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 EXAMINATIONS (ACSEE) 2022

FOOD AND HUMAN NUTRITION

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155 FOOD AND HUMAN NUTRITION

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TABLE OF CONTENTS

FOREWORD

The National Examinations Council of Tanzania (NECTA) is pleased to issue the Candidates' Item Response Analysis (CIRA) report for the Advanced Certificate of Secondary Education Examination (ACSEE) 2022 in Food and Human Nutrition subject. The report has been prepared to inform future candidates, teachers, parents and other stakeholders on the performance of the candidates who sat for this examination. Candidates' performance is an indicator of what the education system was able or unable to offer for the candidates in their 2 years of secondary school.

This report analyses the candidates' performance for each question using statistical data prepared by the National Examinations Council of Tanzania (NECTA). In addition, samples of responses from the candidates' scripts are used for elaboration. The report also highlights some of the factors which led to the candidates' failure to score high marks in the questions. The factors include inadequate knowledge of the topics tested, inability to understand the demand of the questions and insufficient practical skills. Moreover, the analysis highlights some of the factors for some candidates to score high marks. The factors include candidates' adequate knowledge and skills on the subject, good ability to understand the demand of the questions and sufficient practical skills.

The Council expects that the feedback provided in this report will enable the education administrators, school quality assurers, school managers, teachers and students in different capacities to come up with proper measures for improving the teaching and learning of Food and Human Nutrition subject.

Lastly, the National Examinations Council of Tanzania would like to express its sincere gratitude to examinations officers and everyone who participated in the preparation of this report.

Athumani S. Amasi
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report analyses the candidates' performance in Food and Human Nutrition subject for the Advanced Certificate of Secondary Education Examination (ACSEE) conducted in May 2022. The examination assessed competences according to the Food and Human Nutrition Syllabus for Advanced Secondary Education issued in 2009.

Food and Human Nutrition examination had three papers which are Food and Human Nutrition 1, 2 and 3. Paper 1 and 2 were theory while paper 3 was the practical one. Paper 1 and 2 carried a total of 100 per cent each while paper 3 weighed 50 per cent.

Food and Human Nutrition 1 and 2 papers had nine (9) questions each. The questions were divided into sections A and B. Section A consisted of six (6) short answer questions. The candidates were required to answer all the questions. Each question carried ten (10) marks. Section B had three (3) essay type questions and the candidates were required to answer two (2) questions. Each question carried 20 marks. Food and Human Nutrition paper 3 consisted of three (3) practical questions, whereby Question 1 carried 20 marks while Questions 2 and 3 carried 15 marks each. The candidates were required to answer all the questions.

A total of 290 candidates sat for this examination where 289 (99.66%) of them passed with the following grades: A – 0 (0%), B 7 (2.42%), C – 85 (29.31%), D – 154 (53.11%), E – 40 (13.79%) and S – 3 (1.03%). However, 1 (0.34%) candidate failed as he/she obtained F grade. The statistics indicates that the candidates' performance in 2022 has slightly increased by 1.37 per cent compared to the performance of 2021 in which 98.29 per cent of the candidates passed.

The next part analyses the candidates' performance for each question.

2.0 ANALYSIS OF THE CANDIDATES' PERFORMANCE IN EACH QUESTION

The candidates' performance in each question is analysed by indicating the topic, requirement of the question and the percentage of the candidates who attempted the question. The performance on a question is considered to be good if the percentage of the candidates who correctly responded to it ranges from 60 – 100; average if the percentage is from 35 – 59; and weak if the percentage is from 0 - 34. Green, yellow and red colours are used to indicate good, average and weak performances respectively. In addition, the percentage of the candidates who had good, average or weak performance based on their responses is diagrammatically shown. Furthermore, the report highlights the strengths and weaknesses observed in candidates' responses and identify some possible reasons for such strengths and weaknesses. The samples of responses extracted from the candidates' scripts have been attached in order to illustrate their responses.

2.1 155/1 FOOD AND HUMAN NUTRITION PAPER 1

The paper comprised a total of nine (9) questions constructed from seven (7) topics. These are: *Food Processing and Preservation, Food Composition, Technology of Specific Products, Food Production, Nutrient Requirement, Food Quality and Safety* and *Food Storage*. The candidates' responses analysis for each question is as follows:

2.1.1 Question 1: Food Processing and Preservation

This question tested the candidates' ability on the concept of food fortification. The question had two parts; (a) and (b). The question stated that,

(a) "*Fortification being a food based method offers several benefits in health and food processing and preservation". Justify this statement in four points*.

(b) Identify two major methods of food fortification.

The question was attempted by all 290 (100%) candidates. Data shows that 149 (51.4%) candidates scored from 0.0 to 3.0 marks; 120 (41.4%) scored from 3.5 to 5.5 marks; and 21 (7.2%) candidates scored from 6.0 to 8.5 marks. This performance is summarized in Figure 1.

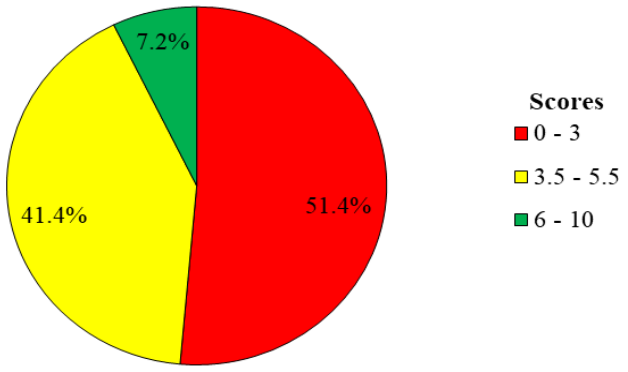
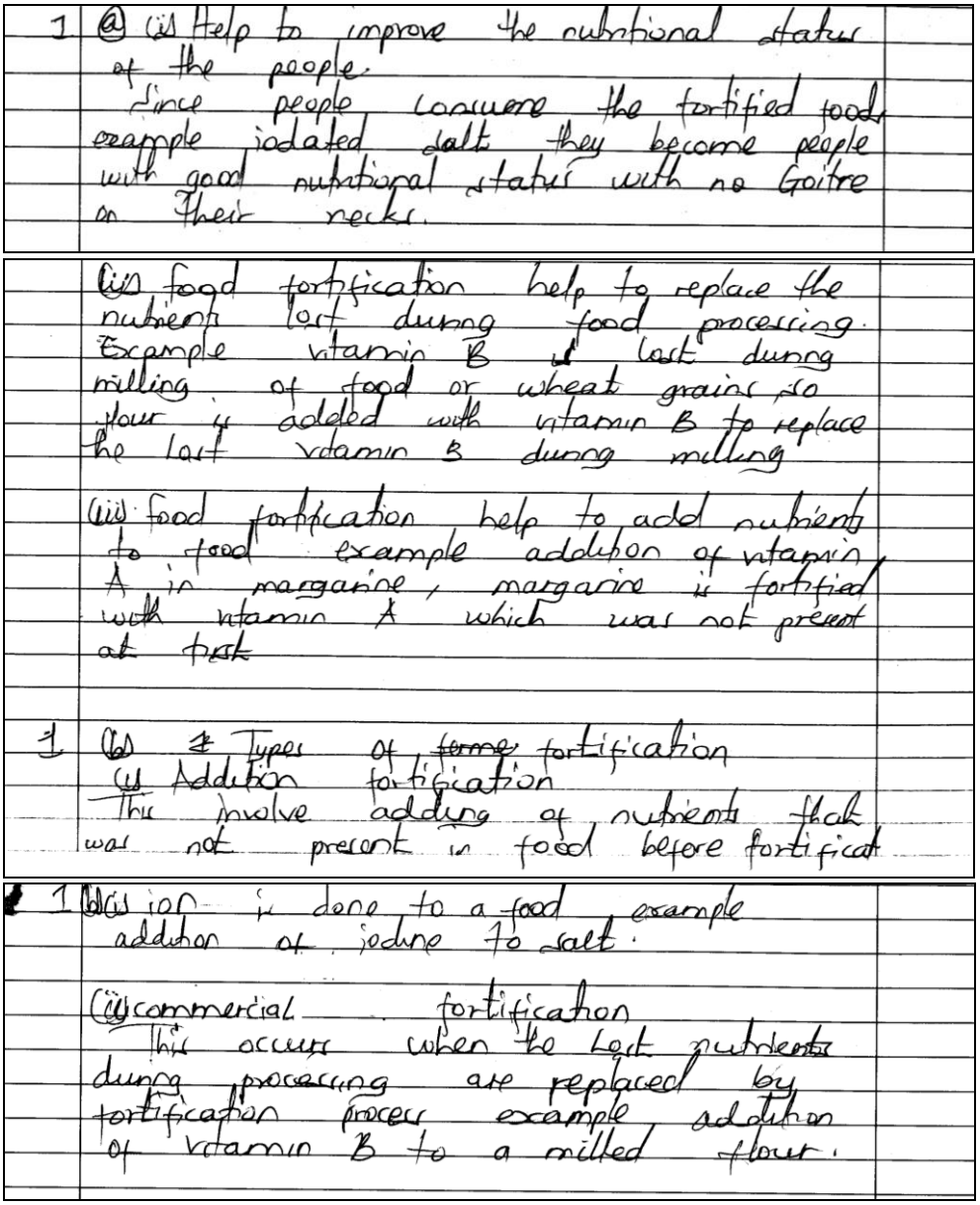


Figure 1: *Percentage of Candidates' Performance in Question 1*

Figure 1 indicates that the performance in this question was average because 141 (48.6%) candidates were able to score from 3.5 to 8.5 marks. These candidates had sufficient knowledge about the advantages of food fortification, although some failed to provide all correct methods of food fortification. Therefore, they performed averagely.

In part (a), the candidates who performed well had sufficient knowledge of the content covered by these items. They were aware that when food is fortified there are benefits which are added in it. They justified it by giving the following food fortification benefits: *Improves nutritional value of the food*, *replaces the nutrients that are being lost in food during processing and preparation*, *Prevents nutritional disorders, adds nutrients, increases marketing of some food* and *improves quality of the food*.

In part (b), some candidates had good performance but did not manage to score all the marks allotted. These candidates mixed correct and incorrect responses. The majority were able to identify one to two correct method of food fortification such as *industrial fortification method*, *targeted fortification method* and *microbial bio-fortification method*, but they were not aware about mass fortification. For example, one candidate wrote; *Industry fortification* and *Home fortification*. Another wrote *targeted fortification, public fortification, and microbial bio fortification*. A sample of the correct responses is shown in Extract 1.1.


1 @ (i) Help to improve the nutritional status of the people.
Since people consume the fortified food, example iodated salt they become people with good nutritional status with no Goitre on their necks.

(ii) food fortification help to replace the nutrients lost during food processing. Example vitamin B is lost during milling of food or wheat grains, so flour is added with vitamin B to replace the lost vitamin B during milling

(iii) food fortification help to add nutrients to food example addition of vitamin A in margarine, margarine is fortified with vitamin A which was not present at first

1 (b) (i) Types of ~~forms~~ fortification
(i) Addition fortification
This involve adding of nutrients that was not present in food before fortificat

1 (b) (ii) ion is done to a food example addition of iodine to salt.

(ii) commercial fortification
This occurs when the lost nutrients during processing are replaced by fortification process example addition of vitamin B to a milled flour.

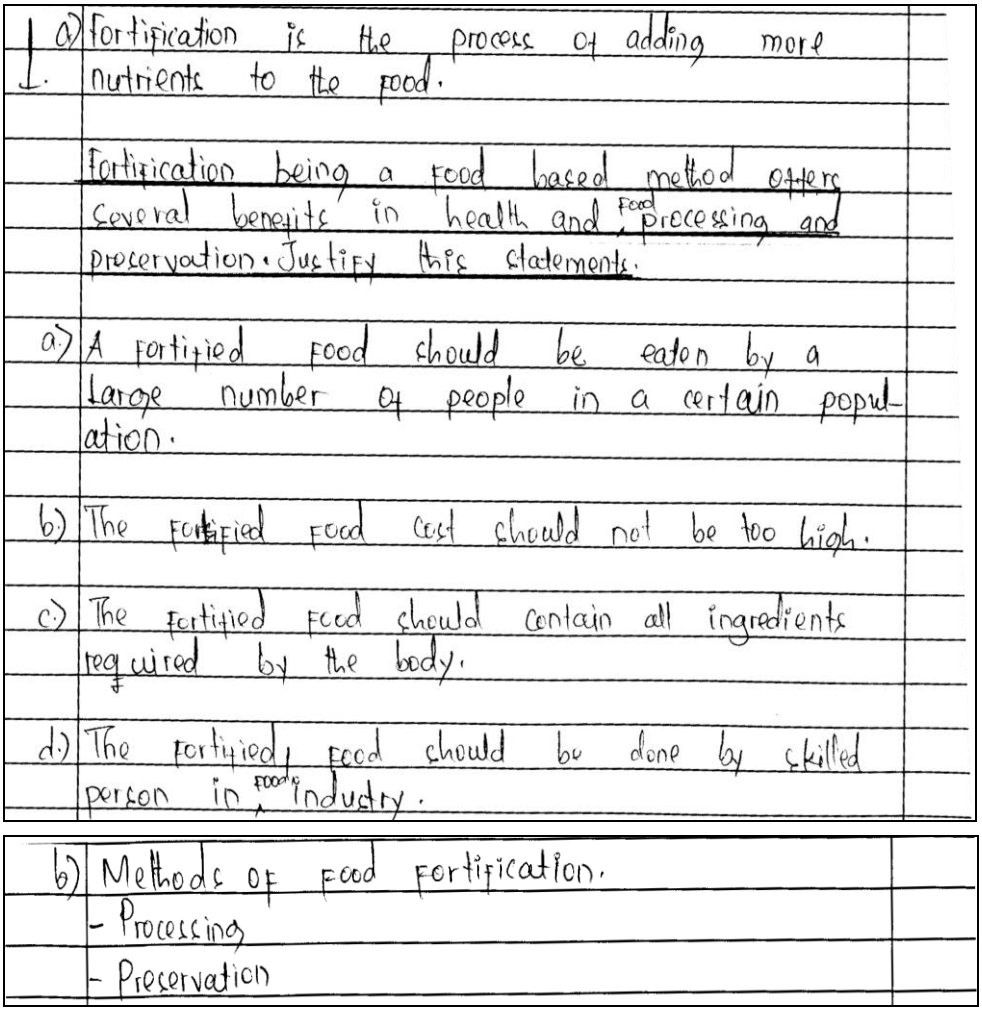
Extract 1.1: A Sample of Candidate's Correct Responses to Question 1

In Extract 1.1, the candidate provided correct advantages of food fortification in part (a), but in part (b), he/she provided one instead of two correct methods of food fortification. Hence, he/she failed to score all the 10 marks allotted to this question.

Despite the average performance on this question, analysis shows that 149 (51.4%) candidates had weak performance. Among them, 5 (1.7%)

candidates scored zero. In part (a), some candidates misunderstood the demands of the question. They wrote characteristics of food fortificants instead of benefits of food fortification. Some of the responses provided were; *should not react with the food where added, should not alter the colour or flavour of the fortified food, nutrients to be added should be cheap, should be available, should not vary very widely and the nutrients added should not be toxic.*

In part (b), the candidates failed to identify major methods of food fortification because some of them were not conversant in that area. For example, one candidate wrote; *direction mixing of fortification, where the food mixed directly with fortificants* and *Food processing.* Another candidate wrote *processing* and *preservation as major methods of food fortification.* Others misinterpreted the question's requirements. They wrote advantages of food fortification instead of methods of food fortification. For example, one candidate wrote; *Addition of nutrients that lost and increase of the minerals in the certain food production.* A sample of incorrect responses is shown in Extract 1.2.


1. a) Fortification is the process of adding more nutrients to the food.

Fortification being a food based method offers several benefits in health and food processing and preservation. Justify this statements.

a) A fortified food should be eaten by a large number of people in a certain population.

b) The fortified food cost should not be too high.

c) The fortified food should contain all ingredients required by the body.

d) The fortified food should be done by skilled person in food industry.

b) Methods of food fortification.
- Processing
- Preservation

Extract 1.2: A Sample of Candidate's Correct Responses to Question 1

In Extract 1.2, the candidate misinterpreted the requirements of the question in all parts. In part (a), he/she wrote characteristics of food fortification instead of advantages of food fortification. In part (b), the candidate wrote the treatments of food during storage instead of the methods of food fortification, therefore he/she scored low marks.

2.1.2 Question 2: Food Composition

This question tested the candidates' understanding on the concept of composition of food stuffs. The question had two parts; (a) and (b). The question stated,

Not all dietary iron is absorbed equally in the body. Support this statement by analysing,

(a) *Three groups of food which enhance the body's ability to absorb iron*.
(b) *Two groups of food which hinder the body's ability to absorb iron*.

The question was attempted by all 290 (100%) candidates. The analysis shows that 245 (84.5%) candidates scored from 0.0 to 3.0 marks, among them 51 (17.6) scored zero. In addition, the candidates who scored from 3.5 to 5.5 marks were 42 (14.5%) and 3 (1.0%) candidates scored from 7.0 to 7.5 marks. This performance is summarized in Figure 2.

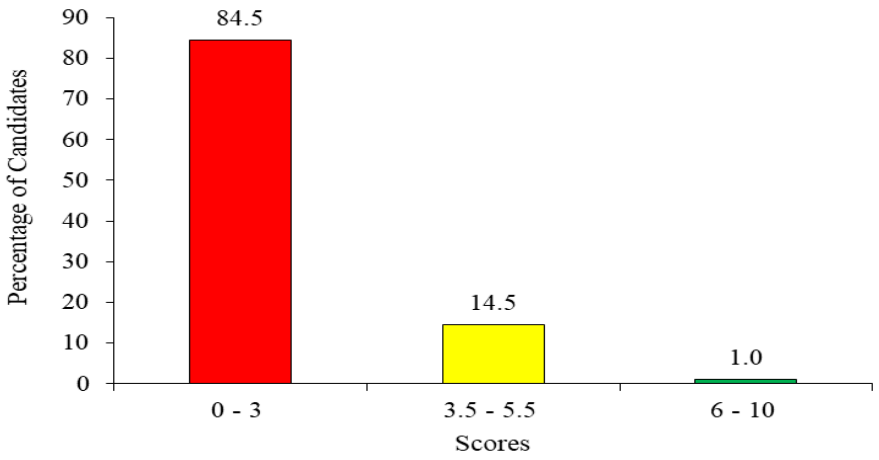


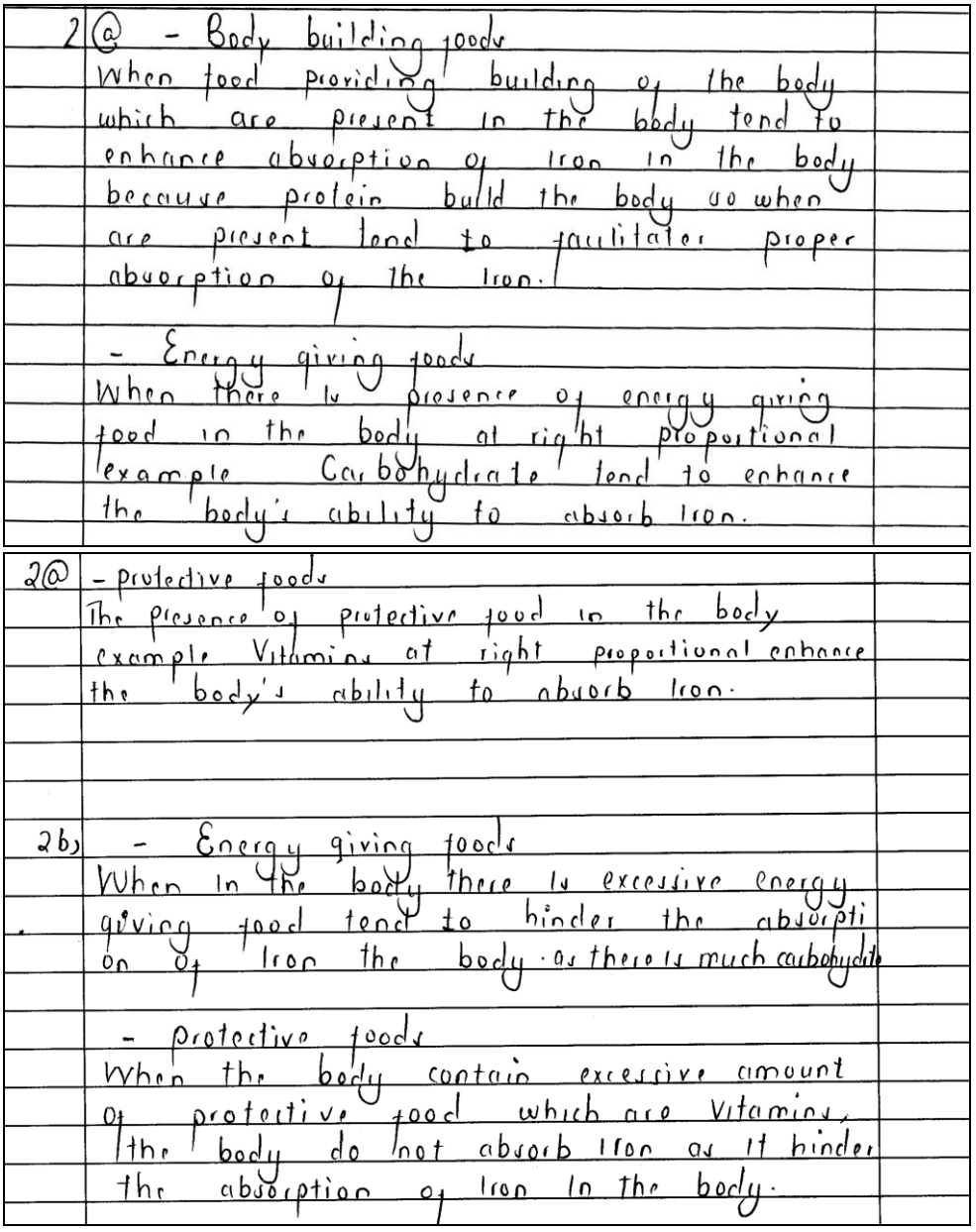
Figure 2: *Percentage of Candidates' Performance on Question 2*

Figure 2 indicates that the candidates' general performance in this question was weak, since 84.5 per cent scored below average.

The analysis shows that the majority of the candidates with weak performance had inadequate knowledge about the composition of food stuffs concept, specifically absorption of iron. They also had inadequate knowledge about food which can enhance or hinder the iron absorption in the body. In part (a), the candidates were not aware that foods rich in vitamin C, foods of high biological value, germinated and fermented foods enhance the body's ability to absorb iron. Majority of the candidates wrote food nutrients instead of groups of food which enhance the body's ability to absorb iron. For example, one candidate wrote; *vitamins D, Phosphorus, vitamin C and proteins*. Some failed to adhere to the demand of the question; they wrote three groups of food without explaining anything about their enhancement of the body's ability to absorb iron. For example, one candidate wrote; *energy giving food, Protective food and body building food*. Others wrote the correct food groups but failed to provide clear

explanations on how they enhance body's ability to absorb iron. For example, one candidate wrote; *fruits and vegetables these can affect the absorption of iron during processing and cooking when the vegetables cooked at high temperature. So they should not cook for long time for them to enhance absorption of iron.*

In part (b), most of the candidates failed to provide correct responses because they had inadequate knowledge about groups of food which can hinder the iron absorption in the body. Some of them wrote the types of foods like vegetables and fruits. Others wrote groups of food based on nutritional contents with no clear explanation. Their responses include: *milk and milk products, fats, excessive dietary fibres, meat, poultry and fish, energy giving foods, protective foods, excess intake of lipids foods, sugars and oil, vegetables, fruits, too much intake of carbohydrates foods.* A sample of the incorrect responses is shown in Extract 2.1.


2@ - Body building foods
When food providing building of the body which are present in the body tend to enhance absorption of iron in the body because protein build the body so when are present tend to faculitate proper absorption of the iron.

- Energy giving foods
When there is presence of energy giving food in the body at right proportional example Carbohydrate tend to enhance the body's ability to absorb iron.

2@ - protective foods
The presence of protective food in the body example Vitamins at right proportional enhance the body's ability to absorb iron.

2b) - Energy giving foods
When in the body there is excessive energy giving food tend to hinder the absorption of iron the body. as there is much carbohydrate

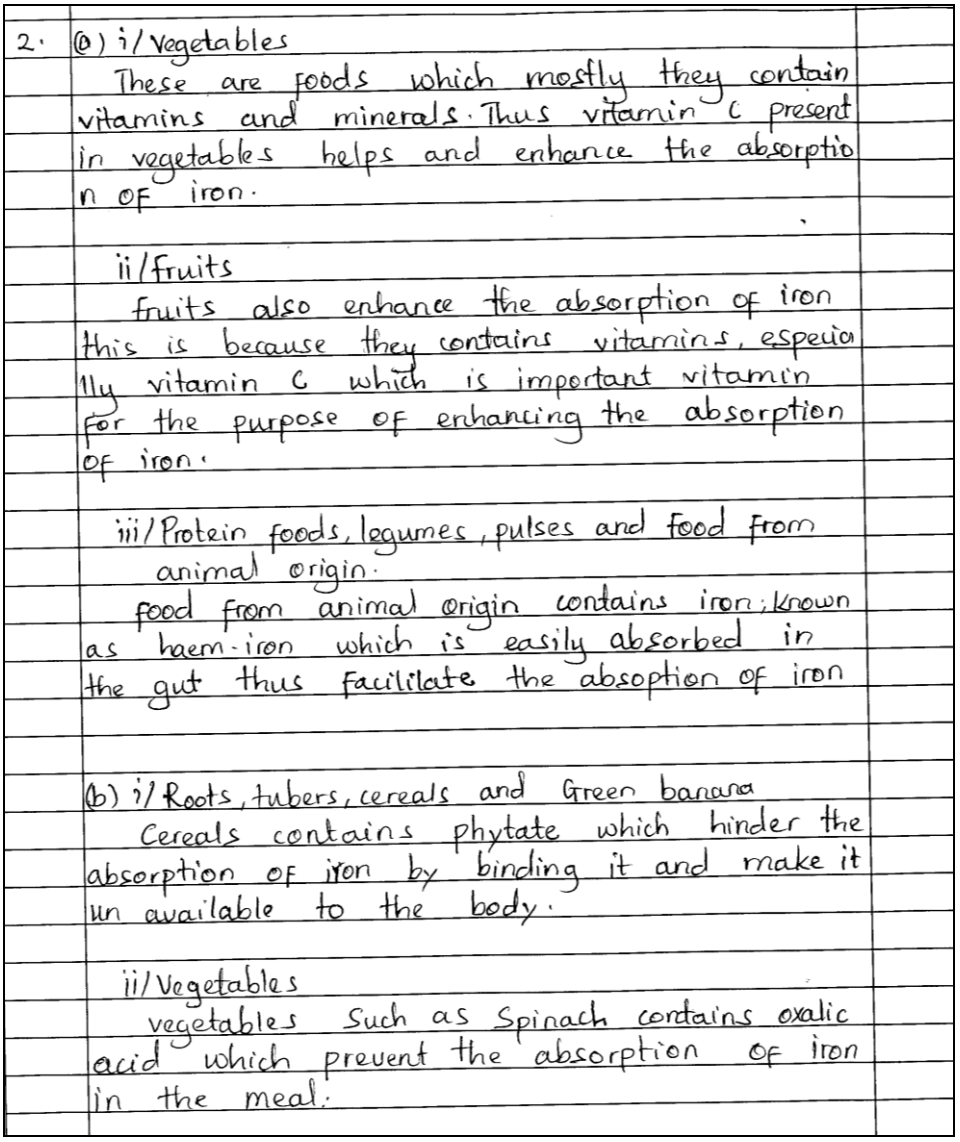
- protective foods
When the body contain excessive amount of protective food which are Vitamins, the body do not absorb iron as it hinder the absorption of iron in the body.

Extract 2.1: A Sample of Candidate's Incorrect Responses to Question 2

In Extract 2.1, the candidate provided incorrect responses as he/she provided types of food based on nutritional contents instead of giving specific group of food which enhance or hinder the body's ability to absorb iron.

Moreover, the analysis shows that 15.5 per cent of the candidates who scored from 3.5 to 7.5 marks had knowledge about composition of food stuffs, specifically groups of food that enhance or hinder body's ability to absorb iron. These candidates failed to score all marks allotted to this question because they could not provide the required number of points. Some of them split one point into two, making them two separate points. In part (a), a few candidates managed to provide correct responses about groups of food that enhance the absorption of iron. Some of the correct responses provided were *Protein food of high biological value like meat and eggs which stimulate the absorption of non heme form of iron*, *Acidic foods like oranges and fruits and vegetables enhance the absorption of iron from the food*.

In part (b), majority of the candidates demonstrated their knowledge about groups of food which hinder the body's ability to absorb iron. They managed to provide correct responses, although some of points were provided repeatedly. The candidates understood that a group of food that contains anti-nutrients substance have got impacts on the availability of nutrients. These anti-nutrients substances bind food nutrients and make them unavailable for body absorption. The examples of those substances are phytate and oxalate found in whole grains, cereals and legumes. Apart from anti-nutrients, some of the candidates provided explanation on foods containing polyphenols. These candidates understood that some food like cereals and some beverages like tea contain polyphenols substance which when consumed together with food containing iron, they bind iron and make it unavailable. For example, one candidate wrote, *Tea and coffee contain tannin that inhibit absorption of iron, unprocessed cereals, and legumes contain phytate that bind with iron preventing iron absorption*. Another one wrote *cereals have phytate which hinder absorption of iron*. *Vegetables such as Spinach have oxalic acid also prevent the absorption of iron*. Based on their responses it suggests that, these candidates did not understand that even foods containing calcium and phosphorus can hinder the body's ability to absorb iron as they bind iron and make it unavailable for absorption. A sample of the correct responses is shown in Extract 2.2.


2. (a) i/ Vegetables
These are foods which mostly they contain vitamins and minerals. Thus vitamin C present in vegetables helps and enhance the absorption of iron.

ii/ Fruits
fruits also enhance the absorption of iron this is because they contains vitamins, especially vitamin C which is important vitamin for the purpose of enhancing the absorption of iron.

iii/ Protein foods, legumes, pulses and food from animal origin.
food from animal origin contains iron; known as haem-iron which is easily absorbed in the gut thus facilitate the absoption of iron

(b) i/ Roots, tubers, cereals and Green banana
Cereals contains phytate which hinder the absorption of iron by binding it and make it un available to the body.

ii/ Vegetables
vegetables such as Spinach contains oxalic acid which prevent the absorption of iron in the meal.

Extract 2.2: A Sample of the Candidate's Correct Responses to Question 2

In Extract 2.2, the candidate correctly provided all the required points but he/she split down one idea into two independent points. Therefore, the candidate did not score full marks.

2.1.3 Question 3: Technology of Specific Products

This question tested the candidates' ability on the concept of technology of specific products. The question stated that,
Suppose you were invited to a training on baking process to present about raising agents;

(a) *Briefly explain four types of chemical raising agents you would include in your presentation*.
(b) *Advice the participants on how they should store the chemical raising agents*.

The question was attempted by 290 (100%) candidates. The analysis shows that 22 (7.6%) candidates scored from 0.0 to 3.0 marks, among them only 1 (0.3) scored zero. However, the candidates who scored from 3.5 to 5.5 marks were 99 (34.1%). Furthermore, 169 (58.3%) candidates scored from 6.0 to 10 marks, among them only 2 scored 10 marks. This performance is summarized in Figure 3.

