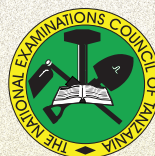




**THE UNITED REPUBLIC OF TANZANIA  
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY  
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA**



**STUDENTS' ITEM RESPONSE ANALYSIS REPORT  
ON THE FORM TWO NATIONAL ASSESSMENT  
(FTNA) 2021**

**BIOLOGY**





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**REPORT ON THE FORM TWO NATIONAL**  
**ASSESSMENT (FTNA) 2021**

**033 BIOLOGY**



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## FOREWORD

The National Examinations Council of Tanzania is delighted to issue the report on Students' Item Response Analysis (SIRA) in the Biology subject for the Form Two National Assessment (FTNA) 2021. The FTNA evaluates the competencies gained by students after their two years of secondary education. The scores obtained in FTNA are used as part of the continuous assessment in the Certificate of Secondary Education Examination.

This report provides feedback to students, teachers, parents, policy makers and the public in general on the performance of the students. It highlights factors which contributed to the achievements of the students as well as the challenges which the students faced in attempting the questions. The analysis shows that students had good performance in questions 1 and 2. The questions with average performance were 3, 5, 8 and 11. However, students performed poorly in questions 4, 6, 7, 9 and 10. The good performance of students was attributed to the ability to understand the demands of the questions, adequate knowledge about the assessed topics and good command of the English language. It was established that factors such as failure to understand the demands of the questions, lack of adequate knowledge in the respective topics and poor proficiency in the English language contributed significantly to the failure of students.

It is expected that, the feedback provided in this report will enable teachers and other education stakeholders to take appropriate measures in order to improve the teaching and learning of the Biology subject. In addition, the Council hopes that the appropriate measures that will be taken by teachers and students will improve performance not only in FTNA, but also in other national examinations.

The National Examinations Council of Tanzania is grateful to all stakeholders who provided valuable assistance in the preparation of this report in various capacities.



Dr. Charles E. Msonde  
**EXECUTIVE SECRETARY**



## **1.0 INTRODUCTION**

This report presents the analysis of responses provided by the students who sat for the FTNA Biology subject in November 2021. The FTNA Biology paper was set in accordance with the NECTA format issued in the year 2017. The questions were composed to assess the biological competencies stipulated in the Form One and Form Two Biology syllabuses of 2010.

The data indicate that a total of 652,596 students were registered for the FTNA. However, only 602,588 sat for the assessment, out of which 312,777 (51.98%) passed. The analysis indicated that, the general performance in this subject was average. The students performance in grades is as follows: A - 35,418 (11.3%), B - 31,350 (10.0%), C - 98,840 (31.6%), D - 147,169 (47.1%) and 288,969 (48.02%) students failed by scoring F. The performance in the year 2021 showed that 312,777 (51.98%) students passed. This implies that there is a decreased of 9.54 percent compared to FTNA in 2020 Biology where 369,612 (61.52%) students passed.

This report shows the students' responses in eleven questions that were divided into sections A, B and C. It begins by explaining what the questions required from the students and proceeds to analyse the students' performance. The national assessment results are based on the scores intervals; 75 – 100 (excellent), 65 – 74 (very good), 45 – 64 (good), 30 – 44 (satisfactory) and 0 – 29 (fail). For the purpose of this report, the analysis of students' responses to a particular question were considered to be good, average or weak if: the percentage of the students who scored 30 per cent or above of the marks allocated to the question fell within the range of 65 to 100, 30 to 64 and 0 to 29, respectively. It proceeds with highlighting the challenges that the students faced in responding to the questions and suggests the plausible reasons as to why they occurred. Extracts of responses from the students' scripts have been presented to show how they responded to the questions in view of the demand of each item. Furthermore, some charts and graphs have been used to illustrate the students' performance on each question. The green, yellow and red colours in charts and appendices represents good, average and weak performance, respectively.



Lastly, the report ends by giving a conclusion and some recommendations. In due regard, it is expected that teachers, students and education stakeholders will take advantage of the report to identify areas in which students had weakness and in so doing use the information to improve the teaching and learning of Biology subject.

## **2.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER QUESTION**

### **2.1 Section A: Objective Questions**

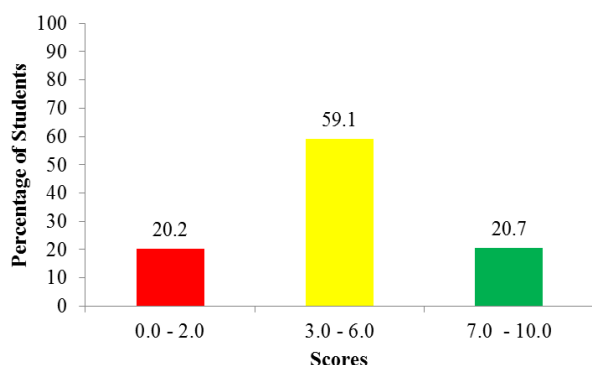
This section consisted of four (4) questions, namely multiple choices, true and false, matching items and completion of the statements items. Students were required to answer all questions in this section.

#### **2.1.1 Question 1: Multiple Choice Items**

In this question, there were ten (10) multiple choice items carrying a total of ten (10) marks. For each of the items (i) to (x), the students were required to choose the correct answer from among the given four (4) alternatives and write the letter of the correct response in the box provided. The items in this question were set from nine (9) topics, which are: Nutrition, Cell Structure and Organisation, Introduction to Biology, Health and Immunity, Gaseous Exchange and Respiration, Transport of Materials in Living Things, Balance of Nature, Safety in Our Environment and Classification of Living Things.

The analysis indicates that out of 602,588 students who attempted this question, 121,723 (20.2%) scored from 0 to 2 marks, out of which 7,781 (1.3%) scored 0 out of the 10 marks allocated to this question. Students who scored from 3 to 6 marks were 356,129 (59.1%) and those who scored from 7 to 10 marks were 124,736 (20.7%). Figure 1 summarizes the students' performance on question 1.





**Figure 1:** Students' Performance in Question 1

Figure 1 shows that students' performance on this question was good because 480,865 (79.8%) students scored from 3 to 10 marks. The analysis shows that out of 480,865 (79.8%) students, 11,789 (2.0%) wrote correct responses in all parts of the question, thus scored all the marks. This indicates that the students had adequate knowledge of the tested topics. The analysis of the students' responses in each item is presented as follows:

Item (i) *Scurvy is a nutritional deficiency disease due to lack of*

- |          |  |          |                                  |
|----------|--|----------|----------------------------------|
| <i>A</i> | <i>vitamin C in the diet.</i>              | <i>B</i> | <i>mineral salt in the diet.</i> |
| <i>C</i> | <i>vitamin B<sub>12</sub> in the diet.</i> | <i>D</i> | <i>vitamin D in the diet.</i>    |

The correct answer for this item was alternative A, *vitamin C in the diet*. The students who chose A, *vitamin C in the diet* were aware with the vitamin nutritional deficiencies and disorders in human being. The students who chose distracter B, *mineral salt in the diet* failed to understand that lack of mineral salts in the diet causes a number of deficiency diseases depending on the mineral that is lacking. For example, lack of iodine causes *goitre* and lack of iron causes *anaemia*. Likewise, those who chose incorrect options C, *vitamin B<sub>12</sub> in the diet* and D, *vitamin D in the diet* did not understand that lack of vitamin B<sub>12</sub> in the diet causes pernicious anaemia while lack of vitamin D results into rickets and not scurvy.

Item (ii) *Substances going in and out of the cell are controlled by*

- |          |                   |          |                       |
|----------|-------------------|----------|-----------------------|
| <i>A</i> | <i>cytoplasm.</i> | <i>B</i> | <i>cell membrane.</i> |
| <i>C</i> | <i>vacuole.</i>   | <i>D</i> | <i>tonoplast.</i>     |

The correct answer for this item was alternative B, *cell membrane*. The students who chose B, *cell membrane* understood the functions of the different parts of plant and animal cells. Therefore, they could connect the

function given with the correct part of the cell. On the other hand, the students who selected an alternative *A*, *cytoplasm* were not aware that cytoplasm is the site for many chemical reactions and cell organelles are also suspended in it. Similarly, students who chose distracter *C*, *vacuole* did not understand that vacuole secretes and excretes wastes from the cell. Moreover, those who chose alternative *D*, *tonoplast* failed to understand that, tonoplast is a membrane which surrounds a liquid called cell sap in a plant cell.

Item (iii) *Which of the following steps is not involved in scientific investigations?*

- |          |                               |          |                          |
|----------|-------------------------------|----------|--------------------------|
| <i>A</i> | <i>Problem identification</i> | <i>B</i> | <i>Asking question</i>   |
| <i>C</i> | <i>Formulating hypothesis</i> | <i>D</i> | <i>Solving questions</i> |

The correct answer for this item was alternative *D*, *Solving questions*. The students who chose the correct answer *D*, *Solving questions*, were familiar with the steps to be followed in a scientific investigation. On the other hand, those students who selected alternative *A*, *Problem identification*, *B*, *Asking questions* and *C*, *Formulating hypothesis* failed to understand that these are the first, second and third steps to be followed in a scientific research.

Item (iv) *A parasite which causes malaria is known as*

- |          |                     |          |                    |
|----------|---------------------|----------|--------------------|
| <i>A</i> | <i>schistosoma.</i> | <i>B</i> | <i>plasmodium.</i> |
| <i>C</i> | <i>mosquito.</i>    | <i>D</i> | <i>amoeba.</i>     |

The correct answer for this item was *B*, *plasmodium*. The students who chose the correct answer had sufficient knowledge about infections and diseases such that they could distinguish the parasite that causes malaria from others. Those who selected incorrect alternative *A*, *schistosoma* and *D*, *amoeba* failed to understand that schistosoma is a parasite which causes bilharzia/schistosomiasis, while amoeba causes amoebic dysentery/amoebiasis. Students who chose alternative *C*, *mosquito* failed to realize that mosquito is a vector which transmits malaria and not a parasite.

Item (v) *The process whereby carbon dioxide passes from blood into the alveoli of lungs is called*

- |          |                   |          |                     |
|----------|-------------------|----------|---------------------|
| <i>A</i> | <i>osmosis.</i>   | <i>B</i> | <i>respiration.</i> |
| <i>C</i> | <i>diffusion.</i> | <i>D</i> | <i>breathing.</i>   |

The correct answer for this item was alternative *C, diffusion*. Students who chose correct answer *C, diffusion* had clear understanding of the gaseous exchange in mammals. They knew that diffusion involves fluids ( liquids and gases) and that particles move from a region of high concentration to a region of low concentration. Therefore carbon dioxide is in high concentration in the blood so it moves to the alveoli for gaseous exchange. Students who chose alternative *A, osmosis* did not understand that osmosis involves the movement of water molecules from low concentration region to high solute concentration region through a selectively permeable membrane. On the other hand, those who chose incorrect alternative *B, respiration* and *D, breathing* failed to understand that respiration involves break down of food to release energy, carbon dioxide and water, while breathing involves taking air in and out of the lungs.

