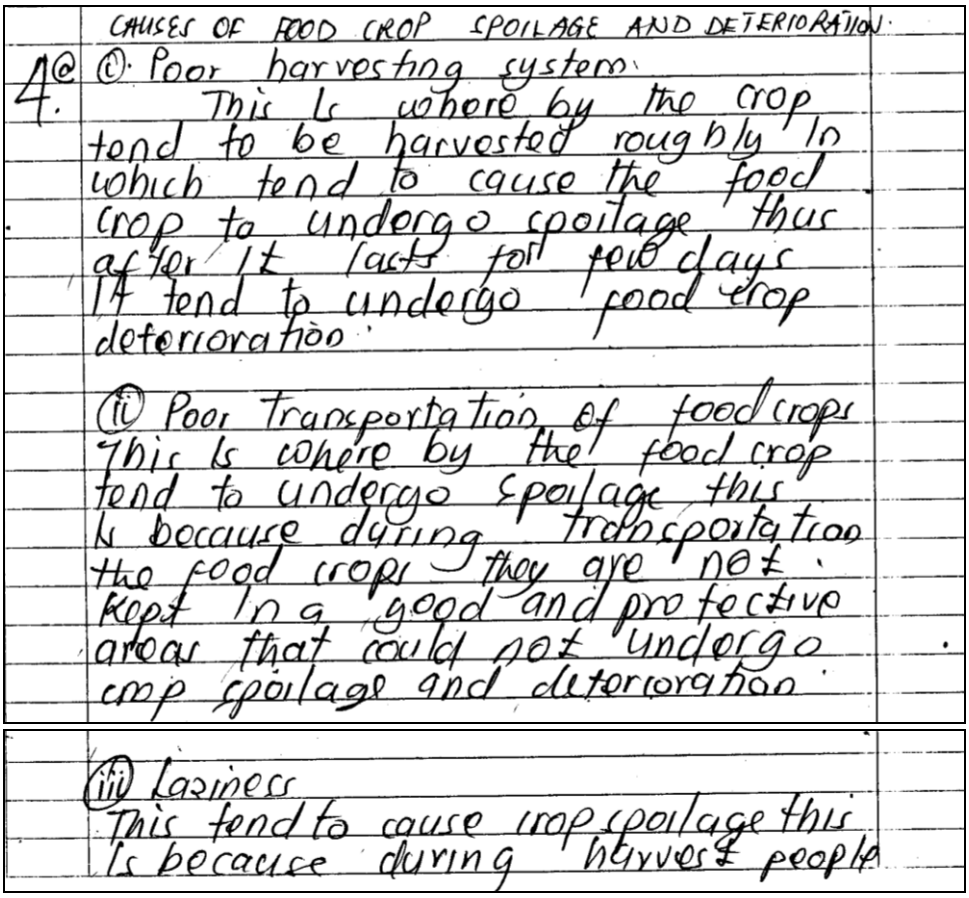
Extract 4.1 is a sample of responses from a candidate who correctly explained three causes of food crop spoilage and deterioration in part (a), three indicators of spoiled and deteriorated food in part (b) and three measures to control food crop spoilage and deterioration in part (c).

The analysis further shows that 5.30 per cent of the candidates had weak performance. Most of these had inadequate knowledge about food crop spoilage and deterioration. Others misunderstood the demand of the question, hence they provided irrelevant responses. For example, in part (a), some of the candidates provided types of food spoilage instead of causes of food crop spoilage and deterioration such as *chemical spoilage, physical spoilage*, *microbial spoilage*. Others wrote down incorrect causes such as *poverty, ignorance, laziness, poor storage, use of insecticides, lack of storage facilities, poor storage structure, poor food use, poor food security*.

In part (b), the majority of the candidates misinterpreted the question, hence they failed to give the indicators of food crop spoilage and deterioration. They provided a variety of incorrect responses such as: *development of small holes in the food crop*, *quality loss*, *safety loss*, *excess production,*

source of energy, can cause abdomen pain, rapid growth than normal, vitamins and minerals loss, growth in larger quantities, synthesis of enzymes, inhibit absorption of nutrients, cause food poisoning.

In part (c), some of the candidates stated methods for controlling rodents, instead of the control measures against food crop spoilage and deterioration. For example, one candidate wrote; *use of rodenticides*, *avoid prolong harvesting*, *use of rodent proof*, *use of traps*. Other candidates provided irrelevant responses such as *hanging materials on the farm that resembling like human being*, *taking care of food crops*, *irrigation*, *application of fertilizers*, *crop replacement*, *change cultivation*. The candidates who scored from 1.0 to 3.0 marks in this question managed to give 1 or 2 correct response(s) in any part but they failed to provide correct explanations. A number of them mixed correct and incorrect responses. This indicates that they had inadequate knowledge of the subject matter tested. Extract 4.2 is a sample of responses provided by one of the candidates under this category.


CAUSES OF FOOD CROP SPOILAGE AND DETERIORATION.

4@ (i) Poor harvesting system.
This is where by the crop tend to be harvested roughly in which tend to cause the food crop to undergo spoilage thus after it lasts for few days It tend to undergo food crop deterioration.

(ii) Poor Transportation of food crops
This is where by the food crop tend to undergo spoilage this is because during transportation the food crops they are not kept in a good and protective area that could not undergo crop spoilage and deterioration.

(iii) Laziness
This tend to cause crop spoilage this is because during harvest people

4@ not to attend the harvest thus the crops could be well attained under proper protection Instead Involve themselves In poor business such as robbery and theft

4b. INDICATORS OF SPOILED AND DETERIORATED FOOD CROPS.

(i) Crop failure.
This is one among the Indicators of crop spoilage this is because if the crop is well harvested it tend to undergo spoilage is due to poor selection of the crop tend to not have proper collaration to the type of soil thus caused to fail and thus undergoes spoilage

(ii) Climatic conditions
This is where by In the climatic condition this is where by some crops tend to afford high climatic condition is when they germinate thus if there is no proper climatic condition it is when it undergoes spoilage and then later tend to deteriorate

(iii) Infestation of pests and insects.
This is where by also In many area when they tend to keep their food crops tend to happen high Infestation of pests In which causes the spoilage of the crops.

(iii) Infestation of pests and insects.
This is where by also in many area when they tend to keep their food crops tend to happen high infestation of pests in which causes the spoilage of the crops.

4(c) CONTROL MEASURES OF FOOD CROP SPOILAGE AND DETERIORATION

(i) Proper crop selection:
This is where by inorder to avoid the spoilage of crop it when a person should have proper selection of the crop in which can easily germinate without undergoing spoilage.

(ii) Formation of crop rotation.
This is where by good and proper formation of crop rotation tend to attain proper of the crop at thus tend to germinate well than attaining one crop is when later the crop fail to germinate and thus undergoes crop spoilage.

4(c) (iii) Proper formation of mixed and Irrigation farming
This is where by due to proper formation of crop by performing mixed farming and Irrigation farming is one when will lead to the avoid crop spoilage and crop deterioration

Extract 4.2: A sample of incorrect responses to Question 4

In Extract 4.2, the candidate provided practices which cause food loss in part (a), factors which affect food production in part (b), and techniques to improve food production in part (c). This shows that the candidate misinterpreted the question.

2.1.5 Question 5: Nutrient Requirement

This question tested candidates' competence on Recommended Dietary Allowance. The question stated;

Recommended Dietary Allowance (RDA) is the guideline for selection of types and amount of nutrients to be consumed to meet the body needs. Briefly describe five uses of RDA.

This question was attempted by 281 (100%) candidates who sat for the examination. Data shows that 46 (16.40%) candidates scored from 0.0 to 3.0 marks, of whom 2 (0.70%) scored 0.0. The candidates who scored from 3.5 to 5.5 marks were 136 (48.40%) and 99 (35.20%) candidate scored from 6 to 10.0 marks. Figure 5 presents the distribution of the candidates' scores.

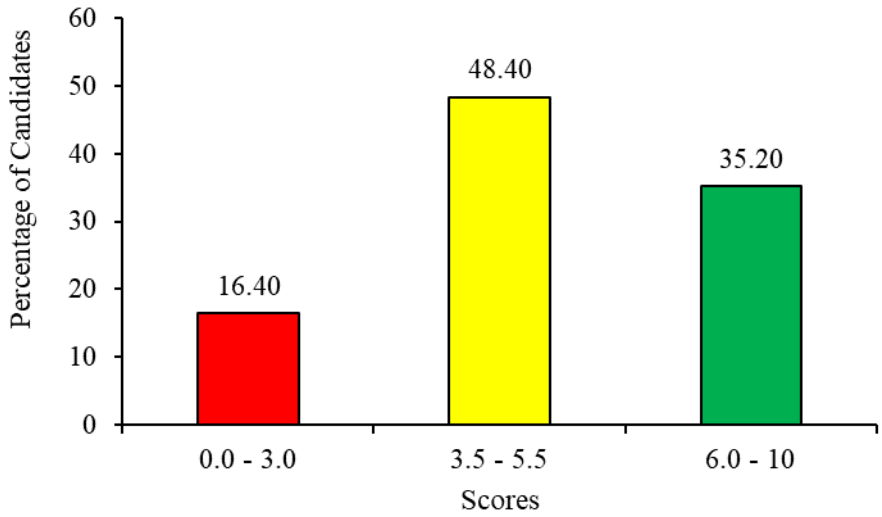


Figure 5: *Candidates' Performance on Question 5*

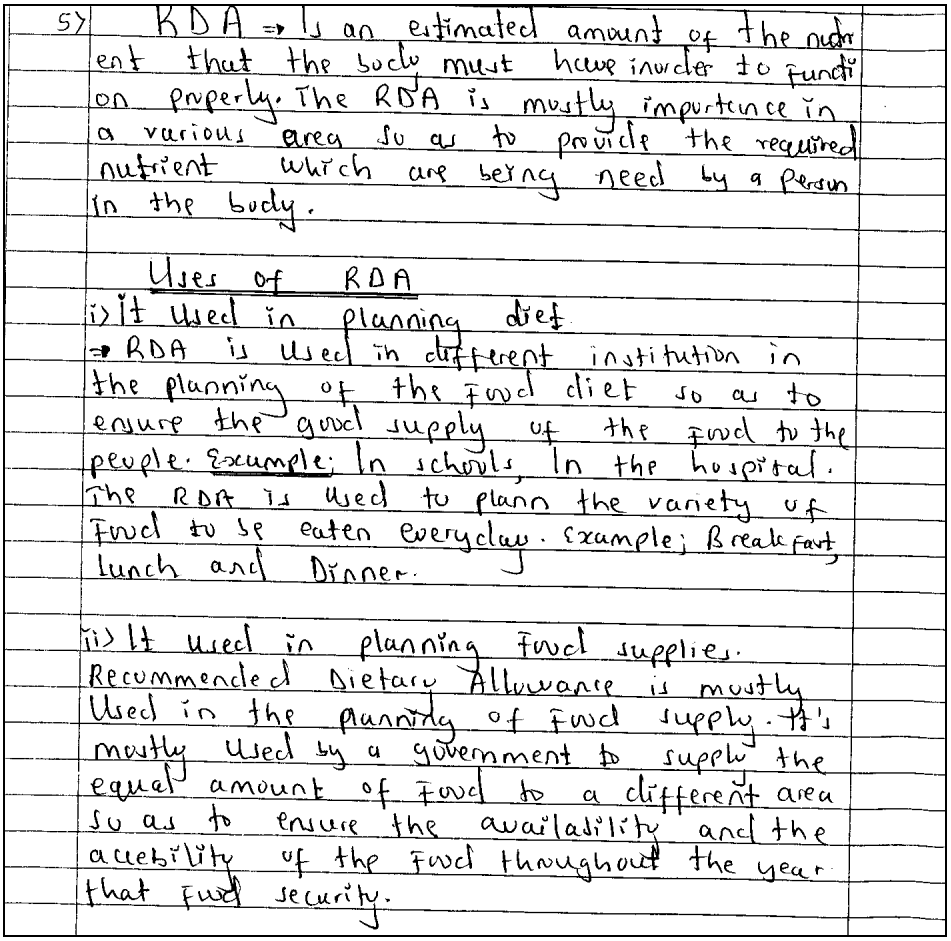
Based on the distribution of scores in Figure 5, the general performance of the candidates was good as 83.6 per cent of them had average scores and above.

The analysis shows that 35.20% of the candidates had average scores. These candidates were able to describe the uses of RDA. They were aware that RDA is sometimes used as a tool in some activities like in nutritional assessment; preparation of food balance sheet; food processing especially on labelling; forming food and agricultural policy; comparing different

underdeveloped countries to see which is in greater need of aid and the amount to be supplied; and prescribing special diets for individuals according to their requirements. Some of the correct responses were:

> *used in dietary nutrition assessment (survey), used in nutritional labelling, used in food planning, used in food and agricultural policy, used in planning special diets, used in assessing amount of food taken by population, used in the factory to provide nutrition information on label, used by food Aider in planning amount of food to be supplied.*

Other candidates did not score all the 10 marks allotted to this question since they provided insufficient explanations. Extract 5.1 is a sample of responses from a candidate with good performance.



5) RDA => Is an estimated amount of the nutrient that the body must have inorder to function properly. The RDA is mostly importance in a various area so as to provide the required nutrient which are being need by a person in the body.

Uses of RDA

i) It Used in planning diet

=> RDA is Used in different institution in the planning of the food diet so as to ensure the good supply of the food to the people. Example; In schools, In the hospital. The RDA is Used to plann the variety of food to be eaten everyday. Example; Breakfast, lunch and Dinner.

ii) It Used in planning food supplies.

Recommended Dietary Allowance is mostly Used in the planning of food supply. It's mostly Used by a government to supply the equal amount of food to a different area so as to ensure the availability and the accebility of the food throughout the year that food security.

iii) It used in dietary survey.
-> The Recommended Dietary Allowance is used in doing survey of dietary intake of the people so as to help to know which people are mostly suffering from the problem of malnutrition and on how the measure can se taken so as to solve the problem which their facing.

iv) It used in Institution labelling.
RDA is mostly importance since it used in the Institution for labelling variety of the food product inorder to give information to the people on the what is found in the product. Example; Type of the food; Nutritive value found on food protein 8%
vitamin 2%
Mineral salt 36%
and place of the origin/manufacture.

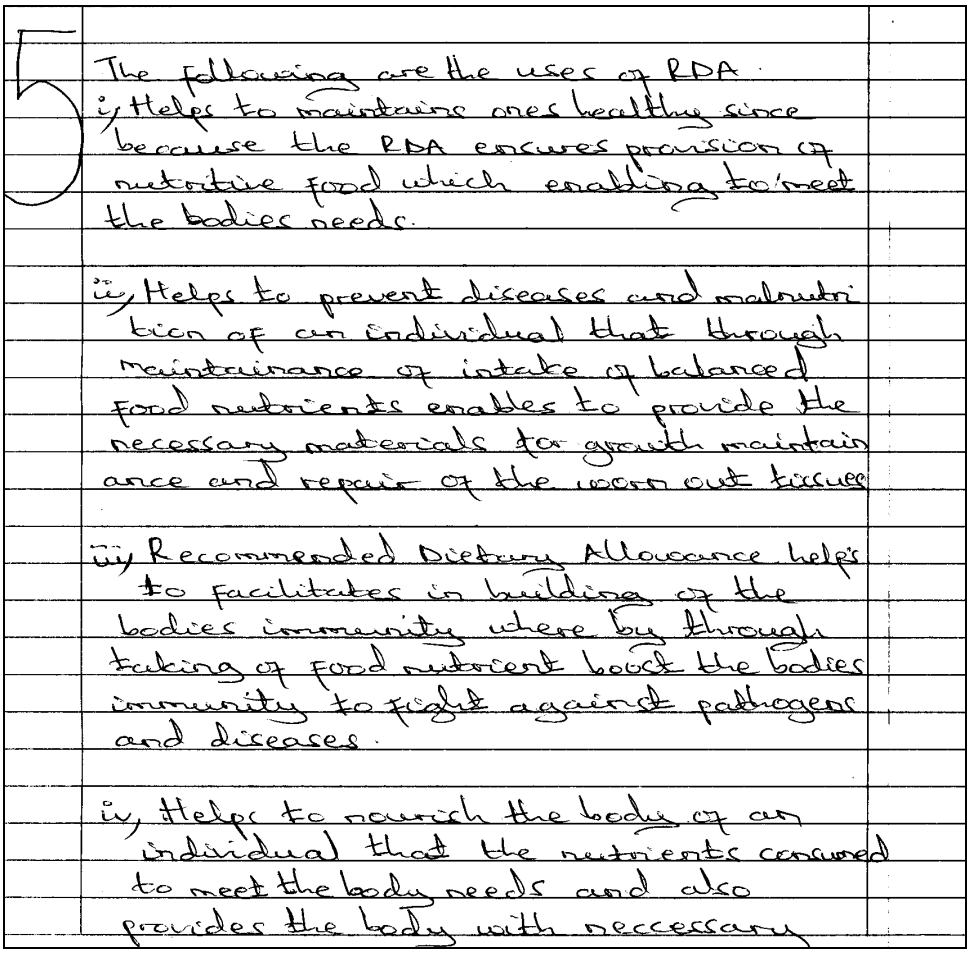
v) It used in determine density of product
-> The Recommended Dietary Allowance/intake it mostly use in determine the density of the food product so as to ensure the manufacture of the good product and obtain the product of the high quality. At this it use different instrument in ostaing the density. Example, lactometer in determine the density of the milk.

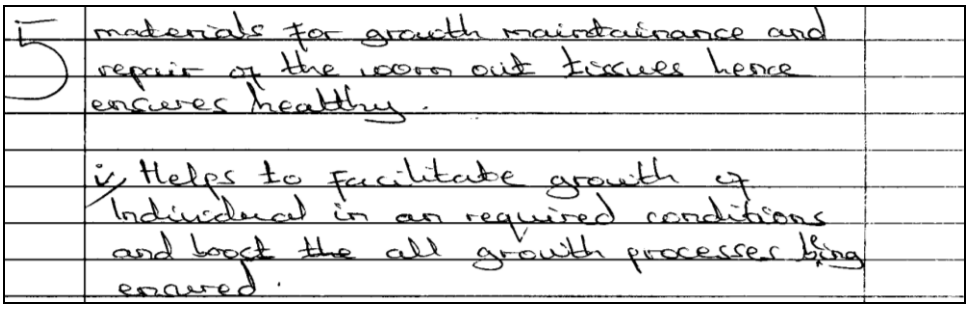
Extract 5.1: A sample of the correct responses to Question 5

In Extract 5.1, the candidate managed to provide all five correct responses on the uses of Recommended Dietary Allowance. This indicates that the candidates had adequate knowledge of the nutrient requirement, especially the Recommended Dietary Allowance (RDA).

Regardless of the good general performance in this question, the analysis indicates that 16.40 per cent of the candidates scored low marks. The majority of these failed to understand the demand of the question, hence they provided irrelevant responses. For example, one candidate provided places whereby RDA can be used such as *It is used in the rehabilitation centres, it is used in the hospital, it is used in the industries, it is used in the*

agricultural sector. It is used by the government instead of the uses of RDA. Another candidate provided some practices solution to malnutrition such as *enable the government to develop new food depending on the deficiency, formulate home gardens, food fortification, preservation of food, used in providing nutritional education to community*. Other candidates failed to explain correctly the points they mentioned. These responses show that this candidate had inadequate knowledge about the topic of nutrient requirement. They did not understand that RDA is the value to be used to determine the adequate nutrients intake in an individual's body. Extract 5.2 is a sample of responses provided by one of the candidates under this category.


5
The following are the uses of RDA.
i, Helps to maintains ones healthy since because the RDA ensures provision of nutritive food which enabling to meet the bodies needs.
ii, Helps to prevent diseases and malnutrition of an individual that through maintainance of intake of balanced food nutrients enables to provide the necessary materials for growth maintainance and repair of the worn out tissues
iii, Recommended Dietary Allowance helps to facilitates in building of the bodies immunity where by through taking of food nutrient boost the bodies immunity to fight against pathogens and diseases.
iv, Helps to nourish the body of an individual that the nutrients consumed to meet the body needs and also provides the body with neccessary



Extract 5.2: A sample of incorrect responses to Question 5

In Extract 5.2, the candidate misinterpreted the question and stated functions of nutrients instead of the uses of RDA, hence he/she scored zero.

2.1.6 Question 6: Food Storage

This question measured candidates' competence on storage structures. The question stated;

Suppose you were consulted by a large scale farmer who wants to construct a storage structure for safe storage of food grain. Assist this farmer by;

(a) differentiating traditional storage structures from modern storage structures.

(b) briefly explaining four characteristics of improved storage structures.

The question was attempted by all 281 (100%) candidates. The analysis shows that 79 (28.10%) candidates scored from 6.0 to 9.0 marks, 131 (46.60%) scored from 3.5 to 5.5 marks and 71 (25.30%) scored from 0.0 to 3.0 marks. Figure 6 summarises the distribution of the candidates' scores.

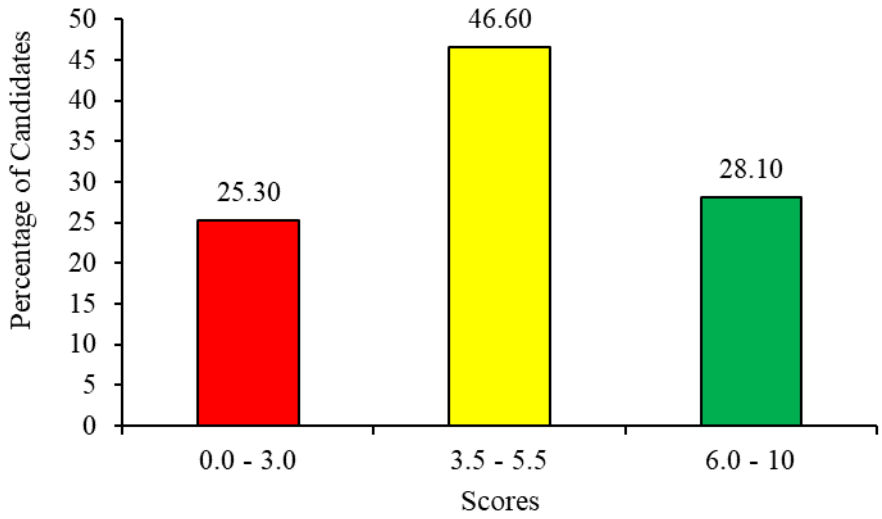


Figure 6: *Candidates' Performance on Question 6*

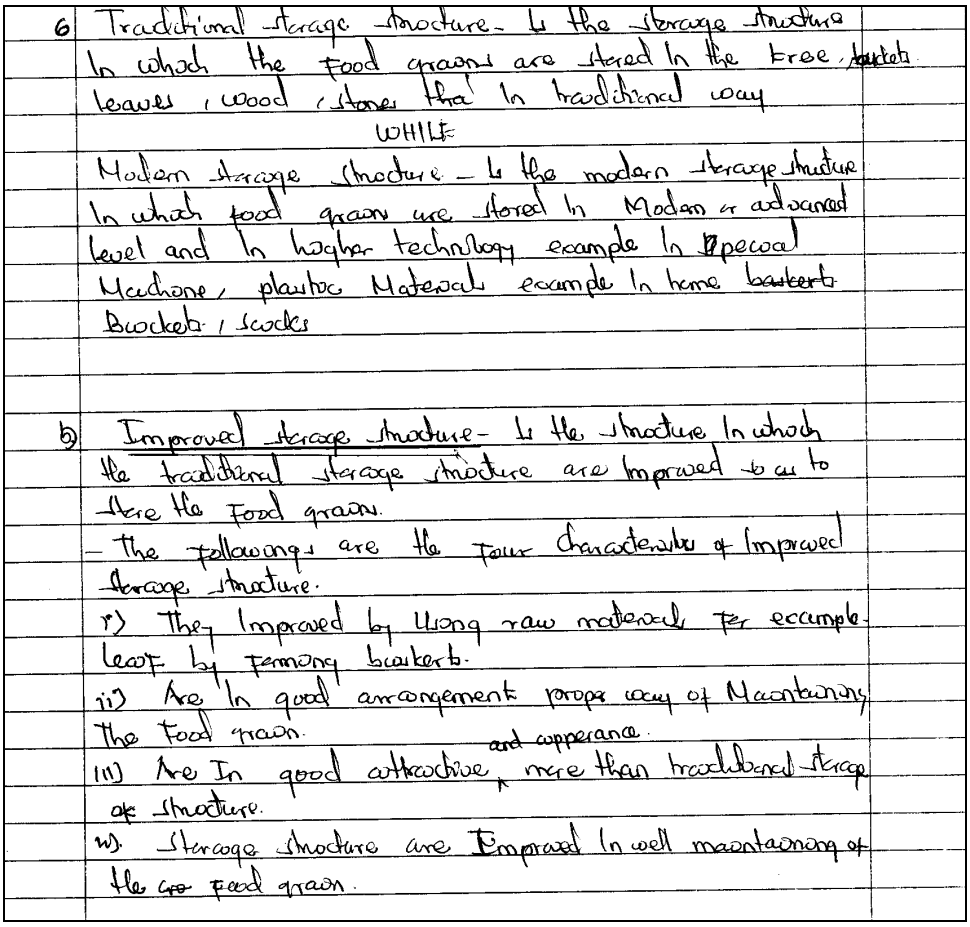
Figure 6 shows that the performance of the candidates was good since 74.70 per cent of them attained average scores and above.