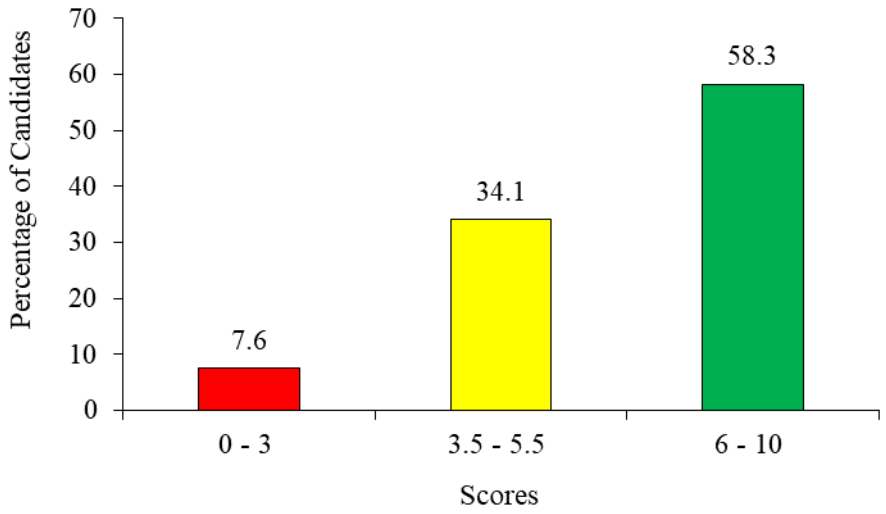


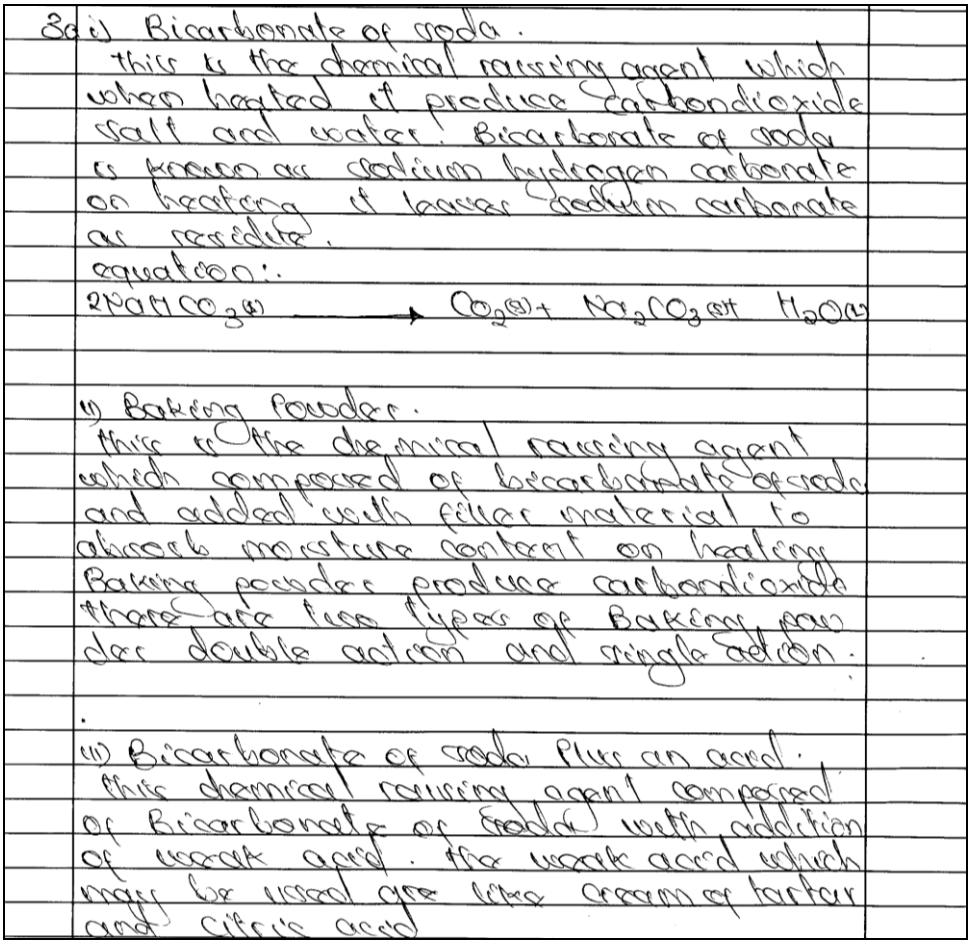
Figure 3: *Percentage of Candidate's Performance on Question 3*

The performance trend indicated in Figure 3 shows that the candidates' performance was good, because 92.4 per cent of the candidates scored from 3.5 to 10. 0 marks. The analysis shows that these candidates had sufficient knowledge about raising agents.

The analysis indicated that 58.3 per cent of the candidates with good performance had adequate knowledge on the technology of specific products, especially about chemical raising agents. In part (a), the candidates (58.3%) who scored high marks were aware that, chemical raising agents are among the types of raising agents, and stand different from biological, mechanical and physical raising agents. They understood that chemical raising agents are of four types which are baking powder,

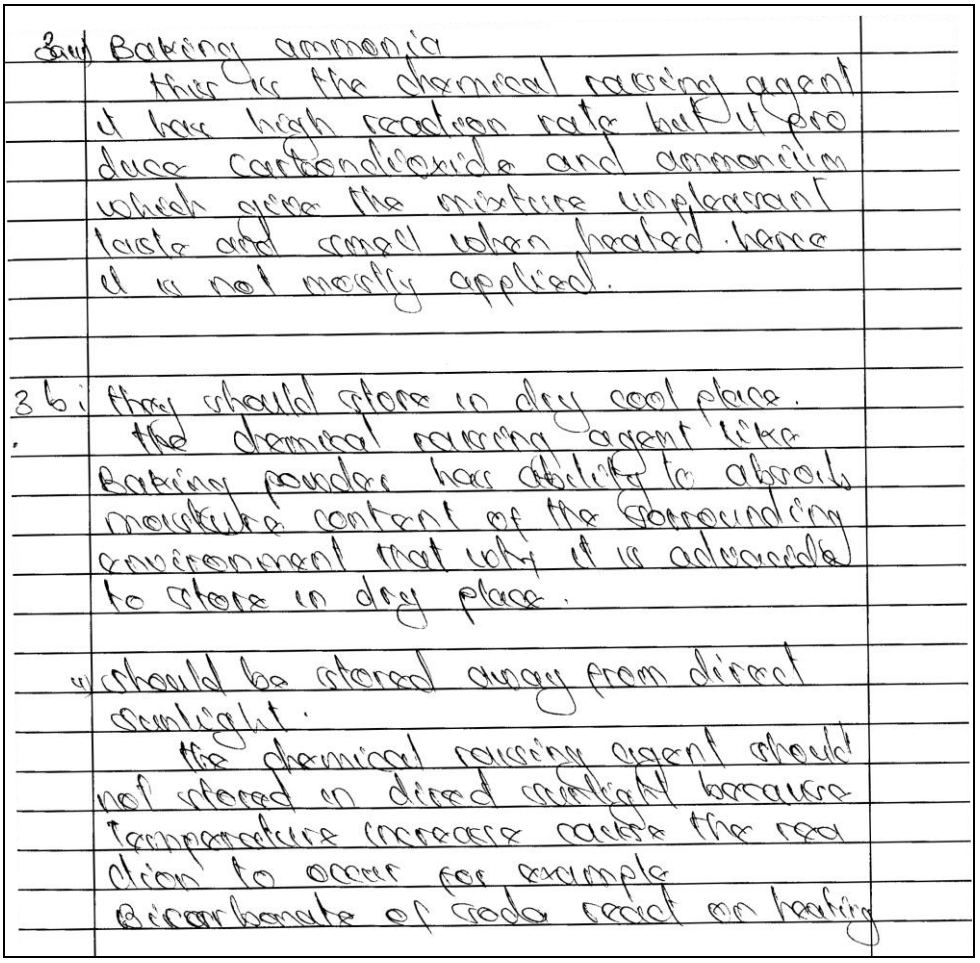
bicarbonate of soda, bicarbonate of soda plus acid and baking ammonia. For example, one candidate wrote; *bicarbonate of soda, baking powder, bicarbonate of ammonia and bicarbonate of soda used together with acid.* Another candidate wrote, *$NaHCO_3$, Baking powder plus $KHC_4H_4O_6$, NH_4HCO_3* and baking powder.

In part (b), most of the candidates who scored high marks provided the correct explanation on the storage of chemical raising agent. They understood that chemical raising agents are chemical substances which when handled poorly can react with the substances they come in contact with, especially the moist one. For that reason, they should be kept away from any moist substances which may dissolve them. For example one candidate wrote; they *should be stored in dry place which is free from moisture.* Another candidate wrote, *store in a tight closed container*. Extract 3.1 is a sample of responses of a candidate from this category.


3a i) Bicarbonate of soda.
this is the chemical raising agent which when heated it produce carbondioxide salt and water. Bicarbonate of soda is known as sodium hydrogen carbonate on heating it leaves sodium carbonate as residue.
equation:
$2NaHCO_3(s) \rightarrow CO_2(g) + Na_2CO_3(s) + H_2O(l)$

ii) Baking powder.
this is the chemical raising agent which composed of bicarbonate of soda and added with filler material to absorb moisture content on heating. Baking powder produce carbondioxide there are two types of Baking powder double action and single action.

iii) Bicarbonate of soda Plus an acid.
this chemical raising agent composed of Bicarbonate of soda with addition of weak acid. the weak acid which may be used are like cream of tartar and citric acid



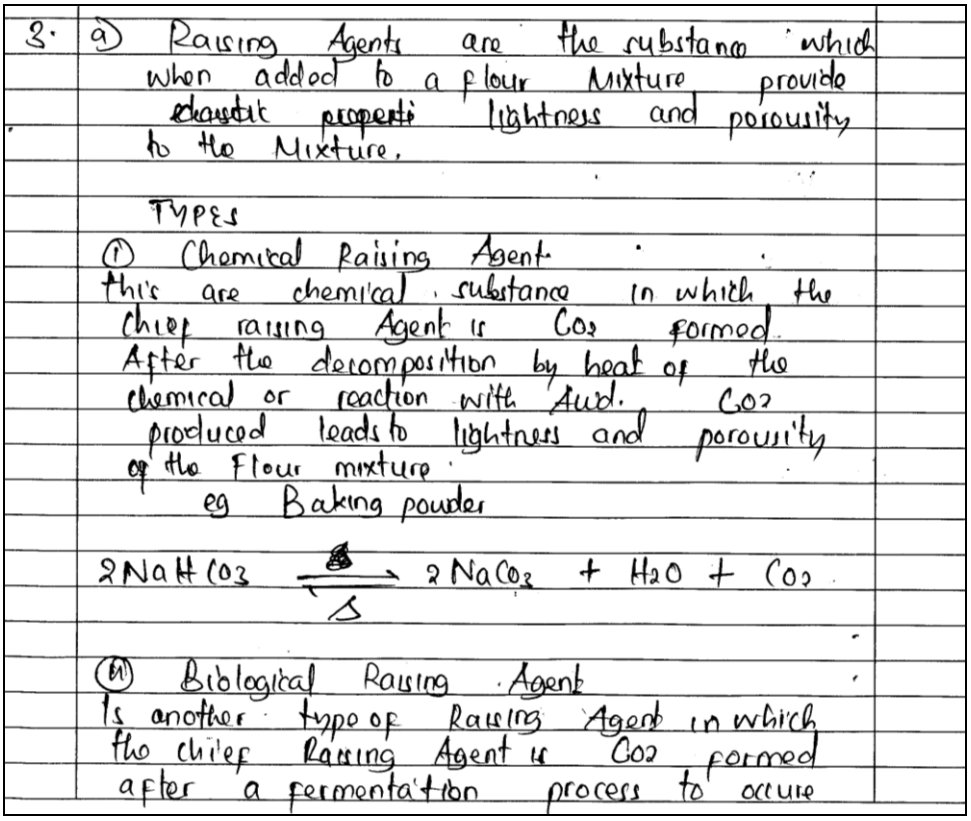
Extract 3.1: A Sample of the Candidate's Correct Responses to Question 3

In Extract 3.1, the candidate provided types of chemical raising agents in part (a) and gave the correct explanation on how to store chemical raising agents in part (b).

In contrast, 7.6 per cent of the candidates who attained weak performance had inadequate knowledge about raising agents. In part (a), some of the candidates did not understand the types of raising agents, hence provided irrelevant responses. Some of them confused the chemical raising agents with the chemicals found in the laboratory, thus they wrote the types of acids found in the laboratory. For example, one candidate wrote; *Nitric acid*, *Ascorbic acid* and *hydrochloric acid*. Others wrote types of raising agents instead of types of chemical raising agents. For example, one

candidate wrote; *Biological raising agents, Mechanical raising agents, chemical raising agents and physical raising agent*.

In part (b), the candidates did not understand that chemical raising agents are chemical substances that react when they come in contact with moist substances. Some of them misinterpreted the requirement of the question. For example, one candidate wrote rules to follow when using raising agents instead of how to store raising agents. His/her responses include: *Follow instruction before used or applying, Used in correct amount when needed as ingredients, follow procedures how to use the raising agent, keep away from children and animals, must work immediately*. Others mixed correct and incorrect explanation about storage of chemical raising agent, hence they scored low marks in this part. A sample of the incorrect responses is shown in Extracts 3.2.



3. a) Raising Agents are the substance which when added to a flour Mixture provide elastic properti lightness and porousity to the Mixture.

TYPES

(i) Chemical Raising Agent.
this are chemical substance in which the chief raising Agent is CO_2 formed. After the decomposition by heat of the chemical or reaction with Acid. CO_2 produced leads to lightness and porousity of the Flour mixture.
eg Baking powder

$$2NaHCO_3 \xrightarrow{\Delta} 2NaCO_3 + H_2O + CO_2$$

(ii) Biological Raising Agent
Is another type of Raising Agent in which the chief Raising Agent is CO_2 formed after a fermentation process to occure

Fermentation is the biological process involve oxidation of Reduction of Sugar glucose into Co2 and Energy and Alcohol. It is done by a Microorganism called Yeast under favourable condition like Temperature of 20-28°C, PH 4-4.5, Food (Sugar), Warmth (Moisture) and Enzyme.
Co2 produced leads to Raising, lightness, and Porousity.

Glucose + Yeast $\xrightarrow[22°-29°C]{\text{Zymase}}$ Co2 + Energy + Alcohol

(iii) Mechanical Raising Agent
Is the type of Raising Agent in which the chief raising Agent is Air which is Introduced during ~~Beating~~
- Beating and Creaming
- Whisking.
- folding and Rolling
- Sieving of the flour Mixture

Air also brings about Raising, lightness and porousity.

(iv) Physical Raising Agent
Is the type of Raising Agent where by Steam is the chief Raising Agent.
Steam is released when heat treatment is Immediately Applied on a flour Mixture, Where when the Moisture gets Heated It release steam which escape

b)
(i) For biological Raising Agent, It should stored at a very low temperature so as to Make It inactive

(ii) Chemical Raising Agent should be stored at a very low Relative humidity to avoid It from Absorbing water, Also store when closed to avoid reaction with Air and Also store at a cool temperature

Extract 3.2: A Sample of Candidates' Incorrect Responses to Question 3

In Extract 3.2, the candidate provided types of raising agents instead of types of chemical raising agents in part (a). In part (b), he/she mixed incorrect and correct explanation on storage of chemical raising agents.

2.1.4 Question 4: Food Production

This question tested the candidate's understanding on the concept of food production. The question stated that,

(a) *Differentiate chronic food insecurity from transitory food insecurity*.

(b) *Analyse the effects of the following factors on food production in Tanzania*:

(i) Rapid population growth.

(ii) Civil conflicts.

(iii) Acquired Immune-Deficiency Syndrome (AIDS).

(iv) Environmental degradation.

This question was attempted by 290 (100%) candidates. The analysis indicates that 2 (0.7%) candidates scored from 0.0 to 3.0 marks, 42 (14.5 %) scored from 3.5 to 5.5 marks and 246 (84.8%) candidates scored from 6 to 10 marks. Figure 4 illustrates the performance.

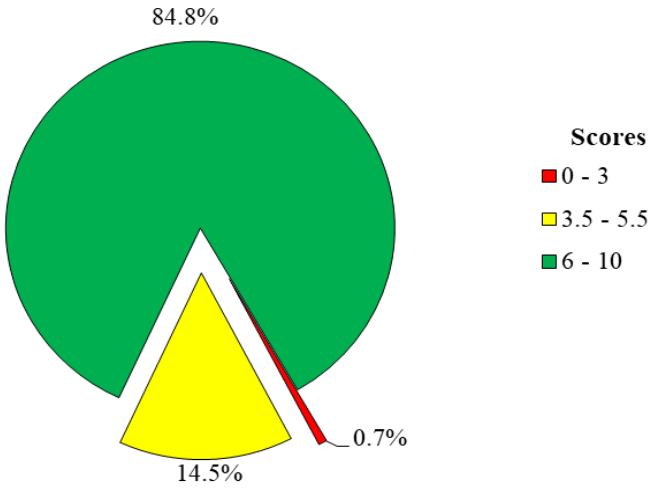


Figure 4: *Percentage of Candidates' Performance on Question 4*

The general candidates' performance was good because 99.3 per cent of the candidates scored from 3.5 to 10.0 marks. These candidates had adequate knowledge on food production.

The analysis of the candidate's responses indicates that the majority of the candidates (84.8%) scored high marks in this question because they had sufficient knowledge of food insecurity and factors affecting food production. These candidates managed to differentiate chronic from transitory food insecurity in part (a). They understood that food insecurity is the situation where there is scarcity of food in a particular geographical location. Chronic food insecurity is a long term problem with many effects, and it is difficult to control. On the other hand, transitory food insecurity is a short term problem with less effects and it is easy to control. For example one candidate wrote; *chronic food insecurity refers to completely lack of food, accessibility and availability in the household or national level while transitory refers to temporarily lack of food availability and accessibility in household and national level*. Another candidate wrote; *Chronic food insecurity is lack of food accessibility and availability to household level and nation level complete either due to the financial resources and are not prevented while transitory food insecurity is lack of food accessibility and availability to household level and nation level but not complete due to financial resources and can be prevented*.

In part (b), the candidates analysed factors affecting food production. They were aware about the factors affecting food production in Tanzania, hence they provided clear explanation about factors given in (i) to (iv). For example, one candidate provided the following answers:

(i) Rapid population growth – when the number of people increased causes the land for cultivation to become small therefore less production of food.

(ii) Civil conflicts - people will not settle and engage in food production due to war and will shift from one place to another and there is no settlement for production.

(iii) Acquired Immune Deficiency Syndrome - People with AIDS also suffer from opportunistic diseases and make their body generally weak to produce food.

(iv) Environmental degradation - This affect the climatic condition which interferes with the food production where the land becomes unfertile.

Extract 4.1 is the sample of candidates' correct responses.

04. a/ Chronic food insecurity	Transitory food insecurity
i. It stays for a long time	i. It lasts temporary.
ii. It is caused by natural calamities such as floods, volcanic eruption	ii. It is caused by either wars,
iii. It can not be solved immediately	iii. It can be solved immediately
iv. It is ~~avai~~ not avoidable	iv. It is avoidable.

b/

i. Effects of rapid population growth on food production.

04. b/ Effects of the following in food production in Tanzani

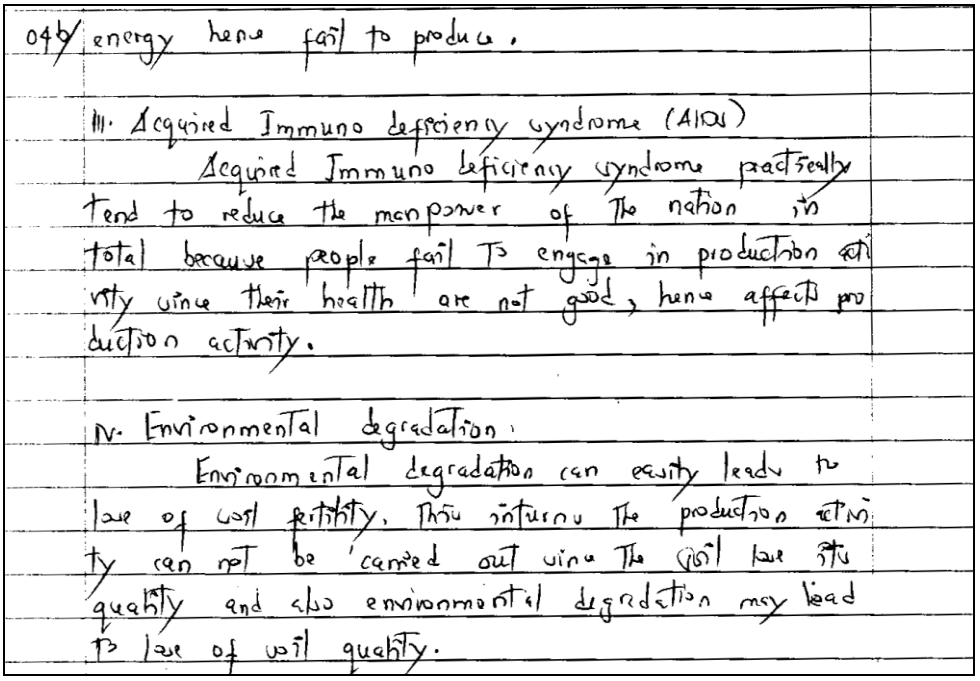
a.

i. Rapid population growth

Rapid population growth may lead to increase number of people, hence the land will be occupied by people for habitat instead of using the land for production activity hence there will scarcity of land.

ii. Civil conflicts.

Civil conflicts may hinder food production because instead of people participating in production people tend to engage themselves in conflicts which waste times and


04b/ energy hence fail to produce.

III. Acquired Immuno deficiency syndrome (AIDS)

Acquired Immuno deficiency syndrome practically tend to reduce the manpower of the nation in total because people fail To engage in production activity since their health are not good, hence affects production activity.

IV. Environmental degradation.

Environmental degradation can easily leads to lose of soil fertility. Thus inturns the production activity can not be carried out since the soil lose its quality and also environmental degradation may lead To lose of soil quality.

Extract 4.1: A Sample of Candidates' Correct Responses to Question 4

Extract 4.1 indicates that the candidate provided relevant differences between chronic and transitory food insecurity in part (a) and he/she provided correct analysis on the given factors affecting food production in part (b).

The analysis further shows that 0.7 per cent of the candidates scored low marks (0.0 - 3.0) in this question. These candidates had inadequate knowledge on food insecurity specifically chronic and transitory food insecurity. In part (a), the candidates failed to differentiate the two types of food insecurity for example, one candidate wrote; *Chronic food insecurity is the type of food insecurity whereby a household cannot access food in term of quality or quantity throughout the year by all people while transitory food insecurity is the type of food insecurity whereby a household can access food in term of quality and quantity by all people throughout the year.*

In part (b), the candidates analysed incorrectly some of the factors affecting food production. For example, one candidate provided the following answers

(i) *Rapid population growth can affect food production due to high number of people which lead to low food,*

(ii) *People have misunderstand themselves so affect food production due to there will be low production,*

(iii) *Acquire Immunodeficiency Syndrome (AIDS), people has no energy hence difficult to production* and

(iv) *Environmental degradation leads low production of food because the environment is poor.*

Extract 4.2 is a sample of incorrect responses from one of the candidates.

4a)	Chronic food insecurity	Transitory food insecurity.	
i)	This food insecurity taker long time to occur to the certain area	i) This food insecurity makes the food to be absence through the various sectors	
ii)	Makes food to be absent when being performed	ii) Makes the food to be available all the time.	

b)

i) Effects of rapid population growth.

i) Spread of disease

Through rapid population growth to the people may cause spread of diseases due to the certain group of people.

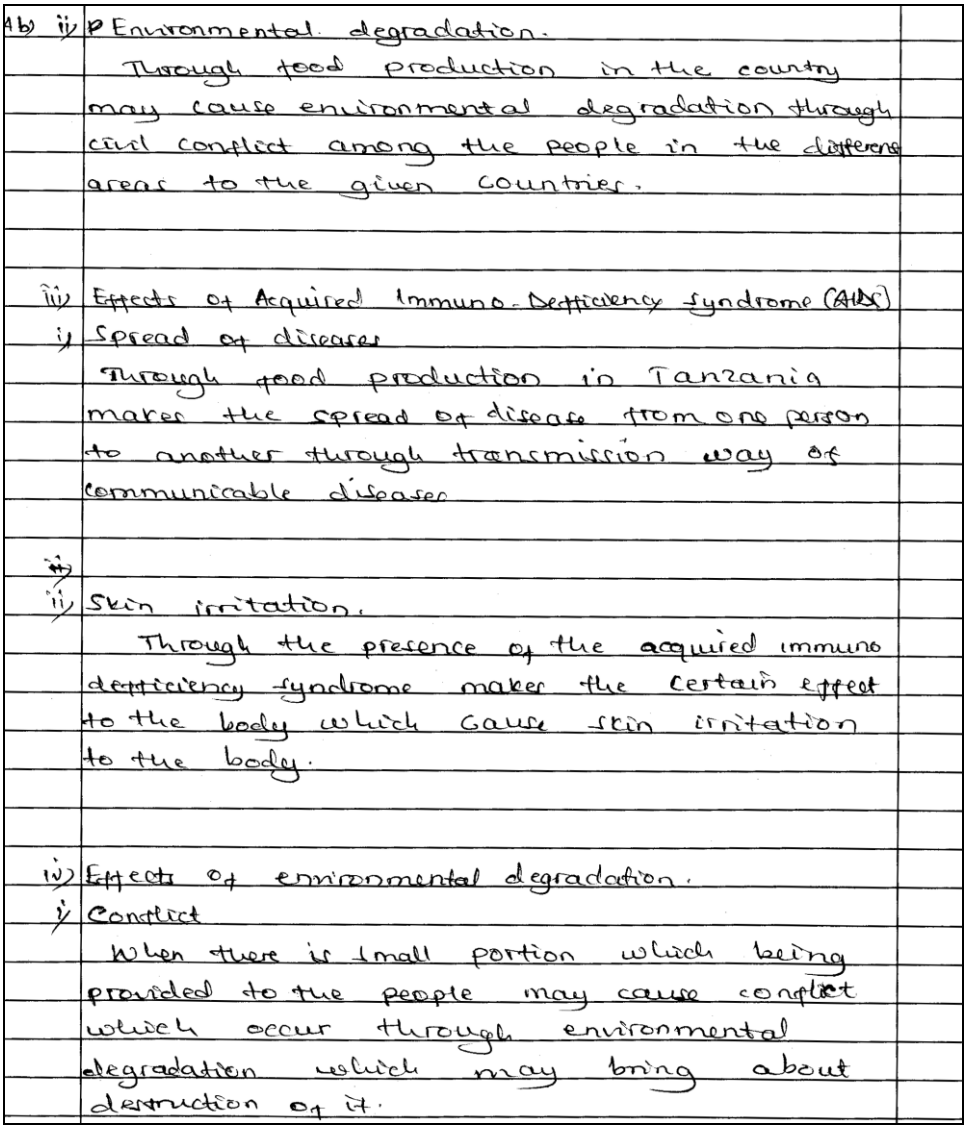
ii) Conflict

Through the presence of high population of the people may cause conflict among themselves through unequal distribution of the food among the people in the county.

ii) Effects of civil conflicts

i) Unequal treatment

Through provision of food production in the county may cause the unequal treatment which bring about conflict between people in the county.



Extract 4.2: A Sample of Candidates' Incorrect Responses to Question 4

In Extract 4.2, the candidate provided irrelevant responses to all parts. In part (b) he/she wrote the effects caused by the given factors (i) to (iv) instead of stating the effects of those factors to food production. This indicates that the candidate lacked knowledge on the subject matter tested, hence he/she ended up scoring low marks.

2.1.5 Question 5: Nutrient Requirement

This question tested the candidates' understanding on the concept of Recommended Daily Intake (RDI). The question stated that,

A patient who is suffering from diabetes mellitus has been referred to you by a physician for nutritional counseling. Recommend five dietary practices of managing his/her illness.

The question was attempted by all 290 (100%) candidates. The analysis shows that 153 (52.8%) candidates scored from 0.0 to 3.0 marks; 114 (39.3%) scored from 3.5 to 5.5 marks and 23 (7.9%) candidates scored from 6.0 to 8.0 marks. Figure 5 illustrates the candidates' performance.

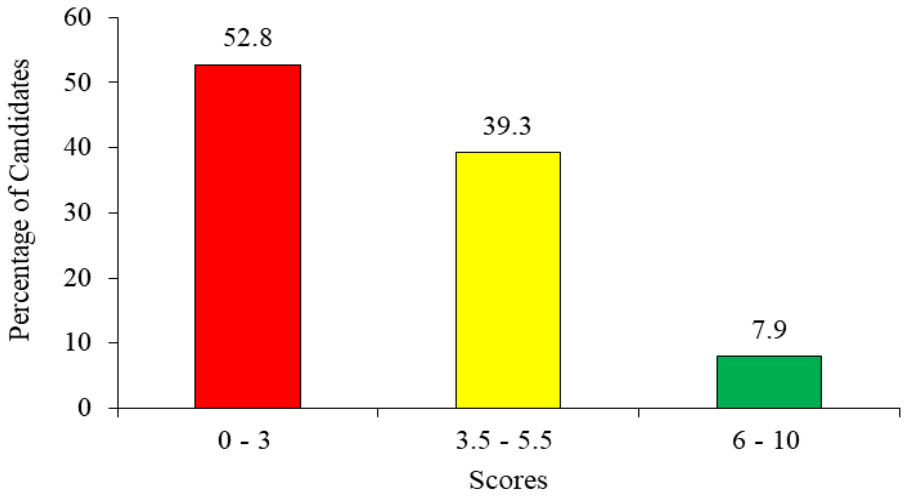


Figure 5: *Percentage of Candidate's Performance on Question* 5

Based on the analysis in Figure 5, the general performance in this question was average, since 47.2 per cent of the candidates scored from 3.5 to 10.0 marks.

The candidates (7.9%) who scored high marks had sufficient knowledge about the diet of a diabetic patient. They understood that diabetes mellitus is a disorder in which the body does not produce enough or respond normally to insulin, causing blood sugar (glucose) levels to be abnormally high. They managed to recommend on dietary practices of managing diabetes mellitus such as: to consume moderate amount of protein because too much protein, especially animal protein may cause insulin resistance that can increase poor glucose metabolism, hence may cause high glucose levels in the body. They also wrote about the reduction of sugar intake, food rich in carbohydrates, alcohol intake, processed or packed foods which may contain sugar. Moreover, they wrote about additional intake of

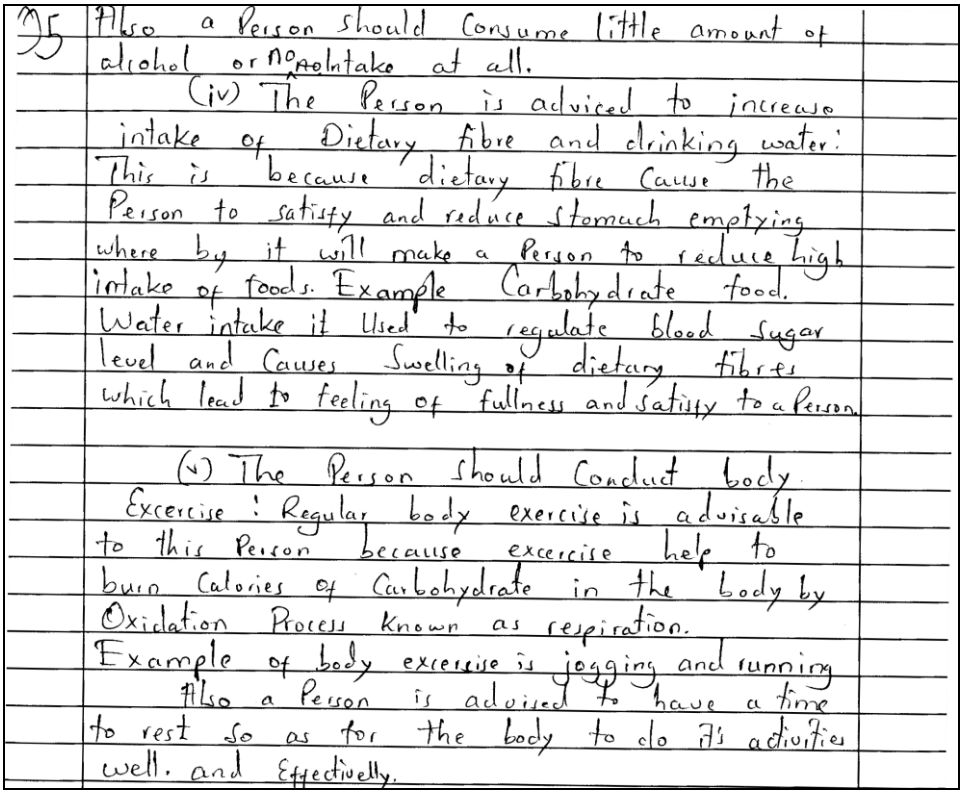
high fibre foods and healthy polyunsaturated fatty acid types of food. For example, one candidate wrote; *Eating food containing small amount of sugar, Eating high amount of fibre foods, Avoiding drinking of alcohol, eating food contain small amount of cholesterol.* Another candidate wrote; *less sugar, less alcohol, less amount of fat and avoids processes food*. Extract 5.1 is a sample response from a script of the candidate with good performance.