Item (vi) *A component of the blood which is responsible for blood clotting is known as*

- |          |                   |          |                     |
|----------|-------------------|----------|---------------------|
| <i>A</i> | <i>albumin.</i>   | <i>B</i> | <i>haemoglobin.</i> |
| <i>C</i> | <i>leucocyte.</i> | <i>D</i> | <i>fibrinogen.</i>  |

The correct answer for this item was *D, fibrinogen*. Students who chose this answer had sufficient knowledge about functions of major blood components therefore could identify that for a clot to occur at the site of a wound there must be soluble fibrinogen which is converted to insoluble fibrin that forms network of fibres. Those who chose *A, albumin*, and *B, haemoglobin* did not recognize that albumin is a blood protein responsible for carrying hormones, vitamins and enzymes while haemoglobin are found in red blood cells and are used to transport oxygen. Those who chose *C, leucocyte* failed to understand that leucocyte is a blood cell which fights against infections and diseases.

Item (vii) *Why rabbit is called a primary consumer?*

- |          |                             |          |                           |
|----------|-----------------------------|----------|---------------------------|
| <i>A</i> | <i>It feeds on animals</i>  | <i>B</i> | <i>It feeds on plants</i> |
| <i>C</i> | <i>It feeds on bacteria</i> | <i>D</i> | <i>It feeds on fungi</i>  |

The correct answer for this item was *B, It feeds on plants*. Students who chose *B, It feeds on plants* demonstrated adequate knowledge about interactions of organisms among themselves, thus, could identify that primary consumers feed on plants and rabbit is among them. Those who chose *A, It feeds on animals* failed to understand that organisms which



feeds on animals are secondary consumers. On the other hand, those who chose *C, It feeds on bacteria* and *D, It feeds on fungi* failed to understand that bacteria and fungi are decomposers.

Item (viii) *If you are asked to prepare a First Aid Kit with its components, which of the following will **not** be included?*

- |                           |                                    |
|---------------------------|------------------------------------|
| <i>A Iodine tincture</i>  | <i>B Medicine to cure diseases</i> |
| <i>C Pair of scissors</i> | <i>D Sterilized cotton wool</i>    |

The correct answer for this item was *B, Medicine to cure diseases*. Students who chose *B Medicine to cure diseases* had adequate knowledge about the component of the First Aid Kit as such could distinguish the components found in the first aid kit and those which are found in hospitals. Those who chose *A, Iodine tincture, C, Pair of scissors* and *D, Sterilized cotton wool* failed to realise that all these are components of the First Aid Kit.

Item (ix) *The following organisms belong to Kingdom Fungi*

- A Mucor, Mushroom, Yeast*
- B Moss, Mucor, Yeast*
- C Euglena, Mushroom, Mucor*
- D Liverworts, Mushroom, Mucor*

The correct answer for this item was alternative *A, Mucor, Mushroom, Yeast*. Students who chose the correct response had adequate knowledge of Kingdom fungi particularly Phylum Zygomycota, Basidiomycota and Ascomycota to which *mucor, mushroom* and *yeast*, respectively, belong. Those who chose alternative *B, Moss, Mucor, Yeast* and *D, Liverworts, Mushroom, Mucor*, failed to understand that although *mucor, yeast* and *mushroom* belongs to Kingdom Fungi, *liverwort* and *moss* belong to Kingdom Plantae. Those who chose alternative *C, Euglena, Mushroom, Mucor* failed to understand that *mushroom* and *mucor* belong to Kingdom Fungi but *euglena* belongs to Kingdom Protocista.

Item (x) *Which of the following is a risky behaviour?*

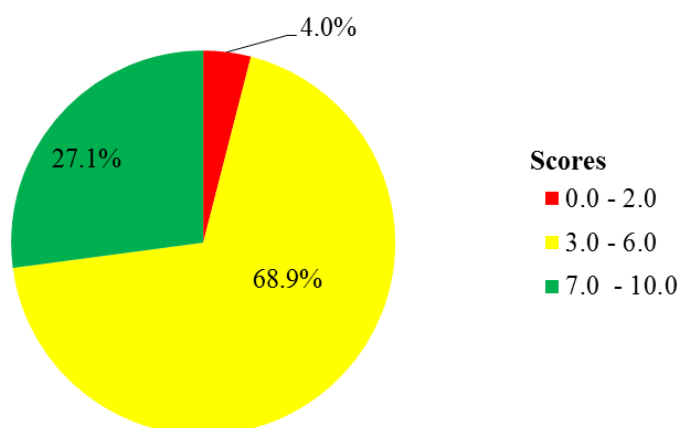
- A Accepting favours and gift from parents*
- B Having many sexual partners*
- C Keeping good company and avoiding immoral friends*
- D Shaking hands with HIV/AIDS infected individuals*

The correct answer for this item was *B, Having many sexual partners*. Students who chose *B, Having many sexual partners* had clear knowledge about STIs management (sexually transmitted infections) and HIV/AIDS (Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome). Those who opted for *A, Accepting favours and gift from parents*, *C, Keeping good company and avoiding immoral friends* and *D, Shaking hands with HIV/AIDS infected individuals* failed to understand that these are acceptable behaviours that do not put a person into a risk of being infected with STIs and HIV/AIDS.

### 2.1.2 Question 2: True and False Items

This question consisted of ten (10) statements composed from eight (8) topics, namely Safety in Our Environment, Nutrition, Health and Immunity, Transport of Materials in Living Things, Classification of Living Things, Introduction to Biology, Cell Structure and Organisation and Gaseous Exchange and Respiration. Students were required to write **True** if the statement is correct or **False** if the statement is incorrect in the spaces provided.

A total of 602,586 students attempted this question. The analysis shows that, 24,103 (4.0%) students scored from 0 to 2 marks. However, the analysis showed further that 1,434 (0.2%) students scored 0 out of the 10 marks allocated to this question. Students who scored from 3 to 6 marks were 415,182 (68.9%) and those who scored from 7 to 10 marks were 163,301 (27.1%). Figure 2 summarizes the students' performance on question 2.



**Figure 2:** Students' Performance in Question 2

The analysis shows that students' performance on this question was good because 578,483 (96.0%) students scored from 3 to 10 marks. It was further established that out of 578,483 (96.0%) students, 4,878 (0.8%) were able to identify the correct and incorrect statements accordingly and scored all the ten (10) marks. Extract 1.1 is a sample of a student's correct responses.

2. For each of the items (i) – (x), write **True** if a statement is correct or **False** if a statement is not correct in the spaces provided.

- (i) Sterile gauze is used for bandaging to allow enough air to get to the wound..... False.....
- (ii) Hydrochloric acid in the stomach is a natural defense against infections..... True.....
- (iii) Beard grows and breasts enlargement are secondary sexual characteristics in girls... False.....
- (iv) Aorta carries deoxygenated blood from the heart to the lungs..... False.....
- (v) A bacterium can be distinguished from amoeba by possession of cell wall..... True.....
- (vi) Acids and alkalis are corrosive substances because they emit harmful radiations... False.....
- (vii) Organ is a group of tissues that perform the same function..... True.....
- (viii) Digestion of protein starts in the mouth..... False.....
- (ix) Alveoli are structures that increase surface area for gaseous exchange in the lungs of human being..... True.....
- (x) Mosses provide shelter for small organisms..... True.....

**Extract 1.1:** A sample of student's correct responses to question 2



Extract 1.1 shows a sample of responses from the student who correctly responded to all the items. These responses indicate that the student had adequate knowledge of the tested concepts.

Those who performed poorly (0 – 2 marks) failed to give correct responses as per question requirements. This suggests that those students had inadequate knowledge of the tested concepts as it appears in the following analysis:

Item (i) asked that, *Sterile gauze is used for bandaging to allow enough air to get to the wound*. The correct response to this item was *False*. The students who opted for *True* failed to understand that sterile gauze is used for dressing a wound to prevent dirt and microorganisms from entering.

Item (ii) asked that, *Hydrochloric acid in the stomach is a natural defense against infections*. The correct response to this item was *True*. The students who opted for *False* failed to understand that hydrochloric acid kills organisms such as bacteria which might enter the stomach together with food.

Item (iii) asked that, *Beard grows and breasts enlargement are secondary sexual characteristics in girls*. The correct response to this item was *False*. The students who opted for *True* did not recognize that beard growth is a secondary sexual characteristic in boys.

Item (iv) asked that, *Aorta carries deoxygenated blood from the heart to the lungs*. The correct answer to this item was *False*. Students who opted for *True* failed to understand that aorta carries oxygenated blood from the heart to all body parts.

Item (v) asked that, *A bacterium can be distinguished from amoeba by possession of cell wall*. The correct response to this item was *True*. The students who opted for *False* failed to recognize that bacteria have cell wall, a feature which distinguishes it from amoeba that lacks a cell wall.

Item (vi) asked that, *Acids and alkalis are corrosive substance because they emit harmful radiations*. The correct answer to this item was *False*. The students who opted for *True* failed to understand that radiations are emitted by radioactive substances such as uranium.

Item (vii) asked that, *Organ is a group of tissue that perform the same function*. The correct answer to this item was *True*. The students who opted for *False* did not recognize that a group of tissues which perform same function forms an organ.

Item (viii) asked that, *Digestion of protein starts in the mouth*. The correct response to this item was *False*. The students who opted for *True* failed to understand that digestion of protein starts in the stomach.

Item (ix) asked that, *Alveoli are structures that increase surface area for gaseous exchange in the lungs of human being*. The correct answer to this item was *True*. The students who opted for *False* failed to understand that human being use lungs for gaseous exchange and these have numerous alveoli which increase surface area for gaseous exchange.

Item (x) asked that, *Mosses provide shelter for small organisms*. The correct answer to this item was *True*. The students who opted for *False* failed to understand that one of the advantages of mosses is provision of habitat for small organisms. Extract 1.2 is a sample of a student's incorrect responses.

2. For each of the items (i) – (x), write **True** if a statement is correct or **False** if a statement is not correct in the spaces provided.

(i) Sterile gauze is used for bandaging to allow enough air to get to the wound.....True.....

(ii) Hydrochloric acid in the stomach is a natural defense against infections.....False.....

(iii) Beard grows and breasts enlargement are secondary sexual characteristics in girls.....True.....

(iv) Aorta carries deoxygenated blood from the heart to the lungs.....True.....

(v) A bacterium can be distinguished from amoeba by possession of cell wall.....False.....

(vi) Acids and alkalis are corrosive substances because they emit harmful radiations.....True.....

(vii) Organ is a group of tissues that perform the same function.....False.....

(viii) Digestion of protein starts in the mouth.....True.....

(ix) Alveoli are structures that increase surface area for gaseous exchange in the lungs of human being.....False.....

(x) Mosses provide shelter for small organisms.....False.....