Out of all candidates, 28.10% had good performance as they demonstrated adequate knowledge about storage structure. In part (a), some of the candidates exhibited awareness of the differences between traditional storage structures and modern storage structures. For example, one candidate wrote; *traditional storage structure is the type of storage structure practiced in rural areas and it is cheap to construct while modern storage structures are structures which made by using advanced materials and it is expensive in construction*. Another candidate wrote *traditional storage structures have been constructed with locally available materials while modern storage structures are constructed using modern materials which should be purchased*.

In part (b), some candidates managed to provide the correct characteristics of improved storage structures. For example, one candidate wrote; *Easy to load and unload*, *ventilation*, *stored large quantity of the grain compared to traditional storage structure*, *it is constructed well compared to traditional storage structure*, *it is constructed well compared to traditional such that it cannot allow the infestation of pests and insects*. Others provided 2 to 3 correct responses instead of four as the question demanded. Hence, they failed to score all the 8 marks allotted in this part.

Conversely, 25.30 per cent of the candidates had weak performance in this question. Some of them exhibited insufficient knowledge on storage structures while others misinterpreted the demand of the question. In part (a), some of the candidates provided the properties of traditional storage structures instead of differentiating traditional storage structures from modern storage structures. For example, one candidate wrote; *constructed with locally available materials and are inexpensive to construct*. Another candidate wrote; *traditional storage structures have low capacity while modern storage structures are modern*. Other candidates provided irrelevant responses such as, *to attract more farmers, understand other storage structures, no use of pesticides, include herbs and seasonings storage, anticipate the number of producers, cook and serve food traditionally*. These responses indicate that the candidates had inadequate knowledge on storage structures.

The analysis further indicates that in part (b), most of the candidates misinterpreted the question, hence they provided irrelevant responses. For example, one candidate wrote down characteristics of a modern kitchen like; *structure should be painted by white colour*, *structure should be supplied with water*, *structure should have large windows*. Another candidate types of modern storage structure such as *warehouse, silos*, *improve silos.* Other candidate provided advantages of food storage like *availability of quality seed during the season, increase shelf life of the product, help to prevent food loss, facilitate the food security, it carries small and large scale crops, store amount of food*. These candidates did not understand that improved storage structures have been improved from the traditional structures. Thus, their characteristics are: easy to clean; load and unload ease; they cannot be easily accessed by unauthorized personnel or pests; durable and not liable to surface run off, flooding, and leakage through the roof; and can store a large quantity of grains. Other candidates skipped this part. This indicates that these candidates were not competent in food storage structures, especially the improved storage structures. Extract 6.1 is a sample of incorrect responses from one of the candidates.


6 Traditional storage structure- Is the storage structure In which the food grains are stored In the tree, baskets leaves, wood, stones that In traditional way

WHILE

Modern storage structure - Is the modern storage structure In which food grains are stored In Modern or advanced level and In hagher technology example In Specoal Machone, plastic Materials example In home baskets Buckets, sacks

b) Improved storage structure- Is the structure In which the traditional storage structure are Improved to go to there the food grains.

- The followings are the four characteristics of Improved storage structure.

i) They Improved by Using raw materials for example least by Forming baskets.

ii) Are In good arrangement proper way of Maintaining the food grain.

iii) Are In good attractive and upperance, more than traditional storage of structure.

iv) Storage structure are Improved In well maintaining of the ~~co~~ food grain.

Extract 6: A sample of incorrect responses to Question 6

In Extract 6, the candidate failed to explain the differences between traditional storage structures and modern storage structures in part (a). Then he/she merely described the appearance of improved storage structure in part (b). This indicates that the candidate did not understood the concept of improved storage structures.

2.1.7 Question 7: Food Processing and Preservation

This question measured candidates' competence on rancidity. The question stated;

Mr. Salehe who is a new food processer and supplier observed rancidity in most of his stored food products. Assist him by;

(a) explaining six factors which accelerate the development of oxidative rancidity in fats and oils.

(b) suggesting six methods of preventing rancidity.

The question was opted by 275 (97.90%) candidates. The analysis shows that 150 (54.50%) candidates scored from 12 to 19.0 marks, 94 (34.20%) scored from 7.0 to 11.5 marks, and 31 (11.30%) candidate scored from 0.0 to 6.5 marks. Figure 7 summarises the performance.

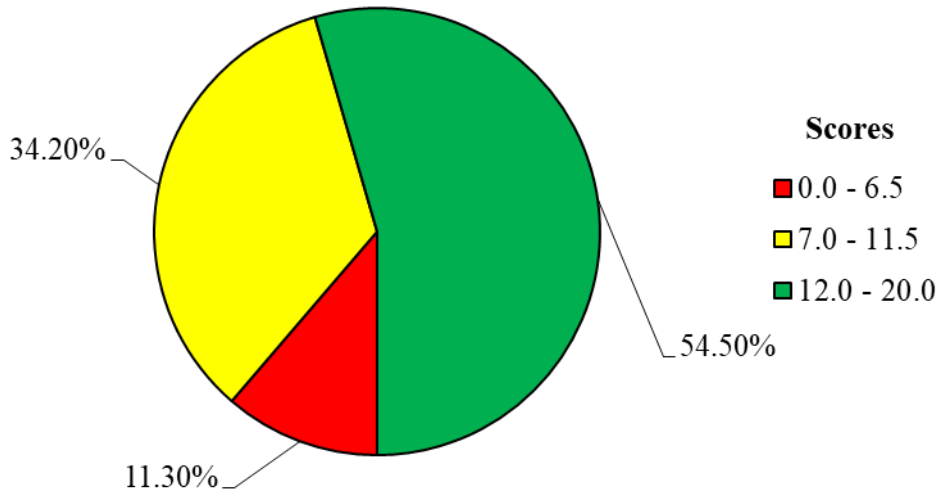


Figure 7: *Candidates' Performance on Question 7*

Figure 7 shows that the general performance of the candidates was good as 88.70 per cent of the candidates scored above 6.5.

The analysis of the candidates' responses shows that the candidates (54.50%) who scored from 12.0 to 19.0 marks had sufficient knowledge about rancidity. These candidates correctly explained the factors which accelerate the development of oxidative rancidity in fats and oils in part (a). They also managed to explain the methods of preventing rancidity in part (b). They organised correctly their responses in essay format by providing an introduction, followed by the main body and conclusion. However, the candidates failed to score all the 20 marks due to different reasons. Some provided explanations and others provided fewer points than the question's requirement. Extract 7.1 illustrates this performance.

7. Rancidity is the kind of deterioration which occurs in Lipid causing unpleasant smell off flavour and ~~grading~~ ending up of the product. This action occured in the fat cause unpleasant smell and bad flavour due to presence of free fatty acids. Rancidity caused by hydroperoxide where by decompose the fat into aldehyde and Ketone hence the formation of free fatty acid due to Lipolysis. Rancidity categorized into hydrolytic rancidity, oxidative rancidity and Ketonic rancidity.

Oxidative rancidity this is the kind or type of rancidity that use air and Light as a sensitizer normally affects many food products. Oxidative rancidity cause the formation of Free fatty acids hence the deterioration of the food.

Oxidative rancidity are caused by some factors. The following are the factors which accelerates the developments of oxidative rancidity in fats and oils:-

Temperature: temperature is one of the major factor that accelerates the developments of oxidative rancidity in fats and oils. High temperature accelerate the formation of free fatty acids in the fats and oils thus causes the deterioration occurance. Therefore, high temperature favour the growth of oil deterioration.

Light; Light also cause the development of Oxidative rancidity in fats and oils. Light actas a sensitizer that when reach the

Fats or oil if decompose the hydrogen peroxide and hence the free fatty acids. The formation of free fatty acids due to light the one caused the deterioration of fats and oils.

Oxygen; Oxygen that are found in the air are the one cause the deterioration of fats and oil. When the oil are exposed to air the oxygen penetrate towards the oil hence formation of free fatty acids that accelerates the deterioration of fats and oil. Oxygen tend to favour the deterioration of oil and fats.

Moisture; moisture accelerate the growth of deterioration into fats and oil. When water reacted with oil or fats the reaction occured between them caused the deterioration of oil and fats.

Oil pigments found in oil; oil pigments found in oil accelerate the developments of Oxidative rancidity in fats and oils. This is Caused by unproper refining of oil that some pigments remains in the oil that when present in the oil accelerate the development of oxidative rancidity in fats and oils. Oil should be well refined to remove the ~~oil~~ pigment that are found in the oil.

Lipase and Lipoxidase enzymes; the enzyme such as lipase and Lipoxidase enzymes accelerate the growth of oxidative rancidity. This enzymes when present in the Fats and oil they facilitate the growth Microbial activities due to its action hence cause the oxidative rancidity.

7 Despite to the fact that oxidative rancidity caused by some numbers of factors, The following are the Methods of preventing rancidity

Exclude air (oxygen); Air can be excluded to avoid the entrace of oxygen in the fats/oil. Air can be excluded by using a container which are impermiable to oxygen that the oxygen will not able to penetrate in the fat or oil. This Method help to prevent rancidity by excluding air

Proper refining of oil; Oil should be refined well to ensure proper refining of oil where by the oil pigments that caused the deterioration of the fats and oil are well refined and absence in the oil. to prevent the rancidity.

Low temperature; the oil must be applied with low temperature because high temperature accelerate the growth of oxidative rancidity. Thereby the low temperature is needed to prevent the rancidity

Keep the food in a cool and dry place; the food must be kept in a cool place and dry place to avoid the light and water activities that when they contaminate with the food. it may cause the deterioration. This help to prevent the rancidity occurance

Use of antioxidant; Antioxidant used to prevent the action of oxygen in the food. So that used of that antioxidants will help to prevent the rancidity

7 Inactivate enzymes; the enzymes such as lipase and lipoxidase enzymes should be made inactive to slow down their actions. Making lipase and lipoxidase enzymes help to prevent rancidity.

Therefore Rancidity causes the off Flavour of food and ending up of products hence the application of preserving food should be done correctly to make the food are well preserved and to avoid food contamination and food losses caused by deterioration of some food Materials.

Extract 7.1: A sample of the correct response to Question 7

In Extract 7.1, the candidate demonstrated adequate knowledge on the factors which accelerate the development of oxidative rancidity in fats and oils in part (a), and managed to explain the methods of preventing rancidity in part (b).

Further, the analysis indicated that 11.30 per cent of candidates scored low marks in this question. These candidates misunderstood the demand of the question. Instead of stating the factors which accelerate the development of oxidative rancidity in fats and oils, they stated the properties of fat/lipids in part (a). For example, one candidate wrote; *liquids or non-crystalline solids at room temperature, lighter than water, medium of cooking, due to colorless, due to tasteless, due to presence low density*. Other candidates provided irrelevant responses. For example, one candidate wrote; *oxidation reduction, raw food, large particles, food colour, white powder, hard starch*.

In part (b), these candidates wrote down the methods of preserving food instead of the methods of preventing rancidity. For example, one candidate wrote; *freezing, blanching, sterilisation, pasteurisation, use chemical preservatives, refrigeration* and *frying.* Meanwhile, some candidates stated the factors which affect growth and survival of microorganisms in food such as; *storage time, gaseous atmosphere surrounding the lipids*, *relative humidity of the atmosphere, antimicrobial constituents*, *biological structure, nutrient content of the lipids* and *moisture content of the lipids*. Others wrote irrelevant responses such as *good storage practice, processing the lipids, extra check-ups by removing them from the containers, controlled ventilation, frying* and *store food in containers*. This indicates that the candidates had insufficient knowledge of the tested area. Extract 7.2 is a sample of responses from one of the candidates with weak performance.

SECTION B

7. Rancidity is the process occur in food which involve freezing of fat and oil in food products.

The following are the factors which accelerate the development of oxidative rancidity in fats and oil Presence of air, Presence of air which is oxygen make racidity in fats and oil in food and hence reduce Nutritive Value.

Presence of Water, Water also cause rancidity in fats and oil, Water in foods favour racidity Cause Water is very reactive

Poor preparation of food, Preparing of food is poor way cause rancidity in ~~food~~ and ie. fat and oily example poor handling of food.

High propitional of fat, high Content of fat and oil in food cause rancidity in fat since these fat and oil Combine together.

Cold climate, In the area where there is cold climate it cause rancidity since fat and oil require temperature to avoid or prevent rancidity

The following are the methods of preventing rancidity;

Application of heat; This will reduce and prevent rancidity cause of high temperature fat fail to combine with each other

Avoid application of Water on fat and oil; Water cause rancidity by avoiding will prevent rancidity

Avoiding Using Saturated fat; Unsaturated fat does not cause rancidity because they are originated from plants but Saturated fat cause rancidity since are originated from Animals

Chemical processing; This will prevent rancidity since they increase Nutritive Value

Rancidity should be Controlled in food processing Industries because it reduce Nutritive Value of food

Extract 7.2: A sample of incorrect responses to Question 7

In Extract 7.2, the candidate provided irrelevant and incorrect explanations on some factors which accelerate the development of oxidative rancidity in fats and oils in part (a), and incorrect methods of preventing rancidity in part (b).

2.1.8 Question 8: Nutrient Requirement

This question tested the candidates' understanding of the concept of meal planning. The question stated;

Proper planning of family meals requires adequate knowledge on food and nutrition for the nutrient requirements of all members to be met. In view of this statement;

(a) explain six benefits of meal planning.

(b) outline six factors to consider when planning family meals.

This question was opted by 280 (99.60%) of the candidates. Among them, 255 (91.10%) scored from 12 to 20.0 marks, 5 (8.90%) scored from 7.0 to 11.5 marks, and there was no one who scored from 0.0 to 6.5 marks. Figure 8 illustrates this performance.

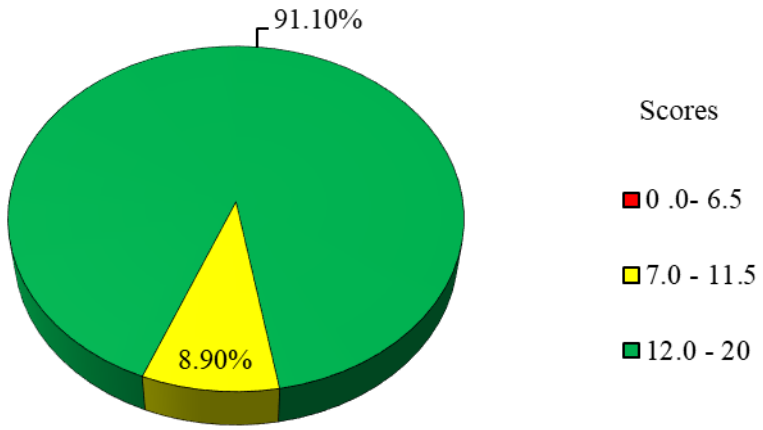


Figure 8: *Candidates' Performance on Question 8*

Figure 8 shows that the performance of the candidates in this question was good because 100 per cent of them scored from 7.0 to 20.0 marks.

The analysis of the candidates' responses to this question shows that the candidates (91.10%) who had good performances demonstrated sufficient knowledge of meal planning. In part (a), the majority of the candidates understood that meal planning saves time, reduces the amount of food waste, saves money, helps to avoid unhealthy options, reduce mealtime stress, helps to avoid unhealthy options and helps to enjoy more varieties. For example, one candidate wrote; *reduce time and energy loss*, *reduce*

wastage of food, *prevent tendency of forget some materials*, *it ensures nutrition's adequate and variety*, *it satisfy each member in the family*. Another candidate wrote; *help the cook to know what to prepare*, *reduce the risk of wastage of food*, *help to meet individual satisfaction, it helps to save money, it helps to save time.*

In part (b), the candidates correctly outlined the factors to consider when planning family meals. These candidates were aware that when you are planning meals you should consider what the family need such as the one requires a special diet for instance convalescents, older, young children; the cooking facilities available; the culture and religion of family members; the income available to be spent on food; season of the year; occupation of individuals. Some of the correct factors provided by these candidates were; *time of the day, nutritional requirement*, *type of work of individual*, *utensils available*, *economic of the family, fuel available, season of the year, meal to balance.* Further, the analysis indicates that the candidates who did not score all the 20 marks allotted to this question as they provided answers that were partially correct or provided fewer points than what the question required them to provide. Extract 8 is a sample of good responses.

8. Meal planning; Is the process of planning what Meal is to be prepared for the family. Meal Planning requires adquate knowledge on food and nutrition so as to know the requirement of the group of people your preparing for

The following are benefits of Meal - planning;

It provide balanced Meal; When planning Meals, a person considers the nutritional requirement of the group, and ensures that all the - nutrients are available in the dish.

It prevents Unnecessary spending; because Meal planning Makes a person to be aware of what to buy for preparing a Meal, so this prevents purchasing of things which are not to be used.

It prevent Wastage of food; because after Meal plan a person will be aware of - what amount of food is to be cooked so - this prevent cooking large amount of food.

8. It saves time; Person goes to the Market and buy direct what is required; also a person prepare direct what was planned to be cooked, so this saves time.

It is cheap and prevent cost; since a person Plan Meal according to the purchasing power of the family in this term it's less cost.

It's not easy one to forget what is needed to buy in Market; because during Meal planning the needed ingredients were analysed and listed.

The following are factors to consider when planning family Meals;

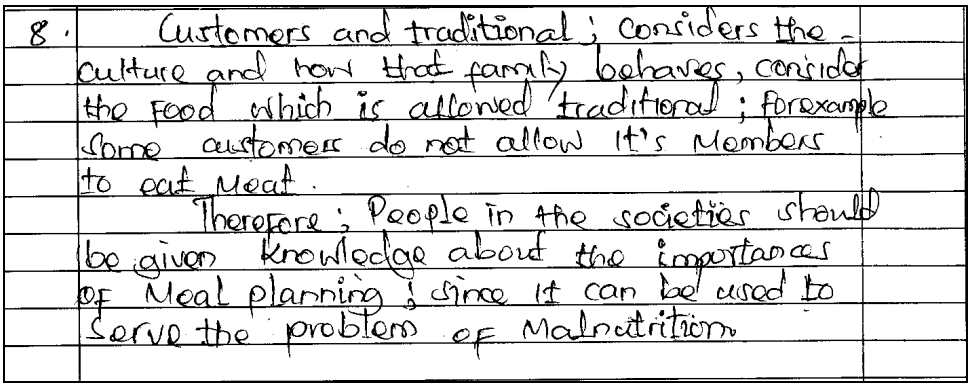
Nutritional needs of the family Members; So that to provide all the nutrients required for their well being and health.

Food in season; So that a person can easy get what is planned for a meal; do not plan the food which is difficult to get or not available.

Utensils available; Make sure that all the Foods planned and it's utensils are available at home; if any dish requires special utensil Make sure is available.

Source of energy available; If the dish needs baking Make sure you'll an oven; Plan a meal according to the source of energy you have example charcoal, gas.

Money available; Plan Meals according to the purchasing power of the family the ingredients should be afforable.


8. Customers and traditional ; considers the culture and how that family behaves, consider the food which is allowed traditional ; forexample some customers do not allow it's Members to eat Meat.
Therefore ; People in the societies should be given knowledge about the importances of Meal planning ; since it can be used to Serve the problem of Malnutrition.

Extract 8: A sample of the correct responses to Question 8

Extract 8 is a sample of responses from the candidate who correctly explained benefits of meal planning in part (a), and factors to consider when planning family meals in part (b).

2.1.9 Question 9: Food Composition

This question tested candidates' competence on the determination of percentage of crude fat content in a given food sample by using soxhlet method. The question stated;

You were consulted by form five students who failed to perform the experiment to determine the percentage of crude fat content in a given food sample by using soxhlet method. With the aid of a well labelled diagram of the soxhlet apparatus, explain seven stages of the experiment that leads to a correct value.

Most candidates skipped this question as only 7 (2.50 %) candidates who sat for the examination opted it. Among them, 2 (28.60%) scored zero and 5 (71.40%) scored from 13.5 to 17.0 out of 20.0 marks. There was no candidate who scored from 7.0 to 11.5 marks. Figure 9 summarises the candidates' performance.

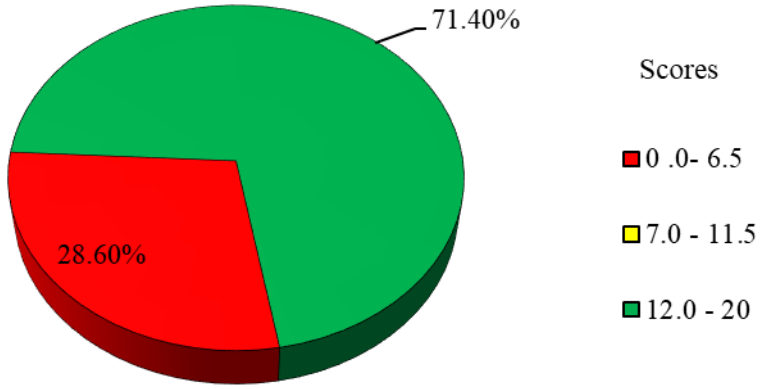
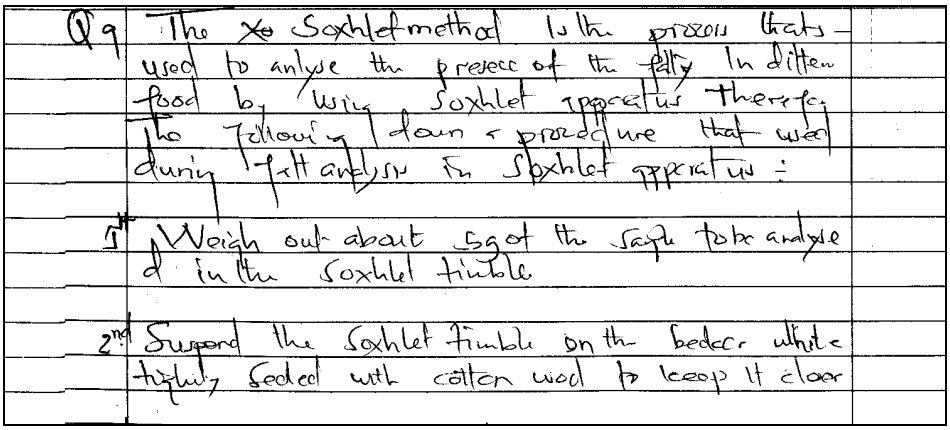


Figure 9: *Candidates' Performance on Question 9*

Figure 9 shows that the performance of the candidates in this question was good because 71.40 per cent scored 7 to 11.5 marks.