05. Diabetes Mellitus: This refers to disease that is Caused by failure of the Pancrease to regulate amount of Sugar in the blood, by Causing blood Sugar level to be in high level.

(i) Red: The Person should Reduce high intake of Sugar: The dietary Practices of this Person so as to manage his/her illness the intake and Consuming of food that Contain high Sugar Content. Example, Cakes, biscuits, jam, jellies, juices, breads and Cookies Because these food will increase Sugar Concentration in the blood. And it is advisable to Consume fresh fruit, juices with addition of honey instead of Sugar and baked Product that do not Contain Sugar.

(ii) The Person should reduce high intake of Carbohydrate food: This is because when there is excessive intake of Carbohydrate, there is Conversion of it to glucose, On which it rise blood Sugar level. The dietary Practices for this Person is to Consume a very little amount of Carbohydrate food Such as Cassava, rice and wheat and not frequentlly So as for the body to balance it blood Sugar level.

(iii) The Person Should reduce high intake of Alcohol and Cigarate: The intake of high amount of alcohol lead to increase of blood Sugar level in the body, because alcohol Contain Carbo-hydrate Example beer and Malt, which is later Converted to glucose. So a Person is also advised to stop intake of Cigarate because it damage body Cell that regulate Sugar level-


Also a Person should Consume little amount of alcohol or no alcohol intake at all.

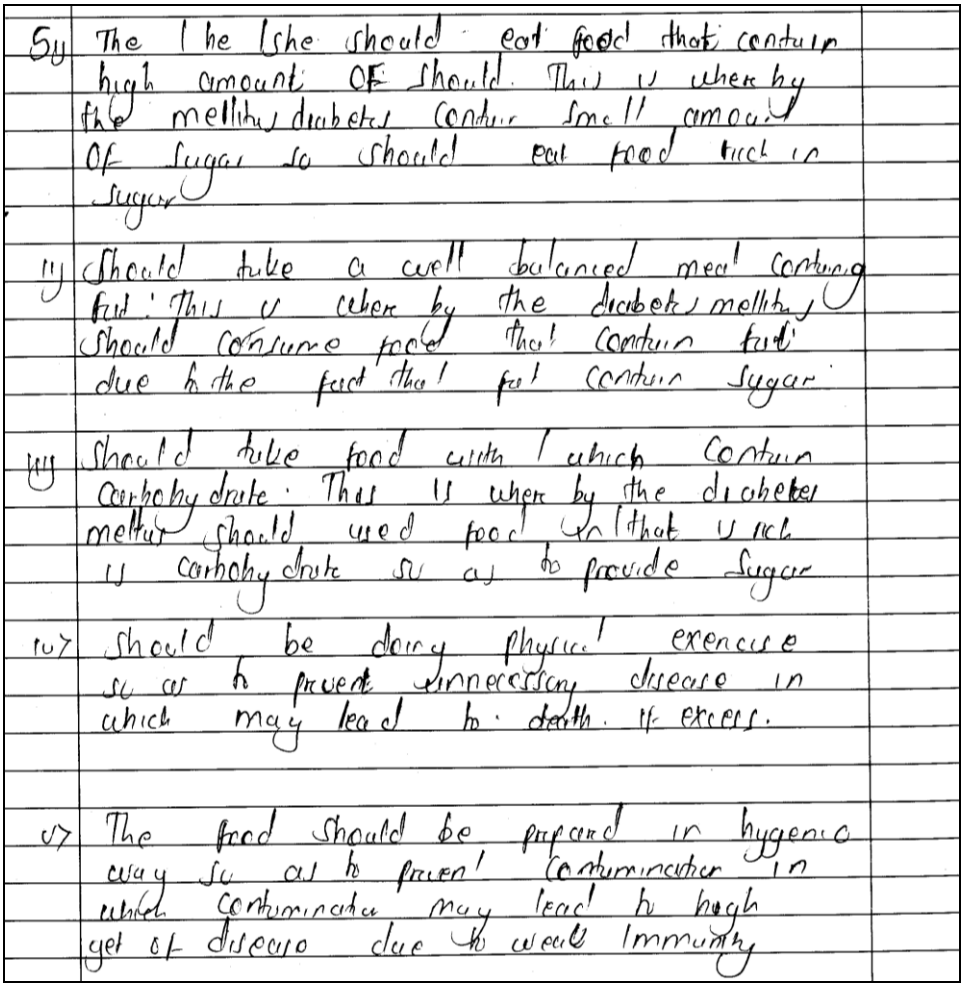
(iv) The Person is adviced to increase intake of Dietary fibre and drinking water: This is because dietary fibre cause the Person to satisfy and reduce stomach emptying where by it will make a Person to reduce high intake of foods. Example Carbohydrate food. Water intake it Used to regulate blood sugar level and Causes Swelling of dietary fibres which lead to feeling of fullness and satisfy to a Person.

(v) The Person should Conduct body Excercise: Regular body exercise is advisable to this Person because excercise help to burn Calories of Carbohydrate in the body by Oxidation Process known as respiration. Example of body excercise is jogging and running Also a Person is advised to have a time to rest so as for the body to do its activities well. and Effectively.

Extract 5.1: A Sample of Candidates' Good Responses to Question 5

In Extract 5.1, the candidate managed to provide four correct responses on dietary practices to manage diabetes mellitus, except point (v) which is a physical practice and not a dietary practice.

Despite the average performance in this question, the analysis indicates that 52.8 per cent of the candidates scored low marks. This performance is due to inadequate knowledge about the diet of a diabetic patient. For example, one candidate wrote; *Should conduct exercise, must be free from stress and depression because they cause rise in glucose in the blood, consume high vitamins rich food as they lower blood glucose, increase intake of protein as it increase efficiency of their body immunity*. Others provided precautions to be taken by a person who is suffering from diabetes mellitus. For example, one candidate wrote; *Taking care of the body by avoiding cuts because they take long time to heal, avoid intake of coffee and milk tea so as to avoid increase of blood sugar, having good medical treatment of diabetic mellitus*. Extract 5.2 is a sample of responses from a script of the candidate who scored low marks.


5(i) The I he /she should eat food that contain high amount OF should. This is when by the mellitus diabetes contain small amount Of sugar so should eat food rich in sugar

(ii) Should take a well balanced meal containg fat: This is when by the diabetes mellitus should consume food that contain fat due to the fact that fat contain sugar

(iii) Should take food with / which contain carbohydrate. This is when by the diabetes mellitus should used food that is rich is carbohydrate so as to provide sugar

(iv) Should be doing physical exercise so as to prevent unnecessary disease in which may lead to death. if excess.

(v) The food should be prepared in hygenic way so as to prevent contamination in which contamination may lead to high get of disease due to weak Immunity

Extract 5.2: A Sample of Candidate's Incorrect Responses to Question 5

In Extract 5.2, the candidate misinterpreted the meaning of diabetes mellitus as low blood sugar and provided practices to adjust it in point (ii) and (iii). However, in point (iv) and (v) he/she provided precautions to be taken by a person who is suffering from diabetic mellitus.

2.1.6 Question 6: Food Quality and Safety

This question tested the candidates' ability on the concept of food quality and safety. The question stated that,

(a) Briefly explain:

(i) How food safety differs from other characteristics of food quality.

(ii) The aim of food quality assurance system in a food company.

(b) What are the reasons for implementation of food quality assurance programmes in food industry? Give four points.

The question was attempted by 289 (99.7%) candidates. The analysis shows that 266 (92.0%) candidates scored from 0.0 to 3.0 marks, among them 107 (37.0) scored zero. Moreover, the candidates who scored from 3.5 to 5.5 marks were 23 (8.0%). No candidate scored above 5.5 marks. Figure 6 summarizes this performance.

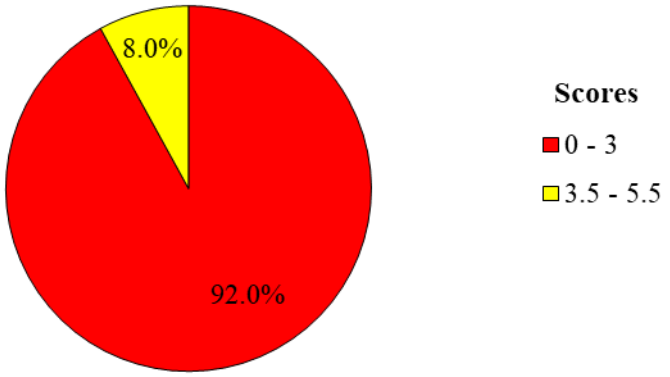


Figure 6: The *Percentage of Candidate's Performance on Question* 6

Figure 6, indicates that the candidates' general performance in this question was weak, since 92.0 per cent scored below average.

The analysis shows that the candidate (92.0%) who scored low marks had inadequate knowledge about food quality and safety. Therefore, they provided no or a few points correct. In part (a) (i), they did not understand that food safety is a food quality characteristic that is difficult to observe, because food can appear to be of high quality but unsafe due to unseen contamination. Some of the candidates mentioned hygiene as a distinctive factor which differentiates food safety from other characteristics of food quality. For example, one candidate wrote; *food safety is different from other qualities of food because it requires high hygienic condition of food*. Others provided wrong meaning of food safety. For example, one candidate wrote; *food safety is all foods taken by the human being for normal body functioning*.

In part (a) (ii), the candidates did not understand that through food quality assurance system a company gained confidence in their products because they abided by the system which guided them to produce products of good standards and adhere to the government regulations. They failed to provide the aim of food quality assurance system in a food company instead they provided irrelevant responses such as: *prevent infection and diseases improve food processing industry, increase number of customers in catering services, improve food product in the industry, provide food to the people, fairy food provided to the people through various activities* and *good and safe food*.

In part (b), the candidates failed to provide reasons for implementation of food quality assurance programmes in food industry. They provided irrelevant responses such as; *to improve food processing industry, to earn more money, to prevent infections, Increase production, to provide safe food to be taken by the customers, provide good food, to ensure food is supplied to all people and to ensure food products nourishes the body of the customers*. These candidates were not aware that customers' demand is one of the reasons that can help in implementation of food assurance programmes in food industry. As customers select food of high quality from the market, food industries will produce products of high quality to meet customers' expectation. Other reasons are requirements set by regulatory agencies, high demand of foods free from chemicals, environmental reasons (production of clean products) and emergence of technology in food industries. Extract 6.2 shows a sample of incorrect responses given by one of the candidates.

6.

a)

i) Food safety differs from other characteristics of food quality because food safety is the amount of food which can be taken by the people in appropriate condition which bring about proper body building.

ii) The aim of food quality assurance system in food company is

i) To ensure food which provided to the people is safety to be taken into the body.

ii) To ensure fairly food provided to the people through various activities.

iii) To ensure food provided to the people is clean and hygiene to be taken by the people.

6b) The reasons for implementation of food quality assurance programmes in food industry.

i) To ensure food which provided is safe to be taken by the people.
Through various sectors people should take the food which is safe for their health according to the certain area.

ii) To ensure food which provided to the people are in high quality.
Due to the presence of the different food quality to the sectors makes the proper process of making people to get the food which have high quality.

iii) To ensure fairly food supply
Through food quality makes the people to take food which have have all nutrients through the different part of the body which required.

iv) To ensure food provided to the people should contain all nutrients so that can be balanced in the body through the various sectors in the country.

Extract 6.2: A Sample of Candidate's Incorrect Responses to Question 6

In Extract 6.2, the candidate provided incorrect meaning of food safety and advantages of food safety in part (a). He/she also confused the advantages of food safety with that of food quality in part (b).

Moreover, the analysis indicates that 8.0 per cent of the candidates scored average marks. This shows that they had adequate knowledge about food quality and safety, but they failed to explain how food safety differs from other characteristics of food quality. Some of them provided the difference between food safety and food quality in part (a) (i). For example, one candidate wrote; *Food safety is the process of ensure that the food which is*

produced is safe and does not cause health hazard to the consumer but food quality is the total feature of food such as colour smell and texture. Another candidate wrote; *Food safety is the assurance that the food will not harm the body of people when consumed*.

In part (a) (ii), a few candidates managed to provide the correct aim of food quality assurance system in a food company. For example, one candidate wrote; *Provide confidence to both manufactures and authorized organizations or management. Products with high quality and quantity give courage to manufacturer to produce enough of it for making of more profits.*

In part (b), a few candidates managed to provide some correct reasons for implementing food quality assurance programme in food industry. They were aware that customer expectation, emergence of technology, demand for organic foods, regulatory requirements and environmental concern are the reasons that can support the implementation of food quality assurance programme in food industry. For example, one candidate wrote; *to meet consumer expectation, to meet the regulatory requirement*. The candidates scored average marks because they failed to provide all the correct points as they mixed correct and incorrect reasons.

2.1.7 Question 7: Food Storage

This question tested the candidates' ability on the concept of food storage. The question stated that,
Explain six primary causes of food losses in the post-harvest food chain.

A total of 223 (76.9%) candidates opted for this question. The analysis shows that 96 (43.0 %) candidates scored from 12 to 19.5 marks, 36 (16.2%) scored from 7.0 to 11.5 marks and 91 (40.8%) scored from 0.0 to 6.5 marks. Figure 7 summarizes this performance.

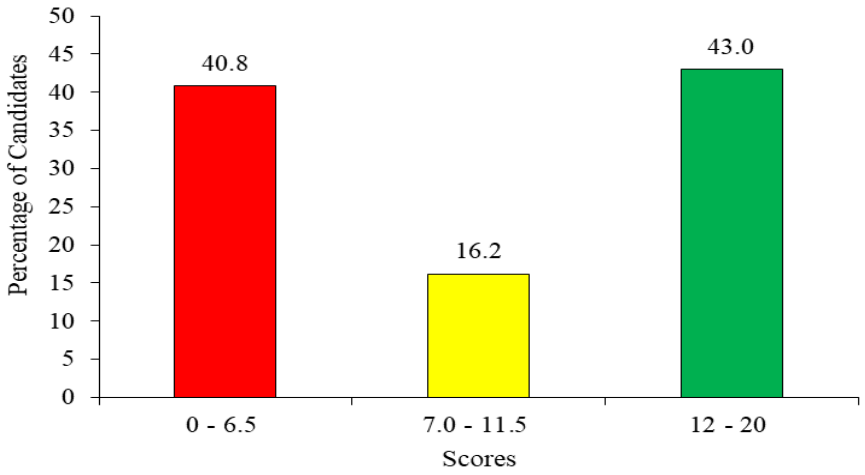


Figure 7: *Percentage of Candidate's Performance on Question 7*

Figure 7, indicates that general performance of the candidates was average since 59.2 per cent of the candidates scored from 7.0 to 19.5 out of 20.0 marks.

The analysis shows that candidates who scored high marks had adequate knowledge of food safety. They knew that, factors such as chemical, biochemical, biological, microbiological, psychological, physical, physico-chemical and physiological are the primary causes of food losses. These candidates correctly explained the primary causes of food losses in the post-harvest food chain, they organised their responses in essay format which having introduction, main body and conclusion. However, some of these candidates failed to score all the marks because they provided insufficient explanations to some of the mentioned causes. Extract 7.1 is the sample of candidates' correct responses.

SECTION B

7 Food loss is the change of availability, quality, quantity and wholeness of the food that resulting to the reducing of value for human consumption.

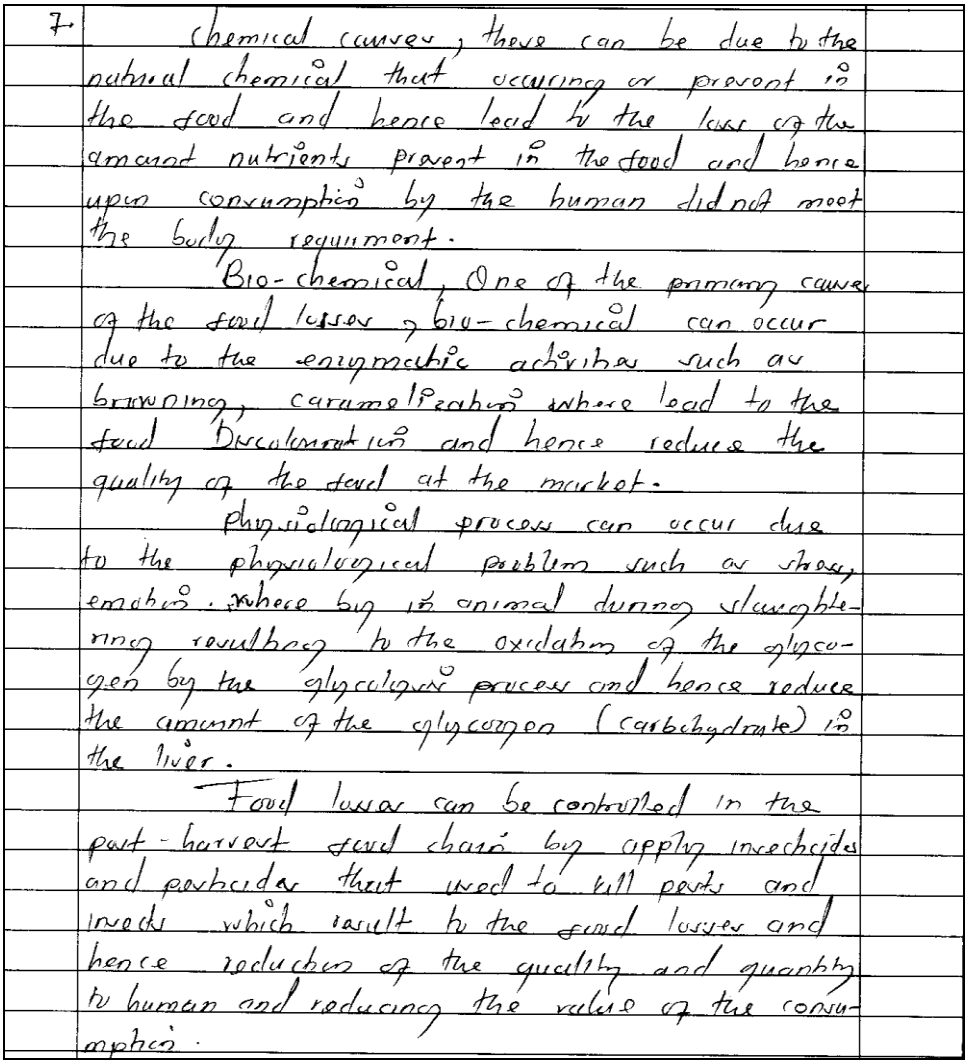
primary food loss it is the type of the food loss that directly affect the product and hence reducing the value for the human consumption.

The following are the primary six causes of the food losses in the post-harvest food chain

Biological causes can be lead to food loss due to the consumption of the vertebrate such Bird and miter and also can be causes due to the consumption of the food by insect immediately after post-harvest or during storage and hence resulting to the lus of quality, quantity of the food.

Micro-biological causes there can be resulted by consumption of the food part by micro-organism where by under a favorable temperature they grow and lead to the food loss example of micro-organism are Fungi, Bacteria, where by A.Niger consumption the cereals, fruits.

physical causes, these can occur due to the contamination of the food with the foreign material and hence reduce the food value for the human being consumption and also breaking of the kernal, Discolouration there reduce the quality and quantity of the food at the market.


7. chemical causes, there can be due to the natural chemical that occurring or present in the food and hence lead to the loss of the amount nutrients present in the food and hence upon consumption by the human did not meet the body requirment.

Bio-chemical, One of the primary cause of the food losses, bio-chemical can occur due to the enzymatic activities such as browning, caramelization where lead to the food Discolouration and hence reduce the quality of the food at the market.

physiological process can occur due to the physiological problem such as sharp, emotion. where big is animal during slaughtering resulting to the oxidation of the glycogen by the glycolysis process and hence reduce the amount of the glycogen (carbohydrate) in the liver.

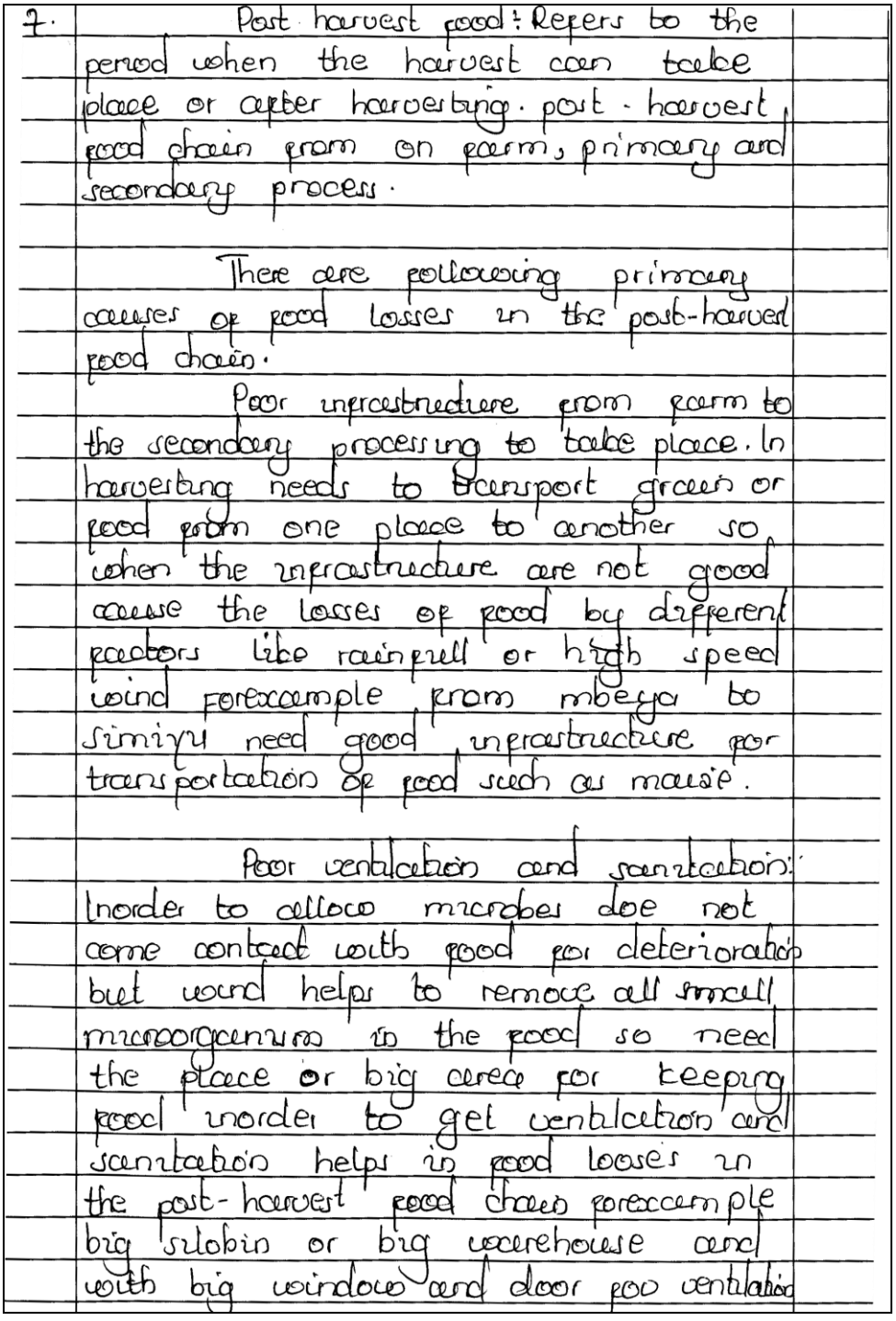
Food losses can be controlled in the post-harvest food chain by apply insecticides and pesticides that used to kill pests and insects which result to the food losses and hence reduction of the quality and quantity to human and reducing the value of the consumption.

Extract 7.1: A Sample of Candidates' Correct Responses to Question 7

In Extract 7.1, the candidate had adequate knowledge in the primary causes of food losses in food chain. He/she provided correct responses.

The analysis further indicates that some of the candidates (40.8%) who scored low marks failed to understand the demands of the question, hence provided conditions which could lead to food loss. For example, one candidate wrote; *heavy rain falls, pests, weeds, diseases, wind and intensive sunlight*. Others had inadequate knowledge of the causes of primary food losses. They analysed biological causes which is just one point. For example, one candidate wrote; *insect, rodents, birds, monkey and large animals can feed on the food and cause quantity loss of that food*. A few candidates wrote incorrect causes like: *determination after handling, low of*

proper storage, disruption of crop grain during transport, early harvesting crops. As a results they scored low marks. Extract 7.2 is a sample of incorrect responses from one of the candidates.


7. Post harvest food: Refers to the period when the harvest can take place or after harvesting. post-harvest food chain from on farm, primary and secondary process.

There are following primary causes of food losses in the post-harvest food chain.

Poor infrastructure from farm to the secondary processing to take place. In harvesting needs to transport grain or food from one place to another so when the infrastructure are not good cause the losses of food by different factors like rainfall or high speed wind forexcample from mbeya to simiyu need good infrastructure for transportation of food such as maize.

Poor ventilation and sanitation: Inorder to alloca microbes doe not come contact with food for deterioration but wind helps to remove all small microorganisms in the food so need the place or big area for keeping food inorder to get ventilation and sanitation helps in food looses in the post-harvest food chain forexample big silobin or big warehouse and with big windows and door foo ventilation

7. Early harvesting ÷ when the people can harvest early cause some food grain can not dry well also can no be matured so cause self heating between them because microbes especially fungi can deteriorate early in the grain and cause the losses of food grain

poor storage for example underground so after harvesting people can stored food underground cause the self heating and germination because of increased humidity and the temperature in food grain also food can be losses because of bacterial and fungi

Lack of pesticide and insecticide because after harvesting need to apply some pesticide or insecticide inorder to kill microbes before stored so after stored without pesticide and insecticide cause the food losses also can increase production of microbes in the food after harvesting

7. Ignorance, because some people have A knows the causes of the food losses in the post-harvest food chain but still can stored food without pesticide or insecticide in small rooms without applying ventilation and sanitation in food to prevent the food losses

Generally causes of food losses in the post-harvest food chain can cause by poverty and poor goverment support so need to provide education to all people about the post-harvest food chain

Extract 7.2: A Sample of Candidate's Incorrect Responses to Question 7

In Extract 7.2, the candidate provided poor practices and factors that could lead to food losses in post-harvest food chain instead of primary causes of food losses in the post-harvest food chain.

2.1.8 Question 8: Nutrient Requirement

This question tested the candidates' ability on the concept of Energy balance. The question stated that,

Dr. Aggrey is a lecturer at the university, he is 38 years old and weighs 65 kilograms. On 5th August 2021, he recorded the activities and the time he spent on each activity as shown in the following table.

The activities recorded by Dr. Aggrey

S/N	***Activity***	***Time used (minutes)***	***Energy expenditure in each activity (kcal/kg/min)***
1.	*Showering*	*20*	*0.047*
2.	*Dressing*	*10*	*0.038*
3.	*Driving*	*50*	*0.056*
4.	*Walking upstairs*	*10*	*0.254*
5.	*Walking down stairs*	*7*	*0.098*
6.	*Walking normally*	*70*	*0.069*
7.	*Having meals and drinks*	*50*	*0.020*
8.	*Marking assignment*	*188*	*0.029*
9.	*Lecturing*	*240*	*0.035*
10.	*Watching TV*	*65*	*0.017*
11.	*Attending natural calls*	*15*	*0.027*
12.	*Sitting and chatting*	*60*	*0.026*
13.	*Writing journal*	*165*	*0.027*
14.	*Sleeping*	*494*	*0.016*

(a) Describe the three major components of total energy expenditure.

(b) Calculate the components mentioned in (a) and the total energy expenditure by Dr. Aggrey. Use the factorial method where applicable.

(c) If Dr. Aggrey consumed 540gm carbohydrate, 250 gm protein, 80 gm fat and 2,750 mills water; compare the energy consumption and expenditure then advise him accordingly.

This question was opted by 137 (47.2%) candidates. Among them 87 (63.5 %) candidates scored from 12.0 to 18 marks, 42 (30.7%) scored from 7.0 to 11.5 marks and 8 (5.8 %) scored from 1.0 to 6.5 marks. There was no candidate who scored zero mark or above 18 marks. Figure 8 is a summary of the performance in this question.

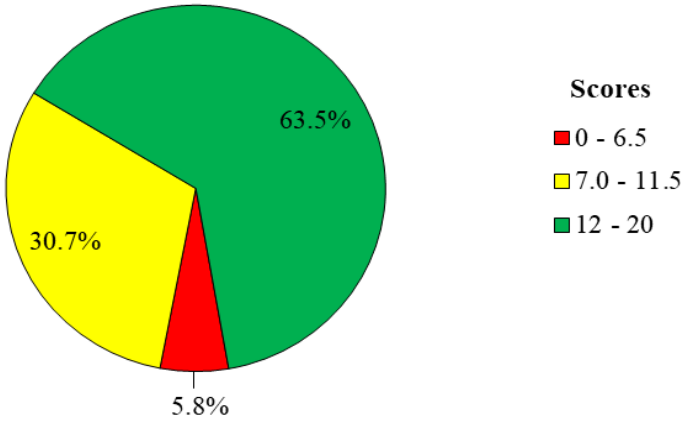


Figure 8: *Percentage of Candidate's Performance on Question 8*

Figure 8 indicates that the candidates' performance in this question was good because 94.3 per cent scored from 7.0 to 18.0 marks out of 20 marks allotted marks for this question.

The analysis of the candidate's responses to this question indicates that the candidates with high performance (63.9%) had sufficient knowledge about energy balance. In part (a), the candidates understood that Energy Cost for Activity (ECA), Energy cost for basal metabolism and the specific dynamic action of food are the major components of total energy expenditure. For example, one candidate wrote; *Basal Metabolic activities, Energy cost activity* and *specific dynamic effect.* Others wrote; *Basal metabolic rate, Physical activities, and specific dynamic action of food*.

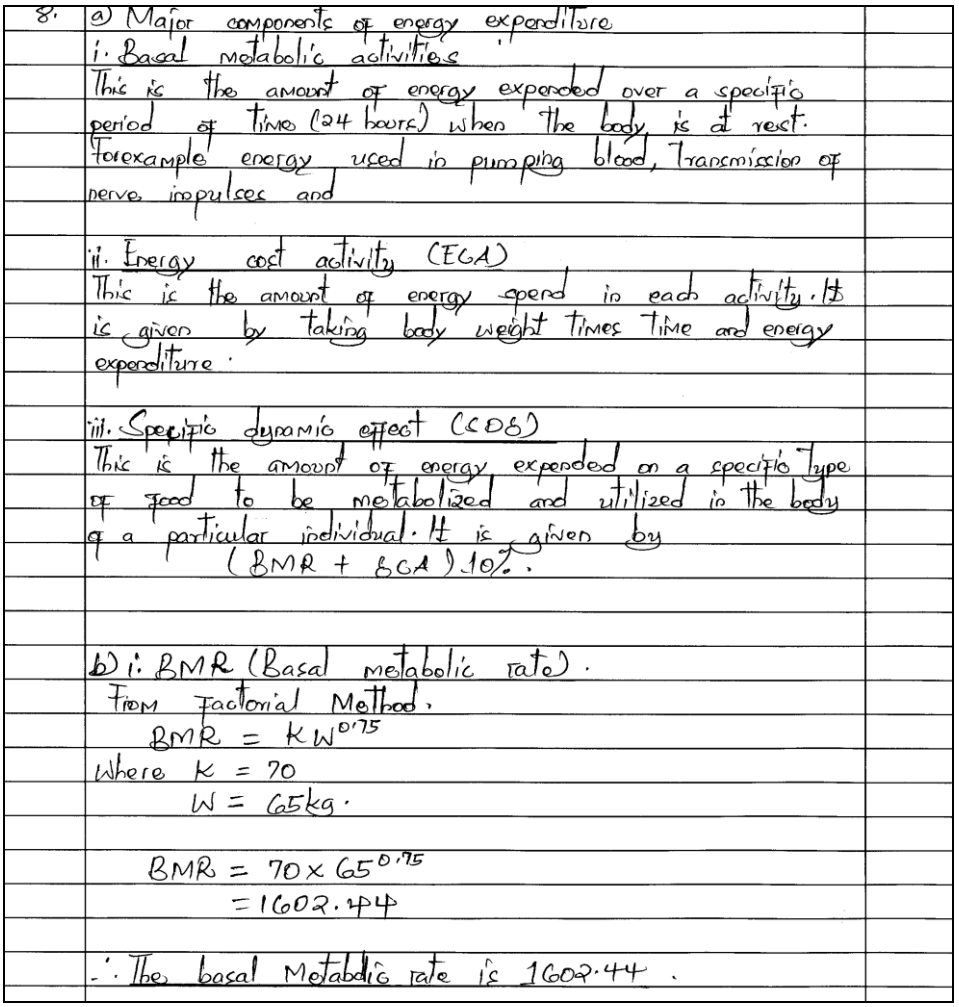
In part (b), they managed to provide the correct calculations on the components of total energy expenditure. The analysis of their responses shows that they were aware that;

Energy Cost for Activities = Σ(Ec x Bwt x Ti)

Where; Ec = energy expenditure (kcal/kg/min),
Bwt = body weight in kg and
Ti = time used in minutes.