**Extract 1.2:** A sample of student's incorrect responses to question 2

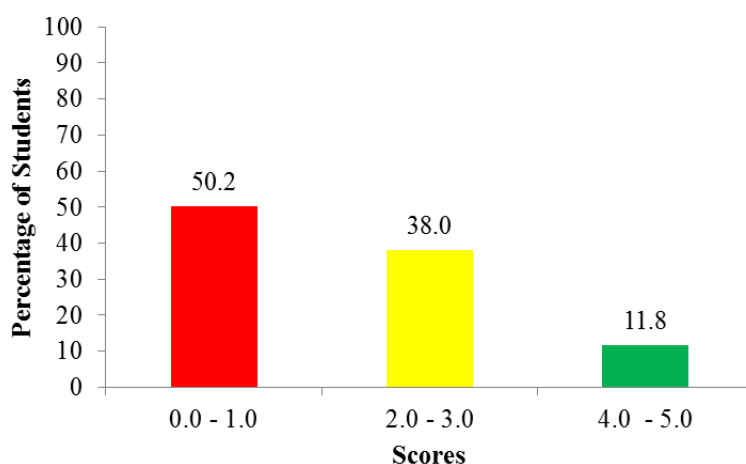
In Extract 1.2, the student wrote incorrect responses in all the items. This shows that the student had insufficient knowledge of tested topics.

### 2.1.3 Question 3: Balance of Nature

The question consisted of five (5) matching items, based on the topic of Balance of Nature. In this question, students were required to match phrases provided in **List A** with the responses in **List B** by writing the letter of the correct response below the corresponding item number in a table provided.

List A	List B
(i) <i>Organism which can manufacture their own food.</i>	A <i>Preys</i> B <i>Decomposers</i> C <i>Community</i>
(ii) <i>Members of the same species living in the same area.</i>	D <i>Predators</i> E <i>Trophic level</i> F <i>Population</i>
(iii) <i>Organism which rely on other organism for food.</i>	G <i>Producers</i> H <i>Consumers</i>
(iv) <i>A group of interdependent organisms living in an environment.</i>	
(v) <i>Organism which kill other organisms and feed on them wholly or in parts</i>	

Students' response analysis shows that, out of 602,586 students who attempted this question, 302,498 (50.2%) scored from 0 to 1 marks and 136,332 (22.6%) scored 0 out of 5 marks allocated to this question. The students who scored from 2 to 3 marks were 228,983 (38.0%), whereas 71,105 (11.8%) scored from 4 to 5 marks. Figure 3 summarizes the students' performance on question 3.



**Figure 3:** *Students' Performance in Question 3*

Based on Figure 3, students' performance on question 3 was average as 300,088 (49.8%) students scored 30 per cent or above of the 5 marks



allocated to this question. Further analysis shows that 26,009 (4.3%) students scored full marks (5) in this question. This shows that these students had sufficient knowledge of the topic of Balance of Nature. Extract 2.1 shows a response from a student who matched the phrases correctly.

**Answers**

<b>List A</b>	(i)	(ii)	(iii)	(iv)	(v)
<b>List B</b>	G	F	H	C	D

**Extract 2.1:** A sample of student's correct responses to question 3

In Extract 2.1, the student correctly matched the phrases with their correct responses and thus scored full marks. This indicates that the student had adequate knowledge of the tested concepts.

Those who scored low (0 – 1) mark failed to give correct responses as per requirements of the question. This indicates lack of knowledge of the tested concepts. The analysis of the item responses is as presented in the following:

Item (i) required the students to select a response which correctly matches the description of the organism which can manufacture their own food. The correct answer was *G, Producers*. Most students matched it correctly showing that they had adequate knowledge of the concept of feeding relationships. However, few selected *B, Decomposers*, these students failed to recognise that decomposers feed on dead and decaying organic matter.

Item (ii) required the students to select a response which correctly matches with a description of the members of the same species living in the same area. The correct answer was *F, Population*. Some students wrote alternative *C, Community*. These students failed to understand that Community is a group of interdependent organisms/different species living in an environment.

Item (iii) required the students to select a response which correctly matches with a description of organisms which rely on other organisms for food. The correct answer was *H, Consumers*. Most of the students got it right. However, some students chose alternative *B, Decomposers* and *D, Predators*. These students failed to understand that decomposers feed on

dead and decaying organic matter, while predators hunt, capture, kill and feed on the whole organism or in parts.

Item (iv) required the students to select a response which correctly matches with a description of a group of interdependent organisms living in an environment. The correct answer for this item was *C, Community*. Most of the students provided the correct response. However, some lacked knowledge of the concept of the natural environment hence chose *A, Preys*. They failed to understand that prey is the animal fed on by a predator.

Item (v) required the students to select a response which correctly matches the description of organisms which kill other organisms and feed on them wholly or in parts. The correct answer was *D, Predators*. Most students matched it correctly showing that they had adequate knowledge of interdependence among organisms. Extract 2.2 is a sample of a student's incorrect responses.

**Answers**

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	D	E	B	G	H

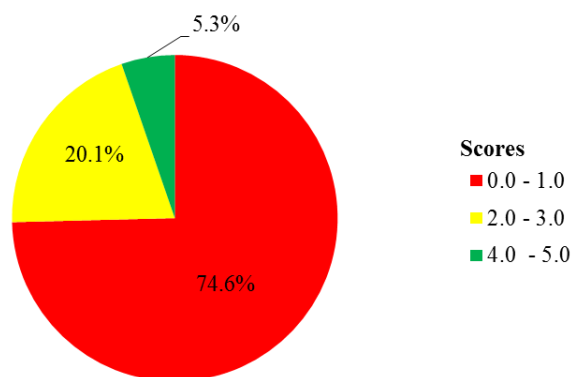
**Extract 2.2:** A sample of student's incorrect responses to question 3

In Extract 2.2, the student failed to match all the items of the question correctly. These responses imply that the student had inadequate knowledge of the tested concepts.

#### 2.1.4 Question 4: Gaseous Exchange and Respiration

This question required the students to complete the statements by writing the correct answer in the spaces provided in each item. The question consisted of five items from the topic of Gaseous Exchange and Respiration. The question had a total of five (5) marks.

A total of 602,586 students attempted this question. The analysis of students performance shows that 449,529 (74.6%) students scored from 0 to 1 mark, out of which 313,638 (52.1%) scored 0. Students who scored from 2 to 3 marks were 121,120 (20.1%) and those who scored from 4 to 5 marks were 31,937 (5.3%). Figure 4 summarizes the students' performance on question 4.



**Figure 4:** *Students' Performance in Question 4*

Figure 4 shows that the general performance on this question was poor because majority (74.6%) of the students scored from 0 to 1 out of the 5 marks allotted to this question. The analysis of the students' responses shows that poor performance was attributed to insufficient knowledge of the topic of Gaseous Exchange and Respiration. The analysis of the item responses is presented as follows:

Item (i) required the students to complete the statement: *A process of taking air into the lungs of mammals is called \_\_\_\_\_*. The correct answer was *inhalation/inspiration/breathing in*. Most of the students failed to distinguish inhalation and exhalation. Therefore, they wrote exhalation which is incorrect response. The analysis reveals further that incorrect responses such as, *gaseous exchange*, *breathing* and *aerobic respiration* were observed in students' scripts. These responses show that the students lacked clear understanding of the mechanism of gaseous exchange in mammals.

Item (ii) required the students to complete the statement: *A muscular sheet of tissue which separates the thorax from the abdomen is known as \_\_\_\_\_*. The correct answer was *diaphragm*, but some of the students wrote *intercostal muscles*. They failed to understand that intercostal muscles are found between the ribs mainly to allow expansion and contraction of the thoracic cavity. Also there were other students who wrote responses such as *smooth muscles* and *skeletal muscles*. Others confused it with cell differentiation because of the word tissue in the statement and wrote *organ*

instead of diaphragm. Moreover, other students skipped this part indicating lack of adequate knowledge of the concept tested.

Item (iii) required the students to complete the statement: *A process by which air diffuse in and out of the body across the respiratory surfaces is called \_\_\_\_\_*. The correct answer was *gaseous exchange*. Some of the students wrote *respiration*, *excretion*, *diffusion* and *photosynthesis*. This shows that the students lacked clear understanding of the concept tested.

Item (iv) required the students to complete the statement: *The structure which protect the lungs from injury is known as \_\_\_\_\_*. The correct answer was *ribs/rib cage/thoracic cage* but most of the students wrote incorrect responses such as *vertebral column*, *trachea*, *tracheal system*, *mucus*, *bronchioles* and *lung cage*. Other students wrote *diaphragm*. These students failed to recognize that diaphragm is muscular sheet of tissue that separates the thorax from abdomen. This indicates that the students lacked enough knowledge about the concept tested.

Item (v) required the students to complete the statement: *The structure which is used for gaseous exchange in spider is known as \_\_\_\_\_*. The correct answer was *book lung*. Most of the students wrote the organs used for gaseous exchange in other living organisms such as *gills in fish*, *skin in frogs/toads*, *tracheal system in insects*, and *cell membrane in amoeba*. Also, some of the students wrote *spiracles* the structure in insects which allows air to enter the tracheal tubes. Furthermore, there were other students who wrote adaptive features found in the mammalian respiratory system such as *cilia*, *hairs*, *alveoli*, *mucus* and *epiglottis*. All these incorrect responses indicate that students had inadequate knowledge of the concept of gaseous exchange, specifically parts responsible for gaseous exchange in living organisms. Extract 3.1 is a sample of a student's incorrect responses.



4. Complete each of the following statements by writing the correct answer in the spaces provided.

- (i) A process of taking air into the lungs of mammals is called.....*respiration*.....
- (ii) A muscular sheet of tissue which separates the thorax from the abdomen is known as.....*cardiac muscles*.....
- (iii) A process by which air diffuses in and out of the body across the respiratory surfaces is called.....*breathing*.....
- (iv) The structure which protect the lungs from injury is known as.....*skeleton*.....
- (v) The structure which is used for gaseous exchange in spider is known as.....*lungs*.....

**Extract 3.1:** A sample of student's incorrect responses to question 4

In Extract 3.1, the student wrote *respiration* instead of *inhalation* in (i) and *cardiac muscles* instead of *diaphragm* in (ii). Also the responses given (iii), (iv) and (v) were incorrect.

Despite the poor performance on this question, 121,120 (20.1%) students scored 2 to 3 out of the five marks allocated, hence had average performance. However, 10,163 (1.7%) students had adequate knowledge of the tested concepts, hence scored all the 5 marks. Extract 3.2 is a sample of a student's correct responses.

4. Complete each of the following statements by writing the correct answer in the spaces provided.

- (i) A process of taking air into the lungs of mammals is called.....*Inhalation*.....
- (ii) A muscular sheet of tissue which separates the thorax from the abdomen is known as.....*Diaphragm*.....
- (iii) A process by which air diffuses in and out of the body across the respiratory surfaces is called.....*Gaseous exchange*.....
- (iv) The structure which protect the lungs from injury is known as.....*Rib cage*.....
- (v) The structure which is used for gaseous exchange in spider is known as.....*Book lung*.....

**Extract 3.2:** A sample of student's correct responses to question 4

Extract 3.2 shows correct responses from a student who had sufficient knowledge of the tested concepts, thus scored all the five marks.