The analysis of candidates' responses in this question reveals that 71.40 per cent of the candidates who scored high marks were aware that laboratory analysis of fat by the Soxhlet method should be done by using Soxhlet apparatus to extract fat from seeds or fruits for the purpose of determining its crude fat content. Furthermore, they were aware of the stages of the experiment, hence they managed to provide correct responses. However, some of them provided some correct points but they provided insufficient explanations for those points. Others labelled two to four correct parts of Soxhlet apparatus. Extract 9.1 is a sample of responses from one of the candidates with good performance.


Q9 The Soxhlet method is the process that's used to analyse the presence of the fatty in diffen food by using Soxhlet apparatus therefo, the following down a procedure that used during fat analysis in Soxhlet apparatus :

1st Weigh out about 5g of the sayle to be analyse d in the Soxhlet timble

2nd Suspend the Soxhlet timble on the beaker while tightly sealed with cotton wool to keep it clear

3rd Connect the beaker and Soxhlet timble with the deriver tubule to the flask that contain Ethanol. Suspended with water baths.

4th Suspend the condenser that condor pointed at the top of Soxhlets thimble contained in the beaker

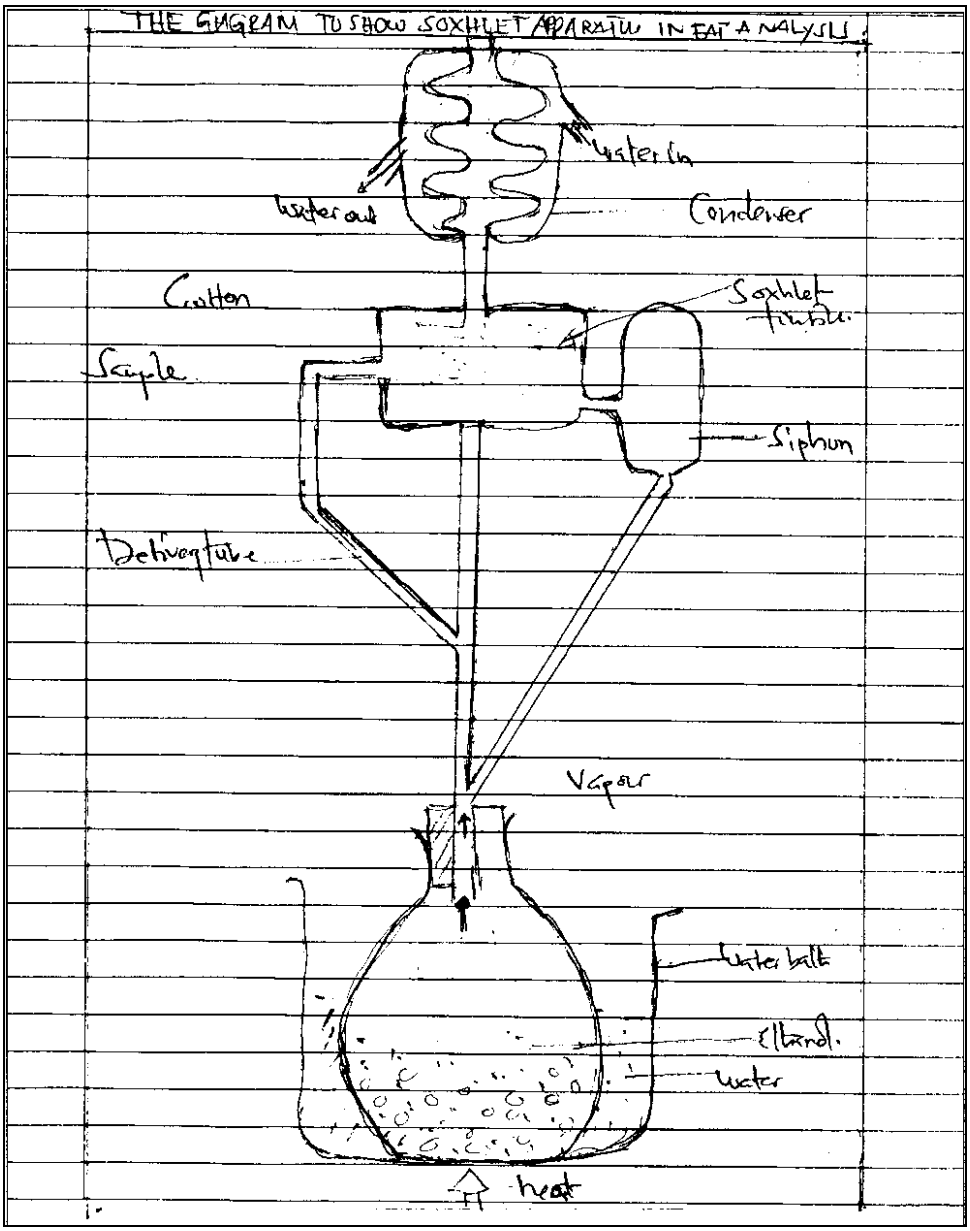
5th Heat the water bath contained with flask so that to keep Ethanol gently boiled, The vapour start to rise using the derivery tube to the condensor via soxhlet thimble, The condenced ethanol turn back to the Soxhlets timble and to such away when it full the Soxhlet timble start to fall back throught siphons while containing fatty from Sample.

6th After the extractions of fat has been completed dis asemble the Soxhlets apparatus and to prevent ethanol away from source of heats or opened flame.

7th The amount of the ethanol coming back with ethanol usually add the weight of ethanol in the flask. To analyse the weight in percents that added will be determined by the difference of final to original weight of the ethanol

Usually the extraction work under principle of solubility where Ethanol dissolve in fatty hence can be possible to extract fatty from the food sample through ethanol.

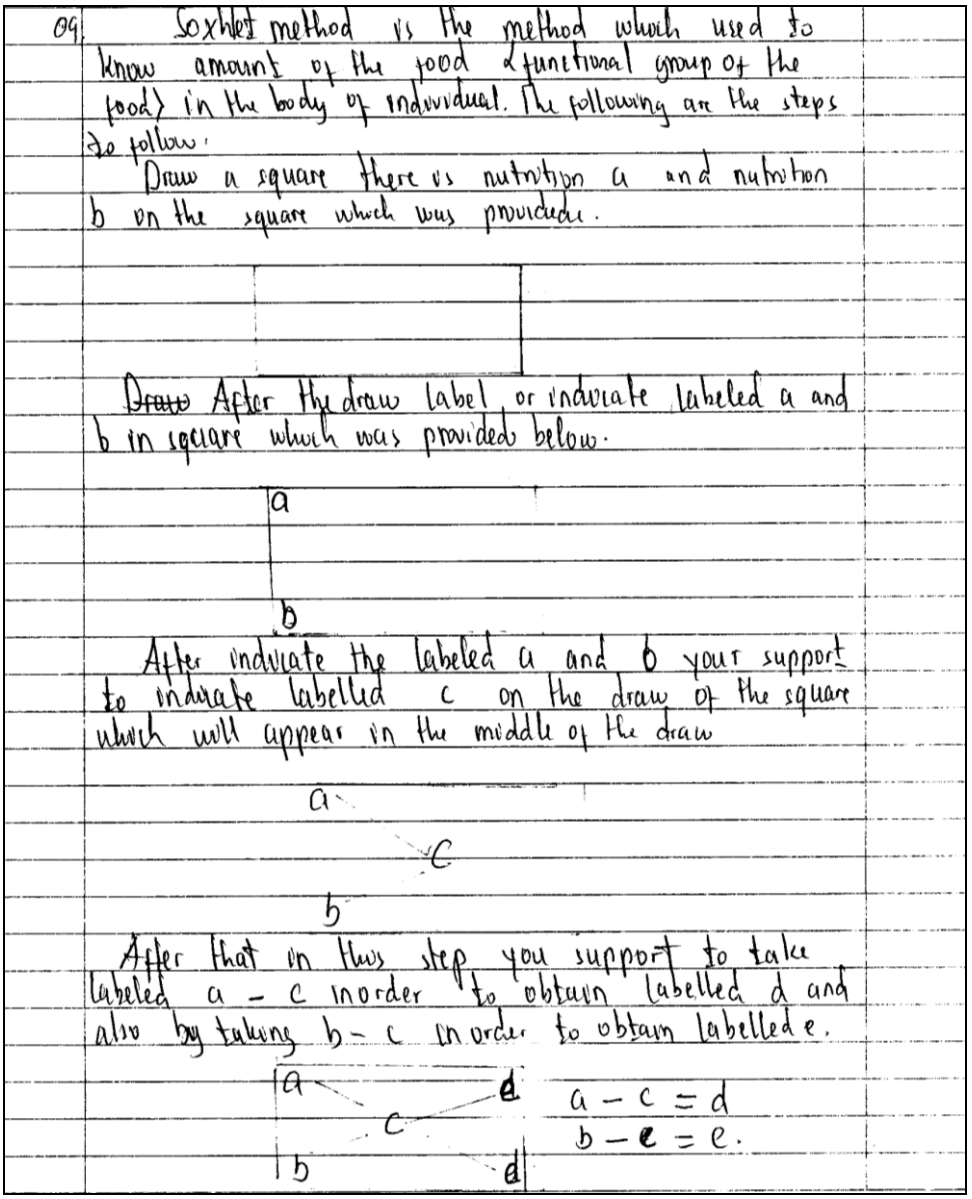
Consider the diagram bellows



Extract 9.1: A sample of the correct responses to Question 9

Extract 9.1 illustrates a sample of responses from the candidate who correctly explained the stages of oil extraction by Soxhlet method by using a diagram but labelled only five parts correctly.

On the contrary, 2 (28.60 %) candidates scored zero. These candidates misinterpreted the question and provided irrelevant responses. For example, one candidate wrote the stages of experiment of titrating alkaline against lipid to find the acid value instead of crude fat content. Extract 9.2 is a sample of responses from one of the candidates with weak performance.


09 Soxhlet method is the method which used to know amount of the food (functional group of the food) in the body of individual. The following are the steps to follow.

Draw a square there is nutrition a and nutrition b on the square which was providede.

After the draw label, or indicate labeled a and b in square which was provided below.

a

b

After indicate the labeled a and b your support to indicate labelled c on the draw of the square which will appear in the middle of the draw

a

c

b

After that in this step you support to take labeled a - c inorder to obtain labelled d and also by taking b - c inorder to obtain labelled e.

a

c

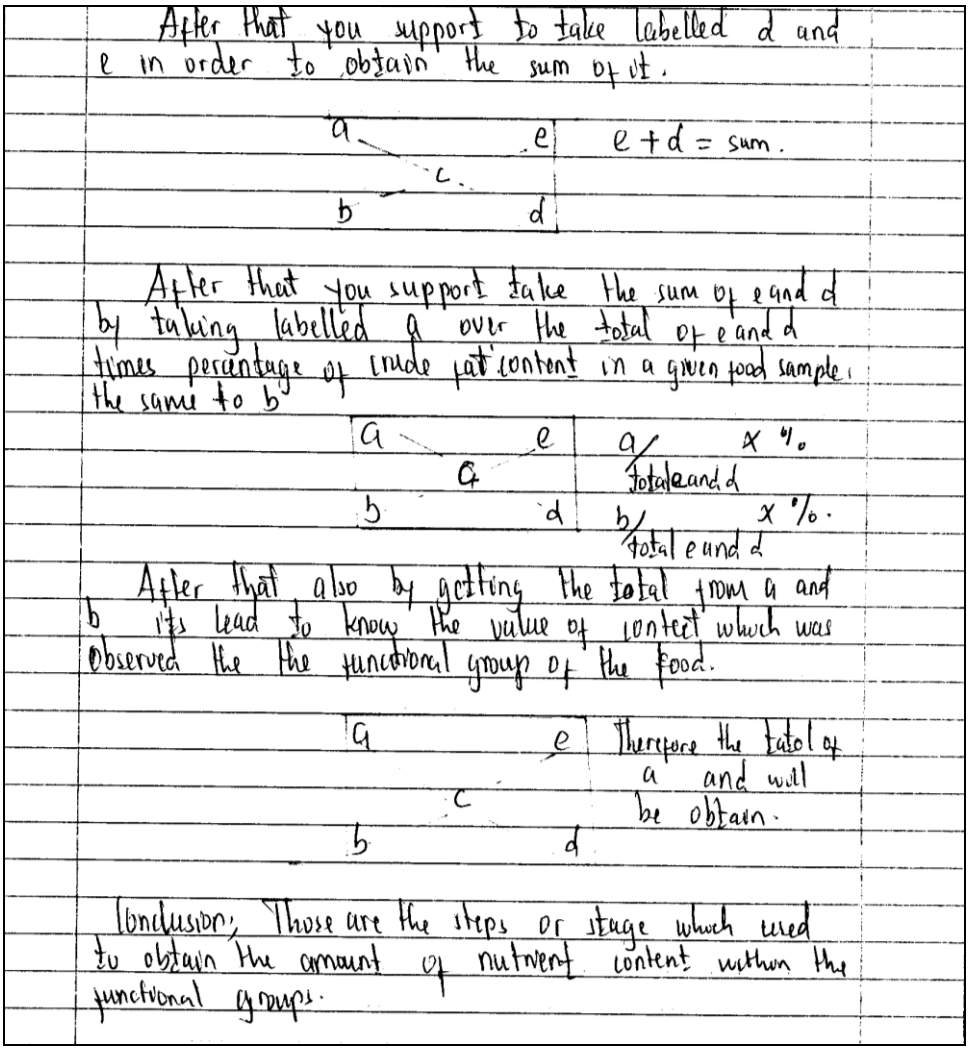
d

b

e

a - c = d

b - e = e.



Extract 9.2: A sample of incorrect responses to Question 9

In Extract 9.2, the candidate explained the procedures of Pearson Square in Food Formulation and scored zero.

2.2 155/2 FOOD AND HUMAN NUTRITION PAPER 2

This paper consisted of two sections namely: A and B. Section A comprised 6 (1 - 6) short-answer questions which carried 10.0 marks each. Section B comprised 3 (7 - 9) essay questions which carried 20.0 marks each. The candidates were required to answer all the questions in Section A and two questions in Section B.

2.2.1 Question 1: Catering and Institutional Feeding

This question measured the candidates' competence in catering business. The question stated,

Assume that you have planned to establish a profitable catering business in the Tanzanian's capital city and you need to estimate the budget for starting that business. Briefly explain five areas that will require estimation of the budget in your business.

The question was attempted by 281 (100%) candidates. The analysis shows that 70 (24.90%) candidates scored from 6.0 to 9.5 marks, 115 (40.90%) scored from 3.5 to 5.5 marks, and 96 (34.20%) scored from 0.0 to 3.0 marks. Figure 10 shows the distribution.

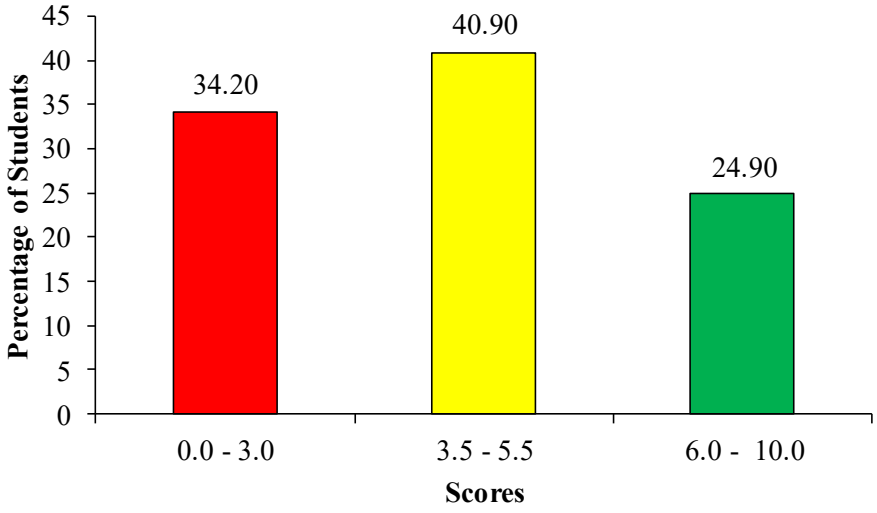
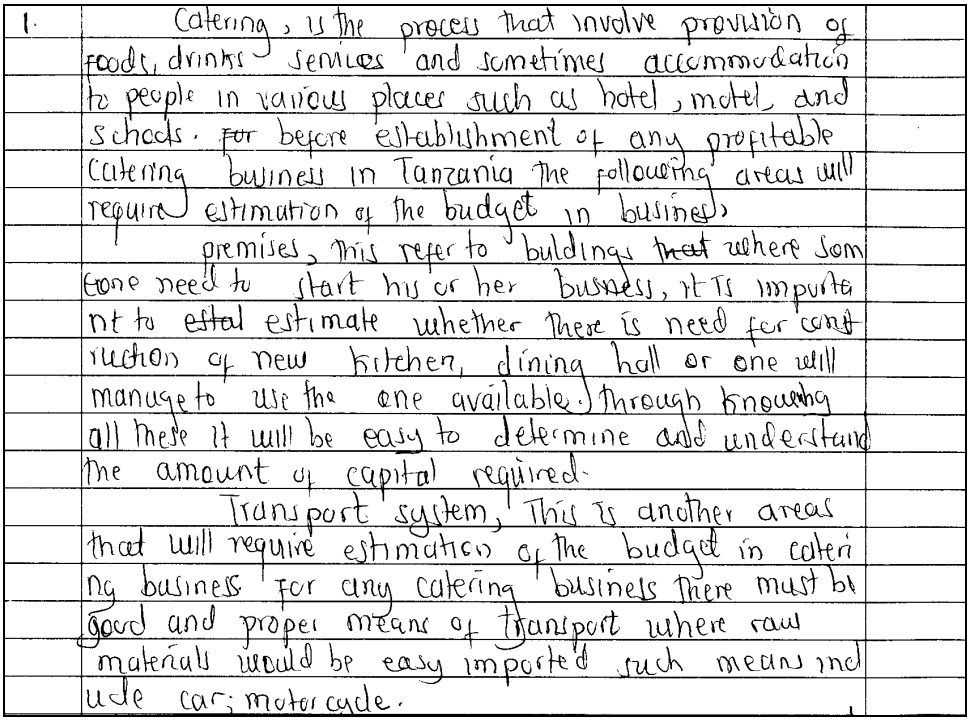


Figure 10: *Candidates' Performance on Question 1*

Figure 10 shows that the general performance of the candidates was good since 65.80 per cent scored from 3.5 to 9.0 marks. This indicates that the candidates had adequate knowledge about establishment of catering business, especially making budget estimations when starting up a business.

The analysis shows that 24.90 per cent of the candidates who had good performance understood the demand of the question. They correctly explained the areas which require estimation of budget when establishing a catering business. Some of the responses provided were; *transport cost, working cost, payment of labour, working equipment premises, starting up cost* and *ingredients cost*. These candidates understood that when establishing a catering business, estimation of the budget for various aspects is important.

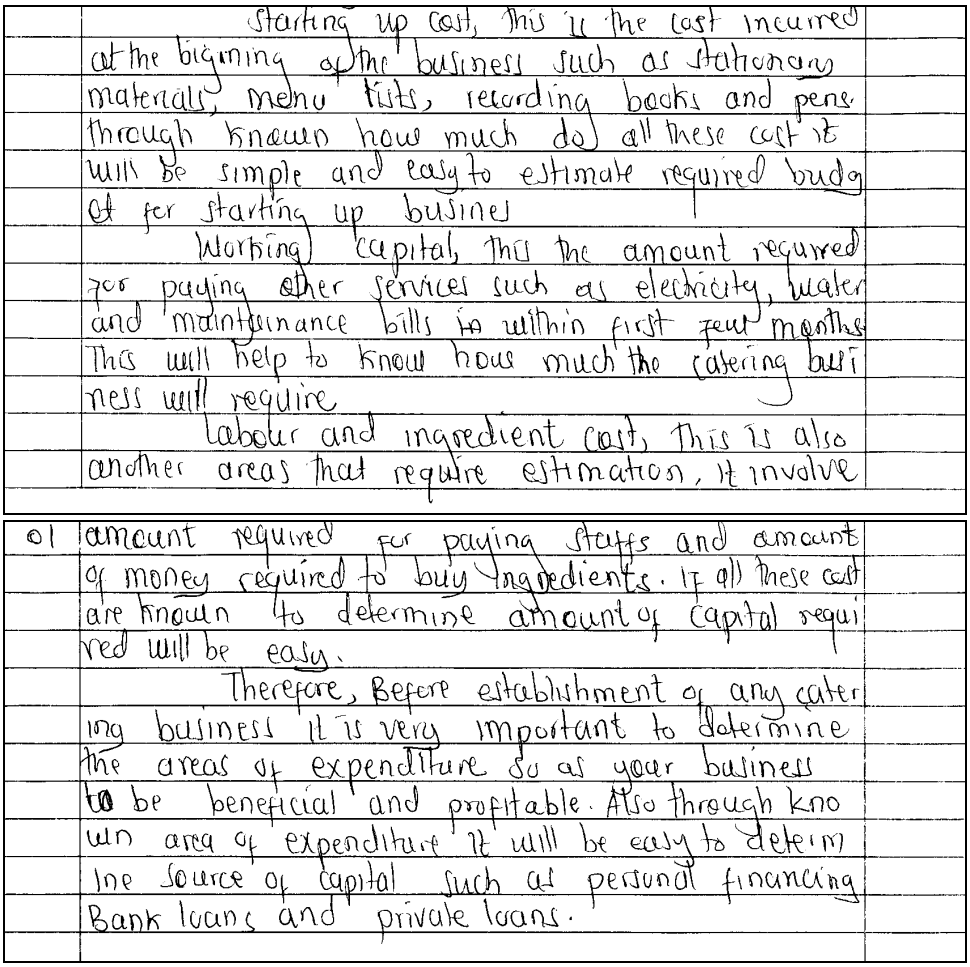
However, some of the candidates in this category failed to score all the 10 marks allocated to this question because they provided insufficient or incorrect explanations about some of the correctly mentioned points. Others provided fewer points than the one required by the question. Extract 10.1 is a sample of a candidate's correct responses to question 1.



1. Catering, is the process that involve provision of foods, drinks services and sometimes accommodation to people in various places such as hotel, motel and schools. ~~for~~ before establishment of any profitable Catering business in Tanzania the following areas will require estimation of the budget in busines.

premises, this refer to buldings ~~that~~ where som tone need to start his or her business, it is importa nt to ~~estal~~ estimate whether there is need for const ruction of new kitchen, dining hall or one will manage to use the one available. Through knowing all these it will be easy to determine and understand the amount of capital required.

Transport system, This is another areas that will require estimation of the budget in cateri ng business for any catering business there must be good and proper means of transport where raw materials would be easy imported such means incl ude car; motorcycle.


starting up cost, this is the cost incurred at the bigining of the business such as stationary materials, menu lists, recording books and pens. through known how much do all these cost it will be simple and easy to estimate required budg et for starting up busines

Working capital, this the amount required for paying other services such as electricity, water and maintainance bills in within first four months This will help to know how much the catering busi ness will require

labour and ingredient cost, this is also another areas that require estimation, it involve

01 amount required for paying staffs and amount of money required to buy Ingredients. If all these cost are known to determine amount of capital requi red will be easy.