They also understood that Energy Cost for Basal Metabolism is calculated by using factorial method such as BM = $70w^{0.75}$, where 70 is a constant and w is the body weight in kilogram. These candidates understood that the specific dynamic action or effect of food SDE (SDA) = 10% x (ECA + BM) kcal and the total energy expenditure (TEE) = ECA + BM +SDA.

In part (c), the candidates provided correct calculations of the energy consumed by Dr. Aggrey, the comparison between energy consumption and expenditure and provided correct advice to Dr. Aggrey. For example, one candidate wrote; *Dr. Aggrey had greater total energy expended than the energy consumed. My advice to him is to increase intake of food or decrease physical activities*. Extract 8.1 is a sample of correct responses given by one of the candidates.



8. a) Major components of energy expenditure

i. Basal metabolic activities

This is the amount of energy expended over a specific period of time (24 hours) when the body is at rest. Forexample energy used in pumping blood, Transmission of nerve impulses and

ii. Energy cost activity (ECA)

This is the amount of energy spend in each activity. It is given by taking body weight times time and energy expenditure.

iii. Specific dynamic effect (SDE)

This is the amount of energy expended on a specific type of food to be metabolized and utilized in the body of a particular individual. It is given by

(BMR + ECA) 10%.

b) i: BMR (Basal metabolic rate).

From Factorial Method.

$BMR = KW^{0.75}$

Where $K = 70$

$W = 65kg$.

$BMR = 70 \times 65^{0.75}$

$= 1602.44$

∴ The basal Metabolic rate is 1602.44.

8. b) ii. Energy cost Activity (ECA).

S/N	ACTIVITY.	CALCULATIONS Body weight x time x Energy	Energy cost Activity (ECA)
1.	Showering	65 x 20 x 0.047	61.1
2	Dressing	65 x 10 x 0.038	24.7
3	Driving	65 x 50 x 0.056	182
4	Walking upstairs	65 x 10 x 0.254	165.1
5	Walking downstairs	65 x 7 x 0.098	44.59
6	Walking normally	65 x 70 x 0.069	313.95
7	Having meals and drinks	65 x 50 x 0.020	65
8	Marking assignment	65 x 188 x 0.029	354.38
9	Lecturing	65 x 240 x 0.035	546
10	Watching TV	65 x 65 x 0.017	71.825
11	Attending calls	65 x 15 x 0.027	26.325
12	Sitting and chatting	65 x 60 x 0.026	101.4
13	Writing journals	65 x 165 x 0.027	298.575
14	Sleeping.	65 x 494 x 0.016	513.76
		65	2759.705

∴ The total Energy cost Activity is 2759.705

8. b) iii. Specific dynamic Effect (SDE)

From

$$SDE = (BMR + ECA)10\%$$

$$= (1602.44 + 2759.705) \frac{10}{100}$$

$$= 436.2145$$

∴ Specific dynamic Effect is 436.2145.

∴ Total energy expenditure = 4362.145 Kcals

c) For carbohydrates

1g of carbohydrates = 4 kcals

540g carbohydrates = ? x

x = 2160 kcals

For protein

1g of protein = 4 kcals.

250g of protein = x ?

x = 1000 kcals

For fat

1g of fat = 9 kcals

80g of fat = x ?

x = 720 kcals.

The tota energy = (2160 + 1000 + 720) kcals

= 3880.

∴ The total energy consumption is 3880 kcals.

» The total energy expended is greater than the consumed energy so he will be Ø Underweight. Thus he May increase energy intake or decrease his activities.

Extract 8.1: A Sample of Candidate's Correct Responses to Question 8

In Extract 8.1, the candidate managed to provide correct responses in all parts. This indicates that the candidate had adequate knowledge about nutrient requirement.

In contrast, 5.7 per cent of the candidates performed weakly. These candidates demonstrated inadequate knowledge on energy balance. In part (a), some of the candidates managed to mention the components of total energy expenditure but they did not provide supportive explanations. For example, one candidate wrote; *energy cost for Basal metabolism, Energy cost for activities and specific dynamic effect of food* without any explanation. Others wrote the components of total energy expenditure correctly but provided wrong description. For example, one candidate wrote; *Energy spending by activity is the energy used by the body, specific dynamic effect is the effect caused by the body* and *Basal metabolism is the time when the body is at rest*.

In part (b), they wrongly calculated the components of total energy expenditure. In (i), some of the candidates converted minutes to seconds (time) and kcal to grams in each activity, hence they failed to get the correct answer. For example, one candidate wrote;

Showering
1 minute= 60 seconds
20 minutes = X
X = 20 x 60
Therefore, X = 120.

In part (ii), they provided wrong calculation as they failed to use factorial method. In (iii), they failed to provide correct answers though they used correct formula. This is because the previous calculations were wrong. In part (c), some of the candidates provided incorrect comparisons between energy consumption and energy expenditure of Dr. Aggrey as well as wrong advice. For example, one candidate after calculation wrote; *the energy consumption is higher than expenditure so Dr. Aggrey is advised to balance meals and work few movements at a day*. Extract 8.2 is a sample of incorrect responses from one of the candidates.

8a) i) Energy spending by activity (ESA).
-This is the amount of energy which is spent by an individual.

ii) Specific dynamic effect (SDE).
-This is obtained by taking 1/10 of multiply by energy spent by activity summed with Basal metabolism.

iii) Basal metabolism (BM).
-This is the minimum amount of energy in which an individual this is in involuntary action like heartbeat, breathing and sleeping

8b) i) Basal metabolism

$$BM = 70 \times W^{0.75}$$

Then Weight is 65 kg

$$BM = 65^{0.75} \times 70$$

$$BM = 1602.44$$

Basal metabolism is 1602.44

8 iii) Specific dynamic effect.

$$\frac{1}{10}(BM + ESA)$$

$$\frac{1}{10}(1602.44 + 6558.331)$$

$$816.077$$

i. Specific dynamic effect is 816.0777

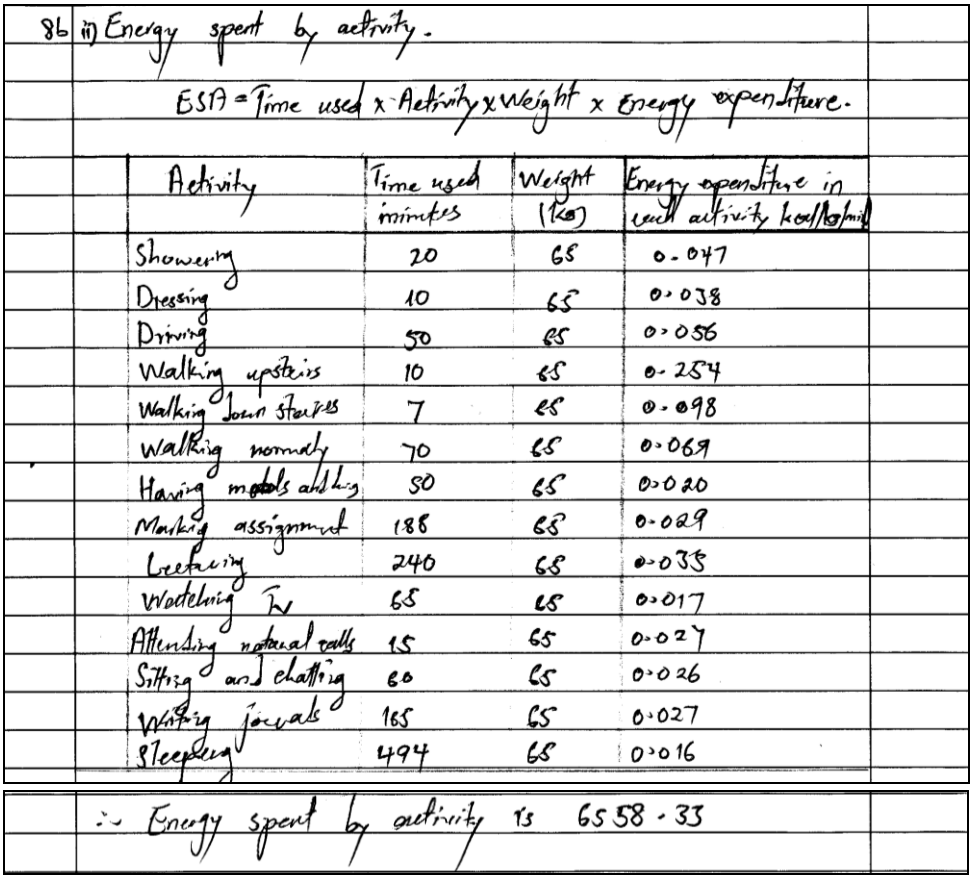
iv) Energy spent

iv) Total energy expenditure.

$$T.E.E = SDE + BM + ESA$$

$$T.E.E = 8976.84$$

Total energy expenditure is 8976.84



86 ii) Energy spent by activity.

ESA = Time used x Activity x Weight x Energy expenditure.

Activity	Time used in minutes	Weight (Kg)	Energy expenditure in each activity kcal/kg/min
Showering	20	65	0.047
Dressing	10	65	0.038
Driving	50	65	0.056
Walking upstairs	10	65	0.254
Walking down stairs	7	65	0.098
Walking normally	70	65	0.069
Having models and king	50	65	0.020
Marking assignment	188	65	0.029
Lecturing	240	65	0.035
Wadeling TV	65	65	0.017
Attending natural calls	15	65	0.027
Sitting and chatting	60	65	0.026
Writing journals	165	65	0.027
Sleeping	494	65	0.016

∴ Energy spent by activity is 6558.33

Extract 8.2: A Sample of Candidates' Incorrect Responses to Question 8

In Extract 8.2, the candidate provided incorrect responses in all parts (a), (b), and (c). This indicates that this candidate had insufficient knowledge about energy balance, hence scored low marks.

2.1.9 Question 9: Food Storage

This question tested the candidates' knowledge about the concept of food storage. This question required the candidates to describe six traditional methods used in storing food grains in order to minimize losses during storage.

The question was opted by 219 (75.5 %) candidates. Among them, 123 (56.2 %) scored from 13 to 19 marks, 65 (29.6%) scored from 7.5 to 11.5 marks and 31 (14.2%) scored from 0.0 to 6.5 marks. Figure 9 illustrates this performance.

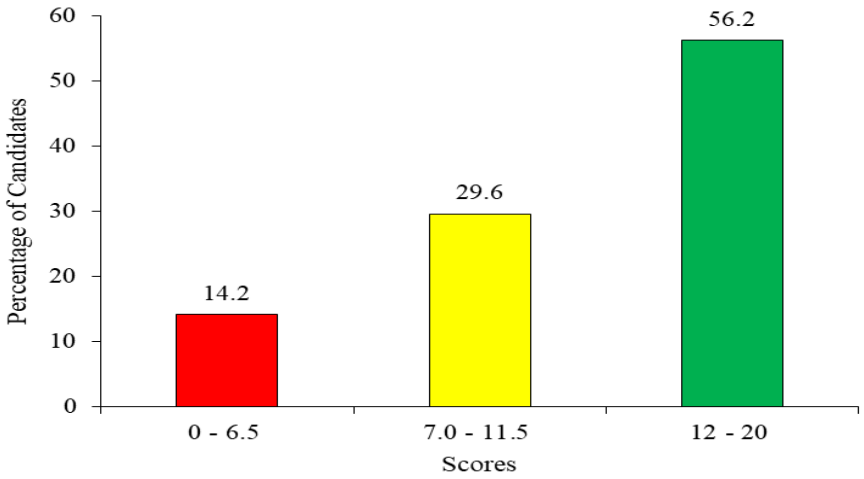


Figure 9: *Percentage of Candidate's Performance on Question* 9

Figure 9 indicates that the general performance in this question was good because 85.8 per cent of the candidates scored from 7.0 to 20.0 marks.

The analysis of candidates' responses in this question indicates that 56.2 per cent of candidates who scored high marks had adequate knowledge about the traditional methods of storing food grains. They understood that traditionally food can be stored in granaries, underground pits, raised timber platforms, ventilated racks, drums, jars, sacks, calabashes, solid wall bins and on the ground or floor. For example, one candidate wrote; *underground, hanging on trees, in sac storage, tightly containers, metal drums and sacks*. Another one wrote traditional storage methods as; *open timber platform, ground floor, calabashes, cribs, and ventilated racks*. These candidates managed to describe correctly the traditional storage methods and therefore scored high marks. Extract 9.1 is a sample of responses from one of the candidates with good performance.

9. Grain storage is the process of storing grains free from pests and microorganisms. There are two types of grains storage method, traditional method and modern method. The following are the traditional methods of storing grains.

Aerial storage. The grains are packed in sacks and hanged on tree branches or on the roof inside the house. This method is advantageous due to the drying of seeds by it is disadvantageous because it allows infestation of pests, air contamination also theft.

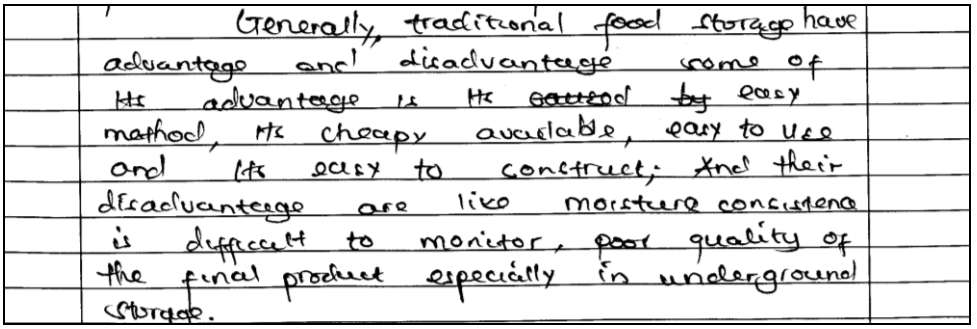
Open timber platform. Timber sticks are made and the timber are laid in a structure that the grains can be stored. The grains /seeds are kept on top of the timbers hence it is advantageous because it provides dryness of the grains but also there is air contamination also infestation of the flying insects but the grains are free from rodents.

9. Sacks. The grains are kept in ~~sto~~ sacks and are kept in the store for storage but it is advantageous in a content as contamination with air is prevented but it is disadvantageous due to the rodents and mice also the grains might undergo self heating hence reducing the viability of the seed. Also prevents contact with water because the grains are kept on top of racks in the store while in there sacks.

Ground / floor. The grains are stored on the floor surface. This methods provides drying of the grains but it is risk as there is infestation of pests in the grains example mites, rodents, mouse, vertebrate animals, dust and also mices.

Calabashes. In some places such as Maasai people store their grains in the calabashes where the grains are free from contamination but if they are stored for along time the grains may undergo self-heating.

Cribs. The grains are stored in cribs the methods is safe but it is contaminous to insects, rodents, mices also air contamination.


Generally, traditional food storage have advantage and disadvantage some of its advantage is its ~~cattled by~~ easy method, its cheapy available, easy to use and its easy to construct, and their disadvantage are like moisture consistency is difficult to monitor, poor quality of the final product especially in underground storage.

Extract 9.1: A Sample Candidates' Correct Responses to Question 9

In Extract 9.1, the candidate described correctly traditional methods used in storing food grains to minimize losses, hence scored high marks.

On the other hand, the analysis indicates that 14.2 per cent of the candidates scored low (0.0 - 3.0) marks. Among them 4 (1.8%) scored zero. These candidates misinterpreted the demands of the question. Some provided things to do in order to control microbial food poisoning such as *control personal hygiene, ensure health stuff, control growth of microbes* and *general hygiene* instead of describing traditional methods of storing food grains. Others provided practices involved in good storage management. For example, one candidate wrote; *cleaning the store, proper drying, sanitary measures, application of insecticides and regular monitoring*. Furthermore, a few candidates failed to organize their work in essay form. This indicated that they did not understand that an essay comprises of an introductory part, the main body and the conclusion. Extract 9.2 shows a sample of incorrect responses from one of the candidates.

9 Food storage refers to the practices done to foods so that may slow down microbial activities and increasing the self life of the food. Through food storage the food to may increase its self life and make them available through out the year. The following are the traditional methods, they can used in storing food grains so that they can minimize the losses

Drying, These refers to process of reduction of moisture content to the food product, So when moisture content will be reduced from the grain microbes will fail to grow and enhance the increasing of the shelf life of the food and minimize losses, Example of the food to which use the methods is maize ~~grain~~ and beans grains.

~~Smok~~ Smoking, These refers to the traditional methods of food storage by using smoke, where by the food grain are hanging up the wood kitchen and on receiving the ~~FAO~~ smoke was are being removed from the ~~product~~ grain hence will ~~enter~~ refere with agent of grain losses and hence ~~factor~~ minimize food losses

Salting, Refers to the application of salts around the food grain where by there will be with enterfearance of microbes activities because the moisture content will be removed from the food grain and creating the unfavourable condition to them to survival and also salting cause partial dehydration to the food grain like ~~seed~~. grain seed

Pickling, The refers to the methods of storing foods grains where by are being sealed in the concentrated anti microbial liquid, thus may prevent the growth activities of small microbes like bacteria, fungi and yeast hence may minimize the food losses and increasing the shealf life of the food grain for the future use.

Fermentation, These refers to the process where by food grain are being filled in a tight containers where there is no accessability to air which will favoure the good microbes activities as the source of the losses, and the containers will not being accesible to the agent of food deterioration like pestics, insects and vertebrate (Birds and rodents) hence will help to minimize losses to the food grain.

Therefore the village should practice proper methods of food grain storage so that to prevent the Food from not being accesible to agent of loss such as rodenticides, mites, insects and other small microbes like bacteria, yeast and fungi so that to minimize losses

Extract 9.2: A Sample of Candidate's Incorrect Responses to Question 9

In Extract 9.2 the candidate misinterpreted the demands of the question. Instead of describing the traditional methods of storing food grains he/she described traditional methods of preserving food.

2.2 155/2 FOOD AND HUMAN NUTRITION PAPER 2

This paper consisted of two sections; A and B. Section A comprised six (1 – 6) short answer questions which carried 10 marks each. Section B comprised three (7 – 9) essay questions which carried 20 marks each. The candidates were required to answer all the questions in Section A and two questions from Section B.

2.2.1 Question 1: Malnutrition

This question measured the candidates' competence in nutritionally vulnerable social groups in the society. The question stated;

The elderly are at a high risk of being affected by undernutrition in our country.

(a) Identify eight causes of undernutrition to this group.

(b) Suggest two nutritional strategies to help elders maintain a healthy diet and good eating habits.

The question was attempted by 290 (100 %) candidates who sat for this paper. The candidates' scores were as follows: a total of 240 (82.8%) candidates scored from 6.0 to 10 marks, 38 (13.1%) scored from 3.5 to 5.5 marks and 12 (4.1%) scored from 0.0 to 3.0 marks as illustrated in Figure 10.

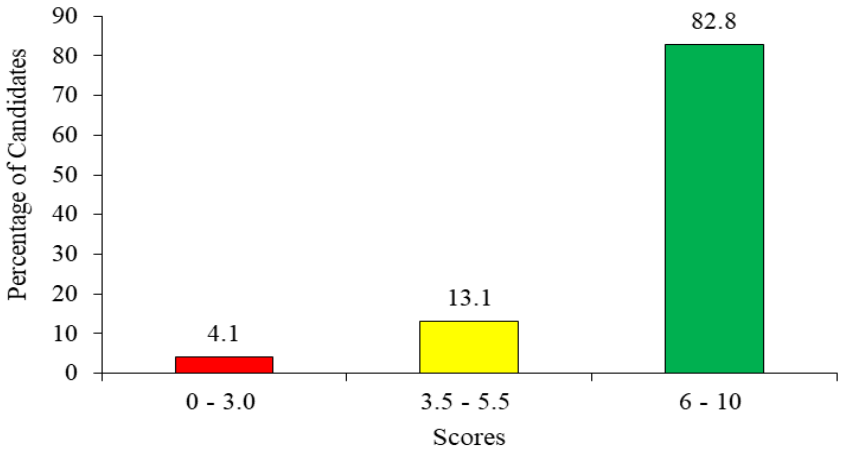


Figure 10: *Percentage of Candidates' Performance on Question 1*

Figure 10, indicates that the general performance on this question was good because 95.9 per cent scored from 3.5 to 10.0 marks. This indicates that the candidates had sufficient knowledge about causes of undernutrition to elderly.

The candidates (82.8%) with good performance demonstrated adequate knowledge about undernutrition to elderly. In part (a) some of the candidates were able to identify causes of undernutrition to elderly, such as low income, limited access to food, loss of appetite, difficult chewing and/or swallowing, change in taste, loneliness, diseases and infections. For example, one candidate wrote; *Infection and disease, low intake of food, poor special care, poor economic situation, insufficient essential social services and poor distribution of food*. Another one wrote; *diseases and infection, low food intake and utilization, inadequate essential services, insufficient household food security, poor living condition low income, low food production and insufficient care to elders*.
These candidates understood that elderly are more likely to have difficult prolonged conditions that may put them at risk for undernutrition.

In part (b), some of the candidates managed to suggest two nutritional strategies to help elders maintaining a healthy diet and good eating habits. Some of the correct responses provided were *proper special care like planning balanced meals for elderly*, *prevention and treatment of disease*, *Nutritional education*, *ensure proper service and care* and *providing food supplement*. These candidates understood that undernutrition is a condition which occurs when the body is not getting adequate amount of nutrients from the consumed food. Therefore, providing food is one of the strategies to curbing malnutrition to elders in the country.

Despite the good performance on this question, the analysis shows that, few candidates (4.1%) had weak performance. Some of these candidates misinterpreted the requirements of the question. Hence, they provided the causes of malnutrition in the community instead of giving the causes of undernutrition to elderly in part (a). For example, one candidate wrote; *Food insecurity, inadequate care, bad tradition and superstition, inadequate provision of social services* and *unequal distribution of resources*. Another candidate wrote; *lack of education to people*, *poor government support* and the other one wrote *carelessness*, *laziness*, *poor*

food production and supply, *lack of knowledge*. Others provide correct causes but their backup explanations were insufficient and some provided a few causes than the ones required by the question. These candidates had insufficient knowledge about the causes of undernutrition to elders. In part (b), some of the candidates provided general strategies to overcome undernutrition problem such as; *provision of education*, *improvement of food production* and *nutrition supplement* instead of nutritional strategies to help elders maintaining a healthy diet and good eating. Extract 10 presents a sample of weak responses from one of the candidates.

a) Causes of undernutrition to elders

i) Poor preparation of food

ii) Poor of cooking of food
- This is whereby some people cook foods at high temperature or for along time which lead to lose of nutrients example; vegetables when they are cooked for a long time they Vitamin A will be loused.

iii) Eating of unbalanced food
- This can also lead to undernutrition since people eat unbalanced food which they lack some nutrients needed by the body for different functions.

iv) Alcoholism
- This is one of the cause of undernutrition whereby people do drink too much alcohol than eating food

v) Too much working
- Some people in different offices they take too

much time to work and forget about eating so it lead to under nutrition.

vi.) Poor intake of food
- Some people eat balanced food but not in a correct amount and therefore the food taken to the body can not meet body requirements and this lead to under nutrition in our country.

vii.) Poor storage of food
- Some people do store food at a wrong place where the food qualities will get losed and when we came to consume later the food lacks food quality which will lead to undernourished.

viii) Ignorance
- This is whereby some people ignore to eat balanced food in correct amount since they don't believe on food nutrients in the body help to provide energy, body building and protects the body.

b.) Nutritional strategies to help elders maintaining a good health diet and good eating habits.

a.) Food fortification
- This is whereby there is addition of more nutrient to the food.

b.) Food supplimentation
- Someone has to supliment food to people so as to avoid undernutrition elders.

Extract 10: A Sample of Candidate's Incorrect Responses to Question 1

In Extract 10, the candidate failed to identify causes of undernutrition to elderly in part (a). Some of the causes identified are the causes of malnutrition. Likewise he/she incorrectly suggested nutritional strategies to help elders maintain a healthy diet and good eating habits. The candidate managed to identify only one correct cause (alcoholism) of undernutrition

to elderly out of eight causes required by the question, hence scored low marks.

2.2.2 Question 2: Food Microbiology

This question measured the candidates' competence on microbial growth in food. The question stated that;

(a) *Elaborate three ways in which the amount of water present in food can be made unavailable for microbial growth.*

(b) *Identify four methods of reducing the water available for microbial growth to prevent growth of spoilage and poisoning microorganisms that may be present in raw foods.*

A total of 290 (100%) candidates attempted this question. Among them 215 (74.1%) candidates scored from 0 to 3.0 marks, 71 (24.5%) scored from 3.5 to 5.5 marks and 4 (1.4%) scored from 6.0 to 8.0 marks out of 10 allotted marks in this question. No candidate scored above 8 marks. Figure 11 illustrates this performance.

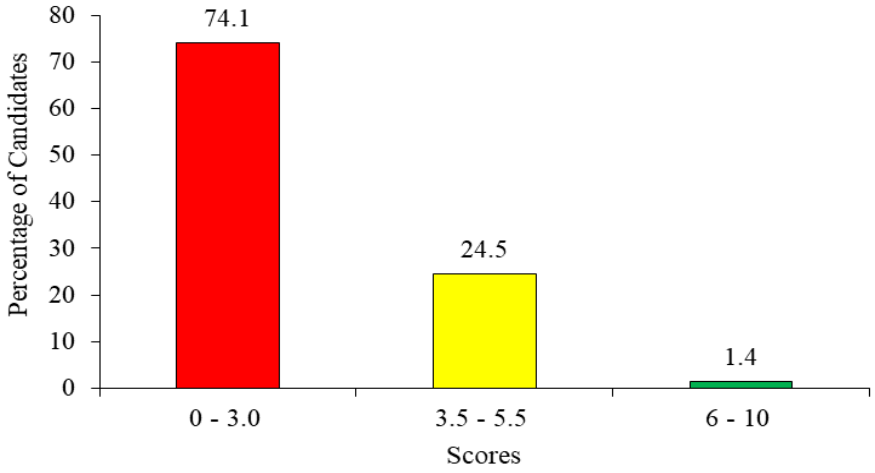


Figure 11: *Percentage of Candidates' Performance on Question* 2

Figure 11, shows that 74.1 per cent of the candidates had weak (0 – 3 marks) performance. These candidates demonstrated inadequate knowledge about food microbiology, specifically on the effects of water on microbial growth in food.

The item response analysis shows that, some of the candidates who scored low marks (0 – 3) misinterpreted the demands of the question. For example

in part (a), one candidate wrote the methods of food preservation such as; *dehydration*, *drying*, *use of preservatives*, *smocking*, *heat treatment* and *canning*. Another candidate wrote the factors that affecting the microbial growth such as *moisture content*, *biological structure* and *nutrient content*. Others provided irrelevant responses, for example one candidate wrote; *through proper drying of food*, *through maintaining the relative density of the food*, *avoid storage of food to the place with higher water content*. Another one wrote; *by cooking in high temperature*, *by storing foods in optimum temperature*, *by storing food in optimum ph*, instead of the ways in which the amount of water presents in food can be unavailable for microbial growth.

In part (b), some of the candidates also misinterpreted the requirements of the question. For example, one candidate wrote about intrinsic factors that influence microbial growth such as; *Nutrient content*, *concentration of different gases* and *temperature concentration*. Another wrote the methods of cooking such as; *baking*, *grilling*, *boiling* and *blanching*. Others provided irrelevant responses to the question. For example, one candidate wrote; *maintaining proper temperature*, *maintaining proper moisture content of food*, *maintaining proper relative humidity of the food* and *to store food to the places with low moisture*. These candidates did not understand that water activity of a food provides sufficient moisture to support the growth of micro-organisms. Likewise, the amount of available water in food can be reduced to a point which will inhibit the growth of the organisms. Extract 11 is sample of incorrect responses from a candidate who performed weakly.

2a) Ways in which the amount of water present in food can be made Unavailable for microbial growth.

- i) Application of heat; If the heat is applied water present in that food will not be available as it would be dried and reduce the number of microorganisms in food.

- Refrigeration; If water is present in the food would be made Unavailable by the refrigerator which tend to stop their action.

2b) The following are the methods of reducing the water available for microbial growth to prevent growth of spoilage and poisoning microorganisms that may present in raw food;-

i) Proper hygiene and sanitation; If the utensils are well cleaned the water present in food wouldn't cause microbial growth.

ii) Proper storage of food; If the food is stored in proper condition there would not be attack by microorganisms and hence water available will not allow microbial growth.

iii) Proper handling of food; If the food present is properly handled with the food handlers by ensuring their hands are clean and washed would not contact food with hands bacteria and therefore the growth of microorganisms would not be present.

iv) Avoiding cross contamination between the raw and the cooked food so as to avoiding food poisoning by the microbial growth due to water present in raw food.

Extract 11: A Sample of Candidate's Incorrect Responses to Question 2

In Extract 11, the candidate failed to provide correct responses in all parts of the question. The responses provided were irrelevant to the question.

On the other hand, the analysis shows that a few (1.4%) candidates attained good (6.0 - 8.0 marks) performance These candidates managed to elaborate one to two ways in which the amount of water present in food can be made unavailable for microbial growth in part (a). They also managed to identify methods of reducing water available for microbial growth to prevent growth of spoilage and poisoning microorganism that may be present in raw foods in part (b). However, these candidates failed to score all the ten marks in this question because some of them provided less points in one or all parts of the question than the one required by the question. Others provided insufficient explanations and some mixed the methods of reducing water available for microbial growth in foods with the methods of preserving foods such as *pasteurization*, *canning* and *smocking*. These candidates did not understand that the methods of reducing water available for microbial growth do not eliminate micro-organisms, rather they inactivate them to grow enough to cause infection. While food preservation involves preventing the growth of microorganisms, retarding oxidation of fats to reduce rancidity, ensuring no discolouration or aging and sealing the food to prevent re-entry of microbes.

2.2.3 Question 3: Nutritional Programme Planning and Intervention

This question measured the candidates' competence on weaning. The question stated that;

It is recommended that weaning should start at the age of 4 to 6 months for the growth and health of infants to be normal. In view of this statement, briefly explain;

(a) Two characteristics of proper weaning foods.

(b) *Three reasons for the malnourishment of infants in Africa countries during the weaning period*.

The question was attempted by 290 (100%) candidates who sat for this paper. The analysis shows that 147 (50.7%) candidates scored from 6.0 to 10 marks, 68 (23.4%) scored from 4.0 to 5.5 marks and 75 (25.9%) scored from 0 to 3.0 marks. Figure 12 summarises this performance.