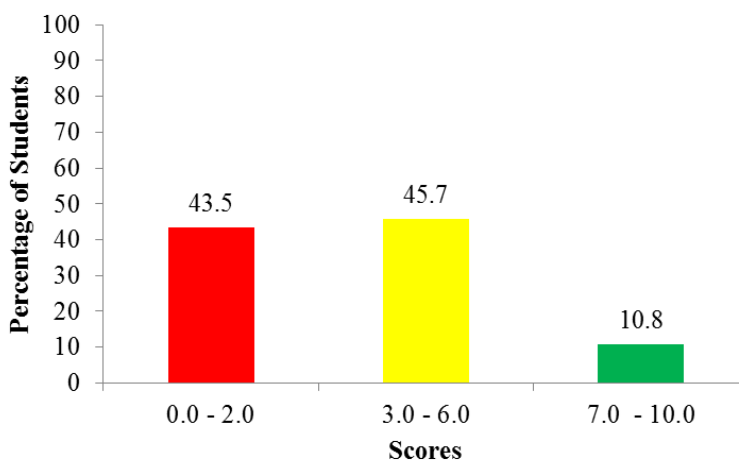
## 2.2 Section B: Short Answer Questions

This section consisted of five (5) short answer questions, carrying ten (10) marks each.

### 2.2.1 Question 5: Introduction to Biology

This question had three parts; (a), (b) and (c). In part (a), students were required to state the uses of each of the following laboratory apparatuses: (i) Mortar and pestle (ii) Petri dish (iii) Test tube rack (iv) Bunsen burner (v) Thermometer. In part (b), students were required to differentiate the term zoology from botany. In part (c), they were required to briefly explain how biology is related to the field of nutrition.

Students' response analysis shows that out of 602,588 students who attempted this question, 262,126 (43.5 %) scored from 0 to 2 marks, out of which 121,717 (20.2%) scored 0 mark. The students who scored from 3 to 6 marks were 275,383 (45.7%), whereas 65,079 (10.8%) scored from 7 to 10 marks. Figure 5 summarizes students' performance on question 5.



**Figure 5:** *Students' Performance in Question 5*

Figure 5 shows that 340,462 (56.5%) students had average performance by scoring from 3 to 10 marks. Most of them provided correct responses in part (a) and (b) but supplied incorrect responses in part (c), hence obtained an average score. Further analysis shows that 13,762 (2.3) students scored all the marks. The students correctly stated the uses of laboratory apparatuses in part (a) and were able to differentiate the term zoology from

botany in part (b). In part (c), they correctly explained how biology is related to the field of nutrition. This indicates that the students understood the demand of the question. Extract 4.1 illustrates a sample of students' correct responses.

5. (a) State the uses of each of the following laboratory apparatuses.

(i) Mortar and pestle... used for grinding solid substances.

(ii) Petri dish... used for placing an organism on it for close observation.

(iii) Test tube rack... storing test tubes.

(iv) Bunsen burner... used for heating substances in the laboratory.

(v) Thermometer... used for measuring temperature of different substances.

(b) Differentiate the term zoology from botany.  
Zoology is the branch of biology which deals with the study of animals while Botany is the branch of Biology which deals with the study of plants.

(c) How is Biology related to the field of nutrition? Briefly explain.  
Nutrition relates with Biology in such a way that nutrition requires the knowledge of Biology to know the kind of nutrients required for different functions in the body also dieticians use the knowledge of Biology to determine diets of people with different health status.

**Extract 4.1:** A sample of student's correct responses to question 5

In extract 4.1, the student correctly stated the uses of the laboratory apparatuses in part (a). In part (b), the student correctly differentiated the terms. Also he/she explained how biology is related to the field of nutrition in part (c).

However, the analysis indicates that 262,126 (43.5 %) students obtained 0 - 2 marks. In part (a) they stated either only one correct use or all incorrect uses of the laboratory apparatuses. For example, in part (a) (i) some of the students wrote the use of beaker instead of mortar and pestle as *mortar and pestle is used for holding chemicals* while others wrote *mortar and pestle is used for boiling substances in the laboratory*. Incorrect responses show that the students lacked skills on biology laboratory specifically the uses of apparatuses.

In part (a) (ii), some of the students stated the use of measuring cylinder instead of petri dish as *petri dish is used to measure the volume of liquids*. Likewise, in part (a) (iii), some of the students wrote the use of test tube holder instead of test tube rack as *test tube rack used to hold test tubes*. All these incorrect responses clearly shows that the students lacked enough knowledge of the uses of apparatuses in the laboratory.

In part (a) (iv), some of the students wrote the use of hand lens instead of bunsen burner as *bunsen burner is used to magnify specimens in the laboratory*. In part (a) (v), most of the students got it right as they were able to connect with the real life situation as it is commonly used in hospitals to measure the body temperature.

Moreover, in part (c), most of the students incorrectly related biology to the field of nutrition. For example, some of them wrote; *biology is the study of living thing and nutrition is a topic in biology*. Another student wrote *nutrition is how organisms obtain their food while biology is the study of nutrition*. These responses indicate that students had inadequate knowledge of the basic concepts and terminologies of biology. Extract 4.2 is a sample of a student's incorrect responses.

5.	(a)	State the uses of each of the following laboratory apparatuses.
	(i)	Mortar and pestle...It used for keeping chemical.....
	(ii)	Petri dish...It use for washing apparatuses.....
	(iii)	Test tube rack...used to measure chemical.....
	(iv)	Bunsen burner...used for keeping apparatuses.....
	(v)	Thermometer...used to measure temperature of the body.....
	(b)	Differentiate the term zoology from botany. Zoology - is the study of plant while botany is the study of animals.....
	(c)	How is Biology related to the field of nutrition? Briefly explain. Nutrition - is the process by which food substance are broken down step by step to provide energy.....

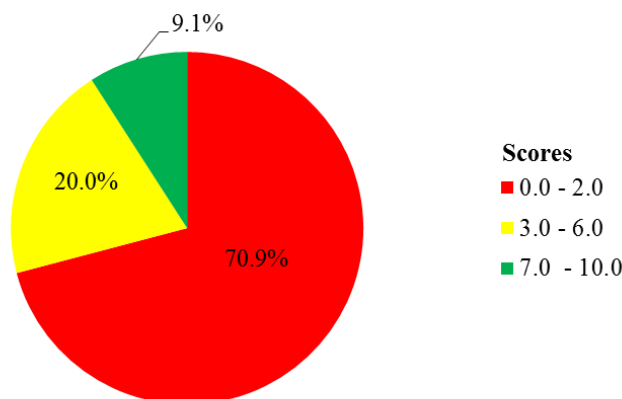
**Extract 4.2:** A sample of student's incorrect responses to question 5

In Extract 4.2, the student incorrectly stated the uses of the laboratory apparatuses in part (a) (i), (ii), (iii) and (iv). The student failed to differentiate the terms zoology and botany in part (b). Also, the student incorrectly defined nutrition instead of explaining how biology is related to the field of nutrition in part (c). However, the response given in (v) was correct.

### 2.2.2 Question 6: Nutrition

The question had three parts; (a), (b) and (c). In part (a), students were required to explain why it is health to be advised to eat balanced diet while in part (b), required them to state three symptoms which can be observed to a child suffering from kwashiorkor. In part (c), the students were required to give two natural sources of food which must be fed to the child to avoid kwashiorkor.

A total of 602,587 students attempted this question. The analysis of students' performance shows that, 427,234 (70.9%) students scored from 0 to 2 marks, out of which 320,836 (53.2%) scored 0 out of the 10 marks allocated to this question. Students who scored from 3 to 6 marks were 120,517 (20.0%) and those who scored from 7 to 10 marks were 54,836 (9.1%). Figure 6 summarizes the students' performance on question 6.



**Figure 6:** *Students' Performance in Question 6*

Based on the analysis in Figure 6, the general performance on this question was weak because 427,234 (70.9%) students scored 0 to 2 marks. 320,836 (53.2%) students provided incorrect responses in all parts of the question, hence scored 0 mark. Most of the responses given by these



students were contrary to the demands of the question. For instance, in part (a), most of the students defined balanced diet as *the type of food which contain all the food types in their right proportion* instead of explaining as to why it is health advised to eat balanced diet. Others defined the word *health as the state of physical, mental and social well being*. These students failed to understand that, *it is healthy to eat balanced diet because it: boosts body immunity and prevent us from getting diseases, provides the body with energy, insulates the body, promote good health, growth and body repair*.

Likewise, in part (b) some students failed to state two symptoms of a child who is suffering from kwashiorkor. Most of the students wrote the symptoms of communicable diseases. For example, some students wrote the symptoms of malaria as *vomiting, nausea and headache*. Others wrote the symptoms of tuberculosis as *night sweats, prolonged cough and poor appetite*. Also, there were other students who wrote the symptoms of digestive system diseases. For example, some students provided the symptoms of heart burn instead of kwashiorkor as *burning sensation in the oesophagus, loss of voice and difficult swallowing* instead of stating symptoms of a child who is suffering from kwashiorkor. These students failed to understand that a child suffering from kwashiorkor shows the following symptoms: *child looks weak, swollen abdomen, hair is easily plucked off, the limbs become thin and weak, skin becomes dry and cracks easily, loss of appetite, diarrhoea, stunted growth as a result of protein deficiency, hair progressively changes in texture and becomes soft, anaemia, weakened body immunity, hair changes colour and becomes reddish or yellowish and loss of body weight*.

Furthermore, in part (c), some students wrote incorrect natural sources of food which must be fed to the child to avoid kwashiorkor. Some of them wrote sources of carbohydrate such as *rice, wheat, maize, irish potatoes and cassava* instead of protein sources such as *meat/chicken/beef/pork fish/sardines/tilapia, eggs, beans, milk, peas, groundnuts cowpeas and legumes*. Others wrote sources of vitamins as, *mangoes, pineapples, green vegetables and banana*. Such responses indicate that the students had inadequate knowledge of nutrition in mammals, specifically human nutrition. Extract 5.1 is a sample of a student's incorrect responses.

6. (a) Why is it health to be advised to eat balanced diet?  
~~Eat~~ balanced diet because balance diet ~~is~~ Contain all  
 type of food.

(b) If a child is suffering from kwashiorkor, which symptoms can be observed? State three.

(i) Fever

(ii) Shortage of breath.

(iii) Loss of ~~eat~~ taste of food.

(c) Give two natural sources of food\* which must be fed to the child to avoid kwashiorkor.

(i) Protein

(ii) Vitamin

**Extract 5.1:** A sample of student's incorrect responses to question 6

In Extract 5.1, the student provided incorrect responses in all parts of the question. For example, he/she incorrectly defined balanced diet instead of stating why it is health to eat balanced diet in part (a). He/she stated symptoms of plague instead of kwashiorkor in part (b). Also, the student wrote the types of food in part (c) instead of natural sources of protein food.

The analysis indicates that 175,533 (29.1%) students scored from 3 to 10 marks. In this category, some of the students correctly stated 1 to 2 symptoms of kwashiorkor in part (a), and gave one natural food sources to be fed to the child to avoid kwashiorkor in part (c), thus failed to score full marks. Further analysis reveals that out of 54,836 (9.1%) students who scored 7 to 10, 12,504 (2.1%) students gave correct responses in all parts of the question and scored all the 10 marks. These students correctly gave reason to why it is health to eat balanced diet in part (a). Also, they correctly stated the symptoms of kwashiorkor in part (b), and gave two natural sources of protein. Extract 5.2 illustrates a sample of students' correct responses.