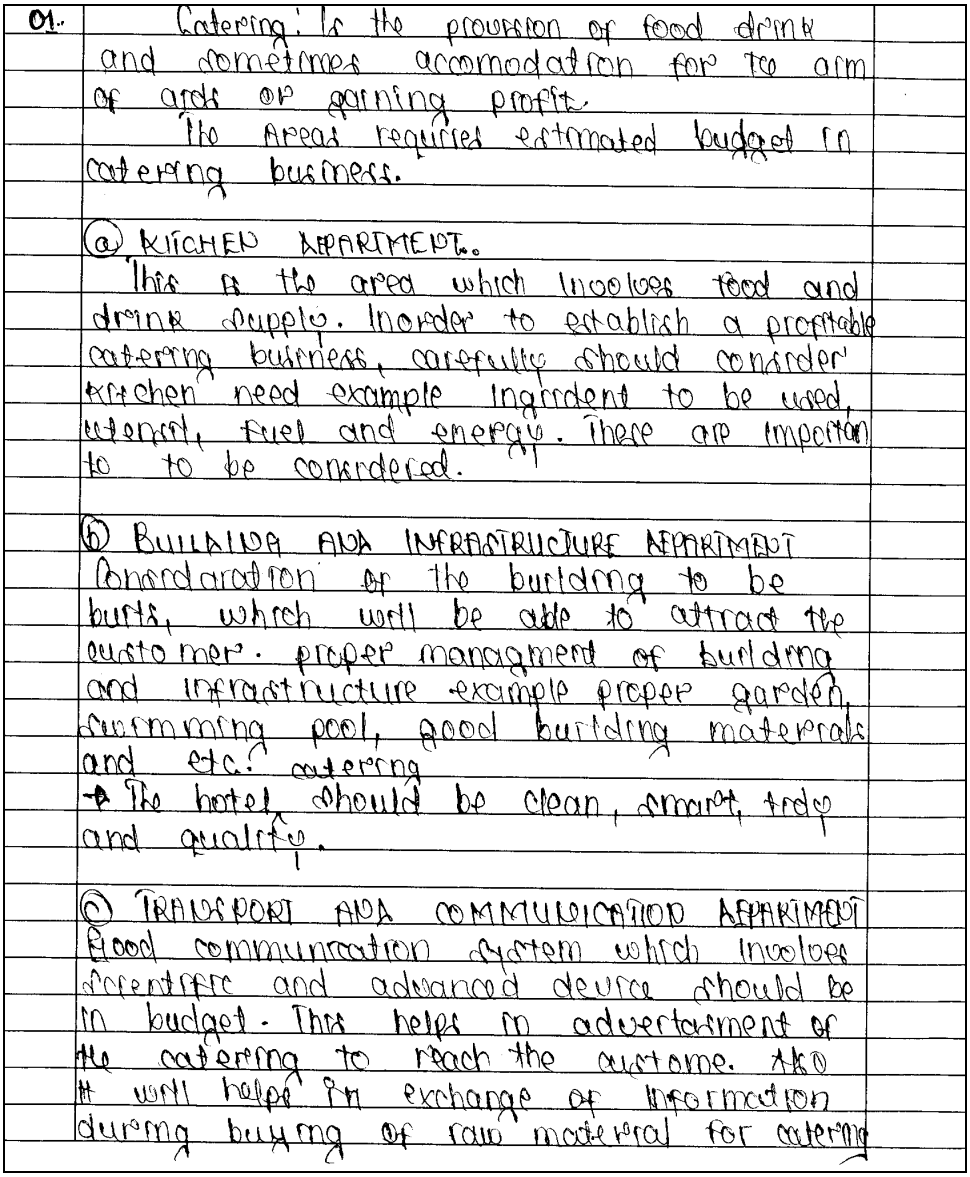
Therefore, Before establishment of any cater ing business it is very important to determine the areas of expenditure so as your business to be beneficial and profitable. Also through kno wn area of expenditure it will be easy to determ ine source of capital such as personal financing Bank loans and private loans.

Extract 10.1 A sample of the correct responses to Question 1

In Extract 10.1, the candidate managed to briefly explain the areas that will require estimation of the budget when one wants to start a catering business. However, some of the explanations were insufficient, hence he/she failed to score all the 10 marks.

Despite the good performance on this question, the analysis shows that 34.20 per cent of candidates had weak performance. Some of these candidates misinterpreted the requirement of the question. For example, one candidate wrote; *Nation park*, *famous and big mountains*, *coast*, *culture and traditions*, *off shape area*. This candidate provided factors to consider when establishing a tourist hotel instead of areas that require budget estimation in a catering business. Other candidates stated the correct areas but their explanations were insufficient. Moreover, some of the candidates misunderstood the question. For example, one candidate wrote; *also is from*

bank loan, also another is from private loan, another is from grants and aids and also is from trade credit. This candidate explained the means of getting capital instead of the areas that require estimation of budget in a catering business. These responses indicate that the candidates had insufficient knowledge about catering business, especially on the areas that require estimation of budget in a catering business. Extract 10.2 is a sample of incorrect responses from a script of one of the candidates with weak performance.

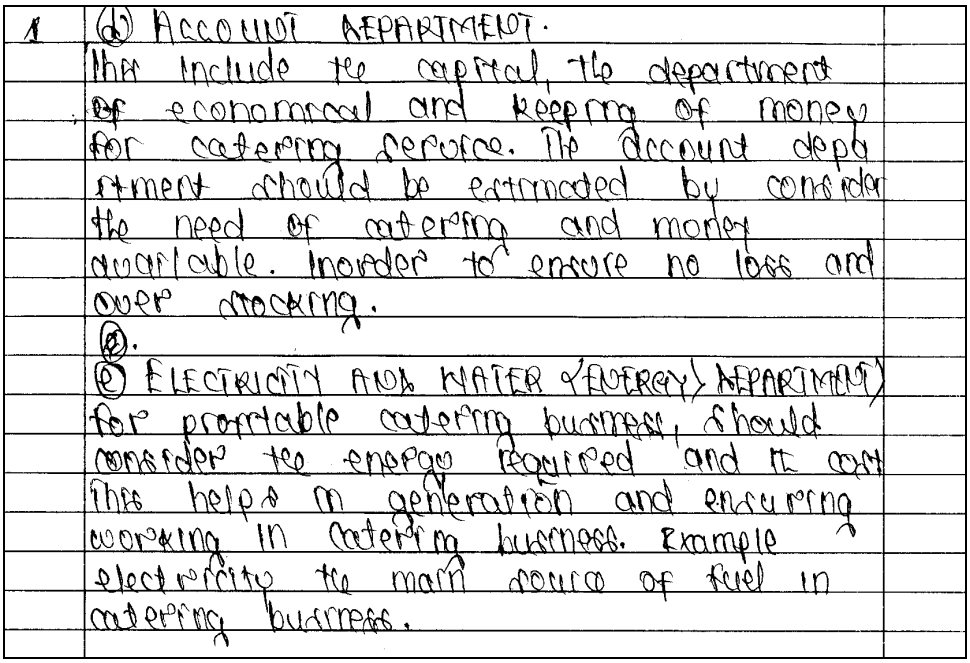


01. Catering: Is the provision of food drink and sometimes accomodation for the aim of aids or gaining profit.
The Areas requires estimated budget in catering business.

(a) KITCHEN DEPARTMENT.
This is the area which involves food and drink supply. Inorder to establish a profitable catering business, carefully should consider kitchen need example ingridient to be used, utensil, fuel and energy. There are importan to to be considered.

(b) BUILDING AND INFRASTRUCTURE DEPARTMENT
Consideration of the building to be built, which will be able to attract the customer. proper managment of building and infrastructure example proper garden, swimming pool, good building materials and etc. catering
→ The hotel should be clean, smart, tidy and quality.

(c) TRANSPORT AND COMMUNICATION DEPARTMENT
Good communication system which involves internet and advanced device should be in budget. This helps in advertisment of the catering to reach the customs. Also it will helps in exchange of information during buying of raw material for catering



Extract 10.2: A sample of incorrect responses to Question 1

In Extract 10.2, the candidate misinterpreted the question. He/she explained the departments of the tourist catering industry instead of the areas that require estimation of budget in a catering business.

2.2.2 Question 2: Nutrition Programme Planning and Intervention

This question measured the candidates' competence in nutrition education communication. The question stated;

Briefly explain;

(a) the importance of nutrition education communication.

(b) characteristics of a communication message on food and nutrition problem solving to the community.

The question was attempted by all 281 candidates. The analysis indicates that 217 (77.20%) candidates scored from 0.0 to 3.0 marks, 60 (21.40%) scored from 3.5 to 5.5 marks and 4 (1.40%) scored from 6.0 to 8.5 marks This data is summarised in Figure 11.

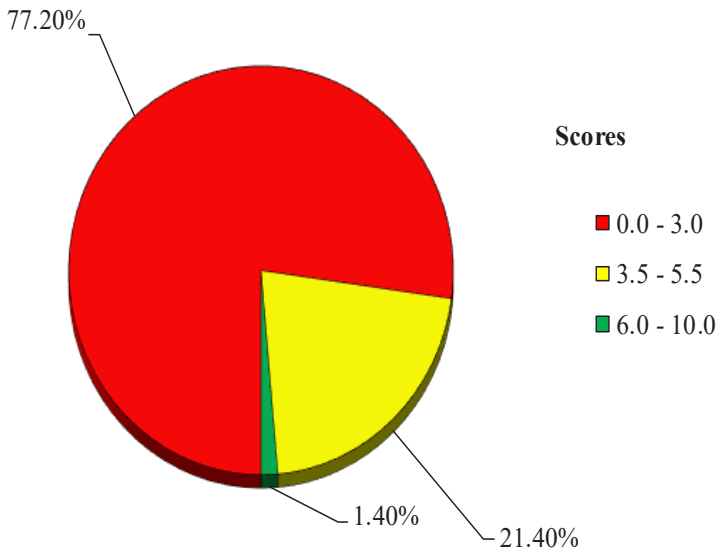


Figure 11: *Candidates' Performance on Question 2*

Figure 11 shows that the general performance in this question was weak since 77.20 per cent of the candidates scored below average. These candidates demonstrated inadequate knowledge of nutrition education communication.

The item response analysis shows that in part (a) majority of the candidates who scored low marks had inadequate knowledge on nutrition education communication. These candidates provided irrelevant responses. For example, one candidate wrote;

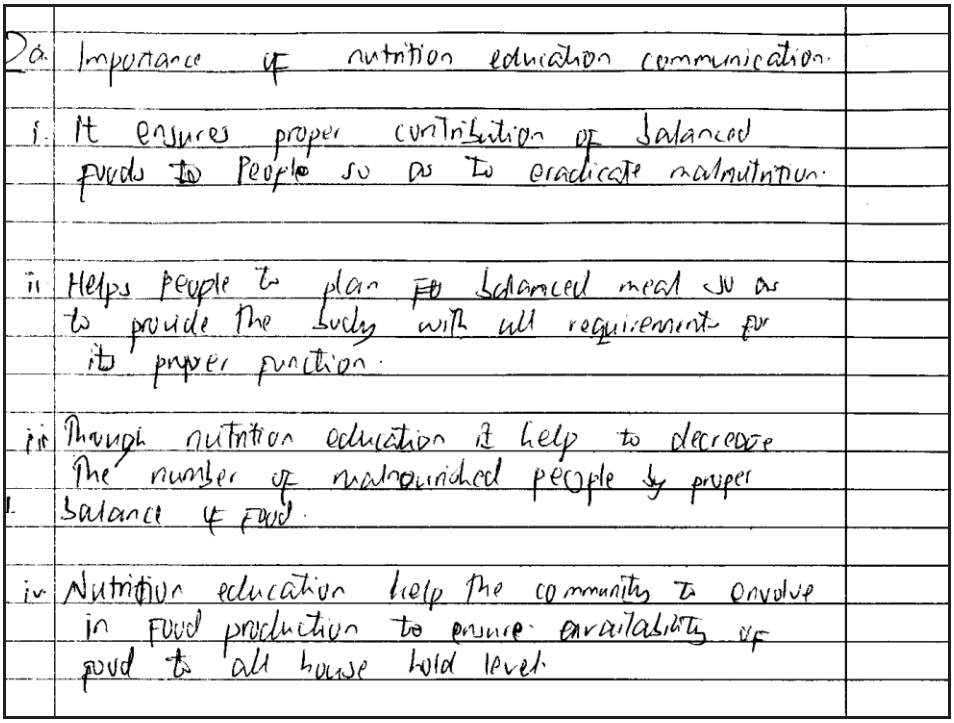
> *it helps to avoid malnutrition disorders within the community*, *it helps to give people good way of affording well nutritious to improve their health*, *help to know the importance of family planning*, *help to improve mother's breastfeeding to their babies, to provide knowledge about weaning baby*, *help to decrease the mortality rate concerned with malnutrition*.

Other candidates misinterpreted the question. For example, one candidate wrote; *due to proper education communication they tend to acquire good source of income, due to proper education communication system they tend to enhance employment opportunity*. These responses were irrelevant to the question's requirements.

In part (b), some of the candidates misinterpreted the demand of the question, hence they provided irrelevant responses. For example, one candidate stated some of the principles/characteristics of primary health

care instead of the characteristics of a communication message on food and nutritional problem solving to the community as he/she wrote; *community participation, sustainability, acceptability and management, to provide solution to the intended problem* and *to provide preventive measures and avoid food disorders or diseases*. Another candidate wrote; *the message focused on prevention is better than cure*, *the message based on encourage family planning*, *food production and consumption*, and *women education*.

These candidates lacked the understanding that the language should be understandable to the community, 'should consider the education level of the people', 'the tradition and values of the community should be considered', 'advise changes by including local knowledge and new knowledge for easy understanding', 'the community workers should deliver the same message within the same sector', 'the technique used to send the message should fit the characteristics and capabilities of the community members', and 'the massage should specify where any other assistance needed in implementing the knowledge can be obtained'. Extract 11.1 is a sample of responses from a script of one of the candidates with weak performance.

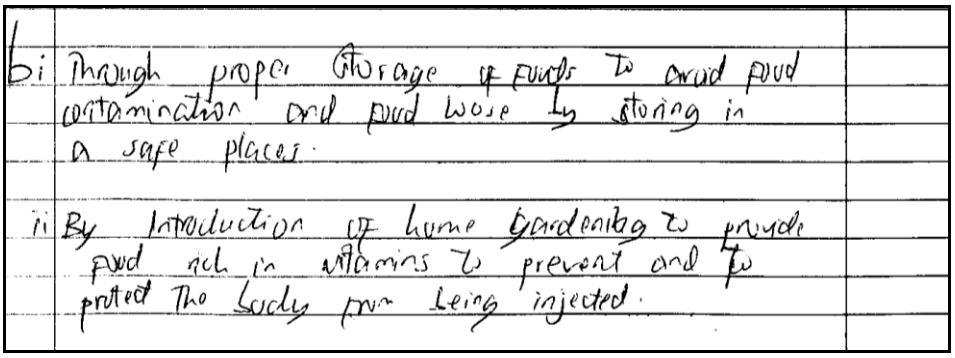

2a. Importance of nutrition education communication.

i. It ensures proper contribution of balanced foods to People so as to eradicate malnutrition.

ii Helps people to plan ~~fo~~ balanced meal so as to provide the body with all requirement for its proper function.

iii Through nutrition education it help to decrease the number of malnourished people by proper balance of food.

iv Nutrition education help the community to involve in food production to ensure availability of food to all house hold level.



Extract 11.1: A sample of incorrect responses to Question 2

In Extract 11.1, the candidate misinterpreted the question. Hence, he/she provided some of the measures to eradicate malnutrition instead of the importance of nutrition education communication in part (a). He/she also provided irrelevant responses in part (b).

On the other hand, the analysis indicates that some of the candidates (22.80%) managed to explain the importance of nutrition education communication in part (a) and the characteristics of a communication message on food and nutrition problem solving in part (b). However, these candidates failed to score all the 10 marks allotted to this question because some of them provided fewer points than the ones required in one or both parts of the question. Others provided insufficient explanations, and some mixed the correct and incorrect responses. Extract 11.2 is a sample of candidate's correct responses to questions 2.

02. (a) The following are importances of nutrition education communication;

(i) Nutrition education communication aids to track the and determine the nutritional status of a particular group of people.

(b) Characteristics of communication message on food and nutrition problem.

(i) The communication message should be specific to a targeted population (group of people).
- The message so as to have a meaning to a society should be specific on a certain issue. For example The message can be like importances of the water.

(ii) The communication message should be presented in a language which is common to a targeted population.
- The language used should be common to all people. For example In Tanzania, the our native and mother language is Swahili Language.

(iii) The communication message should be real focus on solving the problem in a particular population.
- The message provided should have strategies and plan to eradicate the problem in large extent.

(iv) The communication message should be represented in simple way/form that is understood to every member in a society.
- For example, the message can be presented
(v) -T.t according to nature of a people (population)

(vi) The communication message should have positive potential effect on the problem that face a society.
- The positive potential effect aids in changes.

Extract 11.2: A sample of the correct responses to Question 2

In Extract 11.2, the candidate managed to explain the importance of nutrition education communication in part (a) and explained the characteristics of a communication message on food and nutrition problem solving to the community in part (b).

2.2.3 Question 3: Food Microbiology

This question measured the candidates' competence in preventing microorganisms which contaminate food and food environments and cause food-borne illnesses and infections. The question stated as follows;

The microbiological analysis of most patients who consumed poultry, fish and meat dishes in a wedding ceremony revealed the presence of clostridium perfringens. Suggest five techniques the caterer could have taken to prevent the condition.

The question was attempted by all 281 candidates. Out of them, 101 (35.90%) scored from 6.0 to 9.0 marks, 124 (44.20%) scored from 3.5 to 5.5 marks and 56 (19.90%) scored from 0.0 to 3.0 marks. The distribution of their scores is presented in Figure 12.

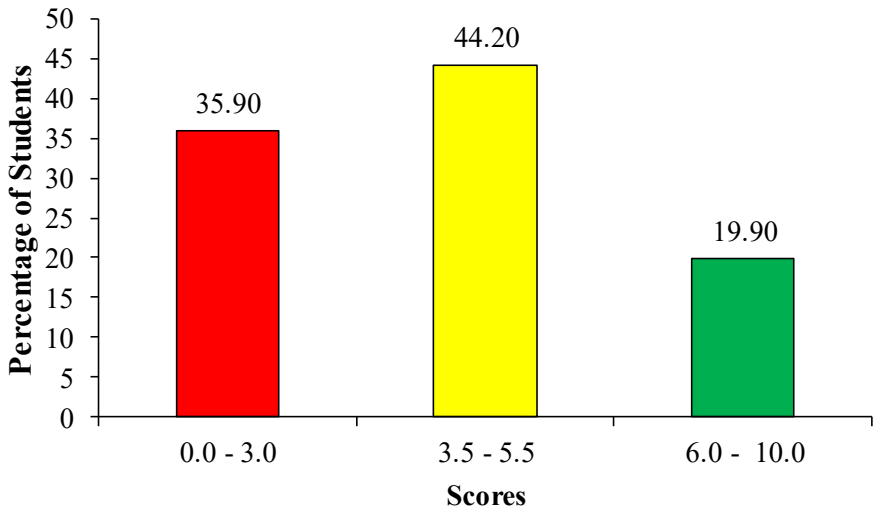
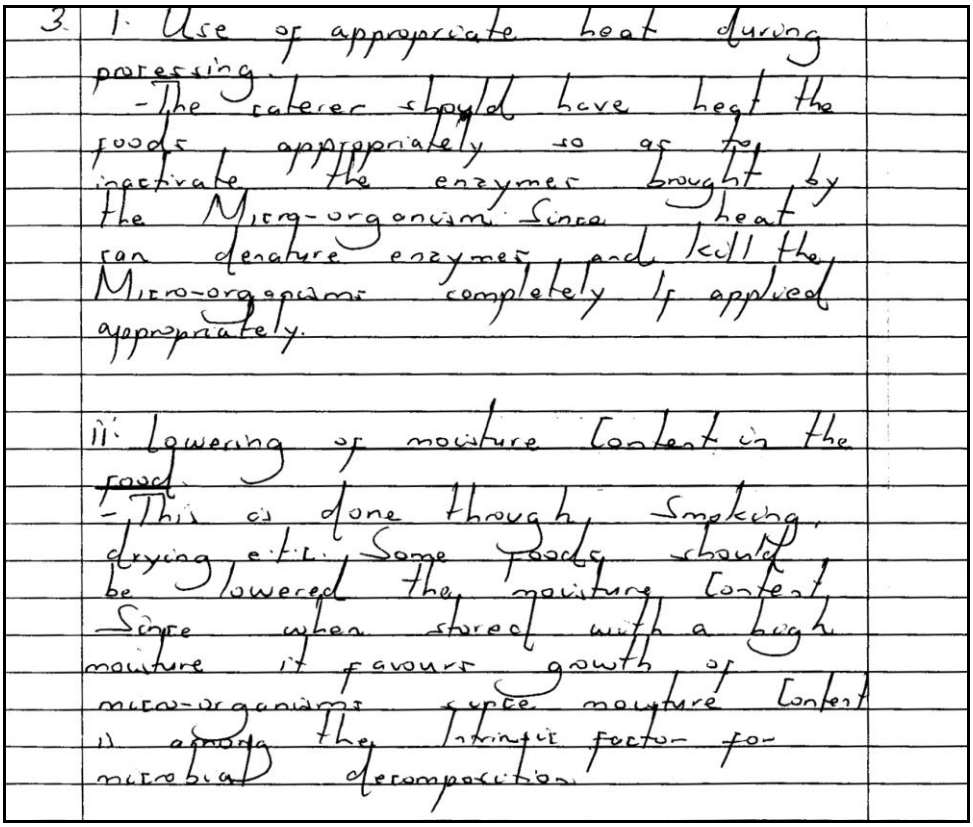


Figure 12: *Candidates' Performance on Question 3*

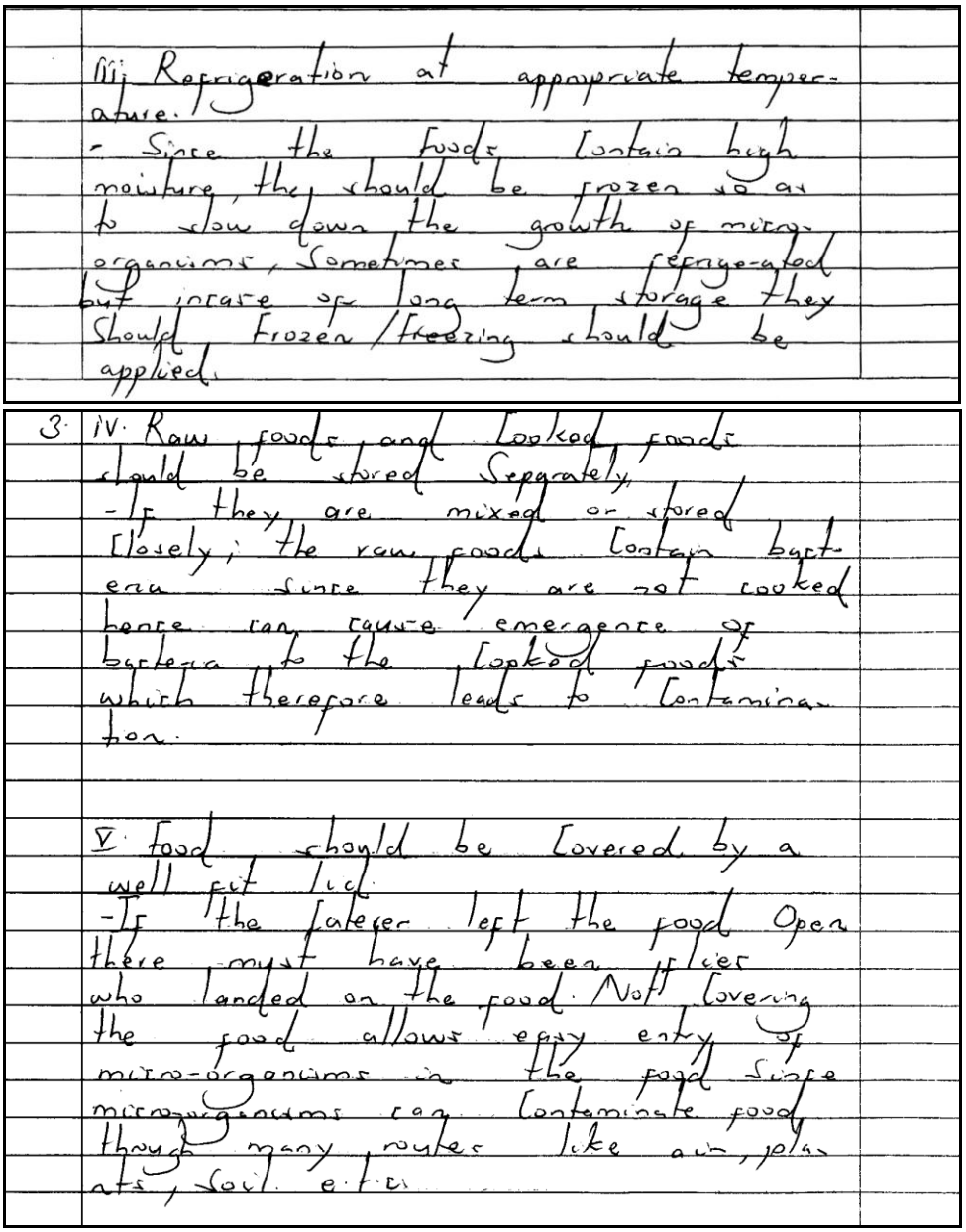
Figure 12 shows that the candidates' general performance in this question was good as 64.10 per cent of them scored from 3.5 to 9.0 marks.