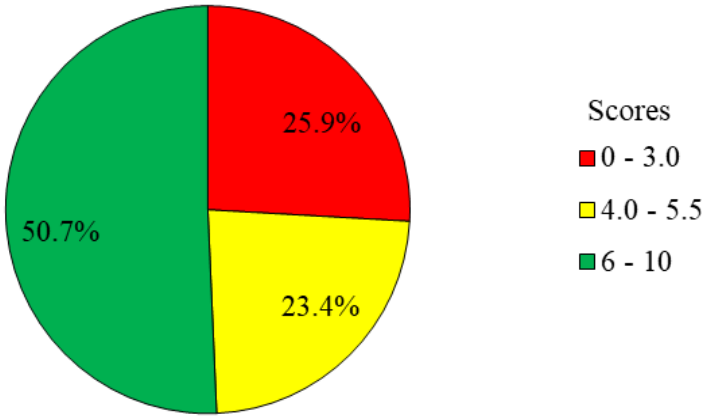
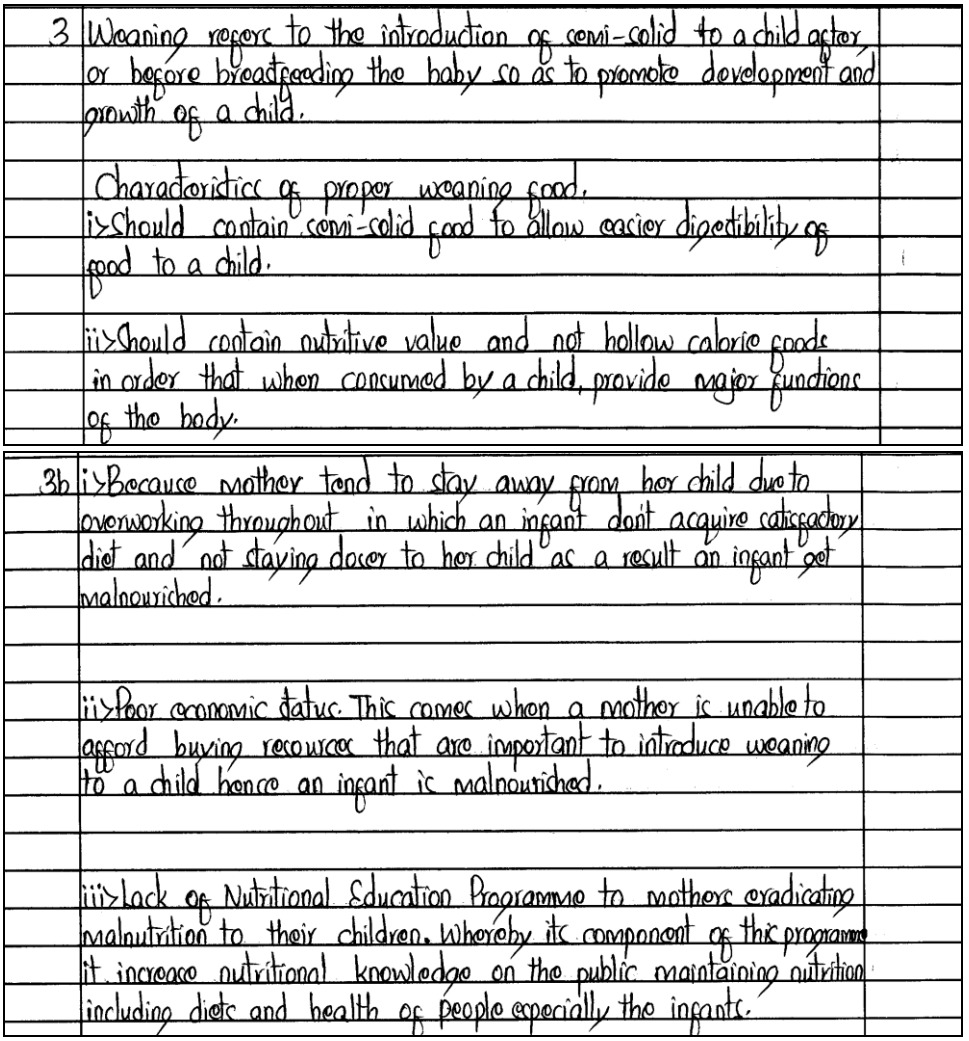


Figure 12: *Percentage of Candidates' Performance on Question 3*

Figure 12, indicates that the general performance for this question was good because 74.1 percent of the candidates who attempted this question scored from 4.0 to 10 marks. These candidates had adequate knowledge on weaning practices in infants, hence correctly explained the characteristics of proper weaning foods and reasons for the malnourishment in infants during the weaning period.

The analysis indicates that, among the 50.7 per cent of the candidate with good performance, a few (2.4%) candidates manage to score all the 10 marks. These candidates correctly explained the two characteristics of proper weaning foods in part (a). The candidates understood that a good weaning food should have all nutrients in good quality, should be in soft consistency, low bulk and viscosity to enable the child to swallow it easily. Likewise, it should be prepared in such a way that it is easily digested by the child. In part (b), the candidates managed to explain three reasons for malnourishments in infant during weaning period. These candidates understood that poverty in a family may cause poor preparation of weaning food, lack of knowledge about preparation of weaning foods, heavy workload to the mothers and abrupt and early stop of breastfeeding the infants may result into malnutrition in infants. In addition, some of the candidates in this category correctly explained fewer characteristics than

the ones required by the question and others provided insufficient explanation in part (a). Moreover, in part (b) some of the candidates provided one to two reasons for malnourishments while others provided insufficient explanation, hence they failed to score all the 10 marks. Extract 12.1 is a sample of a response from a candidate who had good performance.


3 Weaning refers to the introduction of semi-solid to a child after or before breastfeeding the baby so as to promote development and growth of a child.

Characteristics of proper weaning food.
i>Should contain semi-solid food to allow easier digestibility of food to a child.

ii>Should contain nutritive value and not hollow calorie foods in order that when consumed by a child, provide major functions of the body.

3b i>Because mother tend to stay away from her child due to overworking throughout in which an infant don't acquire satisfactory diet and not staying closer to her child as a result an infant get malnourished.

ii>Poor economic status. This comes when a mother is unable to afford buying resources that are important to introduce weaning to a child hence an infant is malnourished.

iii>Lack of Nutritional Education Programme to mothers eradicating malnutrition to their children. Whereby its component of this programme it increase nutritional knowledge on the public maintaining nutrition including diets and health of people especially the infants.

Extract 12.1: A Sample of Candidate's Correct Responses to Question 3

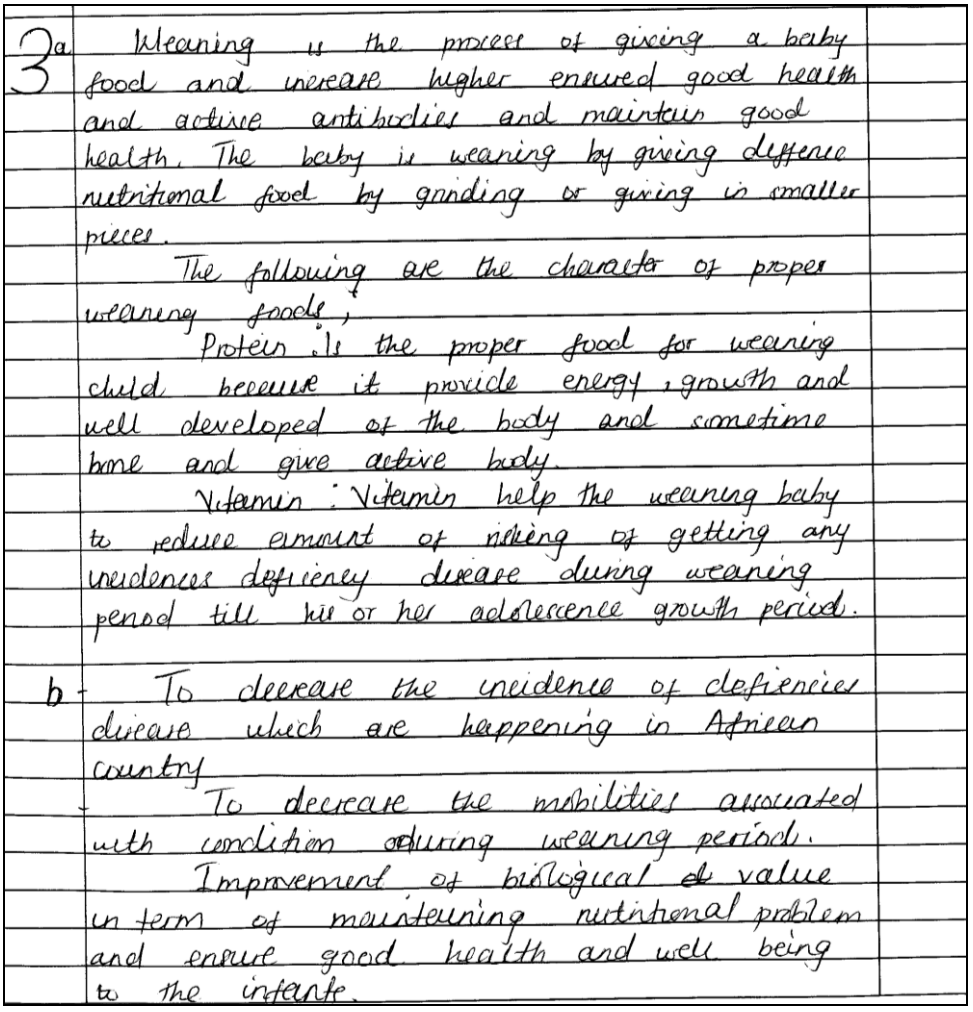
In Extract 12.1, the candidate responded correctly to both parts (a) and (b), hence he/she scored high marks.

Further the analysis shows that the candidates who scored low marks had inadequate knowledge about characteristics of proper weaning foods in part (a). Some of these candidates explained the rules to follow during weaning

instead of characteristics of proper weaning foods. For example, one candidate wrote; *it should be of small amount during the time of start, use one food for a few days before introducing another*. Another wrote *the weaning food should be prepared under hygienic conditions* and *prepare weaning food immediately before they will be eaten*.

Others provided irrelevant response for example one candidate wrote; *proper weaning should have the proper sanitation* and *the proper weaning should give the result to infants with the good growth and development*. Another candidate wrote; *weaning food must have low quantity of carbohydrates* and *weaning food should suit the child wish*. These candidates did not understand that weaning is a process by which a baby slowly gets used to eating family or adult foods and relies less on breast milk. Therefore, food should be balanced, easy to swallow and easily digested by an infant.

In part (b), the candidates provided irrelevant response. For example one candidate wrote; *to improve rapid growth of infant, to eradicate diseases to the infant, to add nutrients to the food*. Another candidate wrote; *the weaning food may contain all carbohydrate, does not eat fruit vegetables* and *does not contain amount of protein*. This implies that these candidates did not understand that breast milk is enough to meet the energy and nutrient requirements of an infant up to six months of age. Thereafter, it needs to be supplemented with appropriate energy-dense foods (weaning food) that can ensure satisfactory growth and development of the children. Extract 12.2 is a sample of responses from one of the candidate with weak performance.



Extract 12.2: A Sample of Candidate's Incorrect Responses to Question 3

In Extract 12.2, the candidate provided food nutrients (protein and vitamin) with incorrect explanation instead of characteristics of proper weaning food in part (a). In part (b), the candidate provided irrelevant responses, hence he/she scored low marks.

2.2.4 Question 4: Catering and Institutional Feeding

This question measured the candidates' competence on recipe formulation. The question stated;

The Maliasili Hotels Ltd has hired you to train its kitchen managers on recipe formulation. Briefly explain ten factors to be considered in formulating recipes for the customers which you would include in your presentation.

This question was attempted by 290 (100%) candidates who sat for this paper. The data shows that 146 (50.3%) candidates scored from 6.0 to 10.0 marks, 114 (39.4%) scored from 3.5 to 5.5 marks and 30 (10.3%) scored from 0.0 to 3.0 marks as illustrated in Figure 13.

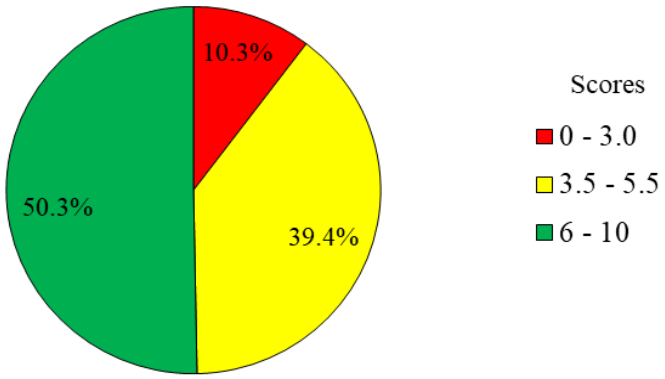


Figure 13: *Percentage of Candidates' Performance on Question 4*

Based on the analysis in Figure 13, the general performance for this question was good, because 89.7 per cent of the candidates who attempted this question scored from 3.5 to 10.0 marks. This implies that these candidates had adequate knowledge on recipe formulation.

The item response analysis shows that 50.3 per cent of the candidates who achieved good performance were able to explain the factors to consider in formulating recipe. A few candidates (1.0%) managed to explain all the ten factors while others provided a few correct factors than the ones required by the question. Others gave insufficient explanation, hence failed to score all the 10 marks. Some of the correct factors provided were; *facilities available*, *the religious influence*, *preparation method*, *health status of people*, *ingredients available* and *the cost*. These candidates understood the basis for formulating recipe. Actually, once the recipe is formulated it will become one of the most important documents in a catering business, because recipe helps the cook to prepare what is needed to produce the menu items. Therefore, it controls food cost and profit. Extract 13.1 is a sample of responses from one of the candidates who scored high marks.

4. Factors to consider in formulating recipes for the customers.

Answer.

i) Consider the previous receipe.

- While formulating a recipe for customers, first you have to consider the past previous receipe, how was it formed what kind of ~~food~~ dishes were used so as you can formulate your owne standarzed recipe.

ii) Consider the nutrients to be kept / added in the recipe.

- Considering the previous recipe lacked some of nutrients hence you have to encounter the addition of those nutrients in your recipe for the health of the customers.

iii) Types of groups of people.

- In the formulation of recipe different groups of people have to be considered because ~~X~~ people like vegeterians do not consume meat or meat products, also considering infants, childrens, adolescents, invalids and convalescents and other vulnerable groups.

iv) Local food available.

- As a caterer i have to consider the local foods available not only processed because of the groups in the community. Forexample elderly people have to consume mostly locally food. These foods example yams, rice, potatoes, cassava and other many.

v) Utensils and equipments available.

- As a caterer i have to ensure that the specific utensils and equipments that a specific food is made should be present. Utensils like saucepans, deepfryers while

iv) equipments such as refrigerators and deepfryers so as to ease production.

v) Fuel and energy available.
- Fuel and energy resources have to be available so as to fasten the preparation process of cooking and other processes. Fuel and energy resources exebample fireplove (charcoal stove), ovens and other facilities.

vi) Time available.
- Time has to be considered during preparation of food, also to consider the time for customers to be ~~mop~~ more present so as to faston the activities at an appropriate time.

vii) ~~Purchasing power~~ Customer's preference.
- While formulating the recipe it has to consider also what the customer/consumer likes not to base on the caterer's likes. The Recipe has to meet the customers expectations.

viii) Purchasing power.
- The recipe formulated has to consider the purchasing power of an individual, the price not to be much high or too low. It has to be favourable for each customer to afford.

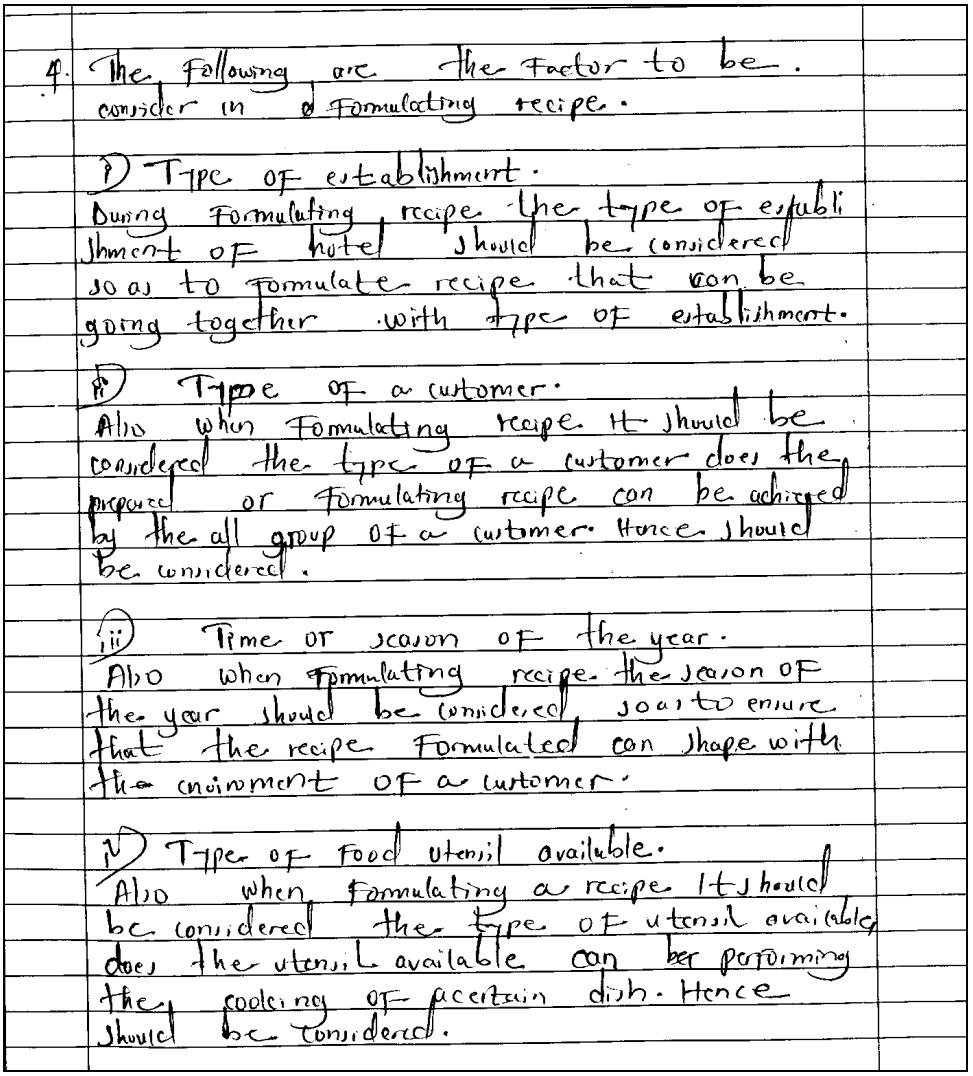
ix) Cost factor.
- The recipe has to conside or to be at increase in profit. The cost of the ingredients and everything used has to be profit oriented.

Extract 13.1: A Sample of Candidate's Correct Response to Question 4

In Extract 13.1, the candidate explained correctly the factors to consider in formulating recipe.

Further the analysis indicates that the candidates (10.3%) who scored low marks had insufficient knowledge about recipe formulation, particularly the

factors to consider in formulating recipes. Some of the candidates mixed up the points to consider when planning meal and factors for planning menu with the factors to consider in formulating recipe, hence they scored low marks. Others provided irrelevant responses. For example, one candidate wrote; *consider the flavour of food, no reparation of colour of food, there must be different types of wine, should know the amount of recipe, size of the pan, collect ingredient, name of menu,* and *way on how to solve the prepare food.* These candidates scored low marks because most of the factors were incorrect and mixed with few correct factors. Extract 13.2 is a sample of responses from one of the candidates who scored the low marks.



4. The following are the factor to be consider in formulating recipe.

i) Type of establishment.
During formulating recipe the type of establishment of hotel should be considered so as to formulate recipe that can be going together with type of establishment.

ii) Type of a customer.
Also when formulating recipe it should be considered the type of a customer does the prepared or formulating recipe can be achieved by the all group of a customer. Hence should be considered.

iii) Time or season of the year.
Also when formulating recipe the season of the year should be considered so as to ensure that the recipe formulated can shape with the enjoyment of a customer.

iv) Type of food utensil available.
Also when formulating a recipe it should be considered the type of utensil available does the utensil available can be performing the cooking of acertain dish. Hence should be considered.

4. v) Consider the kind of kitchen staff in the hotel.
Also, this is the Factors which must be considered in the Formulating of a recipe into which the type of the kitchen staff in the hotel.

vi) Religious rule applicable.
Also when Formulating a recipe in a hotel the religious rule if applicable of that area should be considered. Hence Factor to be considered.

vii) Avoid the repetition of the Flavour in the dishes when formulating recipe.
Also this is the Factors which have to be considered when Formulating the recipe to the customer.

viii) Availability of infrastructure system such as communication network.
Also this is the Factor which has to be considered when Fomulating recipe to the cutomer.

ix) Use of proper language when Formulating recipe. This is also Factor to be considered when Formulating a recipe to the customer.

4. x) Avoid repetition of Flavour to the dish of prepared recipe.
Into which lead to the cutome to do not feel well and hence factor to be considered when Formulating recipe to the cutomer.

Extract 13.2: A Sample of Candidate's Weak Response to Question 4

In Extract 13.2, the candidate misinterpreted the requirements of the question. Instead of giving the factors to consider in formulating recipes, the candidate wrote the factors to consider when planning menu, some of the responses were incorrect and a few were correct with insufficient explanation.

2.2.5 Question 5: Malnutrition

This question measured the candidates' competence in the control of marasmus to under-five children. The question stated;
Marasmus is one of the severe forms of Protein – Energy Malnutrition affecting most under-five children in developing countries; yet many people are not able to detect the problem for immediate control. Identify six indicators and four control measures of the condition.

The analysis shows that the question was attempted by 290 (100%) candidates. Among them 162 (55.9%) candidates scored from 6.0 to 10 marks, 89 (30.7%) scored from 3.5 to 5.5 marks and 39 (13.4%) scored from 1.0 to 3.0 marks. There were no candidates who scored zero. Figure 14 summarises this performance.

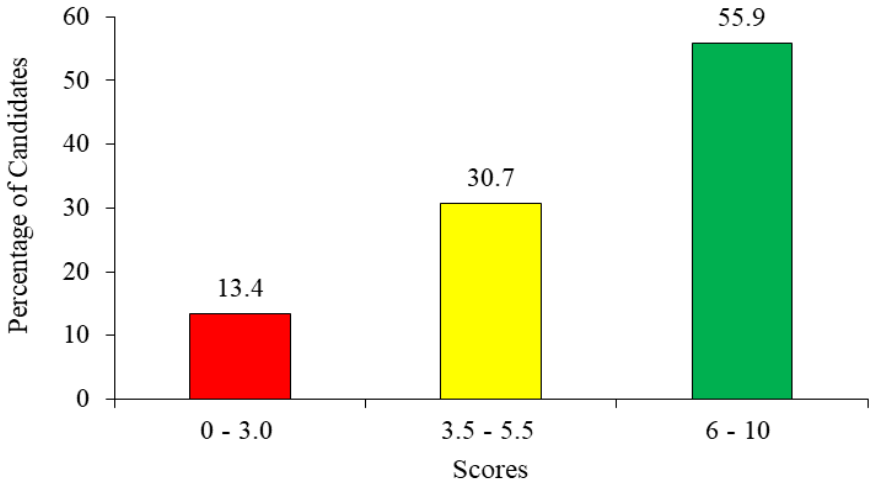
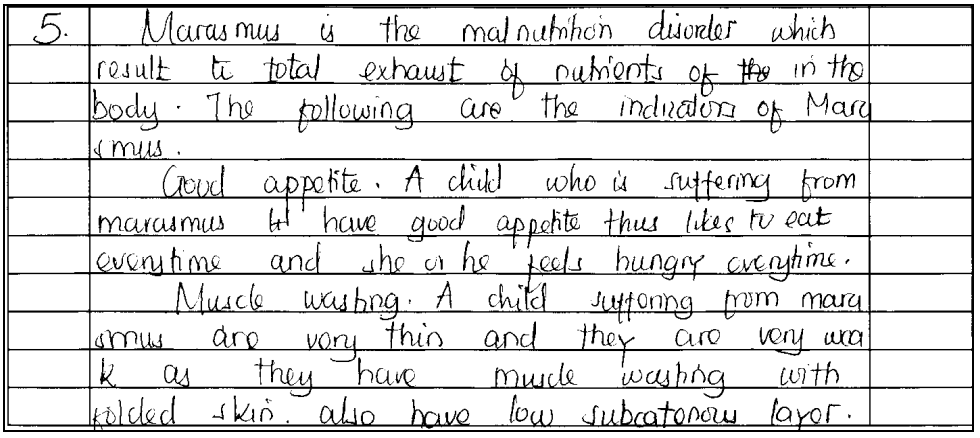


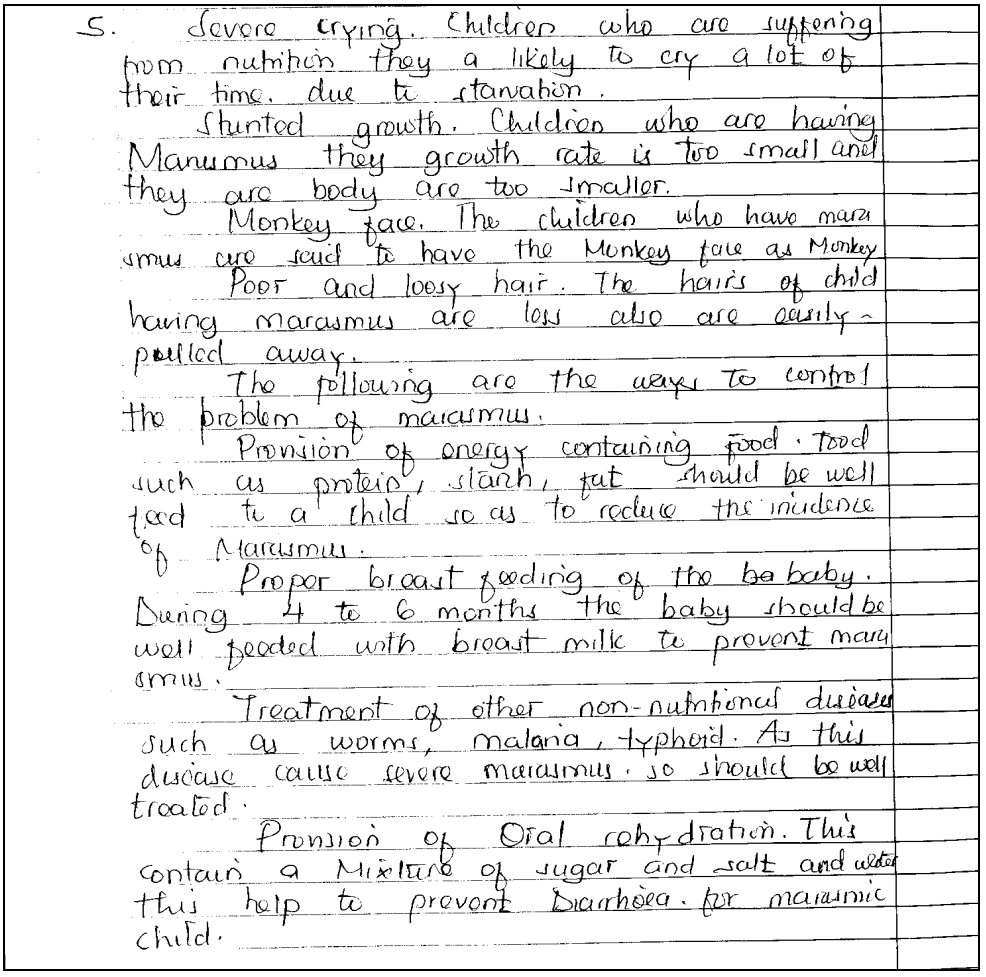
Figure 14: *Percentage of Candidates' Performance on Question 5*

Figure 14, shows that the general performance in this question was good because 86.6 per cent of the candidates scored from 3.5 to 10.0 marks. These candidates demonstrated adequate knowledge on the indicators of

marasmus and the control measures of marasmus to under-five children in developing countries.

The analysis shows that the candidates (55.9%) with good performance were correctly identified the indicators and control measures of marasmus. Some of the correct responses provided by candidates were; *diarrhoea*, *muscle wasting, poor growth, weak hair, dry skin* and *loss of weight*. These candidates understood that marasmus is a severe form of protein-energy malnutrition that results when a person does not consume enough protein and calories. Therefore, it leads to stunted growth, wasting or loss of body fat and muscles, chronic diarrhoea, rapid weight loss, dizziness, getting very hungry and fatigue. These candidates were also able to identify control measures of marasmus. For example, one candidate wrote; *provision of nutrition education, control of infectious diseases*, and *provision of adequate food*. Another wrote; *education to women on proper weaning to children, encourage on the proper intake of energy* and *protein food* and *encourage breast feeding*. These candidates understood that marasmus to under-five children can be prevented by providing adequate feeding to the children, practise exclusive breast feeding, ensuring proper spacing of children (family planning), proper immunisation to children to prevent infection and the use of oral rehydration therapy for the treatment of diarrhoea. Extract 14.1 is a sample of responses from a script of one of the candidates with good performance.


5. Marasmus is the malnutrition disorder which result to total exhaust of nutrients of the in the body. The following are the indicators of Marasmus.
Good appetite. A child who is suffering from marasmus ht have good appetite thus likes to eat everytime and she or he feels hungry everytime.
Muscle washing. A child suffering from marasmus are very thin and they are very weak as they have muscle washing with folded skin. also have low subcatonaw layer.


5. Severe crying. Children who are suffering from nutrition they a likely to cry a lot of their time. due to starvation.
Stunted growth. Children who are having Marasmus they growth rate is too small and they are body are too smaller.
Monkey face. The children who have marasmus are said to have the Monkey face as Monkey
Poor and loosy hair. The hairs of child having marasmus are loss also are easily pulled away.
The following are the ways to control the problem of marasmus.
Provision of energy containing food. Food such as protein, starch, fat should be well feed to a child so as to reduce the incidence of Marasmus.
Proper breast feeding of the be baby. During 4 to 6 months the baby should be well feeded with breast milk to prevent marasmus.
Treatment of other non-nutritional diseases such as worms, malaria, typhoid. As this disease cause severe marasmus. so should be well treated.
Provision of Oral rehydration. This contain a Mixture of sugar and salt and water this help to prevent Diarrhoea. for marasmic child.

Extract 14.1: A Sample of Candidate's Correct Responses to Question 5

In Extract 14.1, the candidate correctly identified the indicators and control measures of marasmus to under-five children in developing countries.

On the contrary, some of the candidates (13.4%) who scored low marks in this question misunderstood the demand of the question. For example, instead of writing indicators of marasmus to children under-five years, they wrote the causes of protein energy malnutrition. Some of the incorrect responses provided were *inadequate intake of protein rich food, inadequate intestinal absorption, ignorance, inadequate utilization*. Another one wrote causes of undernutrition such as; *inadequate dietary intake, inadequate household food supply, inadequate food production, poor weaning practices* and *occurrence of other diseases*. In addition, some of the candidates wrote the control measures of malnutrition such as; *encourage*

fortification, provision of nutrition education, balanced meal should be provided people engaged in small scale agriculture and keeping domestic animals, instead of writing the control of marasmus. These candidates did not understand that marasmus is a deficiency in all the macronutrients that the body requires to function, including carbohydrates, protein and fats. Marasmus causes observable wasting of fat and muscles under the skin, giving bodies a wasted appearance and it causes stunted growth in children. Extract 14.2 is a sample of responses from a script of one of the candidates with poor performance.

5.

i) Low income.
Since many families in developing countries have large families that means they have many children so and their income per day does not so support them to make sure that everyday a person can get a balance diet due to that it cause childrens to have ~~dead~~ disorders of Protein energy malnutrition.

ii) Low production.
Also since there is use of local tools that make to cultivate a small area of the land that being insufficient to the family that have many people and sometime do cultivate one kind of crops that can not fit for the needs of the people.

iii) Poor living standards of people.
this is where by the developing countries many of their people are undergoing poverty due to that cause to fail getting the good reach in protein and hence cause about malnutrition disorders.

iv) Low intake of food.
Since the food that available at that is the one that is being consumed by members in the family and sometimes is be small that is being insufficient to child since need much food reach in protein for their growth.