6.	(a)	Why is it health to be advised to eat balanced diet?
		So as to protect our bodies from diseases and infections that interfere with the health of our body but also to have energy in the body:.....
	(b)	If a child is suffering from kwashiorkor, which symptoms can be observed? State three.
	(i)	stunted growth.....
	(ii)	swollen abdomen.....
	(iii)	Reddish hair.....
	(c)	Give two natural sources of food which must be fed to the child to avoid kwashiorkor.
	(i)	Milk.....
	(ii)	Fish.....

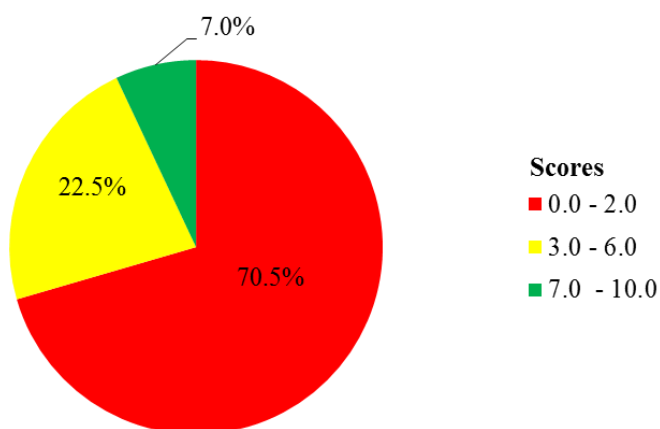
**Extract 5.2:** A sample of student's correct responses to question 6

Extract 5.2 illustrates a sample of a response from the student who correctly provided reasons as to why it is health to be advised to eat balanced diet in part (a). Also, the student correctly stated the symptoms of kwashiorkor in part (b). In part (c), the student gave two natural food sources which must be fed to the child to avoid kwashiorkor.

### 2.2.3 Question 7: Health and Immunity

The question had three parts, namely (a), (b) and (c). In part (a), students were required to differentiate an infection from a disease. In part (b), the students were given two different ways through which communicable disease are transmitted, which are: (i) Sexual intercourse (ii) Contaminated food and water. They were required to name two diseases transmitted by each way. In part (c), they were required to explain four importance of providing care and support to people living with HIV/AIDS.

The analysis revealed that, out of 602,586 students who responded to this question, 424,823 (70.5%) scored from 0 to 2 marks, out of which 233,391 (38.7%) scored 0 mark. Further analysis shows that 135,582 (22.5%) students scored from 3 to 6 marks, whereas 42,181 (7.0%) scored from 7 to 10 marks. Figure 7 summarizes the students' performance on question 7.



**Figure 7: Students' Performance in Question 7**

In general, Figure 7 indicates that the students' performance on this question was weak because 424,823 (70.5%) scored from 0 to 2 marks, out of 10 marks allocated to this question. In part (a), most of the students failed to differentiate the terms. Some of them differentiated them as communicable and non communicable diseases, as follows *infection is the disease which can be transmitted from one person to another while disease is the disease which cannot be transmitted from one person to another*. Others differentiated the terms as pathogen and vector, as: *infection is a microorganism that cause disease while disease is an organism which spread disease from one person to another*. These students failed to understand that *infection is the invasion of the body by disease causing organism/germs/microorganisms/parasites while disease is a condition other than injury that interferes with the normal functioning of the body*. *Infection has no signs and symptoms while disease have signs and symptoms*.

Likewise, in part (b), the students wrote diseases transmitted through ways different from the required ones. For example, in part (a) (i) and (ii), some of the students wrote diseases transmitted through droplet infections such as *tuberculosis* and *meningitis*. Others wrote diseases transmitted by vector as *bilhazia*, *sleeping sickness* and *plague*. Also in part (b) (ii), some of them wrote non communicable diseases as *marasmus*, *diabetes*, *rickets*, and *scurvy*. These students did not understand that diseases transmitted through sexual intercourse are *AIDS*, *gonorrhoea*, *syphilis*, *candidiasis*, *genital*

herpes/genital warts/chancroid, hepatitis B, chlamydia, cervical cancer, trichomoniasis and candidiasis. Those which are transmitted through contaminated food and water are cholera, typhoid, amoebic dysentery and schistosomiasis/bilharziasis/bilharzia.

Moreover, in part (c) (i), some of the students incorrectly wrote the ways of preventing HIV/AIDS instead of the importance of providing care and support to people living with HIV/AIDS, as they wrote: *be faithful to only one partner, use screened blood, avoid sharing of skin piercing tools such as razor blade and abstain from sexual intercourse*. Others wrote different ways of caring and supporting people living with HIV/AIDS, such as *provide them with ARVs, offering financial support, giving them balanced diet and offering spiritual support* instead of the importance of providing care and support to people living with HIV/AIDS. These responses indicate that students had inadequate knowledge about the infections and diseases and care and support of people living with HIV/AIDS. Extract 6.1 is a sample of a student's incorrect responses.

7. (a)	How is infection differs from disease?
	Infection differ from disease are pandemic disease ... Epidemic disease and endemic disease
(b)	The following are different ways through which communicable diseases are transmitted. Name two diseases transmitted by each way.
(i)	Sexual intercourse... <u>malera, cholera</u>
(ii)	Contaminated food and water... <u>Hiv /Aids, gonorrhea</u>
(c)	Why is it important to provide care and support to people living with HIV/AIDS? Give four points.
(i)	people for living HIV/AIDS support out clinic from one point to another
(ii)	you see the doctor and check for papie then go home you come some day
(iii)	Then doctor say people you are very fat and fruit
(iv)	After eat fruit check then and eat and washing han d. washing toilet, brush teeth after twice a day.

**Extract 6.1:** A sample of student's incorrect responses to question 7

In Extract 6.1, the student listed categories of communicable diseases as *pandemic*, *epidemic* and *endemic disease* instead of differentiating the terms infection and disease in part (a). In (b) (i), the student wrote *malaria* which is transmitted by vector and *cholera* transmitted through contaminated food and water instead of disease transmitted through sexual intercourse, such as HIV/AIDS, syphilis and gonorrhoea. In part (a) (ii), he/she wrote *HIV/AIDS* and *gonorrhoea* instead of diseases which are transmitted through contaminated water and food, such as cholera, typhoid and amoebiasis. Also the responses given in part (c) were incorrect.

However, 177,763 (29.5%) students scored from 3 to 10 marks. In this category, some of the students correctly differentiated the terms in (a), named the diseases transmitted through each way in (b), but gave 2 to 3 points in part (c), hence loss some of the marks. Further analysis reveals that out of 42,181 (7.0%) students who scored 7 to 10, 6,540 (1.1%) students provided correct responses in all parts of the question, hence scored all the 10 marks. These students correctly differentiated the terms in (a), named the diseases transmitted through each way in (b), and gave reasons for care and support to people living with HIV/AIDS. This indicates that, they had sufficient knowledge about the tested concepts. Extract 6.2 illustrates a sample of students' correct responses.



7. (a) How is infection differs from disease?  
 Infection is the attack of the body by pathogens.  
 WHILE disease is the abnormal functioning of the body.

(b) The following are different ways through which communicable diseases are transmitted. Name two diseases transmitted by each way.  
 (i) Sexual intercourse HIV/AIDS, syphilis  
 (ii) Contaminated food and water Cholera, Typhoid.

(c) Why is it important to provide care and support to people living with HIV/AIDS?  
 Give four points.  
 (i) To avoid stigmatization among the people living with HIV/AIDS which enhance the victim to live long.  
 (ii) It reduce the risk of infection with other diseases which can make them to live comfortable.  
 (iii) It gives hope and encouragement to the people living with HIV/AIDS to enable them live well as other people.  
 (iv) It reduces fear of death as Family, Friends, and other people are nearby.

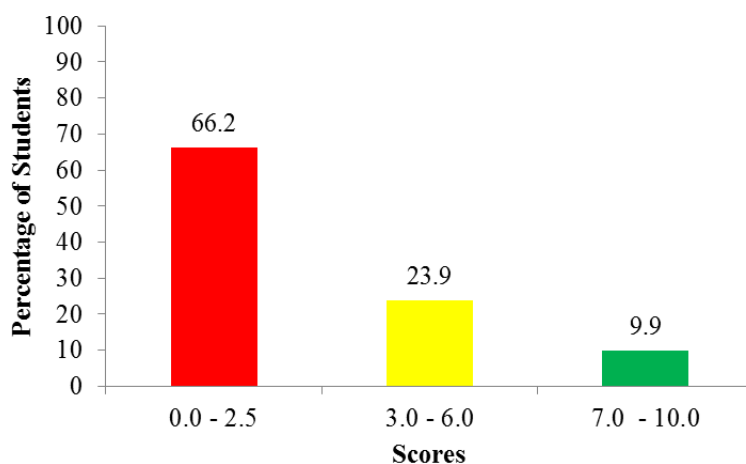
**Extract 6.2:** A sample of student's correct responses to question 7

In Extract 6.2, the student correctly differentiated the term infection from disease in part (a). He/she correctly named disease which are transmitted through each way in part (b) (i) and (ii). Also in part (c), the student correctly provided reasons for providing care and support to people living with HIV/AIDS.

## 2.2.4 Question 8: Cell Structure and Organisation

The question had three parts; (a), (b), and (c). In part (a), students were required to give two examples of tissues, organs and systems found in human body. In part (b), they were required to outline four characteristics of a cell. In part (c), the students were asked to briefly explain what will happen if chloroplast is removed from a plant cell.

A total of 602,588 students attempted this question. The analysis of students' performance shows that 398,913 (66.2%) students scored from 0 to 2.5, out of which 185,614 (30.8) scored 0 out of the 10 marks allocated to this question. Students who scored from 3 to 6 marks were 144,019 (23.9%) and those who scored from 7 to 10 marks were 59,656 (9.9%). Figure 8 summarizes the students' performance on question 8.



*Figure 8 : Student's Performance in question 8*

The analysis shows that the students' performance on this question was average because 203,675 (33.8%) students scored from 3 to 10 marks. Most of the students who scored 3 to 6 marks gave 2 to 3 examples of tissue, organ and system in part (a). Also, they outlined 2 to 3 characteristics of a cell in part (b), but wrote incorrect response in part (c), hence could not score full marks. Further analysis reveals that out of 59,656 (9.9%) students who scored 7 to 10 marks, 2,297 (0.4%) students gave correct responses in all parts of the question thus scored all the 10 marks. These students provided two examples of tissues, organs and systems found in human body in part (a) correctly. They also managed to outline four characteristics of a cell in part (b) and explained what will happen if chloroplast is removed from a plant cell in part (c). This indicates that the students had adequate knowledge of the topic of Cell Structure and Organisation. Extract 7.1 is a sample of a student's correct responses.

8. (a) Give two examples of each of the following found in the human body.

S/n	Tissue	Organ	System
(i)	Blood	Heart	circulatory system
(ii)	Bone	Kidney	lymphatic system

(b) Outline four characteristics of a cell.