The analysis of the candidates' responses indicates that 56 candidates (19.90%) scored high marks as they demonstrated adequate knowledge on

food microbiology, especially prevention of microbes from contaminating food and food environment. Hence, they correctly explained different ways to prevent food contamination by clostridium perfringens. The correct responses provided were such as; *we should prepare foods safely, store foods safely, cook food in safe ways, serve food safely, follow labels on food items package, throw the food out when in doubt* and *shop food items safely*. However, most of the candidates did not manage to get all the 10 marks allotted to the question because they provided insufficient explanation though the points were correct, mixed correct and incorrect responses or provided fewer points than the ones required to provide. Extract 12.1 is a sample of responses from one of the candidates under this category.


3. i. Use of appropriate heat during processing.
- The caterer should have kept the foods appropriately so as to inactivate the enzymes brought by the Micro-organisms. Since heat can denature enzymes and kill the Micro-organisms completely if applied appropriately.

ii. Lowering of moisture content in the food.
- This is done through smoking, drying e.t.c. Some foods should be lowered the moisture content. Since when stored with a high moisture it favours growth of micro-organisms. Hence moisture content is among the intrinsic factor for microbial decomposition.

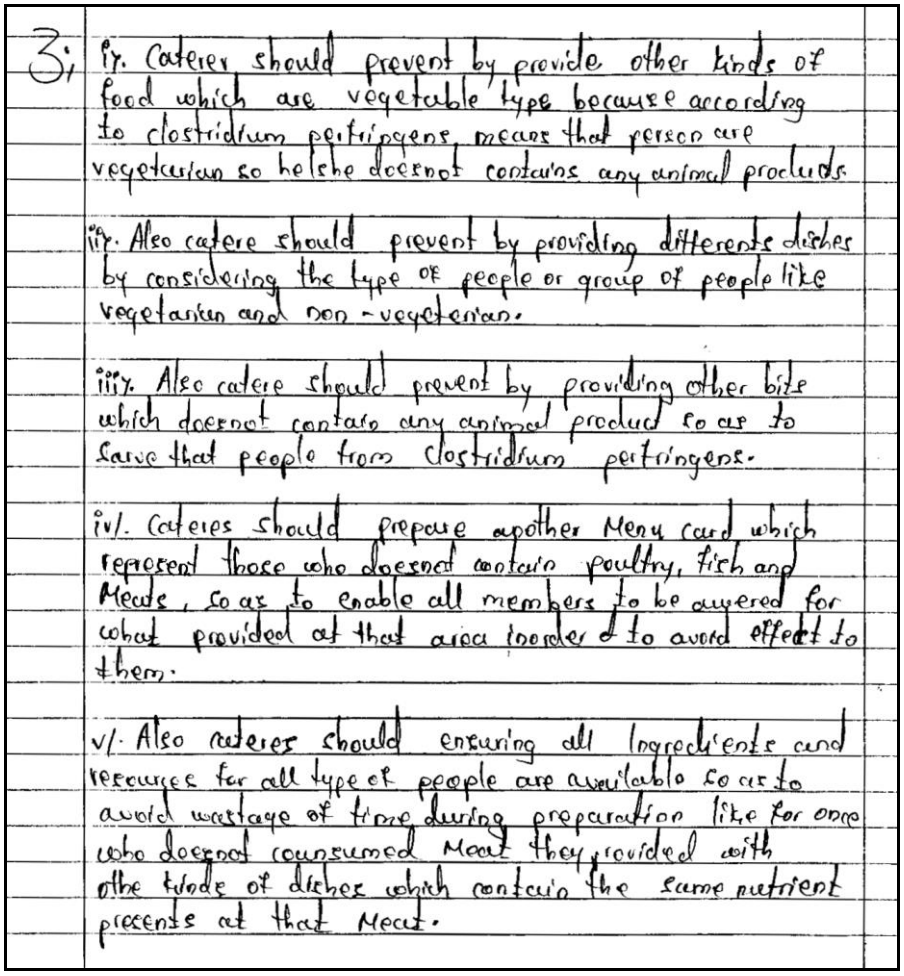


Extract 12.1: A sample of the correct responses to Question 3

In Extract 12.1, the candidate managed to suggest five techniques that a caterer can use to prevent the growth of Clostridium perfringens in poultry, fish and meat dishes. Hence, he/she scored high marks.

Furthermore, the analysis shows that the candidates (35.90%) who scored low marks had inadequate knowledge about prevention of food poisoning caused by microorganisms such as Clostridium perfringens. Some

candidates provided irrelevant responses. For example, one candidate wrote; *to reduce the supply of meat*, *poultry*, *fish and meat dishes to the wedding ceremony*, *to plan for balanced diet*, *encourage people on variety of dishes*, *to encourage people doing regular exercise*, *to encourage people to get treatment*. This implies that these candidates did not understand ways to prevent microorganisms that cause food poisoning. Meanwhile, there were candidates who misinterpreted the question. For example, one candidate provided the principles involved in Nutritional Programme Planning instead of the techniques the caterer could take to prevent the condition. As he/she wrote; *identification of the problem, analysis of the problem, setting objectives, implementation and conclusion, experiment, and drawing conclusion on the done experiment*. Extract 12.2 is a sample of responses from one of the candidates with weak performance.


3; i). Caterer should prevent by provide other kinds of food which are vegetable type because according to clostridium perfringens means that person are vegetarian so he/she doesnot contains any animal products

ii). Also caterer should prevent by providing differents dishes by considering the type of people or group of people like vegetarian and non-vegeterian.

iii). Also caterer should prevent by providing other bite which doesnot contain any animal product so as to save that people from clostridium perfringens.

iv). Caterers should prepare apother Menu card which represent those who doesnot contain poultry, fish and Meats, so as to enable all members to be covered for what provided at that area inorder to avoid effect to them.

v). Also caterers should ensuring all Ingredients and resources for all type of people are available so as to avoid wastage of time during preparation like for one who doesnot consumed Meat they provided with othe kinds of dishes which contain the same nutrient presents at that Meat.

Extract 12.2: A sample of incorrect responses to Question 3

In Extract 12.2, the candidate provided irrelevant responses instead of the techniques the caterer can use to prevent the condition, hence he/she scored zero.

2.2.4 Question 4: Malnutrition

This question measured the candidates' competence on malnutrition, specifically micronutrients deficiencies. The question was as follows;

A mother in her 8th pregnancy visited you complain that she experienced spontaneous fractures and is suffering from deformed spine and rheumatic pain in the legs and lower back. Assist this woman to control the condition by identifying.

(a) two main causes of the condition

(b) four preventive measures and

(c) four treatments for the condition

This question was attempted by all 281 candidates. The analysis indicates that 193 (68.70%) of the candidates scored from 0 to 3.0 marks, 70 (24.90%) scored from 3.5 to 5.5 and 18 (6.40%) scored from 6.0 to 10.0 marks. Figure 13 summarises the performance.

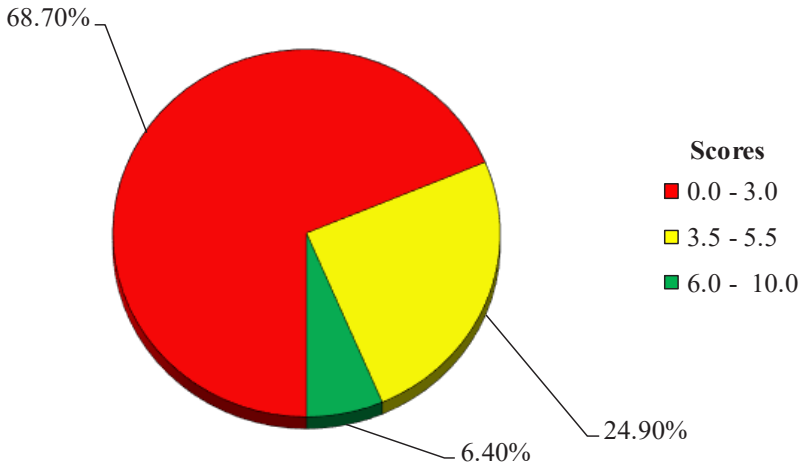


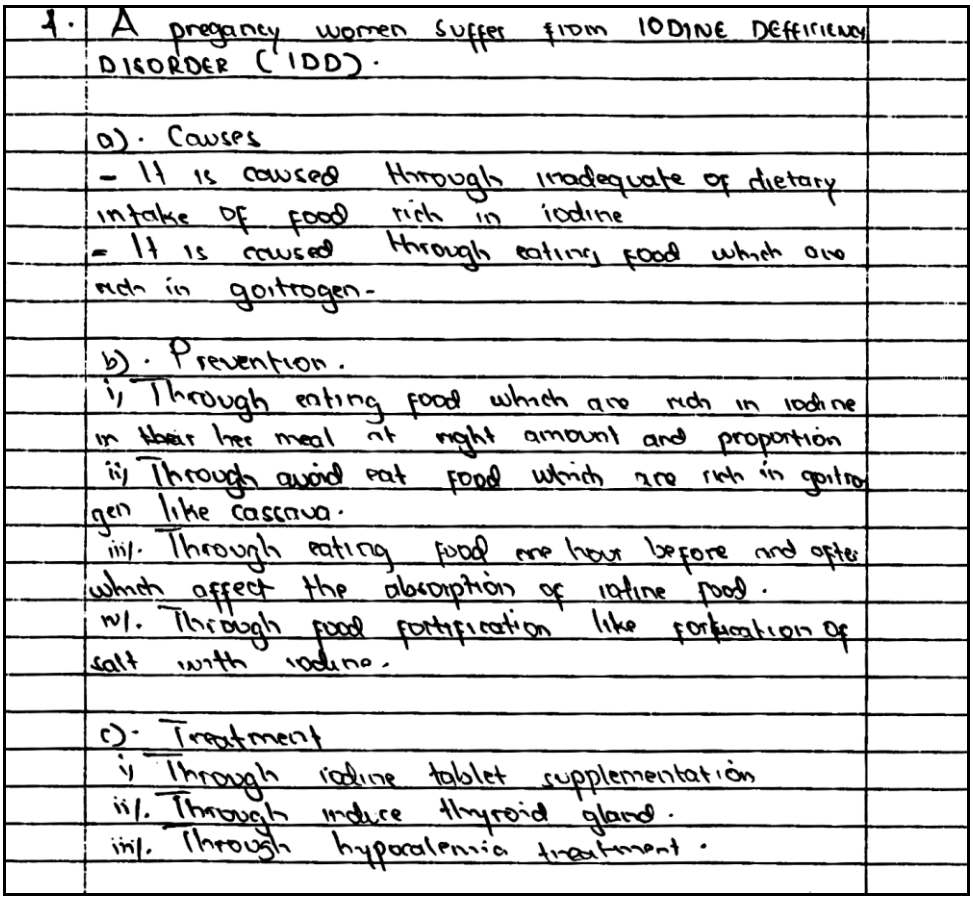
Figure 13: *Candidates' Performance on Question 4*

Figure 13 shows that the general performance for this question was weak since 68.70 per cent of the candidates who attempted this question scored below average marks.

The item responses analysis shows that the candidates (68.70%) who scored lower marks misinterpreted the question. Some demonstrated insufficient knowledge about micronutrients and vitamin D, thus they provided irrelevant responses.

In part (a), some of the candidates mentioned problems that pregnant women are likely to suffer if they don't have a balanced diet. For example, one candidate wrote; *decrease in immunity*, *increase in the mother's uterine walls infections*, *can cause anaemia*, *pre-eclampsia*, *haemorrhage* and *death in mothers*, *stillbirth*, *low birthweight*. Others mentioned factors for malnutrition among pregnant women. Some of their responses were; *insufficient food intake*, *lack of nutrients intake*, *high energy expenditure*, *micronutrient-deficient diets*, *lack of iron*, *infections*. In part (b), some of the candidates mentioned the examples of personal hygiene practices instead of preventive measures. For example, one candidate wrote, *wash hands with soap after visiting toilet and before touching food, sick people not allowed in the kitchen* and *cough and sneeze on handkerchief*. Others mixed correct and incorrect responses.

Moreover, some of the candidates explained the general treatment of malnutrition in pregnant women instead of identifying the specific nutrients required such as calcium, phosphorous and vitamin D in part (c). For example, one candidate wrote; *by taking carbohydrates*, *protein*, *lipids*, *minerals and vitamins*. Others stated few treatments to be taken and their explanations were insufficient. Extract 13.1 is a sample of responses from one of the candidates with weak performance.


4. A pregancy women suffer from IODINE DEFFICIENCY DISORDER (IDD).

a). Causes
- It is caused through inadequate of dietary intake of food rich in iodine
- It is caused through eating food which are rich in goitrogen.

b). Prevention.
i) Through eating food which are rich in iodine in their her meal at right amount and proportion
ii) Through avoid eat food which are rich in goitrogen like cassava.
iii). Through eating food one hour before and after which affect the absorption of iodine food.
iv). Through food fortification like formation of salt with iodine.

c). Treatment
i) Through iodine tablet supplementation
ii). Through induce thyroid gland.
iii). Through hypocalemia treatment.

Extract 13.1: A sample of incorrect responses to Question 4

In Extract 13.1, the candidate misinterpreted the question as he/she stated the causes of iodine deficiency and the measures for preventing and treating it instead of calcium, phosphorus and vitamin D. This implies that the candidate had insufficient knowledge about nutritional deficiencies, especially micronutrients deficiencies.

Furthermore, the item responses analysis shows that 6.40 per cent of the candidates who achieved good performance were able to identify causes, prevention measures and treatment for the nutritional deficiency identified. Some of these candidates understood that the woman had deficiency of micronutrients specifically calcium, phosphorus and vitamin D.

In parts (a), they were aware that when someone consumed food lack in calcium is likely to resulted into calcium deficiency in the body. Also they understood that phosphorous deficiency in the body causes loss of bone mass which resulted into weak bones. For example, one candidate wrote;

lack of vitamin D in her body, *lack of calcium and phosphorous in the bones*.

In part (b), likewise they understood the preventive measures to be taken. For example, one candidate wrote; *increase in intake of vitamin D rich foods to facilitate the absorption of calcium*, *basting under the sun during morning*, *avoiding using and consumption of foods that hinder vitamin D absorption*. Another candidate wrote; *consume food that contain calcium, do not consume ant calcium the food which can hinder the absorption of calcium, consume fortified food with*. In part (c), they were aware of the treatment to be used to solve the problem. For example, one candidate wrote; *by taking the tablets that increase vitamin D*, *taking balanced diets especially food rich in vitamin D*, *by taking of diet containing enough phosphorous*, *by taking of diet containing enough calcium*. Others gave few and insufficient explanations, hence they failed to score all the 10 allotted to this part of the question. Extract 13.2 is a sample of responses from one of the candidates who scored high marks.

4. a) Cause of the condition.

i. Low intake of food rich in calcium and phosphorus in the body; because these minerals are used in the formation of strong bones and teeth.

ii. Insufficient of Vitamin D in the body. Also the vitamin D (calciferal) is used in formation of strong bones when synthesized in the body.

4 b) Preventive measures.

i. Adequate intake of food rich in calcium and of phosphorus like meat and eggs.

ii. Avoid eating food that hinder the vitamin D absorbtion the body.

iii. She should eat fortified foods with vitamin D that will help to proivate the Vitamin D in her body. Example of food is Yoghurt fortied with vitamin D.

iv. She should expose her self on the morning sunlight rays that help the synthesis of vitamin D in the body.

c) Treatments for the condition.

i. She should the taken in calcium tablets supplementation in the body for the repairing of the damaged bones.

ii. She should frequently exposing her self to the morning and evening sunlight rays for the synthesis of vitamin D in the body.

iii. She should take the balanced diet with frequent calcium riching foods.

iv. She should take the balanced diet with phosphorus riching foods.

Extract 13.2: A sample of the correct responses to Question 4

In Extract 13.2, the candidate explained correctly causes, prevention, and treatment measures for the nutritional deficiency identified.

2.2.5 Question 5: Catering and Institutional Feeding

This question measured the candidate's competence in menu planning. The question stated;

Suppose you have been employed as an expert in menu planning;

(a) Briefly explain how the knowledge on food preparation and service methods can simplify your work.

(b) *Categorize eight factors you should consider before planning the menu.*

The analysis shows that the question was attempted by all 281 candidates. Out of them, 235 (99.60%) scored from 6.0 to 10.0 marks, 45 (16.00%) scored from 3.5 to 5.5 marks and only 1 (0.04%) scored 0.0 mark. Table 1 summarises the candidates' performance.

Table 1: *Candidates Performance on Question 5*

Scores	No. of Candidates	Percentage
0.0 - 3.0	01	0.40
3.5 – 5.5	45	16.00
6.0 – 10 0	235	83.60

N=281

Table 1 shows that the candidates' general performance on this question was good since 99.60 per cent of the candidates passed by scoring average marks or above.

The analysis of the candidates' responses indicates that 83.60 per cent of the candidates with good performance were knowledgeable about menu planning. These candidates correctly explained the way knowledge of the food preparation methods can simplify work in part (a). In part (b), they correctly categorized eight factors to consider before planning the menu. This performance indicates that candidates had adequate knowledge about menu planning. Extract 14 is a sample of responses from a script of one of the candidates with good performance.

5. (a) How Knowledge of food preparation and Service methods can Simplify menu planning.

1. Through preparing balance meals ; Through the Knowledge of food preparation the Caterer can be able to prepare the balance meals that contains all essential food nutrients like Carbohydrates, Protein, Water, Fat, Vitamins and Minerals

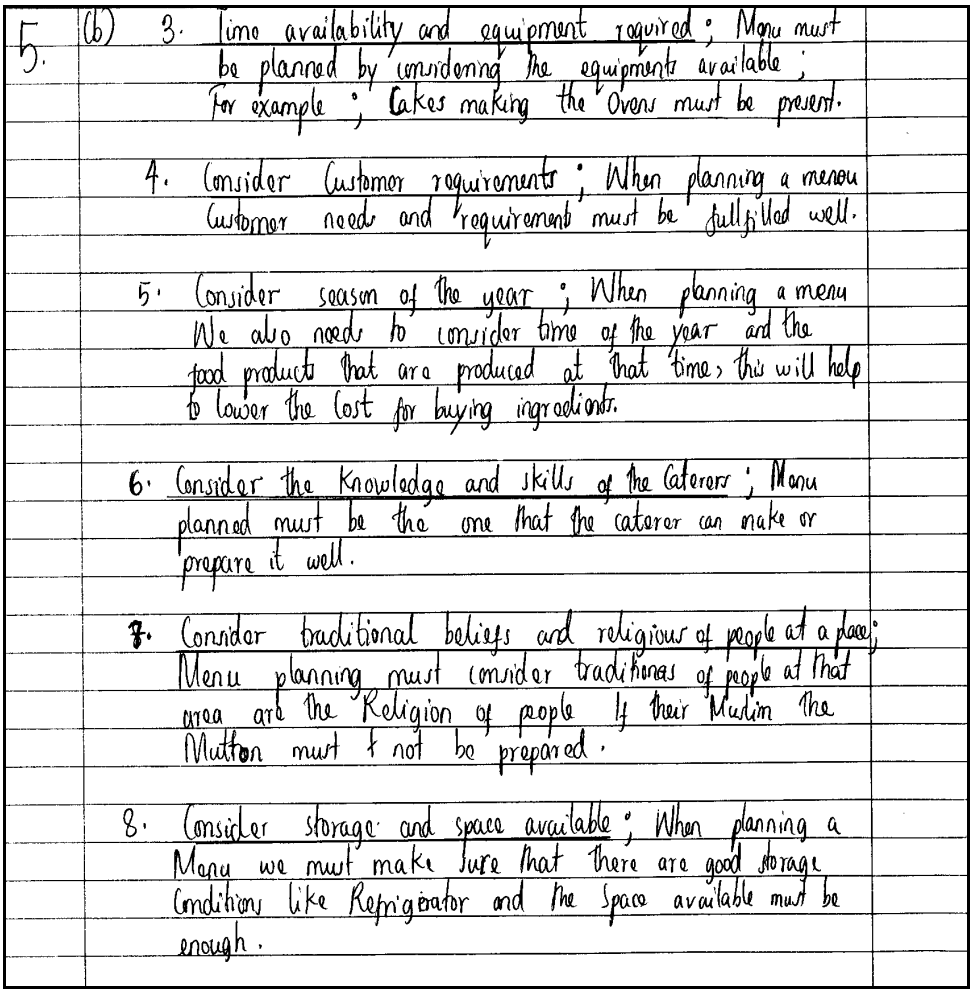
2. Through serving of attractive meals ; Through the Knowledge of food service methods caterers are able to serve and decorate the food to the extent that the Customer is welcomed and stimulated to have the food.

3. Portioning control ; Through the Knowledge of service method the Caterers are able to make and serve food of a specific portion / amount according to the Cost.

5. (b). Eight Factors to consider before planning a menu :-

1. Type of Customer your planning to cater for ; Before Making of a menu / planning of menu first we should Consider the Kind of Customers that are we expecting or or that we are cater for. For example Cyclic Menu can be planned for the Industrial workers, and Statistic menu can be served or planned for the hotels, Restaurants because the customers change every day.

2. Consider purchasing power of Customers ; Plan a the menu With reference to the purchasing power of your Customer. For example ; Doughnuts and black tea for School children and not Pizza and Juice for the School children normally here a Caterer will b get much risk.


5. (b) 3. Time availability and equipment required ; Menu must be planned by considering the equipments available ; For example ; Cakes making the Ovens must be present.

4. Consider Customer requirements ; When planning a menu Customer needs and requirement must be fulfilled well.

5. Consider season of the year ; When planning a menu We also needs to consider time of the year and the food products that are produced at that time, this will help to lower the cost for buying ingredients.

6. Consider the Knowledge and skills of the Caterers ; Menu planned must be the one that the caterer can make or prepare it well.

7. Consider traditional beliefs and religious of people at a place; Menu planning must consider traditionas of people at that area are the Religion of people If their Muslim the Mutton must t not be prepared.

8. Consider storage and space available ; When planning a Menu we must make sure that there are good storage Conditions like Refrigerator and the Space available must be enough.

Extract 14: A sample of the correct responses to Question 5

In Extract 14, the candidate correctly responded to both parts (a) and (b) and scored high marks. This shows that the candidate had enough knowledge of menu planning.

Despite the good performance on this question, one candidate (0.40%) attained low score. This candidate skipped part (a) and misunderstood part (b) of this question. He/she provided factors to consider in the selection of a food recipe in part (b) instead of the factors to consider before planning the menu. The candidates' responses were; *Good nutritional quality, should have desirable sensor qualities, time involved in the preparations of the recipe, should be within food financial ability, fit into your needs for the recipe.* Hence, he/she scored zero.

2.2.6 Question 6: Nutrition Programme Planning and Intervention

This question measured the candidate's understanding of family planning, specifically the effective methods of family planning. The question stated; *The women belonging to Mandateni women group are complaining about the use of contraceptives. Recommend five major factors to consider in selecting an appropriate contraceptive method for use which they have to know*.