5.

v) Presences of infections and diseases.
Where by in the presence of the diseases cause low immunity that cause people suffer from different diseases and finally might lead to malnutrition disorder like protein.

vi) Low level of education.
Abo their level of education is very low that cause their people not knowing different things like the importance of taking protein foods and so on.

Measures of controling Protein Energy Malnutrition.

i) Provision of education to the society.
Where by the education ~~will be~~ should be provided in order people they be aware on the source of protein food and how they can increase the ~~be~~ productivity in order to ensure children are not getting malnutrition.

ii) By ~~for~~ doing forkification.
The foods should be forkified in order ~~to~~ children and consume the to reduce from getting protein energy malnutrition

5.

iii) To improve in production.
Where by when the production will be improved the food will be available and also they will use the local available foods to overcome the problem.

iv) Creating of home gardens.
That might consist of ~~ea~~ plants that reach in protein like beans, peas and so on that can help to eliminate the problem of protein energy malnutrition

Extract 14.2: A Sample of Candidate's Incorrect Responses to Question 5

In Extract 14.2, the candidate misinterpreted the demands of the question. Instead of identifying the indicators of marasmus, he/she identified the causes of undernutrition. However, a few points written were correct, hence scored low marks.

2.2.6 Question 6: Nutrition Programme Planning and Intervention

This question measured the candidates' competence on nutrition programme, particularly on breast feeding. The question stated;

(a) Why mothers are advised to breast-feed their newborns instead of feeding them with breast-milk substitutes? Give eight points.

(b) Briefly explain how feeding the newborns with breast-milk substitutes may lead to undernutrition in developing countries.

The question was attempted by 290 (100%) candidates who sat for this paper. Among them 255 (87.9%) candidates scored from 6.0 to 10.0 marks, 30 (10.4%) scored from 3.5 to 5.5 marks, and 5 (1.7%) scored from 1.0 to 3.0 marks. Figure 15 illustrates the performance.

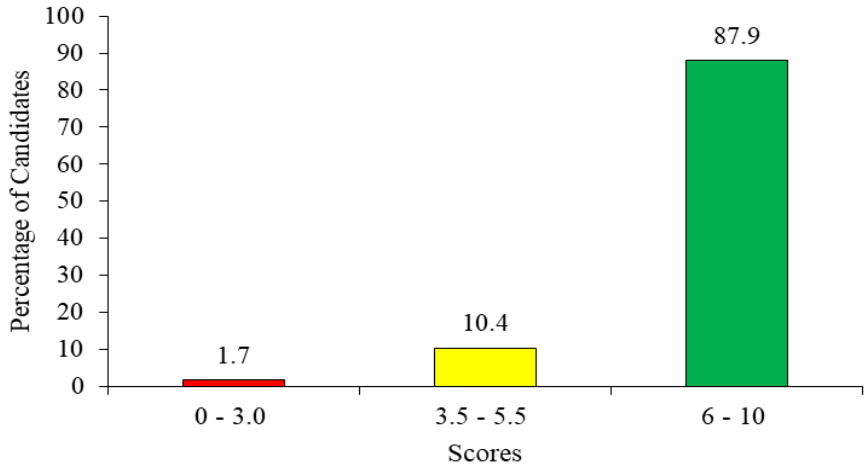
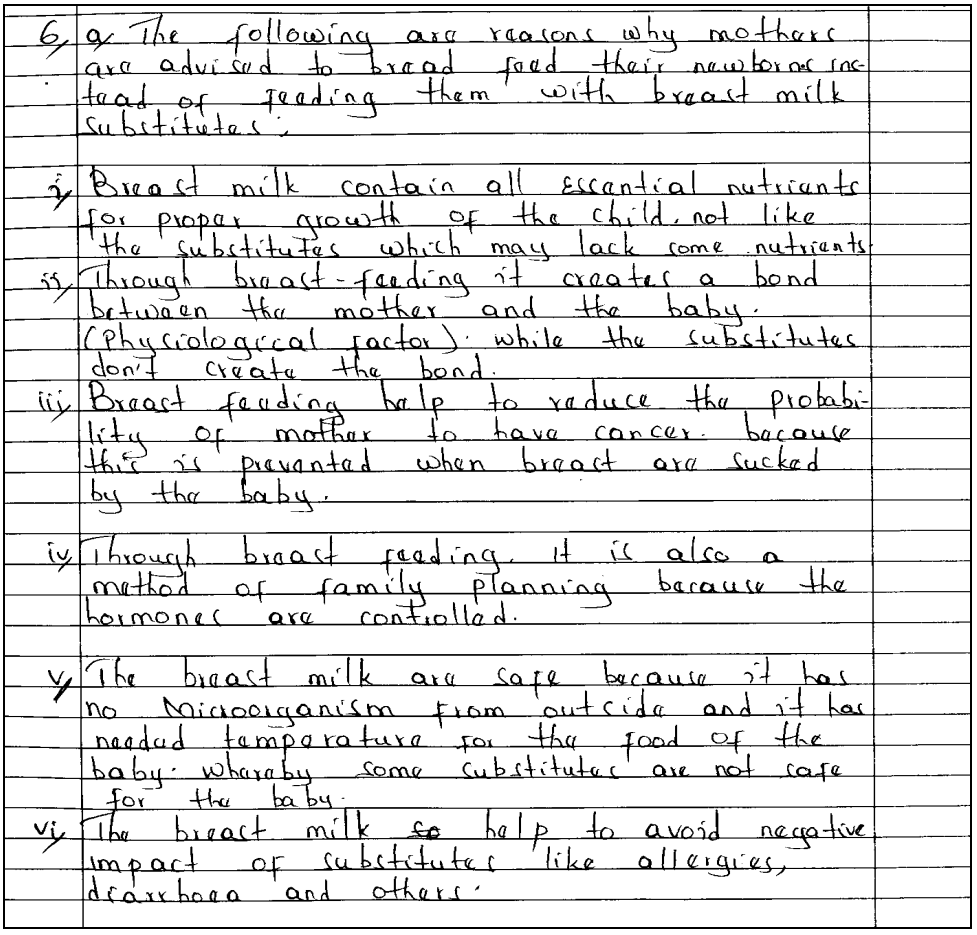


Figure 15: *Percentage of Candidates' Performance on Question 6*

Based on the analysis in Figure 15, the general performance on this question was good because 98.3 per cent of the candidates scored from 3.5 to 10.0 marks, among them only 4.5 percent scored full (10) marks. These candidates understood the importance of breast milk compared to breast milk substitute.

The analysis of the candidates' responses indicates that, some of the candidates who scored full marks (4.5%) were able to give reasons for breastfeeding new-borns instead of feeding them with breast-milk substitutes in part (a). Likewise, they managed to briefly explain how feeding the newborns with breast milk substitute may lead to undernutrition in developing countries. These candidates understood that, breast milk alone can provide enough nourishment to support the baby's optimal growth and development during the first six months of life. On the other hand, majority of candidates (93.8%) in this category did not score full marks because they provided incorrect explanation on how does feeding the newborns with breast-milk substitute may lead to undernutrition in part (b). Some provided a few reasons and others provided insufficient explanation. Extract 15.1 is a sample of responses from the candidate with good performance.



6. a) The following are reasons why mothers are advised to breast feed their newborns instead of feeding them with breast milk substitutes:

i) Breast milk contain all essential nutrients for proper growth of the child, not like the substitutes which may lack some nutrients.

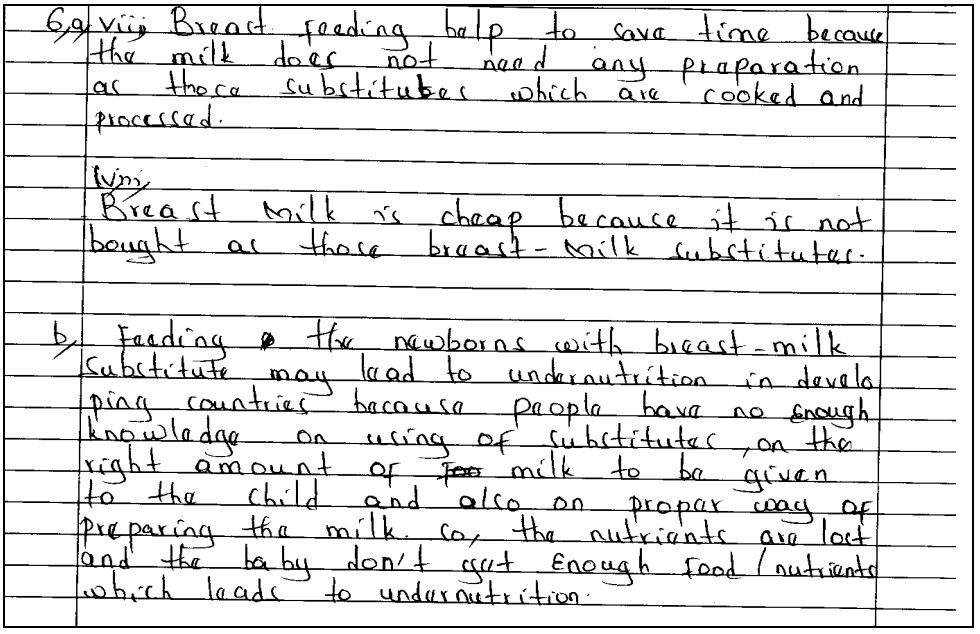
ii) Through breast-feeding it creates a bond between the mother and the baby. (Physciological factor). while the substitutes don't create the bond.

iii) Breast feeding help to reduce the probability of mother to have cancer. because this is prevented when breast are sucked by the baby.

iv) Through breast feeding. it is also a method of family planning because the hormones are controlled.

v) The breast milk are safe because it has no microorganism from outside and it has needed temperature for the food of the baby. whereby some substitutes are not safe for the baby.

vi) The breast milk ~~so~~ help to avoid negative impact of substitutes like allergies, dearrhoea and others.


6 a) viii) Breast feeding help to save time because the milk does not need any preparation as those substitutes which are cooked and processed.

ix) Breast milk is cheap because it is not bought as those breast-milk substitutes.

b) Feeding the newborns with breast-milk substitute may lead to undernutrition in developing countries because people have no enough knowledge on using of substitutes, on the right amount of ~~food~~ milk to be given to the child and also on proper way of preparing the milk. So, the nutrients are lost and the baby don't get enough food / nutrients which leads to undernutrition.

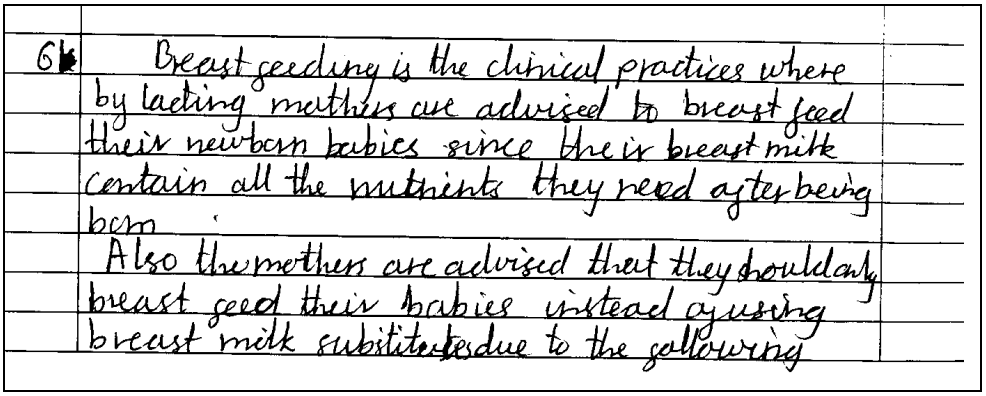
Extract 15.1: A Sample of Candidate's Correct Responses to Question 6

In Extract 15.1, the candidate correctly provided the reasons for breast feeding newborns in part (a). He/she explained correctly how breast milk substitute can lead to undernutrition in part (b).

However, 1.7 per cent of the candidates who scored low marks (1 – 2) had inadequate knowledge about the importance of breast feeding in part (a). Some of the candidates in this category misinterpreted the demand of the question. Instead of giving the importance of breast milk, the candidates explained the reasons on why some mothers do not breastfeed their newborns such as *diseases*, *breast infection*, *women workload* and *death of the mother*. Some provided irrelevant responses. For example, one candidate wrote; *breast milk helps the mother to retain to its ability of removing poisons from the body, it prevents swollen of nipples to the mother, it used as environmental conservation*. Another wrote; *lack protein for immunity, baby affected by nutritional disorder, bonding between mother and baby not be improved, the brain development may not occur, baby born underweight or over weight, their mentally rate may be low or abnormal* and *may lose their vision*. These candidates had inadequate knowledge about breast feeding.

In part (b), some of the candidates misinterpreted the demand of the question. Instead of writing how feeding the newborns with breast milk substitute may lead to undernutrition, the candidates wrote the causes of undernutrition. For example, one candidate wrote; workload *of the mother, limited time for breast feeding due to different activities taking place at home, lack of support for the breast feeding mothers, economic situation of the family, lack of knowledge on the importance of breast feeding*. Others wrote irrelevant responses for example one candidate wrote; *breast milk is not make a more sufficient work due to mixing of foods and milk together, newborns have not ability to digest the food that eaten except milk* and *food may contain antigen and when entering to the body can lead to undernutrition*.

These candidates did not understand that most of breast milk substitute include formula milk and cows' milk. In actual facts, these kinds of milk need good hygienic preparation condition and otherwise this may lead to infections to the newborns that may cause undernutrition. Likewise, formula milk are expensive, as a results the family may purchase too little compared to the baby's need and over dilute the mixture to get more milk with low calories and other nutrients. Extract 15.2 is a sample of responses from one of the candidates who scored lower marks.


6b Breast feeding is the clinical practices where by lacting mothers are advised to breast feed their newborn babies since their breast milk contain all the nutrients they need after being born.
Also the mothers are advised that they should only breast feed their babies instead of using breast milk substitutes due to the following

reasons :-

The breast milk substitutes ~~is~~ don't have all adequate nutrients they need :

This is ~~advise~~ due to ~~to~~ reasons that this ~~kat~~ kind of milk nutrients contain are artificially made and not naturally made as from the mothers which results the babies to be under nutritions.

It lack protein for the immunity generations in the body to fight against diseases.

The baby after being born needed protein so as to produce immunity for their ~~dengerees~~ against diseases which may not ~~p~~ be provided if they are not well breast feed with mother milk.

The baby may be affected by nutritional disorder :

Since the artificial milk has no adequate amount ~~absense~~ nutrient for the ~~improvement~~ improvement of the baby's growth and development which results to stunted height.

The bonding between the mother and the baby may not be improve.

This may lead to conflicts and ~~unmaintained~~ unmaintained relationship between mother with their children that results them to ~~feeling~~ ~~unsecred~~ unsafe and loneness to each other.

The brain development may not ~~acured~~ caused :

This is also caused by artificial milk in which ~~of~~ some of the ~~brain~~ children's brain may not be fully developed which results their I.Q to be low.

The baby being born under weight or over weight :

This is resulted by ~~the~~ too consumption or little consumption of some nutrient in the canned milk where there is not enough amount that favour the weight of the newborn as recommended by the health Center.

Their mentally rate may be low or abnormal.

~~The~~ As the baby grow, due to lack of enough iron in the substituted milk usually the mental to be not normal as other children ~~with~~ which makes them unable to understand or become violent as they grow.

May loose their vision in the ~~eay~~ eyes :

The breast milk substituted may lead the newborns to lose of their vision of light caused by lack of adequate amount of Vitamin A which ~~them~~ results them to become blind.

Extract 15.2: A Sample of Candidate's Incorrect Responses to Question 6

In Extract 15.2, the candidate had inadequate knowledge about breast feeding and breast milk substitute. Hence, he/she provided irrelevant response.

2.2.7 Question 7: Catering and Institutional Feeding

This was an essay type question which measured the candidates' competence on basic guidelines on managing catering operations. The question stated;

You have been invited to a meeting to address the issue on the management of catering establishments. The specific agenda is "the principles of catering which form basic guidelines to managing catering operations." Analyse nine principles which you would include in your presentation.

The question was opted by 200 (69%) candidates who attempted this question. The analysis shows that 79 (39.5%) candidates scored from 0.0 to 6.5 marks, 44 (22.0%) scored from 7.0 to 11.5 marks and 77 (38.5%) scored from 12.0 to 19.5 marks. Figure 16 summarises this performance.

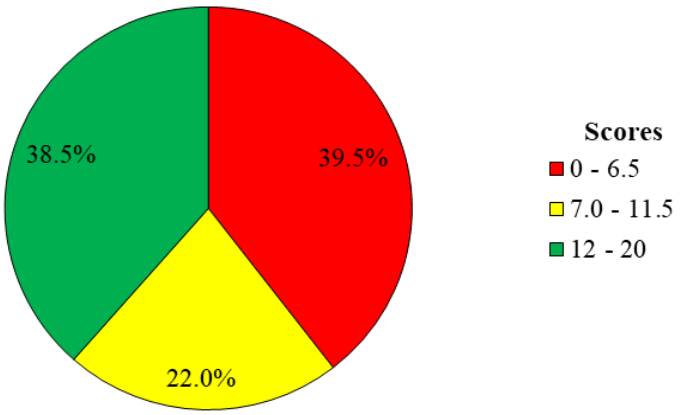


Figure 16: *Percentage of Candidates' Performance on Question 7*

Figure 16 indicates that the general performance for this question is average because 60.5 per cent of the candidates who attempted this question scored from 7 to 19.5 marks. These candidates had adequate knowledge about principles of managing catering operations.

The analysis of the candidate's responses shows that, the candidates (38.5%) who had good performance managed to analyse the principles of managing catering operation. They correctly analysed principles such as;

Division of work, Discipline and responsibility, hierarchy, Orderliness, Unitary command, unitary direction, Payment of remuneration, individual goals subordinate to establishment goals, unity and work stability. The candidates in this category did not score all the 20 marks in this question because they provided a few points and/or insufficient explanations. Extract 16.1 is a sample of responses from one of the candidates with high scores.

07

Catering is a process of providing food beverage and sometimes accomodation services to people. Catering is a common business as it facilitates development of individual as it is a source of income but also it leads to an increase in national Gross profit (GNP). Principles of catering are guideliner to follow in managing a catering business. every business must have own guideliner which limits workers with certain issues.

The following are the principles OF catering

Division OF work: division OF work facilitates increase in efficiency of labour activities. This is done through the fact that when everyone has his or her own task based on specialisation and skill then people will be able to perform their activities at a greater efficiency Another individual cannot take over another persons job.

Unitary command: this leads to increase in loyalty. it mainly deals with the business owners or managers. unitary command explains that the management should have one say concerning different areas of the business. when the management doesnot come into an agreement with the other then the workers themselves may fail to obey the roles allocated.

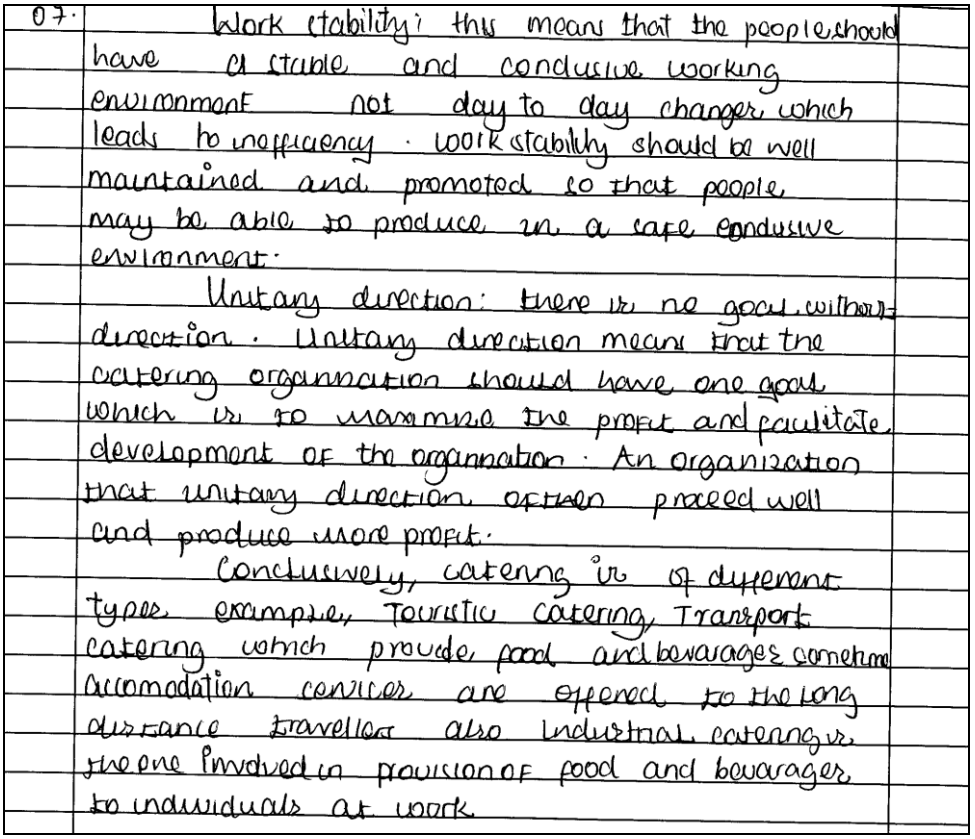
Payment of remuneration: A kind of appreciation offered to the worker as a congratulation payment or motivation for what they do. The major advantage OF this is that it acts as a source of motivation to the worker as his/her work has been noticed. This payment will surely increase efficiency of workers

07 Discipline: this means respect to the catering organization. this involves obedience, punctuality for example reaching at work should not be beyond 8 am everyone must ensure that he/she obeys the time allocated. Also discipline involves obeying rules and regulation of the organization also it talks about discipline with available resources people should not steal. (pilferation)

Hierachy: this is how members are ranked in a catering business. this means from the top Leader to the last Labourer. Example the manager then the director. the head chef. this is highly important as everyone is given respect based on the position example the head chef recieves order from the manager. this shows that a head chef is followed and has to respect the manager.

Initiative: this means to allow the people to provide ideas towards something that will be of benefit to both individual and the company (catering business). Initiative facilitate new idea development as it involves different suggestions/ opinions from individuals. also it promotes good morals. as people feel that they can be listened in case of anything.

Unity: this means that people should work together. Despite division of labour people should be unified by working as a team. ~~despite~~ working as a team of individuals improves the working environment to suit the needs of all individuals this will further enhance efficiency in work and therefore promote development of the catering business


07. Work stability; this means that the people should have a stable and conducive working environment not day to day changes which leads to inefficiency. Work stability should be well maintained and promoted so that people may be able to produce in a safe conducive environment.

Unitary direction: there is no good without direction. Unitary direction means that the catering organization should have one goal which is to maximize the profit and facilitate development of the organization. An organization that unitary direction often proceed well and produce more profit.

Conclusively, catering is of different types example, Touristic catering, Transport catering which provide food and beverages somehow accomodation services are offered to the long distance travellers also Industrial catering is the one involved in provision of food and beverages to individuals at work.

Extract 16.1: A Sample of Candidate's Correct Responses to Question 7

In Extract 16.1, the candidate scored high marks because he/she managed to analyse the principles of management in catering operation. However, explanations in some points lacked clarity leading him/her failing to score all the marks allocated to this question.

On the other hand, 39.5 per cent of the candidates who scored from 0.0 to 6.5 marks, misinterpreted the demands of the question. For example, some of these candidates analysed points to consider when establishing the catering business such as; *capital*, *location*, *labour*, *types of customer*, *purchasing power of the customer*, *food habit of the customers*, *security*, *types of services offered and transport* instead of the principles of management in catering operation. Others wrote irrelevant responses such as; *Pictures*, *Drama*, *Newspaper*, *Magazine*, *Booklets*, *Films*, and *Stories* instead of principles of management in catering operation. These candidates did not understand that catering service is like other services therefore, there should be principles for organising and regulating the

internal activities. Extract 16.2 is a sample of responses from one of the candidates with weak performance.

7

The management of catering establishments are the establishing of type of catering in order to maintain the good industry or catering. During managing the catering operation should follow the basic lines to management of catering establishment the following are;

The first issue is to follow the type of establishment. During the management of catering should know where the catering established. For example you must know either this catering occur either in school, collage or in the camp. This is a good agenda to establish the catering

The secondly is to follow the foode per seasoning, During the management of establishing the catering should follows the the rules either in cold season or warm temperature. For example coffee drink during cold season and not drinking in warm season, or for example ice cream it is better in warm season in order to reduce the temperature in the human body and not eat during cold season.

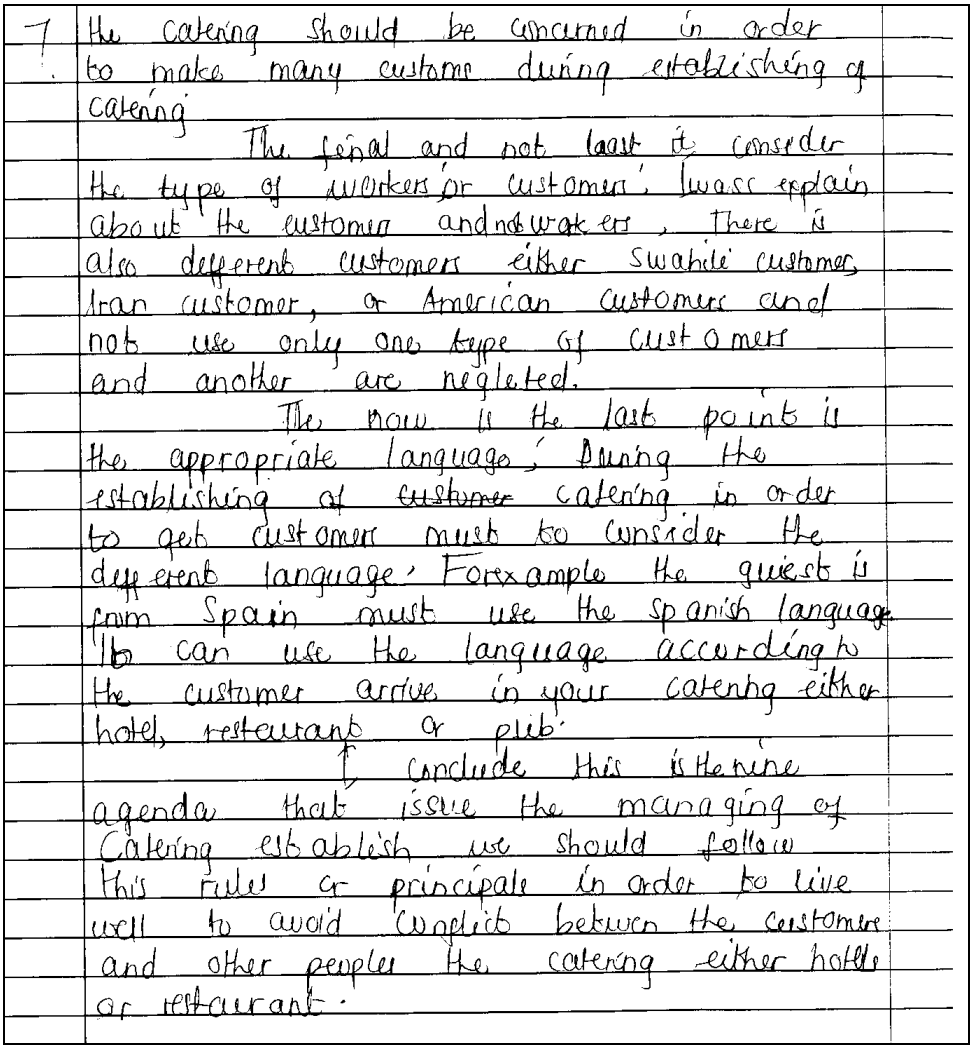
The thirdly concerning with the colour and flavour, When establishing the catering should be consider the different colour because one type of colour it does not attract the food and not attracted with the guests. Therefore during establishing the catering should concerned with different colour in order to make attracted.

7. Not only but also it must be consider the types of Customers, During establishing of catering you know the type of customers. Forexample customers from Africa and customers from Europe in different when accomodate should be concerned one is either eat cow and another it not eat this type of foods.

Moreover the differentiation of ingridients, the food should be use the different ingridients not use the same type of foods, forexample use a chinese rice, vegetable all contain same vegetable. And when making the food different is must because can attract the customers your accomodation. Forexample chinese rice, orange juice, rosted chicken and tomato salad.

Furthermore to follow the day menu or food, In order to get good purposes should follow the time of foods. Forexample you should concern in breakfast, lunch, and dinner and not use the lunch food or diner food to use the food as a breakfast. Therefore these is must follow in order to get good service and good accomodation in and out the catering established

Also it must be concerning the type of religion, In catering establishment the types of religions should follow, because some religion is not use the type of food. Forexample In Islamic religion the pork it not use therefore when establishing the


7. The catering should be concerned in order to make many customs during establishing of catering
The final and not least to consider the type of workers or customers. I was explain about the customers and not workers, There is also different customers either Swahili customer, Iran customer, or American customers and not use only one type of customers and another are neglected.
The now is the last point is the appropriate language. During the establishing of customer catering in order to get customers must to consider the different language. For example the guests is from Spain must use the spanish language to can use the language according to the customer arrive in your catering either hotel, restaurant or club.
I conclude this is the nine agenda that issue the managing of Catering establish we should follow this rules or principale in order to live well to avoid conflicts between the customers and other peoples the catering either hotels or restaurant.

Extract 16.2: A Sample of Candidate's Incorrect Responses to Question 7

In Extract 16.2, the candidate wrote factors to consider when planning menu instead of analysing the principles for managing catering operation.

2.2.8 Question 8: Nutrition Programme, Planning and Intervention

This was also an essay type question measuring the candidates' competence on nutrition education program. The question stated;

In a ward meeting, the members were given a nutritional education message stating, "Every mother should provide her children with meat or fish every day."

(a) In three points, justify why the message may be considered unsuitable for the nutritional education program in our country.

(b) Recommend six suitable techniques for coming up with a successful nutritional education program with the same objective.

The question was opted by 139 (47.9%) candidates. The analysis shows that 46 (33.1%) candidates scored from 1.0 to 6.5 marks, 55 (39.6%) scored from 7.0 to 11.5 marks and 38 (27.3%) scored from 12.0 to 15.0 marks. Figure 17 summarizes this performance.

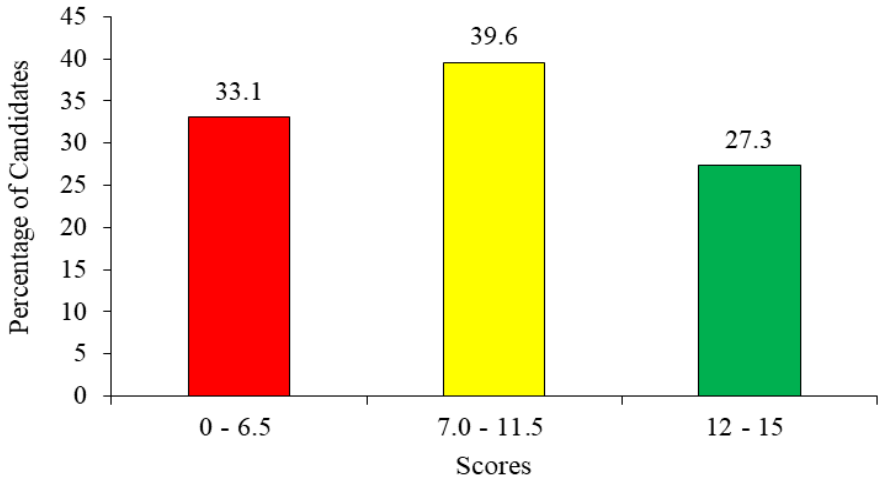


Figure 17: *Percentage of Candidate's Performance on Question 8*

Figure 17 shows that the general performance in this question was average because 66.9 per cent of the candidates scored from 7.0 to 15.0 marks out of the 20 allotted marks for this question. These candidates provided insufficient explanation and others provided fewer points than the ones required by the question.