(i) The cell should have nucleus

(ii) The cell should have cell membrane

(iii) The cell should have cytoplasm

(iv) The cell should have vacuole

(c) What will happen if chloroplast is removed from a plant cell?, Briefly explain.

The plant cell will lack the green pigment called chlorophyll which traps sunlight energy essential for manufacturing of food as a result the plant will die.

**Extract 7.1:** A sample of student's correct responses to question 8

In Extract 7.1, the student correctly gave examples of tissues, organs and systems in part (a). He/she also outlined the characteristics of a cell in part (b) correctly. In part (c), the student explained clearly what will happen if the chloroplast is removed from a plant cell.

However, 398,913 (66.2%) students scored 0 – 2.5 marks in this question. For 185,614 (30.8) students who scored zero mark, either they did not understand the demands of the question or they lacked knowledge of the tested concepts, thus provided incorrect responses in all parts of the question. Those who scored 1 to 2.5 marks wrote either only one or two correct examples. For example, some students wrote tissues, organs and system as tissue- *Cell membrane* and *cell wall*, organ- *nucleus* and *cytoplasm*, system- *chloroplast* and *vacuole*. Some of the students wrote examples of cells in place of tissues as *white blood cell*, *red blood cell*. Others had correct examples of tissues and organs but interchanged them as tissue- *eye*, *kidney*; Organ- *muscle*, *xylem*. Also, on the part of system some wrote different processes instead of system such as *nutrition*, *excretion*, *respiration*, while others wrote the names of different organisms such as *fish*, *frog*, *human being*, *yeast*, *moss* and *mushroom*. These responses show that the students had no understanding of cell differentiation.

Likewise, in part (b), some students failed to outline four characteristics of a cell. Most of them wrote the ideas of the cell theory as *cells are basic unit*

of life, all life processes takes place in a cell, cells are produced from other cells and all living things are composed of cells. Others wrote the characteristics of living things instead of the characteristics of a cell as *respiration, movement, sensitivity and growth*. These students did not understand that cells are characterized by having: *nucleus/genetic material, cytoplasm, cell membrane, vacuole*. Also cells are very small or *microscopic and they have ability to replicate*.

Furthermore, in part (c), some students provided incorrect explanation. Some of them explained the reasons of removing other parts of cell instead of chloroplast, as *plant cell will be regular because the chloroplast give plant cell regular shape*. Others wrote the plant cell will *have no place to suspend its organelles because organelles such as nucleus are suspended in the chloroplast*. These responses suggest that these students had inadequate knowledge of the topic of Cell Structure and Organisation, and consequently, they ended up providing incorrect responses. Extract 7.2 is a sample of a student's incorrect responses.

8. (a) Give two examples of each of the following found in the human body.

S/n	Tissue	Organ	System
(i)	Animal cell	blood	lungs.
(ii)	Plant cell	cell	Muscles

(b) Outline four characteristics of a cell.

(i) ..... It is a basic unit of life.

(ii) ..... It is a source of life.

(iii) ..... It is a source of tissue.

(iv) ..... It is a source of organ.

(c) What will happen if chloroplast is removed from a plant cell? Briefly explain.

..... A plant cell will lose the part which can control substances.

.....

.....

**Extract 7.2:** A sample of student's incorrect responses to question 8

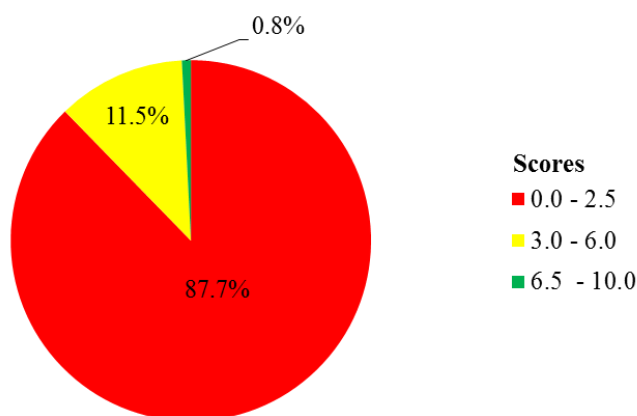
In Extract 7.2, the student wrote *blood* as example of organ instead of tissue. He/she also wrote *lung* and *muscles* as examples of system instead

of writing muscle and lung as example of tissue and organ, respectively, in part (a). Also, the responses given in parts (b) and (c) are incorrect.

### 2.2.5 Question 9: Transport of Materials in Living Things

The question had three parts; (a), (b) and (c). In part (a), students were required to explain the term “Transport of materials” as used in Biology. In part (b), the students were required to briefly explain what will happen to the following (i) A plant cell is immersed in hypotonic solution (ii) The cardiac muscles in the heart stop working. In part (c), the students were required to state three ways of controlling leukaemia.

The analysis shows that 602,582 students attempted this question. The analysis of students performance shows that 528,464 (87.7%) students scored from 0 to 2.5 marks, out of which 399,179 (66.2%) scored 0 marks. The students who scored from 3 to 6 marks were 69,297 (11.5%) whereas 4,821 (0.8%) scored from 6.5 to 10 marks. Figure 9 summarizes the students’ performance on question 9.



**Figure 9:** Students’ Performance in Question 9

Students’ performance indicated in Figure 9 shows that 87.7 percent of the students obtained 0 – 2.5 marks out of 10 marks allocated to this question. These students had either little or no knowledge of the topic of Transport of Materials in Living Things, hence provided incorrect responses. For example, in part (a), some of the students wrote incorrect responses such as *movement of the people from one place to another*. Others wrote *transport of materials is the process of transport blood from one place to another in*

*the body of human being.* Also, there were other students who mixed up the concept of osmosis and transport of materials, thus wrote, *is the movement of materials from the region of low solute concentration to the region of high solute concentration through a semi permeable membrane.* These students failed to understand that *transport of material in living things is the movement/carrying of materials from one part to another within the body of an organism or from the body of an organism to the environment or from the environment to the body of an organism.*

Likewise, in part (b) (i), some of the students wrote the effects of immersing a plant cell in hypertonic solution, as: *the cell will lose water* while others wrote the effects of immersing a plant cell in isotonic solution as *the cell will neither lose nor gain water.* These students failed to understand that when a plant cell is immersed in hypotonic solution *the cell will absorb water by osmosis causing the cell membrane to push against the cell wall and become turgid.* In part (b) (ii), some of the students mixed up cardiac muscles and cardiac sphincter as a result they wrote: *if the cardiac muscles in the heart stop working the food will not be allowed to pass.* Also, there were other students who mixed up cardiac muscle and septum, thus responded as *if the cardiac muscle stop working oxygenated blood will mix with the deoxygenated blood in the heart.* These students were not aware that *if the cardiac muscles stops working the continuous pumping of blood to parts of the body will stop.*

In part (c), some of the students provided ways of preventing different communicable diseases. For example, there were students who wrote ways of preventing tuberculosis as: *vaccination, avoiding overcrowded and provision of education.* Others wrote ways of preventing malaria as *killing all mosquitoes, sleeping under mosquito nets, cutting all long grasses* instead of the ways of controlling leukemia. There were other students who wrote ways of preventing high blood pressure as *exercising regularly, avoid stress, avoiding eating fatty foods.* These students failed to understand that leukaemia is a non communicable disease which can be controlled by *frequent blood transfusion, radiotherapy and chemotherapy, medical treatment and bone marrow transplant.* These responses show that the students had inadequate knowledge about the topic of *Transport of Materials in Living Things.* Extract 8.1 is a sample of student's incorrect responses.

9. (a) What do you understand by the term "Transport of materials" as used in Biology?

Are the movement of foods, from one part of the body to another part for specific function.

- (b) What will happen to the following? Briefly explain.

- (i) A plant cell is immersed in hypotonic solution.

When a plant cell is immersed in hypotonic solution. The plant cell change colour from green to yellowish colour.

- (ii) The cardiac muscles in the heart stop working.

When the cardiac muscles in the heart stop working the heart beating rate increase (Heart beat increase).

- (c) How is leukaemia controlled? State three ways.

- (i) Provide vitamin K and B<sub>12</sub> foods  
(ii) Use oral rehydration  
(iii) Taking enough water frequently.

**Extract 8.1:** A sample of student's incorrect responses to question 9

In extract 8.1, the student wrote *the plant cell will change colour from green to yellowish* instead of cell to gain water by osmosis and becomes turgid in part (b) (i). In part (b) (ii), he/she wrote *the heart beating rate increase* instead of the continuous pumping of blood to all the parts of the body will stop. In part (c) points (ii) and (iii), he/she provided ways of controlling cholera instead of the ways of controlling leukaemia. Also, the responses given in part (a) are incorrect.

On the other hand, the analysis indicates that only, 74,118 (12.3%) students scored from 3 to 10 marks. In this category, most of the students did part (b) (ii) correctly by providing 1 to 2 ways of controlling leukaemia. However, they provided wrong responses in part (a) hence loss some of the marks. Further analysis reveals that out of 4,821 (0.8%) students who scored 6.5 to 10 marks, 156 (0.01%) students provided correct responses in

all parts of the question, thus scored full marks. These students explained the term “Transport of materials” as used in Biology in part (a) correctly. In part (b), the students clearly explained what will happen to the following (i) A plant cell is immersed in hypotonic solution (ii) The cardiac muscles in the heart stop working. In part (c), the students correctly stated three ways of controlling leukaemia correctly. This indicates that, students had sufficient knowledge of the concepts tested. Extract 8.2 illustrates a sample of students’ correct responses.

9.	(a)	What do you understand by the term “Transport of materials” as used in Biology?	Transport of materials is the movement of substances within the body of an organism or movement of substances from an organism to the environment or from the environment to the body of an organism.
	(b)	What will happen to the following? Briefly explain.	
	(i)	A plant cell is immersed in hypotonic solution.	When a plant cell is immersed in hypotonic solution it will absorb water through osmosis and get swollen making it turgid. After absorbing water the plant cell does not burst because it is made up of cell wall which helps to prevent bursting of the plant cell.
	(ii)	The cardiac muscles in the heart stop working.	If the cardiac muscles in the heart stop working blood will not be pumped to the required body organs as a result the person will die.
	(c)	How is leukaemia controlled? State three ways	
	(i)		It can be controlled by frequent blood transfusion
	(ii)		It can be controlled by chemotherapy and radiotherapy.
	(iii)		It can be controlled by medical treatment

**Extract 8.2:** A sample of student’s correct responses to question 9

In Extract 8.2, the student responded correctly by explaining the meaning of the term transport of material in part (a). In part (b), the student managed to explain the effect of a plant cell in hypotonic solution and what happens if the cardiac muscles in the heart stops working. Also in part (b), he/she stated the ways of controlling leukaemia clearly.