The question was attempted by 281 candidates. Among them, 77 (27.40%) candidates scored from 6.0 to 10.0 marks, 99 (35.20%) scored from 3.5 to 5.5 marks, and 105 (37.40%) scored from 0.0 to 3.0 marks. Figure 14 presents the distribution of their scores.

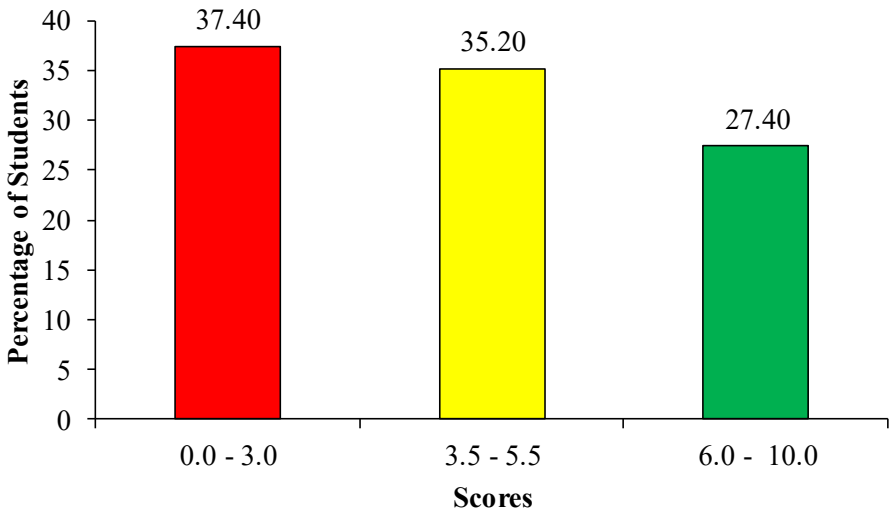


Figure 14: *Candidates' Performance on Question 6*

Based on Figure 14, the general performance of the candidates in this question was good since 62.60 per cent of the candidates scored from 3.5 to 10 0 marks.

The candidates (27.40%) who performed well in this question had sufficient knowledge of the factors to consider in selecting an appropriate contraceptive method for use. These candidates explained correctly the major factors. Some of their responses were; *contraceptive methods should be accepted by the user*, *should be available and easy to obtain when needed*, *their side effects should be known before using it*, *should know whether it is possible to conceive after using the method*, *should know its*

effectiveness. However, the candidates (35.20 %), with average performance failed to score all the 10 marks because they provided few correct responses or insufficient explanations. Extract 15.1 shows a sample of responses from one of the candidates with good performance.

6. Factors to consider in selecting contraceptive Method.

I : Effectiveness.

Consider, IF the contraceptive Method is 100% effective, that is if it can prevent preganancy when used, forexample the use of calender is not 100% effecient, so get to choose any other of contraceptive.

II : Side effect.

When selecting contraceptive Method, get to know the hazards or dis-advantages of that Method, so as you can choose the other safe Method. Some Methods are hazard in term of health, some can cause reproductive cancer forexample use of diaphram.

III : Revesibility.

IF the Method is revesible that is if you use it and then another time you want to get a preganancy, can you get. There are some Methods prevent a person to get preganancy through out her life time forexample female sterilization (cutting of fallopian tube).

IV : Accesibility and availability.

IF you are accesible to that service, IF that service is easly available, Forexample Use of condoms is easly available and accesible so women should use contraceptive Method which is easy available.

V : Acceptability.

When selecting a contraceptive Method, you need to choose the service which is highly accepted and is accepted by your couple Mate.

Extract 15.1: A sample of the correct responses to Question 6

In Extract 15:1, the candidate correctly stated the factors to consider when selecting appropriate contraceptive methods. Hence, he/she scored high marks.

Furthermore, the analysis reveals that 37.4 per cent of the candidates scored low marks in this question. These candidates had inadequate knowledge about family planning, especially the factors to consider when selecting appropriate contraceptive methods. Some of them provided irrelevant responses. For example, one candidate wrote; *money availability*, *time*, *economic income level of a woman*, *duration or time taken for the contraceptive to work*, *nutritional status*, *cost of the method*, *duration of the method*, *health and good sanitation of individual*. Others misunderstood the question as they mentioned types of contraceptive methods instead of the factors to be considered when selecting an appropriate contraceptive method. For example, one candidate wrote; *calendar method, abstaining from sex, condoms, pills* and *Intra Uterine Devices*. Extract 15:2 is a sample of responses from one of the candidates who scored lower marks.

6 Factors to Consider in selecting an appropriate Contraceptive Method.

a1.) Should choose the Method which are adviced by Medical doctors.

Nowadays, there are Contraceptive Method which are locally but are not official, in which sometimes results to effect on the body. But for those which are directed by medical doctors will be safe, hence give instruction to use.

2.) During selecting consider the time for that Contraceptive Method to work.

There are other methods which take a long time even 6 up to 10 years until to change again. These means that method is highly chemically and may cause other effect to the body like Cancer to the reproductive organs.

3) Selecting the one which are naturally (does not consist of any chemicals)

Example natural method are calendar method, Withdra w Method, Abstaining method. This has no effect to the human health. But it's need more carefully and highly Coprperation between two pathers.

4) Select the Method which is not harmfull to the part of the body or health.

There are some Methods which for some people can cause damage when a person finish to use it and all this is because of materials used to make them.
Some of them are allergic to the users. Example of equipm nt which may cause harm Intra uterinary device

5.) Select the method which is affordable.

Some of the Contraceptive Method are not easy to get to our sorrounding areas and if present are very expensive hence cause the users to have problem to find it.
Example if it is Condom Must be durable and affordable at a required place.

Extract 15:2: A sample of incorrect responses to Question 6

In Extract 15:2, the candidate provided incorrect responses due to inadequate knowledge about contraceptives, hence he/she scored low marks.

2.2.7 Question 7: Food Microbiology

This was an essay type question which measured the candidates' understanding on food microbiology, specifically the routes through which microorganisms can reach food. The question stated;

Microorganisms that cause food-borne illnesses may contaminate food products through different routes. Justify this statement in nine points.

The question was opted by 193 candidates. A total of 95 (49.20%) candidates scored from 12.0 to 18.0 marks, 75 (38.90%) scored from 7.0 to 11.5 marks and 25 (11.90%) scored from 0.5 to 6.5 marks. Figure 15 summarizes their performance.

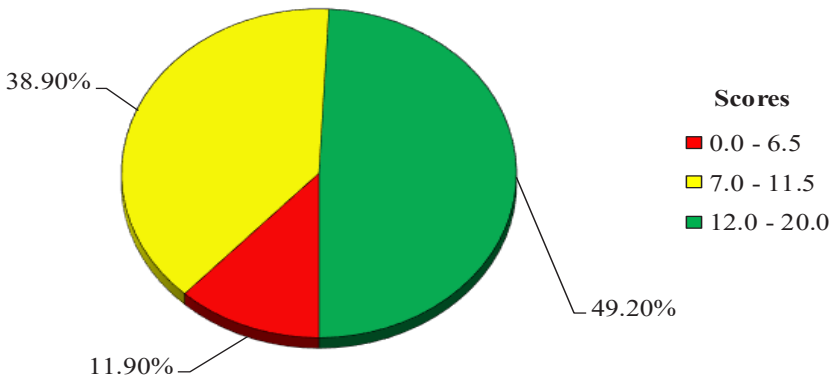
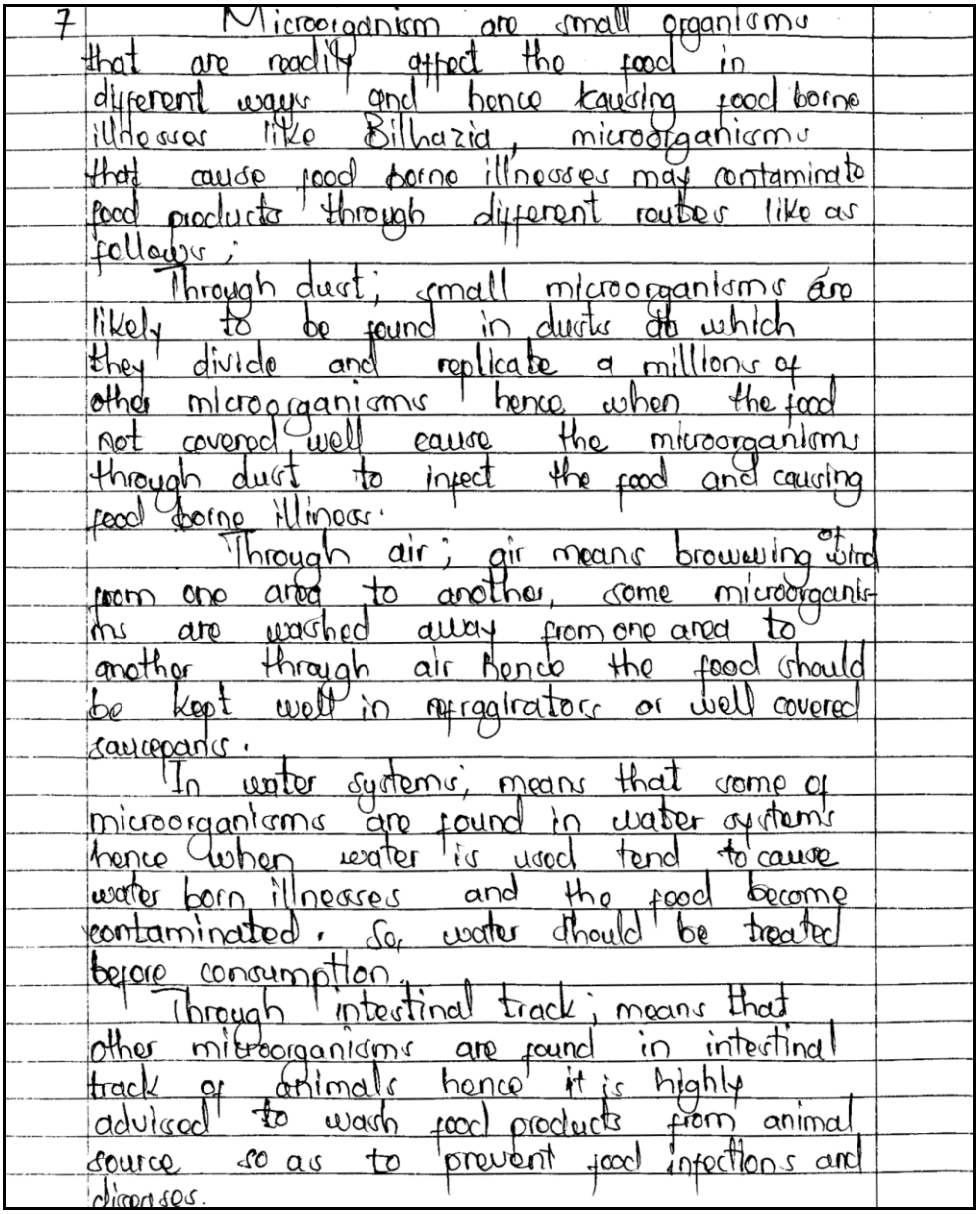


Figure 15: *Candidates' Performance on Question 7*

Figure 15 shows that the general performance of this question was good, since 88.1 per cent of the candidates scored from 7.0 to 18.0 marks.

The analysis of the candidates' responses shows that most of the candidates who scored average marks or above. These candidates managed to justify the routes through which microorganisms can cause food-borne illnesses. They correctly described the routes such as; *dust and air, soil, water*, *plant*

and plant products, *animal feeds*, *animal faeces including human faeces, animal hides, animal food sources, poor sewage system*. Moreover, there were those who managed to mention the correct routes but failed to provide sound explanations about them. Also, others provided only 4 to 6 correct points instead of 9 as the question demanded. Hence, they scored the average marks. Extract 16.1 is a sample of responses from one of the candidates with good performance.



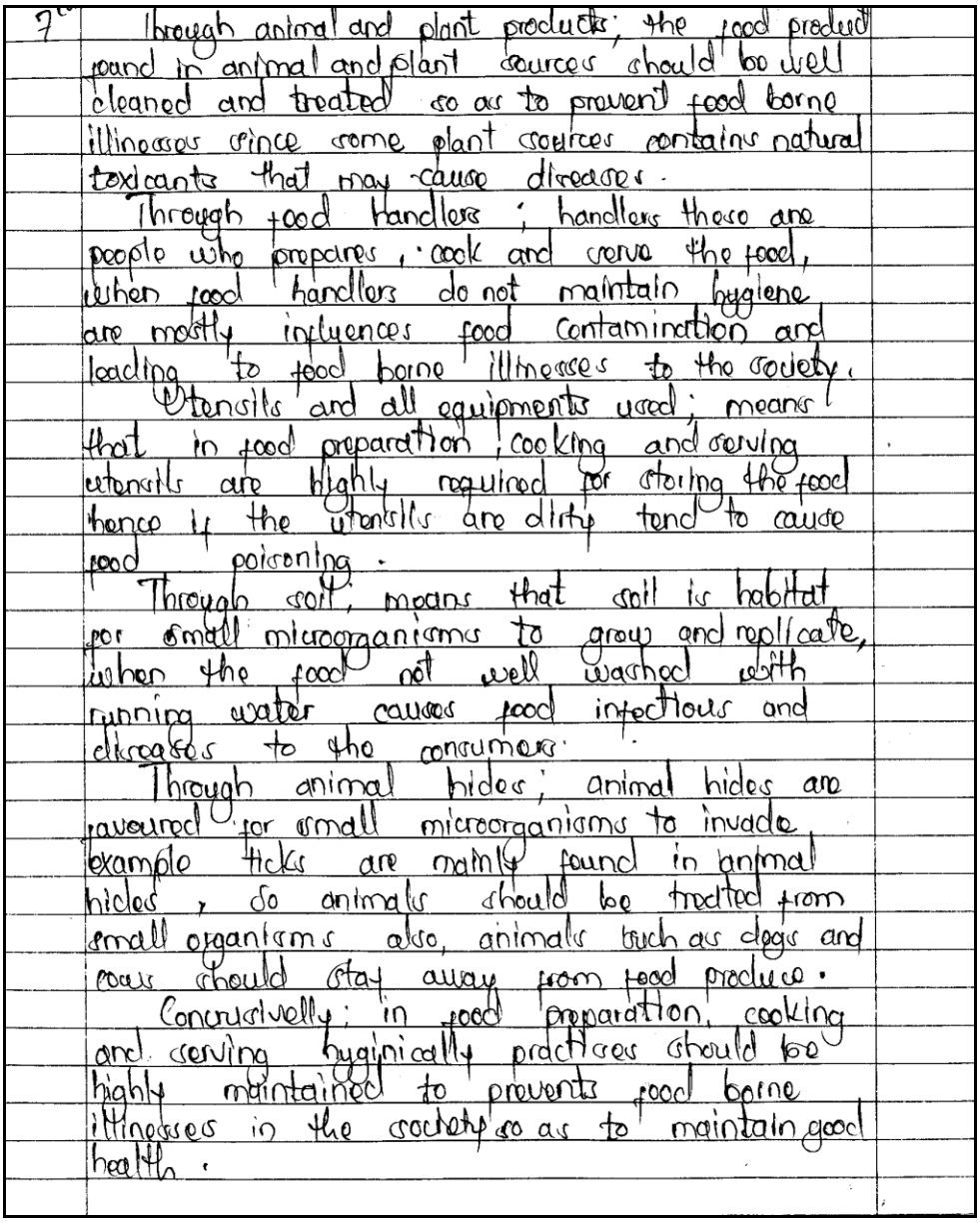
7 Microorganism are small organisms that are readily affect the food in different ways and hence causing food borne illnesses like Bilhazia, microorganisms that cause food borne illnesses may contaminate food products through different routes like as follows;

Through dust; small microorganisms are likely to be found in dusts on which they divide and replicate a millions of other microorganisms hence when the food not covered well cause the microorganisms through dust to infect the food and causing food borne illness.

Through air; air means browwing of wind from one area to another, some microorganisms are washed away from one area to another through air hence the food should be kept well in refrigirators or well covered saucepans.

In water systems; means that some of microorganisms are found in water systems hence when water is used tend to cause water born illnesses and the food become contaminated. So, water should be treated before consumption.

Through intestinal track; means that other microorganisms are found in intestinal track of animals hence it is highly advised to wash food products from animal source so as to prevent food infections and diseases.


7a) Through animal and plant products; the food product found in animal and plant sources should be well cleaned and treated so as to prevent food borne illnesses since some plant sources contains natural toxicants that may cause diseases.

Through food handlers; handlers these are people who prepares, cook and serve the food, when food handlers do not maintain hygiene are mostly influences food contamination and leading to food borne illnesses to the society.

Utensils and all equipments used; means that in food preparation, cooking and serving utensils are highly required for storing the food hence if the utensils are dirty tend to cause food poisoning.

Through soil, means that soil is habitat for small microorganisms to grow and replicate, when the food not well washed with running water causes food infectious and diseases to the consumers.

Through animal hides; animal hides are favoured for small microorganisms to invade example ticks are mainly found in animal hides, so animals should be treated from small organisms also, animals such as dogs and cows should stay away from food produce.

Conclusively; in food preparation, cooking and serving hygienically practices should be highly maintained to prevents food borne illnesses in the society so as to maintain good health.

Extract 16.1: *A sample of the correct responses to Question* 7

In Extract 16.1, the candidate correctly stated the routes through which that microorganisms can contaminate food and cause food-borne illness. This shows that the candidate had adequate knowledge on food contamination.

Despite the good performance obtained in this question, the analysis shows that 11.9 per cent of candidates scored low marks. Most of the candidates under this category misinterpreted the question and provided irrelevant responses. Some of them provided intrinsic and extrinsic parameters of

bacterial growth, bacterial growth phases (curve), or places where bacteria can contaminate food. For example, one candidate wrote; *moisture content*, *nutrient content*, *oxidation/reduction factor*, *pH*, *biological structure*, antimicrobial, *temperature*, *presence of gases*, *relative humidity*. Other candidates provided the areas where food loss can occur. For example, one candidate wrote; *in farm*, *in harvesting processes*, *in storage*, *in transportation*, *in market*, *during processing*, *during preparation*, *during serving* and *in eating*. Furthermore, some candidates provided unhygienic ways of handling food. For example, one candidate wrote; *by using dirt utensils*, *by not covering food*, *after visiting from toilet*, *by not washing well utensils*. Another candidate wrote; *Improper sanitation*, *through food processing*, *improper sewage system*, *consumption of uncovered food*, *improper disposal of waste products*, *the use of dirt and unwashed utensils*, *improper food preparation*, *improper storage practices of food*. These responses indicate that the candidates had insufficient knowledge about food contamination. Extract 16:2 is a sample of responses from one of the candidates who scored lower marks.

7) Logarithimic death phase (D) is the phase at which their is no any multiplication at all and their is rapidly death of the number of bacteria (Micro-organism) as all condition which are favourable for the multiplications are absent. And in this stage the numser of Micro-organism who die is at higher peak.

Negative death phase (N-I). At this stage know their is no any alive bacteria or any Micro-organism since all the activities they have been stop and no any condition which will be favour their growth in the affected area. All the micro-organism they have undergo death.

Survival phase (S-I). Is the last phase of growth of Micro-organism (Bacteria as where it lead to beginning of their life. where at this phase the bacteria start to being survive as their is application of the condition which make them to be alive again as this they start in capturing the environment.

In a nut shell the routes at which ~~orga~~ Micro-organisms are passing enable them to ostain their food and affect the host and lead to food borne illnesses. Apart from their disadvantage some are usepully as they are used in fermentation process and bating of various product in the industries. Example are; Mould, Yeast and bacteria.

Extract 16.2: *A Sample of Candidates' Incorrect Responses to Question* 7

In Extract 16.2, the candidate stated phases of bacterial growth instead of the routes through which that microorganisms can reach food and cause food-borne diseases.

2.2.8 Question 8: Nutrition Programme Planning and Intervention

This question measured the candidates' competence on food and nutritional policy. The question stated;

The food and nutritional policy is an essential aspect that coordinate the implementation of food and nutrition programmes in any state.

(a) Elaborate six aims of the Food and Nutrition Policy for Tanzania to the modern Tanzanian community.

(b) *Analyse four areas which are emphasized in the policy.*

The question was opted by 115 candidates. Data shows that 4 (3.50%) candidates scored from 12.0 to 13.5 marks, 67 (58.20%) scored from 7.0 to 11.5 marks, and 44 (38.30%) scored from 0.0 to 6.5 marks. Figure 16 summarises this performance.

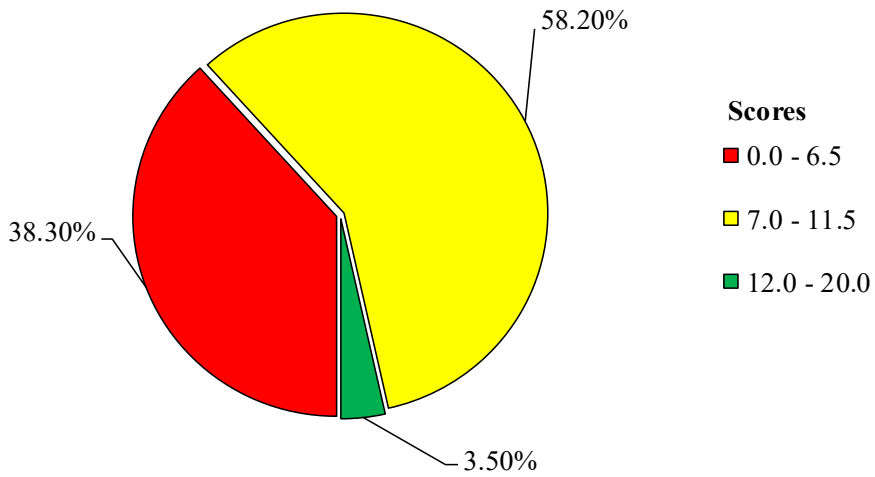


Figure 16: *Candidates' Performance on Question 8*

Figure 16 shows that the general performance of this question was good, since 61.70 per cent of the candidates passed by scoring 7.5 to 13.5 marks.

The analysis of the candidates' responses shows that the candidates who scored average marks or above were knowledgeable of the Nutrition Policy of Tanzania. These candidates satisfactorily explained the aims of the Food and Nutrition Policy of Tanzania in part (a). Some of the responses they provided were; *to integrate food and nutrition activities done by various sectors, to improve the nutritional situation of people in Tanzania*

especially women and children, to enable Tanzanians to produce and use nutritional foods, to enable each sector to play its role in elimination of malnutrition. In part (b), some candidates provided insufficient explanations about the areas which are emphasized in the Food and Nutrition Policy. Hence, they failed to score all the 20 marks. Some of the correct responses were; *food security*, *care for special groups*, *essential human services*, *food and nutrition committees*, *roles of various sectors in the implementation of the food and nutrition policy in Tanzania*.

Conversely, the candidates (38.30%) who scored low marks had inadequate knowledge about Nutritional Policy for Tanzania. In part (a), most of them provided 1 to 2 correct aims of the Nutrition Policy for Tanzania out of 6 points required. For example, one candidate wrote, *to decrease the rate of malnourished individuals*, *to identify the group of people who are at high risk of being malnourished*, *to provide education to individuals on how to prevent the malnutrition problems*, *to improve the nutritional status of individuals in the country*. Some of the candidates provided techniques to prevent bacterial food poisoning. For example, one candidate wrote; *food should be cooked well*, *food should be eaten while hot*, *food should be covered well to decrease rate of morbidity and mortality in the country*, *throw the food away after cross contamination*. These responses were not related to the question's requirement.

Furthermore, some of the candidates provided four macro-areas for food supply and their policy measures instead of areas which are emphasized in the Food and Nutrition Policy for Tanzania in part (b). For example, one candidate wrote; *food supply*, *food demand*, *food utilization* and *food availability*. Others just mentioned the macro-areas instead of describing them. These responses indicated that the candidates had insufficient knowledge about the Food and Nutrition Policy of Tanzania, particularly areas emphasised in the policy. Extract 17 is a sample of incorrect responses from one of the candidates.