The item response analysis shows that the candidates (27.3%) with high scores, managed to justify in one to two points out of the three required ones in part (a). For example, one candidate wrote; *low level of capital to afford that meat* and *Social and cultural beliefs*. Another candidate wrote; *poor availability*, *less money to buy meat and fish*. They recommended three to five suitable techniques for coming up with a successful nutrition education programme with the same objective in part (b). For example, one candidate wrote; *involvement of the key people*, *time and venue*, *evaluation*. Another candidate wrote; *teaching methodology*, *medium of communication*, *community participation* and e*ducation level of the*

targeted group. Other points were incorrect and some had insufficient explanation, therefore failed to score all the marks allotted to this question.

However, 33.1 per cent of the candidates scored low (1.0 - 6.5) marks. Some of these candidates misinterpreted the demands of question, hence they failed to justify the given statement. For example, one candidate wrote;

(i) Nutrition education program provide the education to mothers on how to make sure that their children are provided with good nutrient.

(ii) They also teach the mothers on the importance of breast feeding for the proper growth of the baby.

(iii) It gives education on the preparation, processing and proper hygiene of the food.

Others provided irrelevant responses, for example one candidate wrote; *defective nutrition approach, food aids*, and *integrated shortcoming*. These candidates did not understand that to provide meat and fish every day in children's meal will not be suitable because mothers will give more attention to animal protein than vegetable protein. Also in some places meat and fish cannot easily be affordable, to buy on everyday basis because they are expensive, some families are vegan and others have diseases and allergies to meat and fish.

In part (b), the candidate did not understand that technique is the way of carrying out a particular task, hence they provided irrelevant answers. For example, one candidate wrote; *Nutrition orientation*, *Food supplementation*, *Growth monitoring*, *Treatment of malnutrition through rehabilitation*, *Food availability* and *evaluation*. Another candidate wrote *they should be provided with all good nutrients at all the time*, *nutritional policy should be implemented*, *the mothers should be given nutritional education*, *the government should establish health check up for the malnourished children*. These answers imply that the candidates had inadequate knowledge about nutrition education programme, particularly on the techniques in nutrition education programme. Extract 17 is a sample of incorrect responses from one of the candidates.

8. Nutrition education is the provision of basic knowledge about food and nutrition. It is necessary as it prevents malnutrition and creates awareness among people in the community. The following are the reasons to why daily supply of meat and fish is unsuitable message for nutrition education in our country:

Excess intake of nutritients may lead to over malnourishment which leads to poor feeding habits. When people are told to feed their children daily with meat and fish their food habits will develop the same and leads poor nutrition due to lack of other nutrients.

It deteriorates the awareness to mothers on good nutrition skills. It destroys awareness of people towards good nutrition and change their mind.

The following are the techniques for coming up with successful nutrition education program with the same objective:

To teach food and nutrition in schools. Through teaching methodology people access nutrition education and improve their food and nutrition intake.

To put emphasis and policy encouraging farmers to produce food crops. It gets rids on food insecurity and ensure food availability important to treat and prevent malnutrition.

To provide counselling to mothers in Maternal and child health centres. To advise mothers to prepare good food for the children health.

8. To exercise exhibitions which are nutritional oriented. The exhibitions should include demonstrations on how to prepare food and brosures that educate people on food and nutrition.

To establish primary Health clinics.

Extract 17: A Sample of Candidate's Incorrect Responses to Question 8

In Extract 17, the candidate wrote incorrect responses in part (a) and in part (b) he/she provided irrelevant responses to the question.

2.2.9 Question 9: Food Microbiology

This was an essay type question which measured the candidates' competence on food poisoning. The question stated;
It has been observed that microbial food poisoning is one of the leading problems which affect the catering business. Suggest six approaches that can be used to control the situation.

This question was opted by 240 (82.8%) candidate who sat for this paper. Among them 50 (20.8%) candidates scored from 12.0 to 17.0 marks, 152 (63.4%) scored from 7.0 to 11.5 and 38 (15.8%) scored from 0.0 to 6.5 out of 20 marks. Figure 18 illustrates this performance.

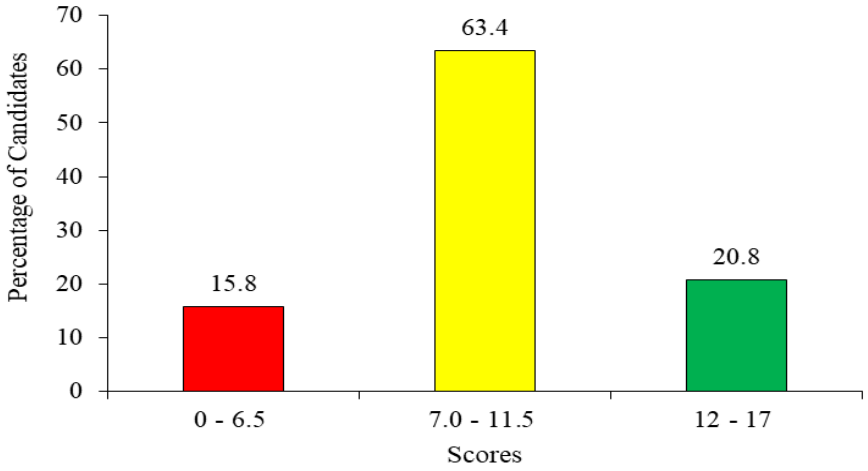


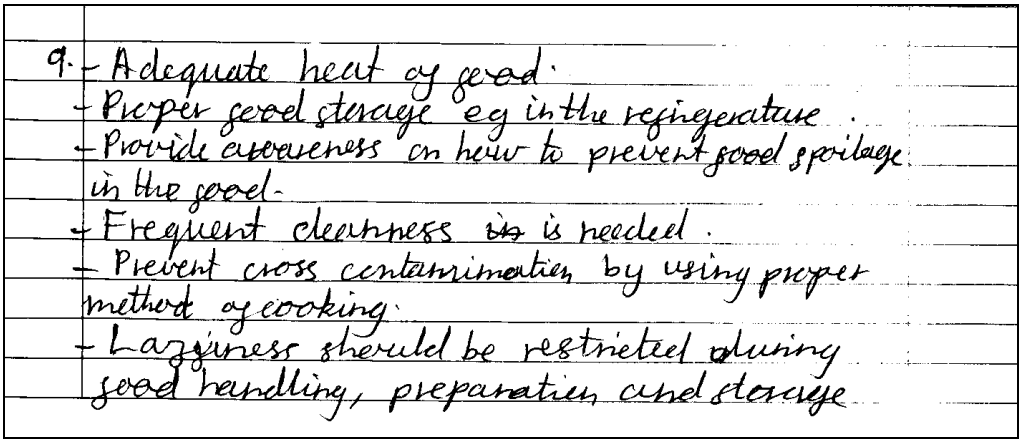
Figure 18: *Percentage of Candidate's Performance on Question 9*

Figure 18, shows that the general performance for this question was good because 84.2 per cent of the candidates scored from 7.0 to 17.0 marks. These candidates had adequate knowledge on the control of food poisoning in catering business.

The candidates (20.8%) who scored high (12 – 17) marks understood that microbial food poisoning is one of the leading problems affecting the catering business, hence they managed to suggest approaches that can be used to control microbial food poisoning in catering business. For example, one candidate wrote; *proper sanitation in the kitchen, avoid cross contamination, Food handlers, the cooked food must covered with a lid in order to prevent insect such as housefly, dustbin must be empty, if the*

cooker is sick. Another one wrote about *Kitchen hygiene, personal hygiene, food hygiene, proper food processing, proper storage of food* and *use of clean and safe water*. These candidates failed to score all the 20 marks because some of them provided a few points required by the question and others provided insufficient explanation. In fact, food poisoning is the result of eating contaminated, spoiled or toxic food.

On the other hand, 15.8 per cent of the candidates scored from 0.0 to 6.5 marks. Some of them misinterpreted the demands of the question. Instead of providing approaches that can be used to control food poisoning in catering business, they wrote nutrition education approaches. For example one candidate wrote about *conventional approach, community approach, social market approach* and *current approach*. Another one wrote about *market and social approach, community participation approach, education* and *public approach*. Others provided irrelevant response to the question, for example one candidate wrote about *removal of natural toxicant, detoxification* and *removal of enterotoxin*. These candidates did not understand that microbial food poisoning is an illness caused by eating contaminated food, hence they failed to suggest the correct approaches to control food poisoning. This suggests that the candidates had inadequate knowledge about microbial food poisoning. Actually, pathogenic microorganisms may cause problem in various ways such as to grow in food that is not stored at the correct temperature, survive in food that is undercooked, transferred from raw to ready to eat foods or transferred onto foods from food handlers. Therefore, food poisoning can be controlled by ensuring good kitchen hygiene, proper waste management and proper protection of food vermin and insects, preventing cross contamination, observing kitchen hygiene, preventing susceptible food to be a source of contamination and applying Hazard Analysis Critical Control Point (HACCP). Extract 18 is a sample of incorrect responses from one of the candidates.


9. - Adequate heat of food.
- Proper food storage eg in the refrigerature.
- Provide awareness on how to prevent food spoilage in the food.
- Frequent cleanness is needed.
- Prevent cross contamination by using proper method of cooking.
- Laziness should be restricted during food handling, preparation and storage

Extract 18: A Sample of Candidate's Incorrect Responses to Question 9

In Extract 18, the candidate failed to write an essay instead he/she wrote the essay in point format. He/she demonstrated inadequate knowledge on the control of microbial food poisoning, therefore scored low marks.

2.3 155/3 FOOD AND HUMAN NUTRITION PAPER 3

This paper had three (3) practical questions. The candidates were required to answer all the questions. Question 1 carried 20 marks and question 2 and 3 carried 15 marks each. The questions were constructed from the following topics. Question 1 was set from *Food Processing and Preservation*, while question 2 and 3 were set from *Food Composition* and *Technology of Specific Products* respectively. The analysis for each question is as follows:

2.3.1 Question 1: Food Processing and Preservation

This question tested the candidates' ability on the concept of the effects of heat on food. The candidates were provided with a slice of white bread and a piece of beef. They were instructed to perform the experiment I and II by following the given procedures.

In Experiment I, the candidates were instructed to: Place the slice of bread on a hot pan and heat each side at high temperature (above 70°c) for 3 to 5 minutes. Record the observations on the changes in colour, texture and aroma. Then they were required to: (a) name and define the reaction which led to the observed characteristics, (b) briefly explain three steps involved in the reaction to obtain the observed characteristics and (c) provide two

roles of high temperature in this reaction. Moreover, in part (d) they were required to outline two methods of cooking food which can result into the characteristic observed in the experiment I above.

In Experiment II, the candidates were instructed to: wash the piece of beef provided and directly place it on a hot pan. Heat each side at high temperature above (70˚c) for 5 minutes. Record the observations on the changes in texture and aroma. Then, they were required: (a) to provide reasons for the changes in texture and aroma observed which differ in Experiment I and II. (b), to show how the texture of the beef sample observed in Experiment II is improved during processing.

The question was attempted by 290 (100%) candidates. Among them, 3 (1%) candidates scored from 12.0 to 13.0 marks, 153 (52.8 %) scored from 7.0 to 11.5 marks and 134 (46.2%) scored from 0.5 to 6.5 marks. Figure 19 illustrate this performance.

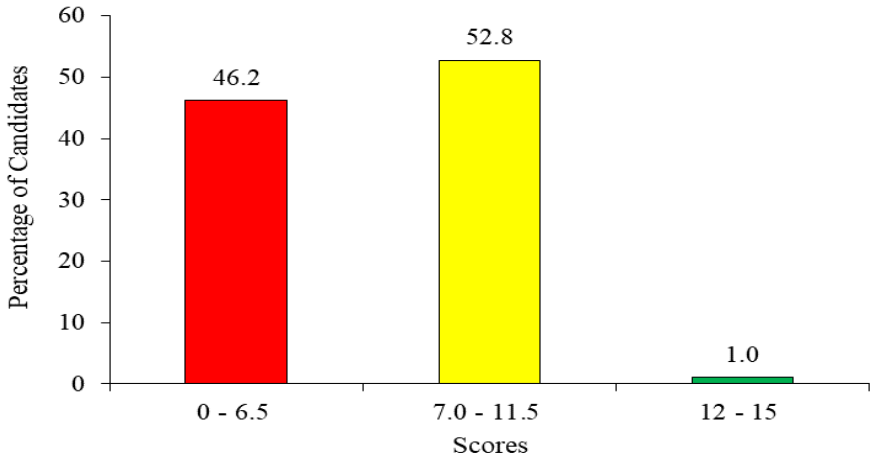


Figure 19: *Percentage of Candidate's Performance on Question 1*

Figure 19 indicates that the candidates' general performance in this question was average, because 53.8 per cent of the candidates scored from 7 to 13 marks out of 15 marks allotted for this question.

The analysis from candidates' responses indicates that a few (1.0%) candidates who had good performance (12.0 - 13.0 marks) were knowledgeable about the effects of heat on food substances.

In Experiment I the candidates observed correctly (i) colour changed from white to brown, (ii) The texture of the sample became tough, brittle and crystalline, (iii) The fresh aroma of the slice changed to a toasted aroma. They managed to provide correct responses because they understood that when heat is applied on food containing amino groups and sugars, it tends to undergo non-enzymatic reaction. In part (a), for example, one candidate wrote, *the reaction is maillard/non-enzymatic browning reaction*. *Maillard reaction is a chemical reaction which occurs between amino acids (proteins) and reducing sugars (carbohydrates) in presence of dry heat.* However, some of them failed to score all the allotted marks to this question because they failed to explain the steps involved in the non-enzymatic reaction in part (b). These candidates were not aware that non-enzymatic reaction occurs in three steps. First step, carbonyl group reacts with the amino group, producing N-substituted glycosylamine and water. Second step, the formed glycosylamine undergoes Amadori rearrangement, forming ketosamines. Third step, the formed ketosamines reacts to produce water, reductones and brown nitrogenous polymers and melanoids (brown pigment).

In part (c), others managed to provide the roles of high temperature. They understood that high temperature facilitates the rate of chemical reaction, and plays part in dehydration. For example, one candidate wrote; *used to speed up the reaction rate and high temperature used to remove all water available in bread*. In part (d), the candidates were able to outline two methods of cooking food which can result into the characteristics observed in Experiment I. They were aware that when dry heat is applied in amino acids and reducing sugars, Maillard reaction takes place. For example, one candidate wrote; *frying method*, *baking* and *grilling*.

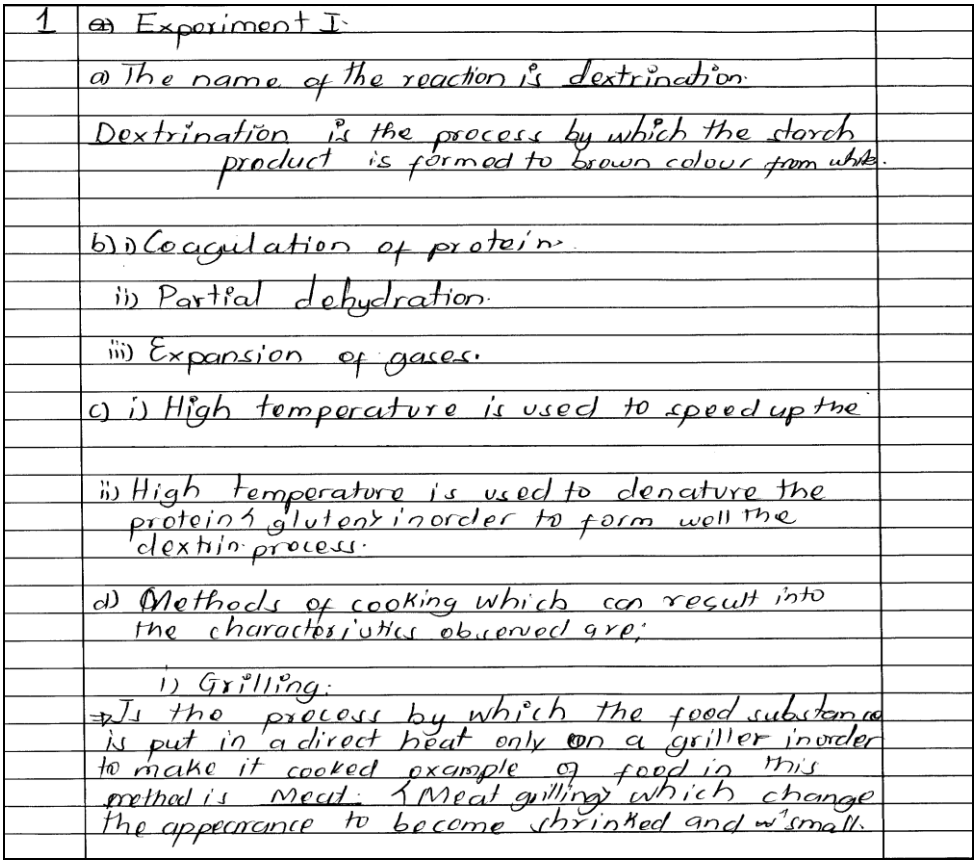
In Experiment II, the candidates observed that (i) texture of beef became hard or dry and (ii) the aroma changed to roasted aroma of beef. Some candidates managed to explain things which caused texture and aroma between Experiment I and II to differ in part (a). Through observation, they noted that water content between a piece of bread and raw beef caused the change of texture to differ. A piece of beef reacts too slow to produce hard texture while that of bread reacts fast and changes to stiff texture. Aroma of a cooked food is determined by the type of sugar and protein contains as well as cooking method used to cook the food. That is why they differ. For example, one candidate wrote, *piece of beef has high moisture content*

compared to slice of bread so when heated at the same temperature and time will differ in texture. In part (b), the candidates provided explanation on how the texture of the beef can be improved. These candidates were aware that during processing of beef, texture can be controlled by making it dry before processing. For example, one candidate wrote, *dry it*.

On the other hand, 46.2 per cent of the candidates had weak performance. Analysis of the candidates' responses shows that, most of the candidates had insufficient knowledge about the effects of heat on the food, specifically on the given samples. They failed to provide correct observations and their explanations on both Experiments I and II were not correct. Moreover, some candidates mixed up the correct and incorrect responses, hence they scored low marks. Others provided incorrect observations, hence they gave incorrect inference in procedures given under each experiment. For example, in Experiment I one candidate wrote, *(i) colour changed from white to black residuals. (ii) The texture of the sample does not change (iii) No change in aroma.* In Experiment II, one candidate wrote, *(i) Texture of beef became soft (ii) The aroma changed to sweet*.

Majority of the candidates who scored weak performance provided incorrect answers to both Experiments I and II. In Experiment I part (a), the candidates were not aware that when heat is applied on foods containing amino groups and sugar; they tend to undergo non-enzymatic reaction. For example, one candidate wrote, *the reaction is dextrin,* and defines it as *the one that does not change color of the substance*. A few candidates failed to explain on the steps involved in the non-enzymatic reaction in part (b), hence they provided methods of preventing enzymatic browning. For example, one candidate wrote; *addition of salt, addition of acid and application of heat*. In part (c), some candidates failed to provide the roles of high temperature, thus they provided the effects of temperature on enzymes. Others provided the importance of cooking. For example, one candidate wrote, *used to denature enzymes that could lead to color change*. Despite insufficient knowledge demonstrated by the candidates, they managed to outline two methods of cooking food which can result into the characteristic observed in Experiment I (d). For example, one candidate wrote, *Frying and Baking method.*

In Experiment II part (a), the candidates failed to explain how change in texture and aroma observed in Experiment I and II differ. Some of the candidates wrote the cooking state of food as the main cause for the difference in texture and aroma in this experiment. For example, one candidate wrote, *bread was already a baked product but beef is raw which changes when heat is applied result to different texture and aroma.* Others provided natural source as the main cause for the difference in texture in this experiment. For example, one candidate wrote, *bread is made from wheat flour which is plant source while beef is animal source*. In Experiment II part (b), the candidates failed to provide explanations on how the beef texture can be improved. Instead some of them provided ways of preserving the beef. For example, one candidate wrote, *by adding vinegar and other spices*. Others provided nutrients contents as causes of the difference in texture in this experiment. For example, one candidate wrote; *bread is carbohydrate while beef is protein in nature*. Extract 19 shows a sample of incorrect responses given by one of the candidate.


1 (a) Experiment I:

a) The name of the reaction is dextrination.

Dextrination is the process by which the starch product is formed to brown colour from white.

b) i) Coagulation of protein.

ii) Partial dehydration.

iii) Expansion of gases.

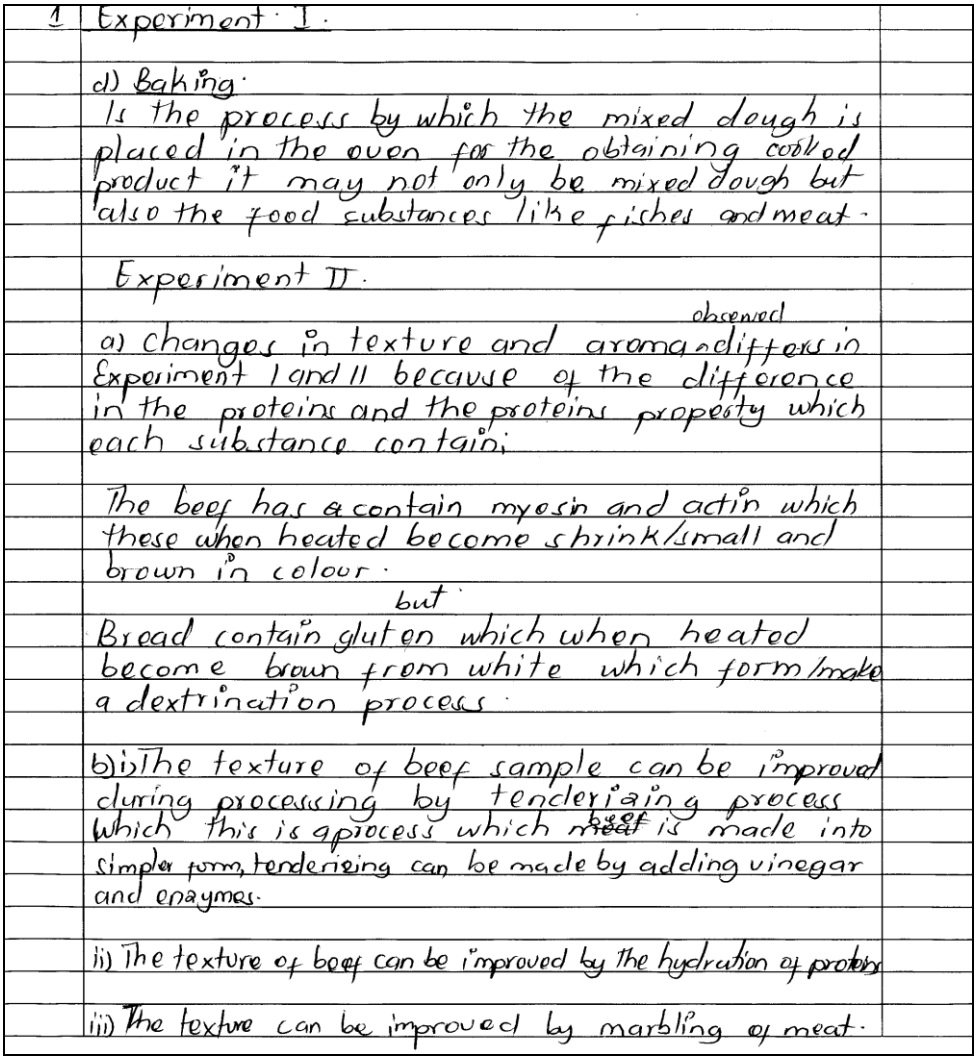
c) i) High temperature is used to speed up the

ii) High temperature is used to denature the protein gluten inorder to form well the dextrin process.

d) Methods of cooking which can result into the characteristics observed are;

i) Grilling:

⇒ Is the process by which the food substance is put in a direct heat only on a griller inorder to make it cooked example of food in this method is Meat. ∴ Meat grilling which change the appearance to become shrinked and small.


1 Experiment I:

d) Baking:
Is the process by which the mixed dough is placed in the oven for the obtaining cooked product it may not only be mixed dough but also the food substances like fishes and meat.

Experiment II:

a) changes in texture and aroma observed differs in Experiment I and II because of the difference in the proteins and the proteins property which each substance contain:

The beef has a contain myosin and actin which these when heated become shrink/small and brown in colour.

but
Bread contain gluten which when heated become brown from white which form/make a dextrination process.

b)i) The texture of beef sample can be improved during processing by tenderizing process which this is a process which ~~meat~~ is made into simpler form, tenderising can be made by adding vinegar and enzymes.

ii) The texture of beef can be improved by the hydration of protein

iii) The texture can be improved by marbling of meat.

Extract 19: A Sample of Candidate's Incorrect Responses to Question 1

In Extract 19, the candidate provided incorrect responses in Experiments II. In Experiment I however, he/she mixed up the correct and incorrect responses. In part (a), (b) and (c), he/she provided incorrect responses while, in part (d), he/she provided correct methods of cooking.

2.3.2 Question 2: Technology of Specific Products

This question tested the candidates' ability on the concept of raising agents. In this question, the candidates were provided with table sugar, glucose, baking soda and yeast. They were required to perform two experiments by following the procedures given under each experiment. Thereafter, they

were required to record and provide explanations of what they have observed and answer the questions that follow.

In Experiment I, the candidates were instructed to: Dissolve 10g of table sugar in 50ml of tap water in a flask and add 5g of yeast. Repeat procedure (a) by using glucose. Fill two gas jars with tap water and place each upside-down supported by a beehive shelf in a trough/basin of water. Warm the flask to 30°c. Immediately fit each flask with one end of delivery tube (using a tight fitting rubber stopper) and insert the other end into the beehive shelf in a trough/basin of water. Observe the changes that take place after two intervals of 15 minutes.

Then, they were required to: (a) write balanced equations for the observed reactions, (b) write roles played by sugar/glucose and yeast in the reactions and (c) give the property of yeast observed in this experiment.

In Experiment II, the candidates were directed to: Mix 2g of baking soda with 3ml of tap water in a clean and dry test tube. Fit the test tube with one end of delivery tube using a tight fitting rubber stopper and then deep the other end in a solution of lime water placed in another test tube. Gently heat the mixture while observing.

Thereafter, they were required to: (a) explain briefly the reaction which took place when heat was applied to the test tube containing baking soda, (b) write a balanced equation for the reaction explained in part (a) and (c) to write the importance of this reaction in baking.

The question was attempted by 290 (100 %) candidates. The analysis shows that 117 (40.3%) candidates scored from 9.0 to 13.5 marks, 130 (44.9 %) scored from 5.5 to 8.5 marks and 43 (14.8 %) scored from 2.0 to 5.0 marks. Figure 20 is a summary of this performance.

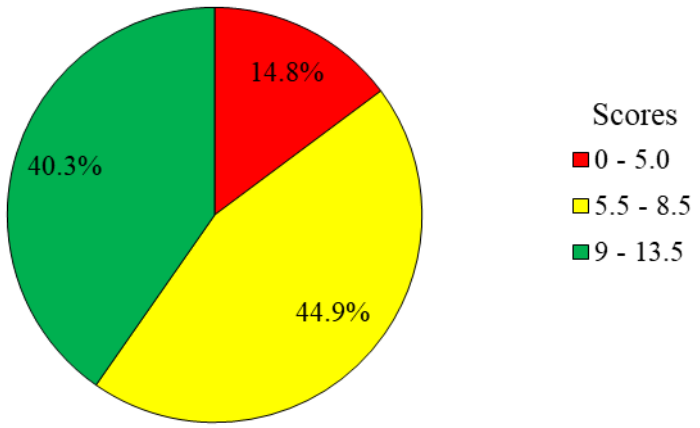


Figure 20: *Percentage of Candidates' Performance on Question 2*

Figure 20 shows that the general performance in this question was good, as 85.2 per cent of the candidates scored from 5.5 to 13.5 marks. These candidates were knowledgeable about raising agents, especially yeast and baking soda. The analysis of candidates' responses indicates that (40.3%) candidates with good performance were able to perform Experiments I and II correctly, observe and explain the mode of actions of yeast and baking soda in baked products.

In Experiment I, the candidates provided correct observations indicating that they had good ability on conducting experiment by following the given procedures. They observed formation of bubbles and empty space. For example, one candidate wrote, *some of the water in the gas jars escape, leaving an empty space filled with a gas*. They explained that, Yeast fermented sugar and glucose to produce carbon dioxide gas, alcohol and energy. The gas is less soluble and lighter than water, thus replacing water in the gas jar.

In Experiment I, the candidates managed to provide correct responses, indicating they had adequate knowledge about biological raising agents (yeast). The candidates managed to write balanced equations for the reaction as required in part (a). For example, one candidate wrote;

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{yeast\,30°C} C_6H_{12}O_6 + C_6H_{12}O_6 \xrightarrow{yeast\,at\,30°C} 4C_2H_5OH + 4CO_2$$

In part (b), the candidates were able to explain the rules played by sugar, glucose and yeast in the reactions. They understood that sugar and glucose were used as sources of food for maximum activities of yeast. But yeast plays a role of fermenting sugar and glucose to produce carbon dioxide gas. For example, one candidate wrote, *the role played by sugar and glucose is food source of yeast, so yeast use sugar/glucose as food to their growth and multiplication*. In part (c), majority of the candidates failed to provide the property of yeast observed in this experiment, instead they provided general properties of yeast. For example, one candidate wrote, *it is crystalline in texture and cream in colour*.

Likewise, in Experiment II, the candidates correctly recorded the observation when heating baking soda. While observing the changes in a solution of lime water placed in another test tube, they observed lime water changed to milky/cloud. For example, one candidate wrote, *lime water changed to milk colour*. Another responded that; *test tube which contained a solution of baking soda produce vapour that turns lime water milky*. On explanations, they explained that the gas evolved was carbon dioxide which reacts with lime water to form sodium bicarbonate which is a milky substance.

Similarly, in Experiment II part (a), the candidates provided correct response concerning the reaction which took place when heat was applied to baking soda. Their responses were; *decomposition of baking soda to carbon dioxide, water and salt, breaking down into carbon dioxide, gas water, and salt*. In part (b), the candidates were able to write the correct balance chemical equation. For example, one candidate wrote;

$2NaHCO_3 \xrightarrow{heat} Na_2CO_3 + CO_2 + H_2O.$

In part (c), the candidates understood the importance of the reaction that took place in Experiment II in baking. For example, one candidate wrote, *the importance of this reaction in baking, it causes the product to rise, lighter and porosity due to production and escaping of carbon dioxide gas*. These candidates failed to score the 15 marks allotted to this question because some of them did not provide the explanations on the observed changes. Others provided insufficient explanations on the observed changes. Extract 20.1 shows a sample of correct responses given by one of the candidate.

Q2. EXPERIMENT I.

OBSERVATION.

- In the first flask which contained table sugar the fermentation process took place whereby it produces Carbondioxide gas which came out in the gas jar as a bubbles but this reaction was a' beat slow Compared to the Second flask.
- In the Second flask there were quick formation of Alcohol and production of Carbondioxide gas which came out inform of bubbles in the immersed inverted gas jar more quickly than that of the first, since the bubbles causes down displacement of water.

Explanation.

→ This is because in the 1st Flask table Sugar has to be broken first into Simple Sugar that is from polysaccharide into Simple Sugar of monosaccharide that is Glucose

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$

$$C_6H_{12}O_6 + H_2O \xrightarrow[\text{enzyme}]{\text{Yeast}} CO_2 + \text{Alcohol}.$$

Thus make the reaction a beat slow than that of the Second (2nd) flask which Contain already a Simple Sugar

in which the reaction will take a short time for the formation of Alcohol and production of Carbondioxide gas which causes the down ward displacement of water in the gas jar.

Answer of the Question.

a) Blanced equation
In the first flask (Flask 1)

Table Sugar + Water (warm) ⟶ Glucose + Glucose.

Glucose + Warm Water $\xrightarrow{\text{Yeast.}}$ Carbondioxide + Alcohol

Chemical equation.