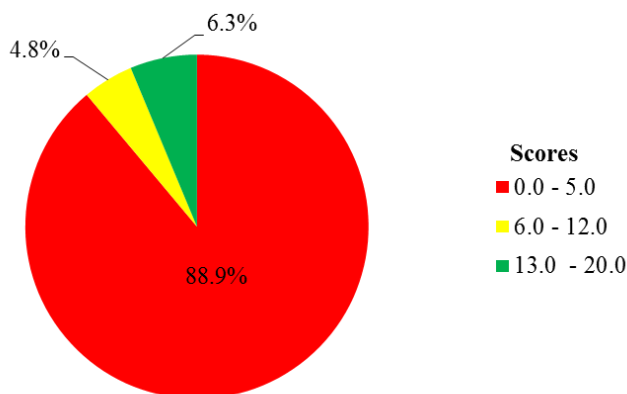
## 2.3 Section C: Essay Questions

This section consisted of two (2) essay type questions. The students were required to choose and answer only one question.

### 2.3.1 Question 10: Classification of Living Things

This question required the students to elaborate three advantages and three disadvantages of the members of Kingdom Monera.

A total of 131,885 (21.9%) students attempted this question. The analysis of students' performance shows that 117,246 (88.9%) students scored from 0 to 5 marks, out of which 107,096 (81.2%) scored 0 out of the 20 marks allocated to this question. Students who scored from 6 to 12 marks were 6,330 (4.8%) while those who scored from 13 to 20 marks were 8,309 (6.3%). Figure 10 summarizes the students' performance on question 10.



**Figure 10:** Students' Performance in Question 10

Figure 10 shows that students' performance on this question was weak because out of 131,885 students who attempted this question 117,246 (88.9%) scored 0 to 5 marks. Most of those students either provided one to two correct points or none. For the students (81.2%) who scored zero mark most of them did not understand the demand of the question, thus they provided incorrect responses. Students were supposed to respond by following essay writing rules by providing an introduction, main body and conclusion. In the introduction students were supposed to explain the characteristics of the Kingdom monera, but most of them introduced the question incorrectly. Some of them provided characteristics of plants, such as: *Kingdom Monera have organisms with cellulose cell wall, Kingdom*

*Monera include moss and liverworts, they have eukaryotic cell, they are made up of many cells. Others wrote the characteristics of Kingdom Fungi instead of Kingdom Monera, as: bacteria have cell wall made up of chitin, they are multicellular, they have hyphae.*

In the main body, they were supposed to elaborate advantages and disadvantages of bacteria, but most of them provided incorrect points. There were other students who wrote one to two correct points, but failed to elaborate them, hence lost some of the marks. For example, some of the students wrote advantages of plants instead of bacteria, as *provide timber, used in paper industry, used to produce clothes*. Others wrote characteristic of bacteria instead of advantages and disadvantages of bacteria. Question required the students to elaborate advantages of the members of Kingdom Monera which are: *In agriculture/they increase soil fertility, decomposition of dead and decaying organic matter, industrial/production of various foods, manufacturing of raw materials, medical/production of antibiotics, genetic engineering, symbiotic relationship, research purposes, bacteria releases oxygen into the atmosphere*. Also, the disadvantages of bacteria are: *production of toxic substances/food poisoning, source of diseases, damage to metal pipes and reduction of nutrients*. The students also provided wrong conclusion. Extract 9.1 is a sample of a student's responses who did not understand the demand of the question.

10. Elaborate three advantages and three disadvantages of the members of Kingdom Monera.

Kingdom monera this is organism include mushroom, yeast and mucor. This organism it is related by human being and their environment. The human being it need kingdom monera in society for drive their life. The following is the advantage of kingdom monera.

Source of food. the kingdom monera it give human being food example of the food is mushroom. Mushroom the human being eat. So is the used to give people food.

Used in baking. the kingdom monera used in industry to baking bread, chapati. Yeast is the kingdom monera used to baking in industry and have many advantage of kingdom monera in the life of human being. The following is the disadvantage of kingdom monera.

Destroy timber. The kingdom monera it destroy timber in our society or in our daily life the timber destroy. Before make a medicine of timber the kingdom monera it destroy timber and give a human being loss. So this is disadvantage of kingdom monera in the daily life.

Destroy environment the kingdom monera it destroyed environment and medicine. the kingdom monera is one of disadvantage have no kingdom monera medicine is no destroyed in our daily life is the kingdom monera have loss of human being.

Transmit pest and disease. have disease transmit by kingdom this disease have different disease in a society or daily life. This disease is known epidemic disease the epidemic disease it transmit in short time in a society this bacterium it spread of disease example cholera and other disease so the kingdom have many advantage.

Therefore kingdom monera have related an human being. So kingdom monera have good effect of human being and bad effect.

**Extract 9.1:** A sample of student's incorrect responses to question 10

In Extract 9.1 the student mentioned *mushroom*, *yeast* and *mucor* instead of explaining about bacteria and its characteristics in the introduction. In the

main body he/she elaborated the advantages of members of the Kingdom Fungi instead of members of the Kingdom monera. Also the responses show that the student had poor English proficiency, thus could not explain the points well. The conclusion was incorrect as well.

On the other hand, 14,639 (11.1%) students scored from 6 to 20 marks. In this category, most of the students correctly elaborated three to four of the six points required. Also some students provided either correct introduction or conclusion but not all of the two, hence loss of marks. Further analysis reveals that out of 8,309 (6.3%) students who scored 13 to 20, 1,352 (0.2%) students gave correct responses and scored all the 20 marks. These students correctly elaborated advantages and disadvantages of members of the Kingdom Monera. This indicates that the students had adequate knowledge of the topic of Classification of Living Things, specifically the Kingdom Monera. Extract 9.2 illustrates a sample of students' correct responses.

10. Elaborate three advantages and three disadvantages of the members of Kingdom Monera.

Kingdom Monera is the kingdom that consist of bacteria, bacteria are unicellular microorganisms which can not be seen by our naked eyes. Bacteria have no membrane bound nucleus and they occur in different shapes. In terms of their shapes there is vibrio bacteria, spiral bacteria, coccus bacteria and bacillus bacteria. Bacteria have both advantages and disadvantages to human being and the environment some of the advantages of kingdom Monera are as follows:

Bacteria which live symbiotically with ruminants helps in digestion of cellulose, the kind of bacteria which live in the stomach of ruminants which chew the cud like goats, cows and donkey produces an enzyme known as cellulase which helps to digest cellulose present in the food eaten by the animals. The ruminant animals are incapable of digesting cellulose, therefore without such kind of bacteria digestion of cellulose in animals specifically ruminants would not take place.

Bacteria found in the roots of leguminous plants helps to convert atmospheric nitrogen into nitrates, leguminous plants are like beans and peas these plants can not directly use the atmospheric nitrogen, instead it has to be turned into a form known as nitrates. The role of converting the atmospheric nitrogen into nitrates is done by bacteria known as rhizobium. The nitrate produced is very necessary for the plants since it adds fertility for the soil and make the plants grow well.

Bacteria helps to ferment sugar, fermentation is a process whereby bacteria break down glucose in the absence of oxygen to release alcohol, carbon dioxide and energy. Fermentation done by bacteria it helps in manufacturing of various types of food like yoghurt, cheese and drinks like alcohol. Therefore bacteria are very important in dairy and brewing industries. Despite having many advantages bacteria have disadvantages to human being, environment and

10. other organisms, some of the disadvantages of bacteria are as follows:
- Some kinds of bacteria cause diseases in plants and animals. harmful bacteria always invade the body of human being, plants and other animals and cause diseases. Example of the diseases which are caused by bacteria are tuberculosis, syphilis, cholera, typhoid and gonorrhea.
- Bacteria release harmful toxins. Some kinds of bacteria produce toxins which cause food to decay and poisoning.
- Denitrifying bacteria reduce the nutrients required by the plants, they always work antagonistically with the rhizobium bacteria, by converting nitrates back into nitrogen which can not be used by the plants. Therefore they reduce soil fertility and make the land infertile for the plants to grow well.
- Generally, it is important to put in mind that bacteria have both advantages and disadvantages. many people do think that bacteria are only harmful, this is wrong. In order to protect ourselves from disease caused by bacteria we should maintain personal hygiene and put our environment clean to put away dangerous bacteria which can cause fatal diseases like cholera and tuberculosis.

**Extract 9.2:** A sample of student's correct responses to question 10

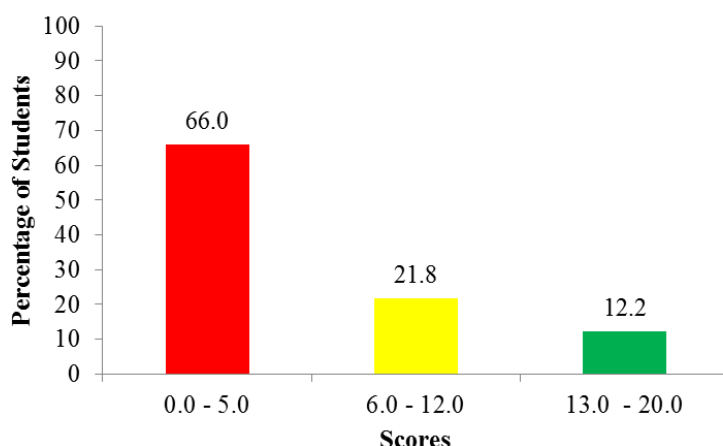
Extract 9.2 shows responses of a student who was knowledgeable enough. He/she elaborated the advantages and disadvantages of members of Kingdom Monera. The student also had good command of the English Language and good essay writing skills.

### 2.3.2 Question 11: Safety in Our Environment

The question required the students to explain the effects of poor waste disposal to the environment by giving six points.

The question was attempted by 470,685 (78.1%) students. The analysis of students performance shows that 310,652 (66.0%) scored from 0 to 5 marks, out of which 156, 566 (33.3%) scored 0 marks. The students who

scored from 6 to 12 marks were 102,609 (21.8%), whereas 57,424 (12.2%) scored from 13 to 20 marks out of 20 marks allocated to this question. Figure 11 summarizes students' performance on this question.



**Figure 11:** *Students' Performance in Question 11*

Students' performance indicated in Figure 11 shows that the performance on this question was average because 160,033 (34.0%) students obtained 6 to 20 marks. For the students who scored 6 to 20 marks, some of them provided appropriate introductory, explained three out of the six required points on the effects of poor waste disposal and a correct conclusion or none, hence loss of marks. However, only 1,949 (0.3%) of the students managed to explain the effects of poor waste disposal correctly by providing good introduction, correct points in the main body and clear conclusion and thus scored all the 20 marks. This implies that the students had adequate knowledge of the topic of Safety in Our Environment and essay writing skills. Extract 10.1 is a sample of a student's correct responses.

11. Explain the effects of poor waste disposal to the environment. Give six points.

Poor waste disposal is simply the in-appropriate management of wastes in a particular area.

The following are effects of poor waste disposal:

**Spread diseases.** Due to poor waste disposal, most of organisms which prefer dirty environment would be attracted.

This may force people to be victims of diseases since cockroaches and houseflies which can transmit disease are around the areas. Example of such diseases is diarrhoea. Due to drinking of contaminated foods or water a person is likely to be a victim.

**Land pollution.** This makes the environment of a certain area ugly and not attractive to the eyes of people. Waste disposed along the roads or grounds makes a certain area look bad although it might be good constructed by presence of beautiful buildings. Most of people would be discouraged to live in an area which is not attractive at all.