8a) done so as to avoid malnutrition to the people especially the children. Therefore, food fortification is also among the aims of the food and Nutrition Policy for Tanzania to the modern Tanzanian community.

To introduce food therapy. Also food therapy should be introduced to the Tanzanians so that people could have good health, that is why food and nutritional policy coordinates the implementation of food and nutrition programmes in any state.

To provide nutrition education. Among the aims of Food and Nutrition Policy is to provide the nutrition education to the people so that malnutrition may be combated. The nutrition education should be provided to all the people so that everyone can be aware.

To enable child spacing. Among the other aims is that it wants to enable child spacing through family planning because without family planning or child spacing the children won't have a good health hence they may become undernourished children.

To raise the living standard of the people. The food and Nutrition Policy aimes at raising the living standard of the people so that it can implement food and nutrition programmes in any state. There are also four areas which are emphasised in the policy and they are as follows :-

In hospitals. The hospitals are emphasised in the policy so that the nutrition education should be provided so that people may have

Sal done so as to avoid malnutrition to the people especially the children. Therefore, food fortification is also among the aims of the food and Nutrition Policy for Tanzania to the modern Tanzanian community.

To introduce food therapy. Also food therapy should be introduced to the Tanzanians so that people could have good health, that is why food and nutritional policy coordinates the implementation of food and nutrition programmes in any state.

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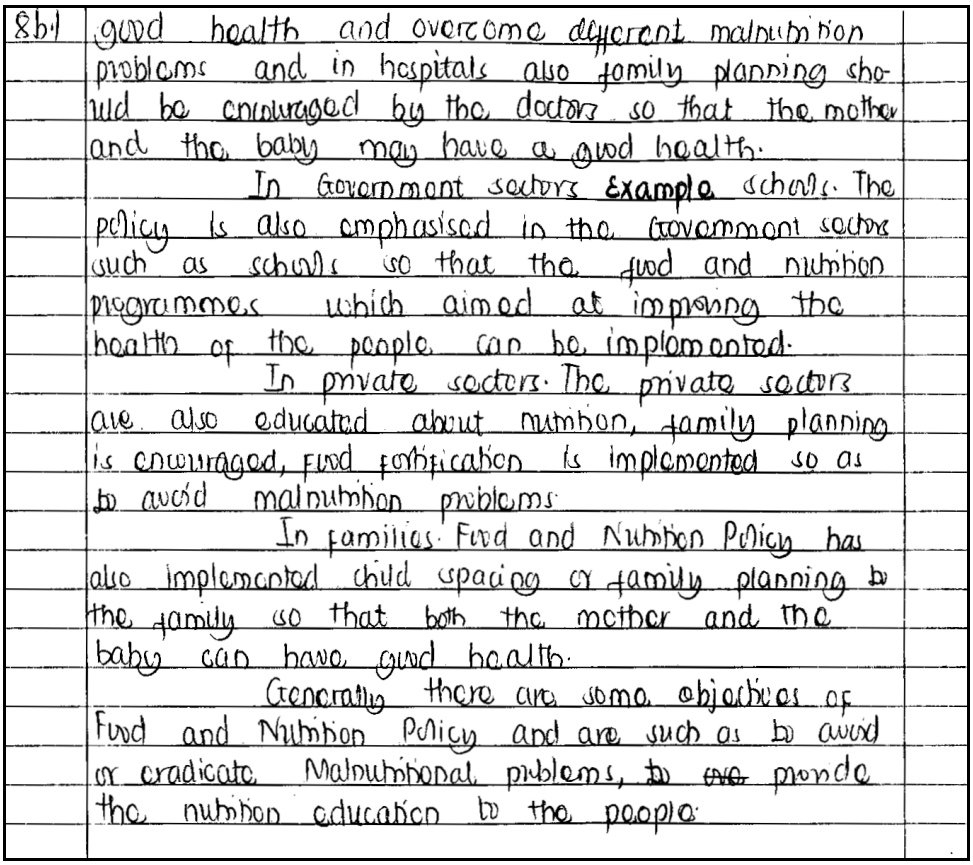

8b)
good health and overcome different malnutrition problems and in hospitals also family planning should be encouraged by the doctors so that the mother and the baby may have a good health.

In Government sectors **example** schools. The policy is also emphasised in the Government sectors such as schools so that the food and nutrition programmes which aimed at improving the health of the people can be implemented.

In private sectors. The private sectors are also educated about nutrition, family planning is encouraged, food fortification is implemented so as to avoid malnutrition problems.

In families. Food and Nutrition Policy has also implemented child spacing or family planning to the family so that both the mother and the baby can have good health.

Generally there are some objectives of Food and Nutrition Policy and are such as to avoid or eradicate Malnutritional problems, to ~~eve~~ provide the nutrition education to the people.

Extract 17: *A sample of incorrect responses to question 8*

In Extract 17, the candidate provided incorrect responses in all parts of the question part (a) and (b), hence scored low marks.

2.2.9 Question 9: Malnutrition

This was an essay-type question which measured the candidates' understanding on undernutrition. The question stated;

The forms of undernutrition in the community are caused by different factors that require multiple measures to control them. In view of this statement;

(a) Explain how lack of nutrition education and failure to eat enough food for the body requirements can cause undernutrition.

(b) Suggest seven practical solutions to the situation.

The question was opted by 254 candidates. Out of them, 194 (76.40%) candidates scored from 12.0 to 20.0 marks, 58 (22.80%) scored from 8.0 to

11.5 and 2 (0.80%) scored from 6.5 out of 20 marks. Figure 17 illustrates this performance.

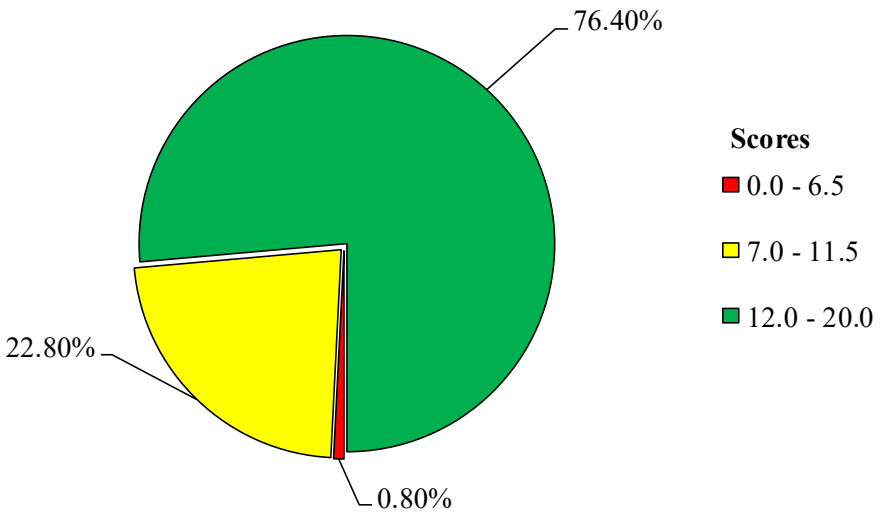


Figure 17: *Candidates' Performance on Question 9*

Figure 17 shows that the candidates' general performance in this question was good since 99.20 per cent of the candidates scored from 8.0 to 20 marks.

The analysis shows that the candidates (76.40%) who had good performance understood that lack of nutrition education and failure to eat enough nutritious food for the body requirements can cause undernutrition. Hence, they provided correct responses in part (a) of the question. Some of the correct responses were; *prolonged inadequate food intake results to malnutrition*, *lack of nutrition education result to improper nutrition practices which can result to poor nutritional status.*

In part (b), most of the candidates managed to provide the practical solution to the problem. Some of the responses provided were; *Observe proper storage of food, proper heat treatment, avoid cross contamination of food, use clean equipment, food must be cooked well, proper preparation of food* and *covering the food well*. These responses indicated that the candidates had sufficient knowledge about Food and Nutrition Policy.

On the contrary, only 2 (0.80 %) of the candidates scored below average marks. In part (a), these candidates provided irrelevant responses due to misconceptions of the demand of the question. For example, one candidate

described the services which are provided in the Reproductive and Child Health (RCH) clinics such as *nutritional care of children, safe delivery service, family planning, supplementation of Vitamin A, care for pregnant women, health education, nutritional advice, examination and treatment of minor illnesses* and *growth monitoring.* The candidates did not understand that lack of nutrition education results into inadequate intake of food (both in quantity and quality) which subsequently causes undernutrition. the candidates also did not understand that failure to eat enough food for the body requirement is a result of various factors such as food insecurity, poor food distribution, sickness and lack of nutrition education. This condition tends to lower body immunity making the body to be frequently attacked by diseases and infections, and that if it prolongs it leads to undernutrition.

In part (b), the candidates misunderstood the demand of the question, hence they provided irrelevant responses. For example, one candidate provided strategies used to promote proper nutrition in a community such as, *basic education, healthy environment, maternal and child care, healthy social and family life, proper agriculture* and *public health measures* instead of the practical solution to the situation. These candidates did not understand that improving and increasing food production, food distribution, food crop storage, food processing and preservation and nutritional education are the practical solutions to undernutrition. Other solutions include prevention and control of diseases and infections, improved environmental sanitation and water supply, as well as improved social and family life. Another candidate listed few correct points but provided unsatisfactory explanations. These responses indicated that the candidates had inadequate knowledge of the concept of malnutrition, specifically undernutrition.

2.3 155/3 FOOD AND HUMAN NUTRTION PAPER 3

This paper comprised 3 practical questions. The candidates were required to answer all the questions. Question 1 carried 20. marks and questions 2 and 3 carried 15. marks each. The questions were constructed from the following topics: *Technology of Specific products*, *Processing and Preservation* and *Food Composition*. The analysis for each question is as follows:

2.3.1 Question 1: Technology of Specific Products

This question tested the candidates' understanding on the concept of components of wheat flours, specifically on separating the major components of a wheat flour. The candidates were provided with wheat flour (food sample H), food reagents and a piece of cloth (muslin cloth). They were instructed to perform an experiment by following the given procedures.

The candidates were instructed to:

(i) *Place the wheat flour in a mixing bowl. Add little water gradually and kneed for 10 minutes to make dough. Roll the dough into a ball, place it in a petri dish then press to touch it while observing. Record your observations and to give explanations for the observations.*

(ii) *Place the dough on a piece of cloth and wrap it tightly. Wash and squeeze the dough under running tap water. Serve about 50ml of the first washing in a beaker and leave it to settle for 15 minutes. Record their observations and to give explanations for their observations.*

(iii) *Continue washing until the water coming out is clean. Scratch the substance left from the piece of cloth and place it in a petri dish. Record the characteristics of the obtained substance and compare its size with the original dough.*

(iv) *Place 2g of the substance obtained in procedure (iii) in a test tube then add concentrated nitric acid to cover it. Carefully boil the mixture while observing the colour changes. Cool the mixture under tap water and carefully add 3ml of ammonium hydroxide solution while observing. Record your observations.*

Questions

(a) *Identify sample **H**.*
(b) *What is the effect of discarding the top substance obtained in step (ii)?*
(c) *Identify the substance obtained in step (iii).*
(d) *Give the reason for the change in the size of the dough observed in step (iii).*
(e) *What does step (iv) demonstrate.*
(f) *Briefly explain the principle applied in separating the two components of sample H.*

The question was attempted by 281 (100%) candidates. Among them 25 (8.90%) scored from 12.0 to 16.0 marks, 173 (61.60%) scored from 7.0 to 11.5 marks and 83 (29.50%) scored from 1.0 to 6.5 out of 20 marks. Figure 18 illustrates this performance.

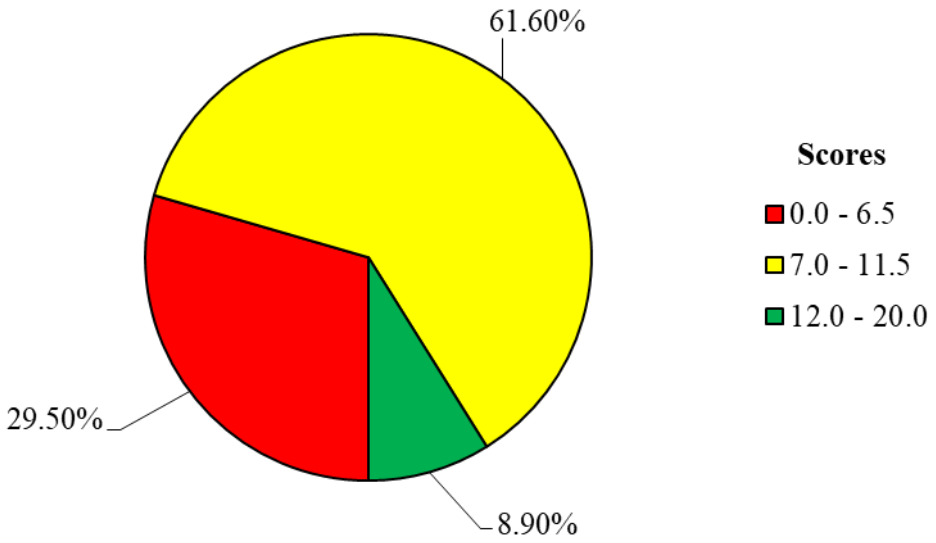


Figure 18: *Candidates' Performance on Question 1*

Based on the analysis in Figure 18, the general performance in this question was good, since 70.50 per cent of the candidates passed by scoring from 7.0 to 16.0 marks.

The analysis indicates that the candidates with good performance (8.90%) knew how to separate the major components of wheat flour. The candidates were able to; separate wheat flour constituents, observe the changes that took place during the experiment and give correct explanations. In step (i), the candidates correctly observed that the dough obtained from sample H was soft, elastic, and not sticky. The candidates managed to explain the mechanism of gluten extraction. They understood that kneading exposes/releases more granules to the water, which can be easily removed by washing, thus resulting into more matrix concentration in the dough. For example, one candidate wrote; *when sample H mixed with water and kneaded became elastic*, *soft*, *stick to the fingers when start kneading but at the end not stick again*. *This occurs due to the kneading process which help to formation of gluten matrix which is elastic in nature*. In step (ii), candidates observed correctly that the dough gave out milky water during squeezing and white sediment settled at the bottom of the beaker. They

managed to explain the characteristics of starch which was observed during the experiment. They observed milky or white water drained out. For example, one candidate wrote; *during washing the water which was drained out was white in colour*. *This shows that the starch present in sample H was removed out during washing*. Moreover, in step (iii), candidates observed correctly that the substance left from the piece of cloth was cream in colour, elastic, insoluble in water and small in size compared to the original dough. This is because other constituents had been removed out and only gluten was left. For example, one candidate wrote; *the substance obtained was elastic in nature*, *insoluble in water*, *cream in colour and small size compared to the size of origin dough*. In step (iv), candidates correctly observed the change in the colour of the substance from yellow to orange. This indicates that the substance was protein. For example, one candidate wrote; *the colour change from yellow to orange shows the presence of complex protein*.

The analysis shows that the candidates were competent in making interpretation of the Experiment. Correctly observed the characteristics of sample H and managed to identify sample H in question (a). They were aware of the type of flour which produces the substance with cream colour, sticky, extensible and elastic. For example, one candidate wrote; *sample H was wheat flour*. Likewise, in question (b), the candidates correctly explain the effect of discarding the top substance obtained in step (ii). For example, one candidate wrote; *cause loss or remove of nutrients which are present as water contain damaged starch, protein water soluble vitamins and fibres*. In question (c), the candidates correctly managed to identify the substance obtained in step (iii) by observing its characteristics such as cream colour, sticky, extensible and elastic. For example, one candidate wrote; *the substance obtained was gluten*. Similarly, in question (d), they managed to give the reason for the change in the size of the dough observed in step (iii) as they observed what happened during the experiment. For example, one candidate wrote; *the change in size of the dough is due to the removal of the starch substance*. In question (e), some of the candidates understood that gluten contains large amount of protein, hence they managed to explain what step (iv) is about. For example, one candidate wrote; *the step iv demonstrates Xanthoproteic test which is the test used for testing the protein in food samples as when the colour change from yellow to orange*. Other candidates skipped this question.

Moreover, in question (f), some of the candidates managed to explain the principle applied in separating the two components of sample H as they witnessed what happened during the experiment. This observation enabled the candidates to correctly explain the principle applied. For example, one candidate wrote; *the principle applied is different in solubility*. *That the starch is partially soluble in water therefore during washing starch was removed out and gluten is insoluble in water therefore during washing remains in the cloth*. However, some candidates misunderstood the demand of the question in some parts, hence they failed to score all the 20 marks.

In contrast, 29.50 per cent of the candidates had weak performance as they scored low (1.0 - 6.5) marks. The majority of the candidates in this category misinterpreted the experiment, hence they provided incorrect responses to some procedures and questions. In step (i) – (iv), some candidates managed to report the observation correctly but failed to provide correct explanations. For example, one candidate provided irrelevant explanation like; *dough become stretched due to the presence of amylose and amylopectin that when absorbs water become swell and burst causing stretching of a dough* in step (i). Another candidate provided only the features observed in step (ii) without explaining them, hence lost some marks. For example, one candidate wrote; *the small particles were settled down which were white in colour*. In step (iii), some candidates stated the uses of gluten instead of its characteristics. For example, one candidate wrote; *it can be used as a source of protein to vegetarian*, *it helps in holding gas during baking*, *used as a meat for vegetarian*, *used as a stabilizer*. Likewise, in step (iv), some candidates failed to write down their observations and explanations. Instead, they provided response to the questions only. For example, one candidate wrote; *there is formation of brown colour of the solution*. *The reaction resulted into browning reaction*.

Despite the insufficient knowledge demonstrated by candidates in this category, a few of them managed to correctly answer some parts of the question. For example, one candidate wrote; *(a) wheat flour*, *(b) lead to make a component called gluten which contain glutenin and gliadin*, *(c) gluten*, *(d) due to the squeeze and wash with water*, *(e) the colour change from whitish to yellow*, *(f) water up wheat flour down*. This candidate provided a mixture of correct and incorrect responses, hence scoring low marks. Others skipped this part. This implies that the candidates lacked

enough knowledge about how to separate wheat flour constituents. Extract 19 is a sample of responses from a candidate who scored lower marks.

1. (a) Sample H was the wheat flour.

(b) The effect of discarding the top substance obtained in step(iv) is that to separate the component that were present in the dough.

(d) The change in the size of the dough is because the other part that made up the dough was removed that is glutenin the cream colour of the dough that removed during washing the dough that was inside ~~water~~ the cloth.

(c) The substance obtained in step(iii) is ~~glutenin~~ gliadin that is elastic in nature.

(e) Demonstration (5U)
The demonstration of step (iv) was the ~~ob~~ test of gliadin in the dough made that is yellow in colour. So the test showed that the gliadin in the Obtained substance is present.

(f) Basin Principles applied in separating the two component of sample H

i) Since glutenin is cleam in colour they separation of glutenin was observed when washing the dough in the running water inside the piece of cloth. the water at the beggining water were creamikly like colour that in excess washing the water changed to clean that showed finally ~~water~~ the glutenin component was over

ii) Since the gliadin in elastic in nature the washing of the dough removed the glutenin and left the elastic substance that was the gliadin.

Extract 19: A sample of incorrect responses to Question 1

In Extract 19, the candidate did not provide observation and explanation to the given procedure. The candidate provided incorrect responses to all the questions except question (i) where he/she managed to identify sample H.

2.3.2 Question 2: Food Processing and Preservation

This question tested the candidates' understanding of the concept of enzymatic browning reactions. The question state as follows;

You are provided with food sample G. Peel, wash and cut four slices from the sample. Perform the experiment immediately by following the given procedure. Record your observations in colour changes after 10 minutes. Give explanations of what you have observed and then answer the questions that follow.

***Procedure*:**

(i) leave one slice on a plain paper.
(ii) Put the second slice in a tap water bath.
(iii) Spray the third slice with lemon juice.
(iv) Plunge the fourth slice into boiling water for 3 minutes.

Questions

(a) Briefly explain the reaction that resulted into the development of colour change observed in the experiment. Give three points.

(b) Briefly explain the benefit of the reaction observed in this experiment in food processing.

The question was attempted by 281 (100%) candidates. Analysis shows that, 134 (47.70%) candidates scored from 9.0 to 15.0 marks, 60 (21.30%) scored from 5.5 to 8.5 marks and 87 (31.00%) scored from 0.0 to 5.0 marks. Figure 19 is a summary of this performance.

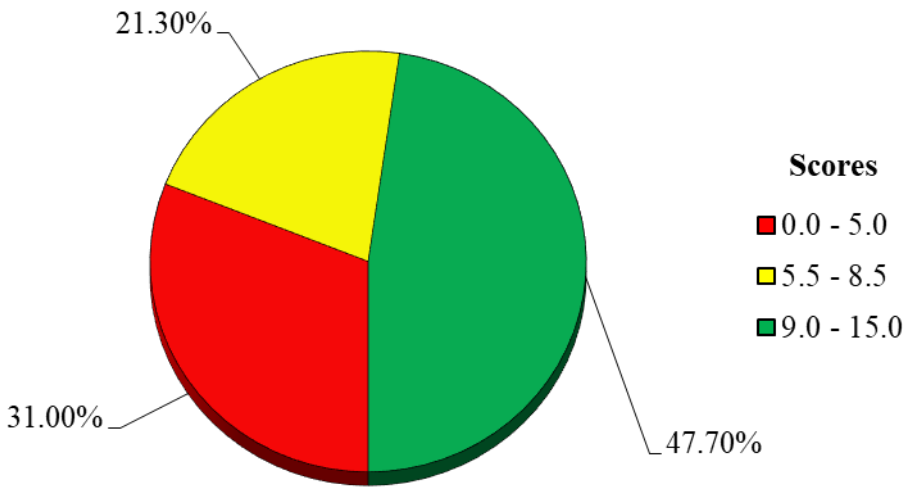


Figure 19: *Candidates' Performance on Question 2*

Figure 19 shows that the general performance in this question was good because 69.00 per cent of the candidates scored average and above.

The analysis of the candidates' responses shows that the candidates (69.00%) who scored from 5.5 to 15.0 marks demonstrated adequate practical skills in determining of the effects of air on food. In step (i), the candidates understood that the brown pigment formed on the cut sample is due to the reaction between the enzyme present in the sample and the oxygen from the atmosphere. Hence, they correctly recorded the observation and provided correct explanations. For example, one candidate wrote; *The slice changed its colour to brown*. *Observing of the brown colour around the surface of the slice of sample G*, *is its compounds which are phenolic reacted with the atmospheric oxygen led to browning*. In step (ii), the candidates were aware that, when the cut sample is immersed in water, water prevents the enzymes from acting on the sample because it reduces the contact with oxygen from the atmosphere. Thus, the candidates observed no colour formation on the cut sample and provided correct explanations. For example, one candidate wrote, *the sample G did not change in colour*, *it retained its original colour*, *this is when sample G was soaked (immersed in water) hence prevented oxidation that result to the formation of colour, the process inhibits the enzyme phenolase to react with air*. Likewise, in step (iii), the candidates understood that enzymatic reaction can be inactivated by lowering the pH. Therefore, these candidates

correctly recorded the observation and provided correct explanations. They were aware that the vitamin C present in lemon juice acts as an oxidant that retards enzymatic browning. For example, one candidate wrote, *the sample G did not change in colour*, *as lemon juice contain antioxidant*. However, most of them lost some marks in this step because they failed to state clearly the mechanism behind. Moreover, in step (iv), the candidates observed no colour formation and gave correct explanations because they were aware that the application of heat denatures the enzyme and inactivate the reaction. For example, one candidate wrote, *it retained its original colour*. *This is because hot water denatures the enzyme so no reaction occurs*.

Further analysis shows that the candidates correctly responded to the asked questions. For example, one candidate wrote, *the cut surface exposed to the air*. *When oxygen and enzyme reacts they rapidly oxidise the phenolic compounds and form brown pigments.* Likewise, in part (b), some of the candidates correctly explained the benefit of the reaction observed. For example, one candidate wrote; *the colour formed is beneficial for favourable colour and flavour during food processing*. Extract 20.1 is a sample of responses under this category.