$C_{12}O$ $C_{12}H_{22}O_{11}$ + Warm H_2O ⟶ $C_6H_{12}O_6 + C_6H_{12}O_6$

$C_6H_{12}O_6 \xrightarrow{\text{Yeast}}$ ~~$C_6H_{12}O_6$~~. Alcohol + $CO_2 + H_2O$

Flask 2.

$C_6H_{12}O_6$ (Warm water(H_2O)) $\xrightarrow{\text{Yeast}}$ Alcohol + $CO_2 + H_2O$

b. The role of Sugar / glucose they act as food for yeast where as for yeast it act as a Catalyst to speed up the reaction so as it can ferment and give out Carbondioxide gas and Alcohol in which Carbondioxide is used in baking process as a raise agent.

c. They are affected by the temperature whereby at Optimum temperature they work best to give out C_2H_5OH and CO_2.

02. EXPERIMENT II

OBSERVATION

Upon heating the mixture there is evolution of Carbondioxide gas that was produce which ~~for~~ turn lime water milky.

Explaination.

→ This means that baking soda is a double action raising agent that it can work in Cold condition also in hot Condition whereby in hot Condition it gives out a Carbondioxide gas in which it turns lime water milky.

Answers of Question

a. Upon heating baking soda that is a chemical raising agent it will give out the product that is Carbondioxide, Sodium Carbonate and water.

b. $2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + H_2O + CO_2$.

c. The Important of this reaction is to produce Carbondioxide gas which is used in baking process as a raise gas to make the mixture or dough light and give a well risen dough.

Extract 20.1: A Sample of Candidate's Correct Responses to Question 2

In Extract 20.1, the candidate provided correct responses to both Experiments I and II. But in Experiment I part (c) he/she provided unsatisfactory explanation, hence he/she failed to score all the full (15) marks.

However, 14.8 per cent of the candidates who scored low marks had inadequate knowledge about raising agents, hence they provided incorrect responses. In Experiment I, the candidates recorded incorrect observation and therefore provided incorrect explanations. For example, one candidate wrote; *No changes. Glucose and sugar are the same so no effect*. Another one wrote, *the reaction remains unchanged. This is because sugar does not react*.

In Experiment I, the candidates failed to provide correct responses indicating that they had inadequate knowledge about biological raising agents (yeast). The candidates failed to write balanced equations for the reaction as required in part (a). For example, one candidate wrote;

$$C_6H_{12}O_6 + H_2O + Sugar$$

Another candidate wrote,

$$C_6H_{12}O_6 + H_2O \xrightarrow{yeast} 3C_2H_5O_4 + CO_2$$

In part (b), the candidates provided functions of carbohydrates to human body instead of stating the roles played by sugars/glucose in the reaction. For example, one candidate wrote; *Glucose or sugars are the source of energy in the body helps to increase energy especially in muscles of the body*. In part (c), the candidates provided uses of yeast in industry instead of property of yeast observed in this experiment. For example, one candidate wrote, *yeast used in industry for production of the product like bread and bear*.

Likewise, in Experiment II, the candidates incorrectly recorded the observations and therefore, gave incorrect explanations. For example, one candidate wrote; *lime water decreased in the test tube one but in test tube two increased*. In part (a), the candidates provided irrelevant answers. For example, one candidate wrote; *when heat is applied to the test tube containing baking soda observe production of C0₂ more to the other test-tube containing lime water can increase the number of C0₂ gas but reduce the amount of lime water after carbon dioxide gas be increased*. In part (b), the candidates failed to write the correct balance equation for the reaction. For example, one candidate wrote;

$$NaHCO_3 + H_2O_{(l)} \rightarrow NaOH_5 + CO_{2(g)} + H_2O_{(l)}$$

and

$$CaCOH_2O_{(g)} + CO_{2(g)} \rightarrow NaOH_5 \rightarrow CaCO_3 + H_2O_{(l)}$$

Despite insufficient knowledge portrayed by most of the candidates, a few of them managed to provide correct responses in part (c) because they were familiar with the importance of reaction of baking soda in baking. Extract 20.2 shows a sample of incorrect responses given by one of the candidate.

2. v) No changes that take place after two interval of 15 minutes were observed.

Questions
a) Balanced equation

i) Yeast + table sugar $\xrightarrow[30^{\circ}c]{Heat}$ ~~Alcohol + CO_2~~ No reaction

ii) Yeast + $C_6H_{12}O_6$ $\xrightarrow[30^{\circ}c]{Heat}$ $CH_3CH_2OH + CO_2$

b) Roles played by sugar / ~~glucose~~ and yeast in reaction
i) production of carbondioxide
ii) production of alcohol
iii) lead to occurance of fermentation reaction

c) Property of yeast observed in this experiment
i) It give production of carbondioxide
ii) It give small of alcohol

2 Experiment II
Procedures
i) 2 g of baking soda was mixed with 3 ml of tap water in a clean and dry test tube

ii) The test tube was fitted with one end of delivery tube using a tight fitting rubber stopper and then deeped the other end in a solution of lime water placed in another test tube.

iii) The mixture was gently heated while observing.

Questions
a) The reaction took place was compositon reaction.
composition reaction is the reaction in which when heat is applied during reaction hydrogen is released.

b) Blanced equation for the reaction

$2NaHCO_3 \xrightarrow{\text{composition}} Na_2CO_3 + HCO_2 + H_2O$

c) Importance of this reaction in baking
i) It helps to introduce carbondioxide gas in the dough.

Extract 20.2: A Sample of Candidates' Incorrect Responses to Question 2

In Extract 20.2, the candidate provided incorrect responses in both Experiments I and II, but he/she managed to provide correct answer in part (c) of the Experiment II.

2.3.3 Question 3: Food Composition

This question tested the candidates' ability on the concept of composition of food stuffs. In this question the candidates were provided with the samples *A (fresh sugar cane juice), B (soybean milk), C (cassava leaf powder)* and *D (sardine powder).* Then, they were instructed to perform the Experiment I to IV. They were supposed to record the observations and provide inferences of what they have observed and answer the question that follow.

In Experiment I, the candidates were given the following instructions: In a test tube containing 2ml of sample A add 3 drops of dilute hydrochloric acid. Boil the mixture under low heat for a minute and allow it to cool. Add 3 drops of dilute sodium hydroxide solution followed by equal volume of Benedict's solution. Shake and boil the mixture again. Then they were required to explain the bases of the observed changes, by providing two points.

In Experiment II, the candidates were instructed as follows: In a test tube containing 2 ml of sample B add equal volume of dilute sodium hydroxide solution and mix thoroughly. Add 2 to 3 drops of 1% copper (II) sulphate solution and mix the mixture thoroughly. Then they were required to provide the basis of the observed changes.

In Experiment III, the candidates were given the following instructions: In a test tube containing 2g of sample C add 5ml of dilute hydrochloric acid and mix thoroughly. Filter the mixture and then neutralize the filtrate by adding ammonium hydroxide solution (Note: neutral filtrate will turn red litmus paper purple). Add equal volume of 5% ammonium oxalate solution to a portion of filtrate. Then they were supposed to provide reason why dilute hydrochloric acid was added to sample C, and asked to give a balanced equation for the reaction.

In Experiment IV, the candidates were instructed as follows: Dissolve 1g of sample D in concentrated nitric acid in a test tube. Filter the mixture and

then add a few drops of 10% ammonium molybdate solution to a portion of the filtrate. Warm the mixture. Then they were required to give two plant foods which are the best sources of the inference they have provided and reasons for warming the mixture.

The question was attempted by 290 (100%) candidates. Among them 142 (49.0%) candidates scored from 9.0 to 14.5 marks, 100 (34.4%) scored from 5.5 to 8.5 marks and 48 (16.6%) scored from 0.5 to 5.0 out of 15 marks.

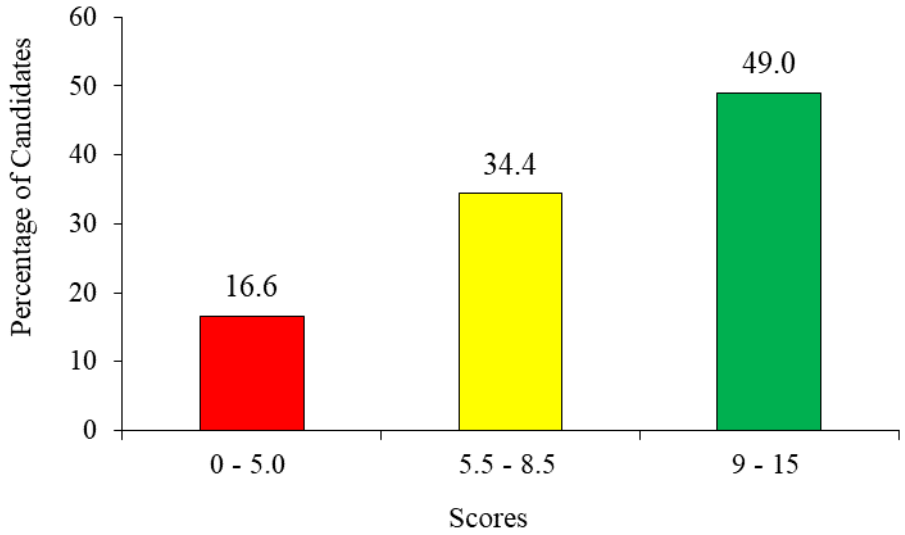


Figure 21: *Percentage of Candidate's Performance on Question 3*

Based on the analysis in Figure 21 the general performance in this question was good, since 83.4 per cent of the candidates scored average or above (5.5 - 14.5) marks. The analysis indicates that the candidates who scored high marks had adequate knowledge about composition of food stuffs, specifically on determining their basic nutrient contents.

In Experiment I, the candidates with good performance correctly observed and explained the changes that took place on Benedict's solution. They observed changes in a series of colours which were from blue, green, yellow, orange and finally brick-red precipitate. This infers that non-reducing sugar was present. For example, one candidate wrote; *the series of colour change from blue, green, yellow orange and finally brick red. The inference, non-reducing sugar was present in sample A.* Furthermore, the candidates provided correct explanations about the bases of the observed

changes. These candidates understood that Hydrochloric acid hydrolyses non-reducing sugar (complex sugar) to reducing sugar (simple sugar). The addition of Benedict's solution contain copper sulphate reduced the copper (II) ions present in Benedict's reagent to copper (I) ions when the reducing sugars heated with Benedict's solution. The changed Benedict's reagent appears like insoluble red copper (I) oxide. For example, one candidate wrote; *hydrolysis of non-reducing sugar to reducing sugar occurs under the presence of hydrochloric acid then, neutralise the sample by using sodium hydroxide solution. Reducing sugar reduce* Cu^{2+} *ion present in Benedict's solution to* Cu^{+} *ion which show the formation of brick red.* $Cu^{2+} \rightarrow Cu^{+} + e^{-}$.

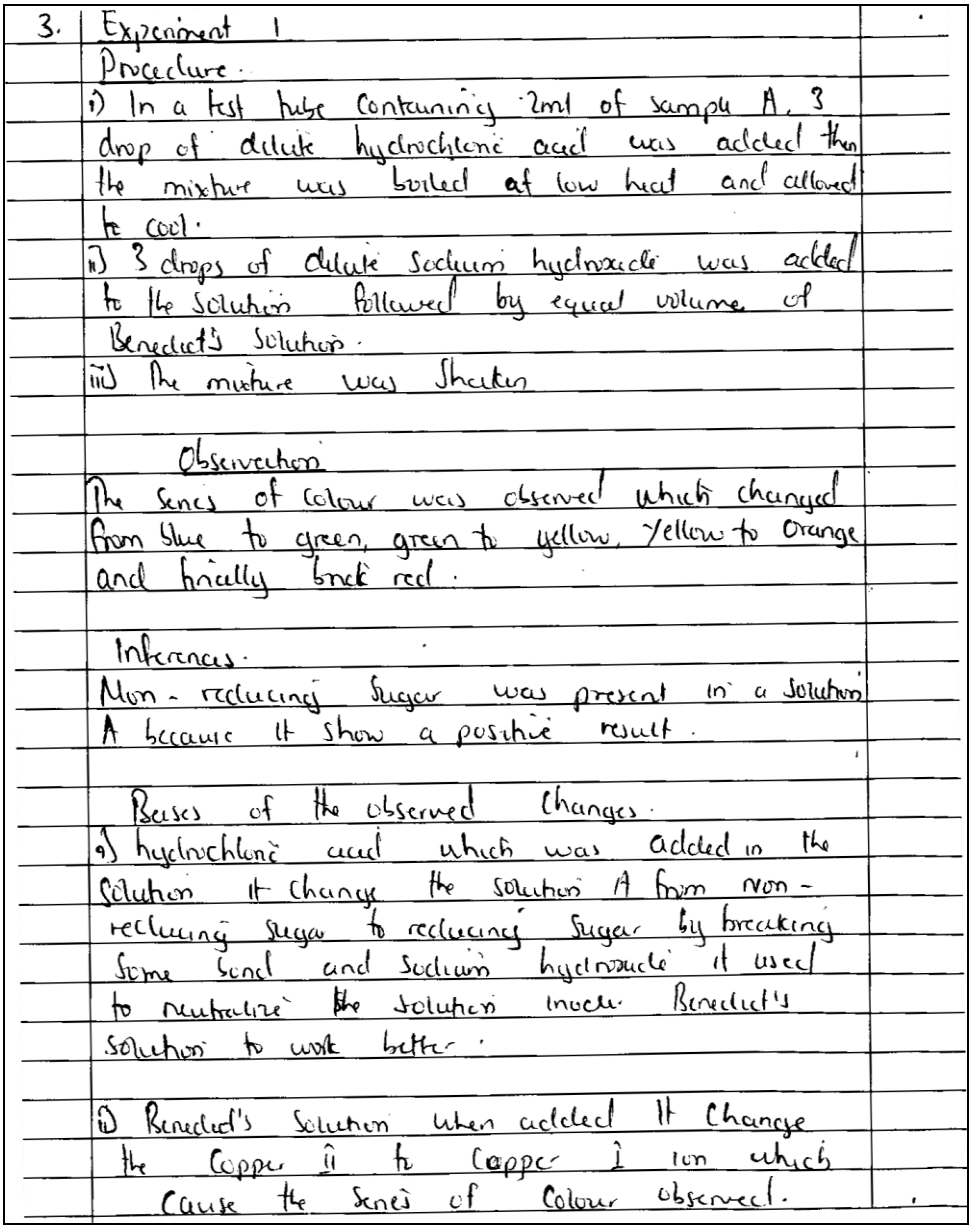
In Experiment II, they observed purple or violet colour. This infers that protein was present. For example, one candidate wrote; *when sample B mixed with dilute copper sulphate, nitrogen atoms in the peptide bonds formed a purple colour with copper II ions. This proved that protein was present in sample B.* On the basis of the observed changes, the candidates understood that when protein mixed with dilute alkaline copper (II) sulphate solution, nitrogen atoms in the peptide bonds formed a purple complex with copper (II) ions. For example, one candidate wrote, *there was formation of purple colour due to formation of copper complex which result from copper (II) ions from copper (II) sulphate and nitrogen from amino group under polypeptide bond*.

In Experiment III, the candidates observed white precipitation which is a confirmation test for Calcium. For example, one candidate wrote; *the white precipitate was formed which show that the calcium was present*. The candidates were aware that hydrochloric acid is used to dissolve calcium carbonate present in plant sources. For example, one candidate wrote, *hydrochloric acid was added in sample C for breakup of calcium*. Some candidates managed to provide correct equation for the reaction. For example, one candidate wrote;

$$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} \rightarrow CO_{2(g)} + H_2O_{(l)}$$

In Experiment IV, the candidates observed bright yellow precipitate which infers presence of phosphate. For example, one candidate wrote, *there was formation of yellow precipitation in the test tube containing mixture. This indicates that there is presence of phosphate in the sample D.* In part (a), the candidates demonstrated good understanding of the plants sources of

calcium. Their responses were; *spinach, cassava leaves, green leafy vegetables, legumes leaf, beans, whole cereals, nuts, amaranthus, and soybeans*. Similarly, in part (b), the candidates provided correct reason of warming the mixture. They understood that heat speeds up the rate of reaction. For example, one candidate wrote, *the mixture was warmed so as to increase the rate of the reaction to take place*. Extract 21.1 is a sample of correct responses from one of the candidates.



3. Experiment 1

Procedure.

i) In a test tube containing 2ml of sample A, 3 drop of dilute hydrochloric acid was added then the mixture was boiled at low heat and allowed to cool.

ii) 3 drops of dilute Sodium hydroxide was added to the solution followed by equal volume of Benedict's Solution.

iii) The mixture was Shaken

Observation

The series of colour was observed which changed from blue to green, green to yellow, Yellow to Orange and finally brick red.

Inferences.

Non-reducing Sugar was present in a solution A because it show a positive result.

Reasons of the observed Changes.

a) hydrochloric acid which was added in the solution it change the solution A from non-reducing sugar to reducing sugar by breaking some bond and Sodium hydroxide it used to neutralize the solution inorder Benedict's solution to work better.

b) Benedict's solution when added it Change the Copper II to Copper I ion which cause the series of Colour observed.

3. Experiment II.

Procedure.

i) In a test tube containing 2ml of Sample B, equal volume of dilute sodium hydroxide solution was added then mixed thoroughly.

ii) 3 drops of 1% Copper II Sulphate solution was added in the solution and mixed throughly again.

Observation.

The colour of solution was changed from blue colour to purple colour was observed.

Inferences.

protein was present in a solution B.

Basis of the observed Changes.

Addition of 1% of copper II Sulphate in the Solution under alkaline Solution it cause the copper to react with Nitrogen present in amino acid which found in protein present in Solution B to form a Complex which appear in purple colour which is called a copper complex.

8. Experiment III.

iii) equal amount of 5% of ammonium Oxalate Solution was added in portion of filtrate.

Observation.

The yellow colour was observed on the addition of ammonium hydroxide and disappear on addition of ammonium Oxalate.

Inference.

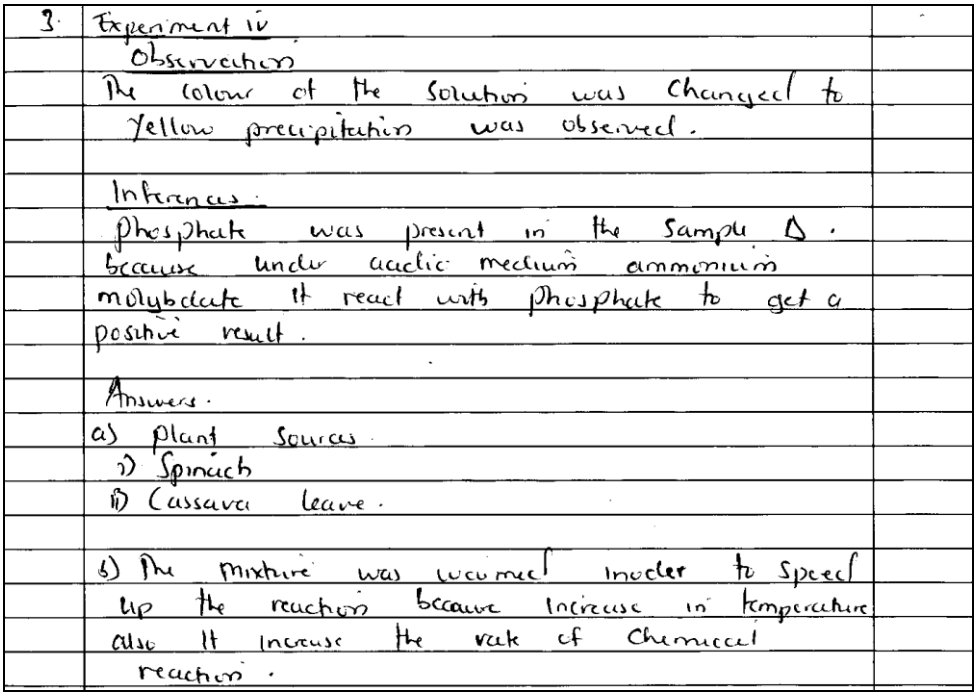
Calcium was present in Sample C

Answers in experiment III

hydrochloric acid was added in Sample C because for digestion where by it breaks a Sample ~~from~~ through digestion process inorder to get a Calcium.

Balanced chemical equation

$2HCl + Ca(CO_3) \longrightarrow CaCl_2 + H_2O + CO_2$.



Extract 21.1: A Sample of Candidates' Correct Responses to Question 3

In Extract 21.1, the candidate provided correct responses on Experiment I, II, III and IV, hence he/she scored high marks. This shows that the candidate mastered the subject matter tested.

Despite the good performance in this question, the analysis shows that 16.6 per cent of the candidates attained weak performance. Some of these candidates misunderstood the task given in each experiment, hence they wrongly performed the experiment. However, a few of them managed to answer some parts of the question correctly, hence scored low marks in this question.

Further the analysis shows that, in Experiment I to IV some of the candidates failed to provide correct observations and inferences, while others skipped this part.

In Experiment I, a few candidates expressed that, the colour changed from green to orange, but they did not provide the inference for this reaction. For example, one candidate wrote; *colour change from blue, to orange*. Majority of the candidates provided incorrect explanations about the bases of the observed changes. They failed to understand the demands of the question, hence they provided irrelevant answers. For example, one

candidate wrote; *the base of colour change was to indicate the presence of reducing sugar in a sample solution A.* Another candidate wrote, *the base of colour change was to show the effect of heat acid and alkaline on the reaction.*

In Experiment II, they were able to observe the blue colour. For example, one candidate wrote, *when sample B mixed with dilute copper sulphate, the blue colour observed in sample B.* Likewise, instead of explaining basis of the observed changes some explained the aim of the experiment. For example, one candidate wrote; *the basis of the observed change was to determine the type of nutrient present in sample B.*

In Experiment III, a few candidates observed no colour change. For example, one candidate wrote, *the color of sample C was retained.* The candidates were not aware that hydrochloric acid is used to dissolve calcium carbonate present in plant sources, hence they provided incorrect answer. For example, one candidate wrote, *diluted hydrochloric acid was added in sample C to prevent the precipitates of other insoluble minerals from sample*. Some candidates failed to provide correct equation for the reaction. For example, one candidate wrote;

$$NH_4Cl + HCl \rightarrow NH_2Cl \rightarrow + H_2O.$$

In Experiment IV, a few candidates were able to observed brown colour. For example, one candidate wrote, *there was formation of brown colour in the sample D.* In part (a), the candidates failed to provide correct answers because they failed to identify the type of mineral present in a sample solution D. For example, one candidate wrote, *sea fishes and milk*. Similarly, in part (b), some of the candidates failed to provide the correct reasons of warming the mixture. They were not aware that heat speeds up the rate of reaction. For example, one candidate wrote; *the mixture was warmed so as neutralize the pH of the sample D*. Extract 21.2 is a sample of incorrect responses from one of the candidates.

03. Experiment 1.

- The observable changes is the colour.

After addition of benedict solution the solution of sample A with dilute hydrochloric acid was blue in colour but after addition of heating the colour change from blue to colourles.

In Experiment II.

- The solution turns from milky colour to blue colour.

In experiment III

- After addition of sample e dilute hydrochloric acid to sample C, it does not mix, the dilute hydrochloric acid remain down the test tube while sample e come above the dilute hydrochloric acid.

Dilute hydrochloric acid was added to the sample C so as to complete the reaction.

$HCl + O_2 \rightarrow H_2O + CO_2$

In Experiment IV

a) plants food which are best source

- Vegetables and fruits.
- Soya beans.

b) - The mixture was warmed so as get clear observation.

Extract 21.2: A Sample of Candidates' Incorrect Responses to Question 3

In Extract 21.2, the candidate provided incorrect responses in Experiment I, II, III and IV b but in Experiment IV (a), he/she provided correct plant foods which are best sources of calcium.

3.0 ANALYSIS OF CANDIDATE'S PERFORMANCE PER TOPIC

The Food and Human Nutrition examination had three papers which comprised a total of 21 questions set from 11 topics. The statistics indicates that the candidates' performance was good in 14 topics, average in 6 topics and weak in 1 topic.

The analysis of candidates' performance in each topic indicates that the questions with good performance were set from the topics of *Food Production (99.3%), Malnutrition (91.3%), Technology of Specific Products (88.8%), Nutrition Program Planning and Intervention (79.8%), Catering Institutional and Feeding (75.1%), Food Storage (72.5%)* and *Nutrient Requirement (70.7%).* The good performance in these topics was attributed by the candidates' adequate knowledge on the concept tested, understanding the requirements of the question and sufficient practical skills.

Furthermore, the analysis indicates that the questions constructed from the topic of *Food Microbiology (55.1%), Food Processing and Preservation (51.2%)* and *Food Composition (49.5%)* had average performance. The average performance in these topics was due to the sufficient knowledge that the candidates had about the subject content, something which made them provide relevant answers. However, in various parts of the question, some of the candidates provided less points, incorrect points or insufficient explanation, hence scoring relatively low marks.

On the other hand, the analysis shows that the question from the topic of *Food Quality and Safety (8.2%)* had weak performance. In addition, the analysis of individual question indicated that the candidates also achieved weak performance on questions number 2 (Paper 1) and 2 (Paper 2) which were set from the topics of *Food Composition* and *Food Microbiology* respectively. The candidates' weak performance observed in these topics was a result of failure to understand the requirement of some parts of the question, insufficient knowledge on the concepts tested that led them to provide incorrect responses and insufficient explanation when answering the question. Appendix A illustrates the candidates' performance in each topic for ACSEE 2022.

The topic-wise comparison of candidates' performance in the year 2021 and 2022 indicates that in ACSEE 2022, the candidates' performance on

some topics has maintained, while other topics has been improved and some has decreased. Further, the analysis indicates that the candidates maintained good performance on five topics namely *Food Production*, *Malnutrition, Technology of Specific Products*, *Nutrition Program, Planning and Intervention, catering and Institutional Feeding*, average performance on the topics of *Food Processing and Preservation* and *Food Composition*; whereas the candidates has been maintained weak performance on the topic of *Food Quality and Safety*. In addition, the candidates' performance has improved from average to good on the topics of *Food Storage* and *Nutrient Requirement* while that of *Food Microbiology* the performance decreased from good to average. Appendix B demonstrates this comparison.

4.0 CONCLUSION

Based on the analysis made in this report, the general performance of the candidates in Food and Human Nutrition subject in the ACSEE 2022 was good because 99.66 per cent of the candidates who sat for this examination passed. However, 0.34 per cent failed the examination by obtaining grade F. The general performance in Food and Human Nutrition ACSEE 2022 and the comparison of the candidates' general performances of 2021 with that of 2022 are summarised in Appendices C and D respectively.

The analysis of candidates' performance for each question shows that the good and average performances observed were attributed by the candidates' ability to understand the demands of the question, sufficient knowledge of Food and Human Nutrition concepts and adequate practical skills. On the contrary, the weak performance in some of the questions was a result of some candidates' failure to understand the demands of the questions and having inadequate knowledge on the concepts tested. Other factors were the candidates' provision of irrelevant responses, fewer points than the ones required by the question and lack of lucidity in explaining some points. Weak performance in individual question has been observed in the questions set from the topics of *Food Composition* and *Food Microbiology* in Paper 1 and paper 2 respectively.

5.0 RECOMMENDATIONS

Based on the analysis of the candidates' performance in the Food and Human Nutrition ACSEE 2022, it is recommended that:

(a) Subject teachers should invite guest speakers to explain about the concept of food quality assurance. This may help to engage students in broadening their knowledge, hence improving the performance on the topic of *Food Quality and Safety*.

(b) Teachers should guide students to carry out enough practical lessons on the topics of *Food Microbiology* and *Food Composition* in which majority of the candidates performed weakly. Sufficient practical lessons will help students master the topic mentioned easily.

(c) Teachers should arrange study tours to various Food and Nutrition institutions for the students to learn more about *Food Composition* specifically on *laboratory analysis of different food stuffs*, *Food Processing and Preservation* and *Food Microbiology*. The study tour will provide practical knowledge along with theoretical knowledge therefore, may improve students' understanding and increase candidates' performance on these topics.

(d) Students should be given exercises, tests and assignments regularly as these will motivate them to learn and familiarise in answering questions. Likewise, teachers should provide timely feedback as it improves students' learning.

(e) Teachers should continue to provide students with enough reading assignments on the topic of *Food Quality and Safety,* and guide them to perform group discussions and class presentations. This will improve the students' acquisition of knowledge about this topic.

Appendix A

Summary of Candidates' Performance per Topic for ACSEE 2022

S/N	Topic	Number of questions per topic	The average percentage of candidates who scored 35% or above	Remarks
1.	Food Production	1	99.3	Good
2.	Malnutrition	2	91.3	Good
3.	Technology of Specific Products	2	88.8	Good
4.	Nutrition Program, Planning and Intervention	3	79.8	Good
5.	Catering and Institutional Feeding	2	75.1	Good
6.	Food Storage	2	72.5	Good
7.	Nutrient requirement	2	70.7	Good
8.	Food Microbiology	2	55.1	Average
9.	Food Processing and Preservation	2	51.2	Average
10.	Food Composition	2	49.5	Average
11.	Food quality and safety	1	8.2	Weak

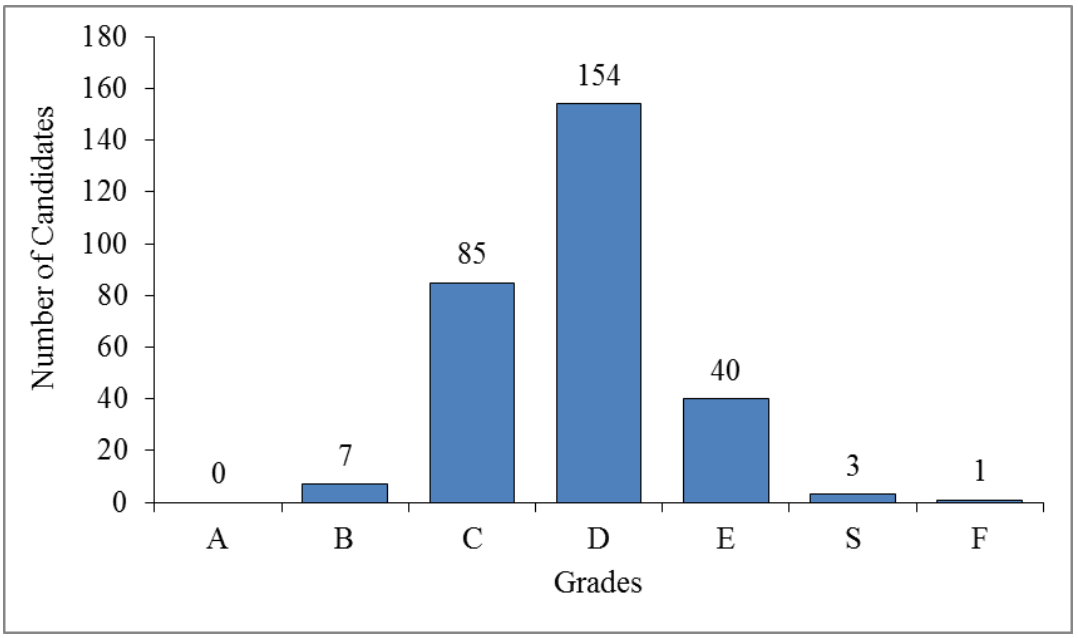
Appendix B

Comparison of Candidates' Performance per Topic between 2021 and 2022

S/N	Topic	2021			2022		
		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	78.6	Good	1	99.3	Good
2.	Malnutrition	2	75.4	Good	2	91.3	Good
3.	Technology of specific products	2	78.6	Good	2	88.8	Good
4.	Nutrition program, planning and intervention	3	74.2	Good	3	79.8	Good
5.	Catering and institutional feeding	2	75.8	Good	2	75.1	Good
6.	Food storage	2	37.4	Average	2	72.5	Good
7.	Nutrient requirement	2	49.7	Average	2	70.7	Good
8.	Food microbiology	2	78.1	Good	2	55.1	Average
9.	Food processing and preservation	2	52.0	Average	2	51.2	Average
10.	Food composition	2	49.2	Average	2	49.5	Average
11.	Food quality and safety	1	7.6	Weak	1	8.2	Weak

Appendix C

Candidates General Performance in ACSEE 2022



Appendix D

Comparison of Candidates' Performance in ACSEE 2021/2022