2. Observations (i)

i) The slice of sample food G which left on plain paper turned brown in colour after 10 minutes

Explanation (i)

The food sample G contains phenolic compound in which when exposed to air, it react with oxygen under phenol oxidase (enzyme) to form brown - complex compound.

Observation (ii)

The food sample G remained unchanged in colour.

Explanation (ii)

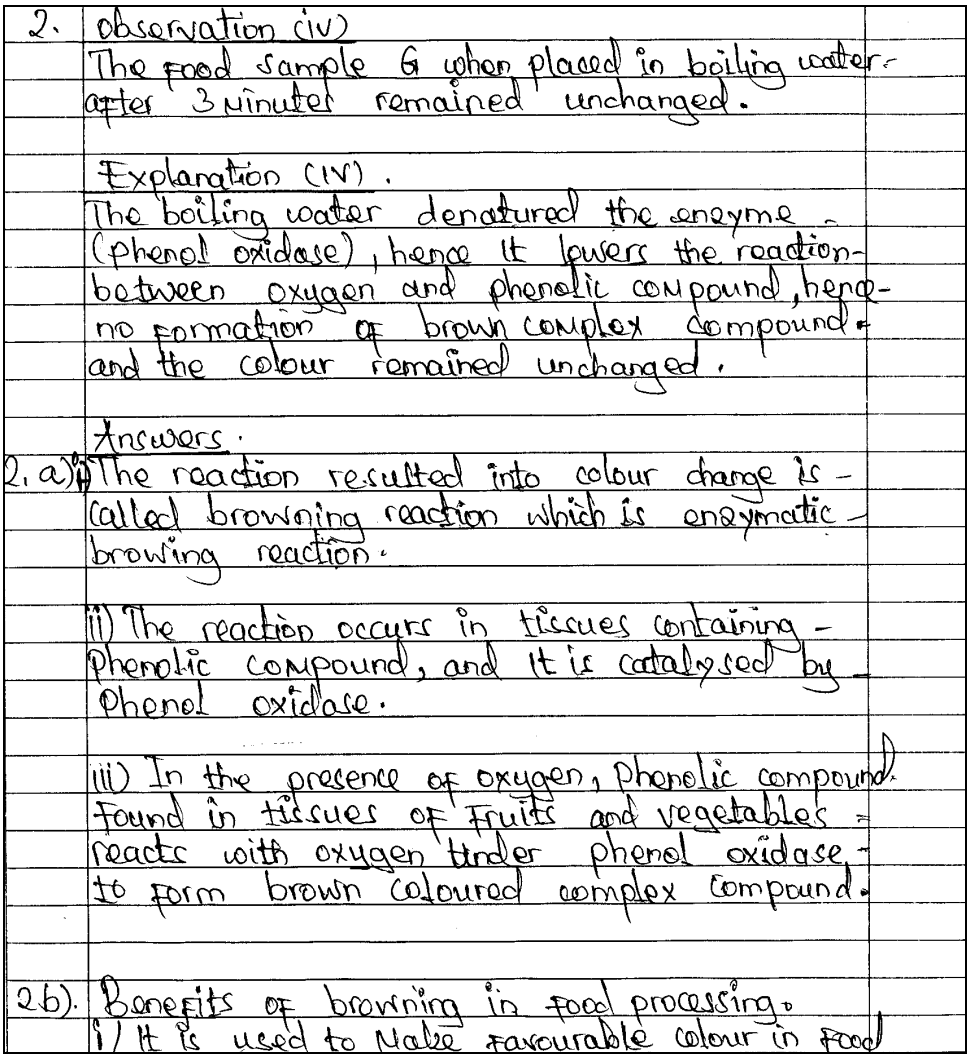
When food sample G is kept in tap water bath, oxygen is prevented from reacting with phenolic compound present in food sample G, hence - no formation of brown complex compound.

Observation (iii)

The food sample G was remained unchanged.

Explanation. (iii)

The food sample G remained unchanged when kept in lemon juice because lemon juice - is acidic in nature, it then lowers the pH, - making the pH unsuitable for enzyme - (phenol oxidase) to catalyse the reaction, hence no reaction between oxygen and - phenolic compound, no formation of brown - coloured complex.


2. observation (iv)
The food sample G when placed in boiling water after 3 minutes remained unchanged.

Explanation (IV).
The boiling water denatured the enzyme (phenol oxidase), hence it lowers the reaction between oxygen and phenolic compound, hence no formation of brown complex compound and the colour remained unchanged.

Answers.
2. a) i) The reaction resulted into colour change is called browning reaction which is enzymatic browing reaction.

ii) The reaction occurs in tissues containing phenolic compound, and it is catalysed by phenol oxidase.

iii) In the presence of oxygen, phenolic compound found in tissues of fruits and vegetables reacts with oxygen under phenol oxidase to form brown coloured complex compound.

2b). Benefits of browning in food processing.
i) It is used to make favourable colour in food

Extract 20.1: A sample of the correct responses to Question 2

Extract 20.1, illustrates a sample of responses from the candidate who correctly provided correct observation and explanation and explained the reaction that resulted in colour change in part (a), and the benefit of the reaction observed in part (b).

On the other hand, the candidates who scored below 5.5 marks had inadequate knowledge about enzymatic browning reactions in food products. Hence, they failed to respond correctly to most parts of the question. The majority of them recorded incorrect observations and therefore, provided wrong explanations in all procedures. For example, in procedure (i) one candidate wrote, *The colour of the slice was maintained but as time increases the yellow colour become dip due to increase in*

oxygen, (ii) *the slice on tap water bath formed a slight yellow colour, due to presence of water* (iii) *the slice on the spray of lemon juice changed into a slight yellow colour due to presence of acid* and (iv) *changed into a slight yellow colour due to heat*.

Moreover, some of the candidates failed to provide any correct response to the questions asked. The responses provided by the candidates under this category imply that the candidates had inadequate knowledge on the enzymatic reaction. For example, one candidate wrote; *the reactions involved (a) (i), phenol + oxygen*, *(a) (ii)*, *phenol + lemon juice*. Other candidates misinterpreted the question, hence they provided irrelevant responses. For example, one candidate stated the benefit of non-enzymatic browning instead of enzymatic browning in question (b), such as; *it helps to obtain brown colour in bread during baking*, *it helps to make brown colour by roasting of sugar and protein.* Extract 20.2 is a sample of responses from one of the candidates with weak performance.

2. a). i). Due to the Temperature.
- This means that due to high temperature which ~~lead~~ Leads to the development of colour change where the colour change from ~~yell~~ pale yellow ~~rather~~ to yellow.

ii). Improper ~~Co~~ storage.
- This means that due to improper ~~cooking~~ storage of food it cause the food to be exposed in air which cause the phenolase enzymatic to react potatoes tissues. which cause the food to change colour from yellow colour of peeled potato. to the brown colour

iii). Cooking Method.
- Also due to cooking of ~~some~~ food sample it may lead to the development of colour change.

b). The benefit of the reaction observed in this experiment in food processing is;
i). Helps to reduce the number of ~~f~~ microbes in the food.

ii). Helps to ~~in~~ improve the quality of food and also helps to increase the shelf life of the food. ~~through adding the~~ because food is treated chemically biologically, and physically into slight ~~too~~ totally in different type of food.

Extract 20.2: A sample of incorrect responses to Question 2

In Extract 20.2, the candidate did not provide observation and explanation to the given procedure. Instead he/she provided the practices which may lead to browning of food in part (a) and the benefits of cooking food in part (b). Hence, he/she scored zero.

2.3.3 Question 3: Food Composition

This question tested the candidates' competence on lipid analysis. The question state that;

You are provided with sample J (cooking oil), K, L, M (phenolphalein indicator solution) and N (0.1N potassium hydroxide solution). Perform the experiment by following the given procedure and then answer the questions that follow.

Procedure:

(i) Mix sample J thoroughly before weighing.
(ii) Weigh accurately 8g of sample J in a 200 ml (or 250ml) conical flask.
(iii) Prepare 50ml of a mixture of K and L by mixing 25ml of each sample. Heat the mixture in a water bath to make it hot. Add the mixture to the flask containing sample J, then shake the content.
(iv) Add about 1.0ml of solution M.
(v) Heat the mixture for 10 minutes in the water bath maintained at 75-80^{o}C.
(vi) Titrate the mixture while hot against solution N, shaking vigorously during titration until a permanent colour persisting for at least 10 seconds is formed in the conical flask.
(vii) Record the titre volume and repeat the titration to obtain three readings.

Questions

(a) Identify samples K and L.
(b) What was the function of the mixture of sample K and L in this experiment?
(c) Calculate
  (i) the acid value of sample J.
  (ii) the percentage of free fatty acid (expressed on an oleic acid basis).
(d) Give the importance of;
  (i) shaking the mixture in steps (iii) and (vi).
  (ii) heating the mixture in procedure (v).
(e) From the literature, the acid value of the cooking oil ranges from 0.9 - 1.1. Compared the experimental value with the literature value and give the analytical importance of this value.
(f) Briefly explain the significance of cooking oil/fat analysis for Free Fatty Acid (FFA).

The question was attempted by all 281 (100%) candidates. The analysis shows that 38 (13.50%) candidates scored from 9.0 to 14.0 marks, 113 (40.20%) scored from 5.5 to 8.5 marks, and 130 (46.30%) scored from 3.0 to 5.0 marks. Figure 20 summarises the distribution of their scores.

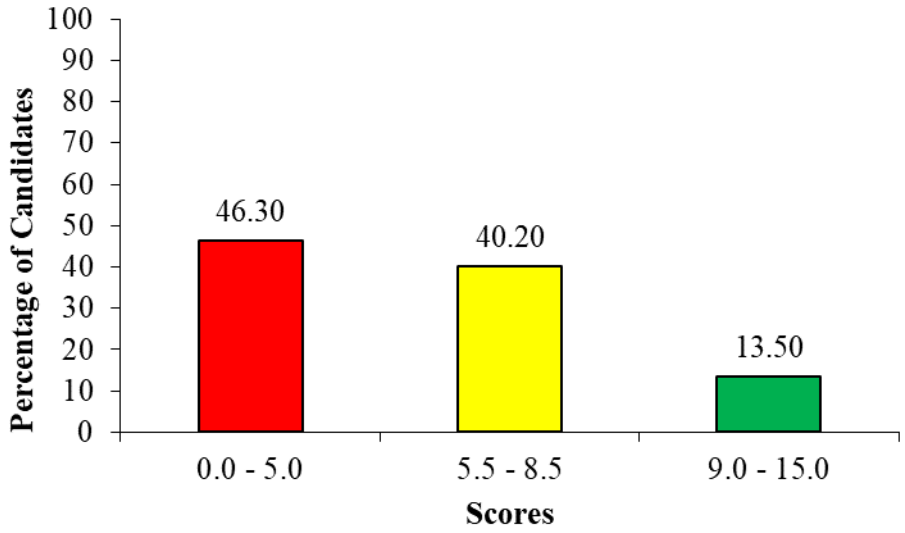


Figure 20: *Candidates' Performance on Question 3*

Figure 20 shows average performance in this question, because 53.70 per cent of the candidates passed by scoring from 5.5 to 14.0 marks.

The analysis of the candidates' responses indicates that the candidates (13.50%) who performed well in this question were knowledgeable of lipids analysis. These candidates managed to provide correct responses for each observation. They observed well the colour change and correctly identified sample K as alcohol and sample L as Diethyl ether in part (a). In part (b), the candidates managed to explain the function of the mixture of sample K and sample L as solvent. Other candidates managed to calculate the acid value and percentage of free fatty acids of the sample given. In part (d) (i), some of the candidates managed to provide the importance of shaking the mixture in step (iii) and (iv). These candidates understood that shaking of solution enabled it to mix well and ease. Likewise, in part (d) (ii), they managed to state/explain the importance of heating the mixture in procedure (v). These candidates understood that, heat speed up the rate of reaction and aid solubility of lipids. For example, one candidate wrote; *increase in temperature aid solubility of oil thus it provides favourable*

condition for the test of free fatty acid. Others managed to provide the comparison difference and explain the analytical importance of the value obtained. For example, one candidate wrote, *literature values ranges from 0.9 to 1.1, while the experimental value was 0.49. The analytical importance it helps to determine the appropriate validity of the oil tested*. Similarly, in part (f), most of the candidates correctly explained the significance of cooking oil/fat analysis for Free Fatty Acid (FFA). They understood that the analysis of Free Fatty Acid provided the real quality condition of the oil/fat given. However, some candidates failed to calculate the acid value and percentage of free fatty acid while others misinterpreted some parts of the question. Hence, they failed to score all the 15 marks. Extract 21.1 is a sample of responses from one of the candidates under this category.

Table of result.

Titration	Pilot	1	2	3
Final volume (cm^3)	0.80	1.50	2.10	2.60
Initial volume (cm^3)	0.00	0.80	1.50	2.10
Volume used (cm^3)	0.80	0.70	0.60	0.50

Average titre volume $= \frac{V_1 + V_2 + V_3}{3}$

$= \frac{0.70 + 0.60 + 0.50}{3}$

$= 0.6 cm^3$.

∴ The average titre value volume of acid is $0.6 cm^3$.

3(a). Sample K was Diethyl ether.
Sample L was alcohol.

3(b) The function of adding mixture of K and L in the experiment was to increase the solubility of the components of the cooking oil (Sample J).

3(c). Solution

(i) Acid value required.

Molarity of base = 0.1.

Volume of base = 0.6 cm^3.

Weight of the cooking oil = 8g.

From.

$$\text{Acid value} = \frac{56.1 \times \text{volume (titre volume)} \times \text{Molarity}}{\text{Weight of fat.}}$$

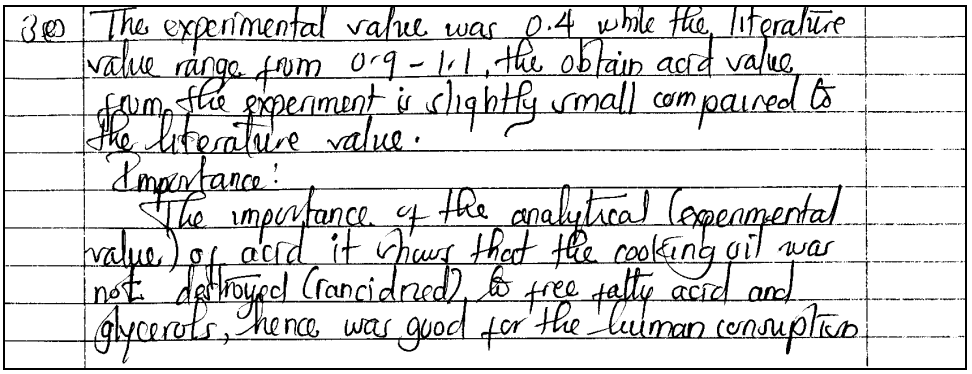
$$= \frac{56.1 \times 0.6\,cm^3 \times 0.1\,mol/dm^3}{8g.}$$

$$= 0.42075\,cm^3.$$

∴ The acid value of sample J was 0.42075

3(d)(i) The importance of shaking the mixture in step (iii) was to increase the solubility between mixture of sample J and that with Sample K and L.
The importance of shaking the mixture in Step (v) was to increase the rate of reaction between sample N and mixture containing sample J, K and L in a conical flask.

3(d)(ii) The importance of heating the mixture in procedure (v) was to increase miscibility of the mixture and increase the rate of reaction between mixture of Sample J with that of Sample K and L.



Extract 21.1: A sample of the correct responses to question 3

In Extract 21.1, the candidate provided correct responses though he/she did not respond to part (c) (ii), and part (f). The responses provided indicated that the candidate had adequate knowledge on the tested area.

On the other hand, 130 (46.30%) candidates who scored low marks had inadequate knowledge about lipids analysis. The majority of them managed to identify sample K and L correctly in part (a) but some failed to do so. For example, one candidate wrote, *sample K is oleic acid, sample L is ester*. A few candidates misunderstood the question in part (b), hence provided irrelevant responses. For example, one candidate provided the function of base (alkaline) such as; *sample K to neutralize the sample J so as to obtain the acid value present in sample J*. Others skipped this part. Likewise, in part (c), the candidates failed to calculate the acid value of sample J and the percentage of free fatty acid of the same sample. Some of them used wrong formulae and made wrong calculations. Others used correct formulae but their calculations were incorrect. This reveals that these candidates lacked computation skills.

In part (d) (i), some of the candidates correctly provided the function of shaking the mixture in steps (iii) and (iv), but incorrect responses in part (d) (ii). For example, one candidate wrote, *shaking the mixture in step (iii) and (iv) help the mixture to dissolve to each other and form a single or one solution. heating the mixture in procedure (v) is because of making the mixture uniform due to the differences in boiling points*. Most of the candidates in part (e) misunderstood the question, hence they provided irrelevant responses. For example, one candidate wrote down the benefit of acid value ranges from 0.9 – 1.1 such as: *the acid value of the cooking oil ranges from 0.9 -1.1 it's a permanent cooking oil hence its important of this value is that it stays longer than temporary which undergoes rancidity*. In

part (f), the candidates were not aware that the determination of free fatty acid (FFA) content is vital in evaluating the quality of raw material, and their degradation during storage, and throughout the shelf life of several vegetable oils, such as sunflower oil. For example, one candidate wrote; *it's significance is that it is used in the formation of rancidity under the presence of oxygen to form free fatty acid.* Extract 21.2 is a sample of responses from one of the candidates under this category.

02.	Functions of K and L in such experiment.	
(b)	→ Mixture of K and L tend to breaks the bonds of sample J (cooking oil).	
03.	(d) Importance of the following.	
	(i) Shaking the mixture in step (iii) and (vi).	
	• In step (iii) the mixture is shaken so as to breaking the bond present in cooking oil or sample (iii).	
	• In step (vi) the mixture is mixed so as to be neutralized with the base potassium hydroxide solution (KOH).	
	(ii) Heating the mixture in procedure (v).	
	(→) This tend to complete breaking of bond found in the sample J because at normal temperature bond tend to be not breaked when, but on appling temperature (heat) the bond tend to be broken completely.	

03.	(e) acidic value from the experiment is $0.9 cm^3$ and from literally is (0.9-1.1) this indicate that any cooking oil must contain an acidic volume ranging from 0.9 - 1.1 above this, such cooking oil is acidic.	
	Importance of Acidic value.	
	→ This tend to know the PH content of the cooking oil or acidic property of the cooking oil.	

03	(f) Significance of cooking oil/fat analysis for Free Fatty Acid (FFA). → This help to know the amount of acid present in the cooking oil.	

Extract 21.2: A sample of incorrect responses to Question, 3

In Extract 21.2, the candidate provided incorrect responses to all parts (a) and (b), hence he/she scored zero. This shows that the candidate had inadequate knowledge on the tested area.

3.0 ANALYSIS OF CANDIDATES' PERFORMANCE PER TOPIC

The Food and Human Nutrition examination questions 2023 were constructed from 11 topics with the total of 21 questions.

The candidates performed well on the topics of *Nutrient Requirement* (91.80%), *Food Storage* (84.70%), *Catering and Institutional Feeding* (82.70%), *Food Microbiology* (76.10%), *Technology of Specific Products* (70.50%), *Malnutrition* (65.25%) and *Food Composition* (62.55%). The good performance in these topics is an indication of candidates' adequate knowledge of the concepts of the subject matter, understanding of the requirements of the respective questions and sufficient practical skills.

The candidates had average performance on the topics of *Food Processing and Preservation* (58.56%), *Food Production* (57.30%), *Nutrition Program Planning and Intervention* (49.03%) and *Food Quality and Safety* (37.00%). The candidates who performed averagely had relatively adequate knowledge about the concepts of the subject matter. They provided partial responses and lacked clarity in explanations of the mentioned points. However, none of the topics had weak performance.

Topic-wise comparison of the candidates' performance in the year 2022 and 2023 shows that the candidates' performance in the ACSEE 2023 topics has improved in some topics, decreased in other topics, and remained the same in a few others. The candidates' performance has improved from average to good in the topics of *Food Microbiology* and *Food Composition,* and from weak to average on the topics of; *Food Quality and Safety*. In addition, the candidates maintained good performance on five topics namely, *Malnutrition*, *Technology of Specific Products, Catering and Institutional*

Feeding, Food Storage and *Nutrition Program Planning and Intervention*; whereas the candidates maintained average performance on the topic of *Food Processing*. Furthermore, the candidates' performance has decreased from good to average on the topics of *Food Production* and *Nutrient Requirement*. This comparison is presented in Appendix B.

4.0 CONCLUSION

The analysis on the Candidates' Item Response shows that the performance of the candidates in the 2023 ACSEE on Food and Human Nutrition subject was generally good. It has been revealed that 99.29 per cent of the candidates passed the examination. According to the analysis, this performance is an outcome of candidates' ability to understand the questions' demands, adequate knowledge on the tested concept and sufficient practical skills. Conversely, the weak performance in some of the questions were due to candidates' lack of knowledge on the tested concepts which made them provide incorrect responses to some parts of the questions, giving fewer points than the required by the question, and failure to understand the requirements of the questions.

5.0 RECOMMENDATIONS

Based on the analysis on the candidates' performance in this subject, the following are recommendations for improving the performance in the future years:

(a) Candidates should read the examination questions carefully before attempting them in order to clearly grasp the demand of the question.

(b) Teachers should provide students with enough assignments, tests and examinations frequently so as to encourage learning and improve their confidence and ability in attempting questions; Teachers should provide immediate feedback on their performance.

(c) Teachers should put more emphasis on the topics which involve practical skills such as Technology of specific products, Food Composition and Food Quality and Safety since students learn better by doing. The skills obtained help the students to apply what is learnt in the classroom in real-life situation.

(d) Teachers should invite and involve various subject specialists in their teaching sessions. This will encourage the students to learn from their experiences and gain more knowledge about food and human nutrition.

(e) School management should facilitate study tours for students to learn more and get practical knowledge on the topics of *Food Quality* and *Safety*, *Food Program Planning and Intervention*, *Food Production* and *Food Processing and Preservation*.

Appendix A: **Summary of Candidates' Performance per Topic in ACSEE 2023**

S/N	Topic	Number of questions	The average percentage of candidates who scored 35% or above	Remarks
1.	Nutrient Requirement	2	91.80	Good
2.	Food Storage	2	84.70	Good
3.	Catering and Institutional Feeding	2	82.70	Good
4.	Food Microbiology	2	76.10	Good
5.	Technology of Specific Products	1	70.50	Good
6.	Malnutrition	2	65.25	Good
7.	Food Composition	2	62.55	Good
8.	Food Processing and Preservation	3	58.56	Average
9.	Food Production	1	57.30	Average
10.	Nutrition Program Planning and Intervention	3	49.03	Average
11.	Food Quality and Safety	1	37.00	Average

Appendix B: **Comparison of Candidates' Performance per Topic between 2022 and 2023**

S/N	Topic	2022			2023		
		Number of questions per topic	The average percentage of candidates who scored 35% or above	Remarks	Number of questions per topic	The average percentage of candidates who scored 35% or above	Remarks
1.	Food Production	1	99.3	Good	1	57.3	Average
2.	Malnutrition	2	91.3	Good	2	65.3	Good
3.	Technology of Specific Products	2	88.8	Good	1	70.5	Good
4.	Nutrition Program Planning and Intervention	3	79.8	Good	3	49.0	Average
5.	Catering and Institutional Feeding	2	75.1	Good	2	82.7	Good
6.	Food Storage	2	72.5	Good	2	84.7	Good
7.	Nutrient Requirement	2	70.7	Good	2	87.4	Good
8.	Food Microbiology	2	55.1	Average	2	76.1	Good
9.	Food Processing and Preservation	2	51.2	Average	3	58.6	Average
10.	Food Composition	2	49.5	Average	2	62.6	Good
11.	Food Quality and Safety	1	8.2	Weak	1	37.0	Average

Appendix C: **Comparison of Candidates' Performance in ACSEE between 2022 and 2023**