**Air pollution.** This is the destruction caused by presence of bad smell in the environment a person might be living. Organic waste example vegetable peels or rotten fruits may be a result of air pollution if disposed in the open areas where it is not advisable. Having an environment which has bad smell is not attractive.

**Breeding sites for pests.** These are sites where most of pests like snakes enjoy living and reproduce. Waste materials example, contaminated materials are exposed in areas and containers, insects like mosquitoes would reproduce more. Pests may attack people and cause severe damage.



11. Leads to accidents and injuries: Due to poor waste disposal, broken glasses would be exposed anywhere around the environment. The children who would be playing in such areas are likely to be in accidents caused by sharp objects. People might be in a risk of acquiring tetanus and other dangerous diseases caused by poor waste disposal. One may also be in a risk of further bleeding due to cuts.

Water pollution: Waste disposed in water streams affect the availability of quality water needed to use when running activities. example, sewage waste from animals which are allowed to enter into river streams cause the clean river water to be contaminated. This may cause waterborne diseases which could spread by means of water during its pollution. People would not be comfortable to use polluted water.

Therefore, Proper measures of disposing waste could be taken to prevent the bad effects of poor waste disposal. example, Recycling, Burying, use of organic waste as animal feeds and also use of animal waste as manure for the growth of plants. The government should also ensure that proper measures of disposing waste materials are observed.

Extract 10.1 A sample of student's correct responses to question 11

In Extract 10.1, the student correctly explained the effects of poor waste disposal to the environment such as *water pollution*. Also, he/she had good command of English Language and essay writing skills.

Despite the average (34.0%) performance on this question, further analysis indicates that out of 310,652 (66.0%) students who scored low (0 - 5) marks, 156,685 (33.3%) students scored zero marks. The responses indicate that for the students who scored zero, they provided wrong introduction. For example, some students defined wastes while others defined waste disposal instead of poor waste disposal.

In the main body, students were required to mention points and give explanation for every point. The analysis shows that some of the students outlined incorrect points. There were other students who gave explanations but the points given were incorrect, hence obtained low marks. For

example, some of the students wrote the importance of proper waste disposal as *prevents spreads of diseases, makes the environment look beauty and attractive, brings pleasant smell, prevents accidents and water pollution*. Other students wrote the proper ways of disposing wastes as *incineration, land fill, recycling and burying*, while others wrote the principles of proper waste disposal as *reducing, recycling and re-using*. Also, there were other students who wrote the types of wastes based on physical state as *gaseous, liquid and solid* instead of the effects of poor waste disposal. Also they provided incorrect conclusion. All these responses imply that the students had inadequate knowledge of the topic of Safety in Our environment, specifically waste disposal. Extract 10.2 (a) is a sample of a student's incorrect responses.

11. Explain the effects of poor waste disposal to the environment. Give six points.

Waste disposal: Is the process of getting rid of unwanted materials in the society. While Waste is the unwanted material that are found in the environment in the society. Waste disposal is concerning with the act of all unwanted material around the environment to be collected. The following are the effects:

Lack of Dustbins and Dustpans: In the community you found if there is no dust pan and bins. It must be poorly disposal of waste in the society. The dust bins help us to avoid throwing of dust through here and there where by the unwanted material looks dirty all around every where. dust bin helps people for example after have finished to sweep the dust and throwing them through dustpan and I throw through the dust bin in the society.

Lack of good Manner (habit): In the society. May be person has good manners won't throw the dust around each where and there the society will understand that the people of the community are good and with good habit but the people who are keeping throwing their dust around the environment is always not okay with No good Manners in the society found among the community.

Lack of skills and technology: In the society many people are not having good technology that if you dispose waste too much they don't know on how the environment will be and they cause disease among the community. The waste which they disposal the life of their village is not good because they lack skills and technology in the society that the community found.

Too much eating of packaging food: The people of the society when they done eating they throw each here and there that is why around the society we found in our sexually environment where by the society keep on resting the dust in the environment around the community found. The eating of packaging food it is not wrong but when you done eating you throw them in the dust bin and the incinerating Method condenser in the society. The following is the next point on the poor waste effect disposal.

Lack of education: The people who are not educated they always be opposite with the educated people where by they see people when they have dust then this is them in the dust bin but then they don't in the society. The society should be educated on how to take care of their environment in the society and the way of getting rid in the environment.

Growth of population: This also is among because the society when it is too much big with highly growth of population, it will be just work done zero because the society is untechnology educated unskilled people. Then still the population grow in the society. The people should developed to highly population where they are educated and skilled.

Generally the waste disposal is the way of getting rid of unwanted material in the surrounded environment in the community. The waste are the unwanted material found on the ground in the society of the community that is found. The well growth of cleanliness they will be no effect of poor waste disposal in the society.

**Extract 10.2 (a):** A sample of student's incorrect responses to question 11

In Extract 10.2 (a), the student explained the factors which leads to poor waste disposal such as *lack of dustbins and dustpans* instead of the effects of poor waste disposal in the environment.

Further analysis of the students responses reveals that some of the students failed to express their responses using English language. They used Kiswahili language, contrary to the language of instruction hence obtained low marks. This imply that students had poor mastery of the language. Extract 10.2 (b) is a response from a student who used both English and Kiswahili in responding to question 11.

11. Explain the effects of poor waste disposal to the environment. Give six points. ....
- Waste is the process where by the waste disposal like news paper, food etc there are these board in waste disposal. Reduce, Recycle and Reuse they three types of waste disposal. Recycle Newspaper, clothes, Trees and etc. Newspaper is waste like and clothes ni'zilempa ambazo zimeitika na kutu pwa enyo baidala ya kuzichama au kupotea sehemu wakati Tree waste Nimit ambazo Imo kotea na kukauka na kukaki Uchafu baloya uli ubafu Kuchemua au kutupua jalalot Majani pia ni ubafu Kuwata baba beaus Ume kati majani Ume kacha pale pale ulipo kati yaka kauka yoni wezaku Uchafu wa Mazingira Mazingira ni vitu vyote vichanyo ambao nguka bidadamu na vilumbe hai zikuataa ni faida za mazingira Kuwa na Atya kora tukiya watika Mazingira kutapata ayaaboo Kutikiti kura kilwango cha tukiyasafisha Mazingira tunaku wa utikiti wa haliyo juu Kupuka miongo wa mawazo tuki ya safisha Mazingira tunapukana na Miongo wa mawazo Zikuataa ni afkar za Uchafu wa Mazingira Kuwa na mazingira machafu Kuwa na harufu mbaya Kutapata na ajali mara kura Mara na Kupata na Magonjwa Mara kwa Mara Example Cholera, Malaria, Tuliyo safisha mazingira kutapata na Magonjwa Mara kwa Mara

**Extract 10.2 (b):** A sample of student's incorrect responses to question 11

In Extract 10.2 (b), the student used English and Kiswahili in responding to the question. He/she wrote incorrect introduction, correctly outlined some of the effects of poor waste disposal such as *kuwa na harufu mbaya* (unpleasant smell), *kupatwa na ajali* (It can cause accidents) and *kupatwa na magonjwa* (Source of disease) but lost marks due to the use of Kiswahili. Also he/she did not provide the conclusion.

### 3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER TOPIC

A total of nine (9) topics were assessed in FTNA 2021 Biology subject. The analysis shows that question 2 which consisted of True and False items composed from the topics of *Safety in Our Environment*, *Nutrition*, *Health and Immunity*, *Transport of Materials in Living Things*, *Classification of Living Things*, *Introduction to Biology*, *Cell Structure and Organisation* and *Gaseous Exchange and Respiration* had the highest performance of 96.0 percent. Question 1 had 79.8 percent of students who performed well. This question consisted of Multiple Choice Items based on the topics of *Nutrition*, *Cell Structure and Organisation*, *Introduction to Biology*, *Health and Immunity*, *Gaseous Exchange and Respiration*, *Transport of Materials in Living Things*, *Balance of Nature*, *Safety in Our Environment* and *Classification of Living Things*.

The topics with average performance were: *Introduction to Biology* (56.5%), *Balance of Nature* (49.8%), *Safety in Our Environment* (34.0%) and *Cell Structure and Organisation* (33.8%) which were assessed in questions 5, 3, 11 and 8, respectively.

The topics with weak performance were: *Health and Immunity* (29.5%), *Nutrition* (29.1%), *Gaseous Exchange and Respiration* (25.4%), *Transport of Materials in Living Things* (12.3%) and *Classification of Living Things* (11.1%) which were involved in questions 7, 6, 4, 9 and 10, respectively. Appendix I summarizes the students' performance on FTNA 2021 topic-wise.

In comparing the performance of the students in the years 2020 and 2021 in terms of topics, the analysis shows that in the FTNA 2021, the performance has improved from weak (21.0%) to average (33.8%) in the topic of *Cell Structure and Organisation*. This implies that there were some efforts made toward improving teaching and learning in Biology subject. However, the topics of *Safety in Our Environment* and *Balance of Nature* had the same average performance for 2020 and 2021. On the other hand, the performance on *Introduction to Biology* topic has decreased from good (72.9%) in 2020 to average (56.5%) in 2021, while on *Health and Immunity* decreased from good (65.9%) in 2020 to weak (29.5%) in 2021. The topics of *Classification of Living Things*, *Gaseous exchange and respiration*,

*Transport of Materials in Living Things* and *Nutrition* have maintained the weak performance. The comparison is summarized in Appendix II.

#### **4.0 CONCLUSION**

Generally, the performance of students in Biology subject FTNA 2021 was average as 51.98 per cent of the students who sat for this assessment passed. The analysis conducted on the students' responses indicated that, good performance to some students was attributed to the students' ability to understand the demands of the questions, adequate knowledge about the assessed topics and good command of the English language. However, weak performance was attributed to failure of the students to understand the demands of the questions, lack of adequate knowledge on the respective topics and poor proficiency in the English language.

#### **5.0 RECOMMENDATIONS**

According to the analysis of Students' Item Response Analysis; the following are recommended in order to improve the performance of Biology subject in future assessment:

- (a) Teachers and students are advised to read the Students' Item Response Analysis report (SIRA). This will enable them to find the factors which affect students' responses and take appropriate measures so as to improve the students' performance.
- (b) Teachers should make an effort for students to improve their proficiency in English through activities such as reading novels, writing and speaking practises. This will improve their writing skills as well as other languages related skills, hence enabling them to understand what is taught in the classrooms as well as the questions' demand.
- (c) Teachers should encourage students to read questions carefully before answering them in order to understand demand of the questions and answer them accordingly.
- (d) Teachers are advised to adhere to the teaching and learning strategies underlined in the Biology syllabus for better students' acquisition of knowledge.

### Appendix I: Students' Performance per Topic in FTNA – 2021

S/N	Topic	FTNA 2021		
		Question Number	Percentage of Students who Scored from 30% or above	Remarks
1.	Nutrition, Cell Structure and Organisation, Introduction to Biology, Health and Immunity, Gaseous Exchange and Respiration, Transport of Materials in Living Things, Balance of Nature, Safety in Our Environment and Classification of Living Things	2	96.0	Good
2.	Safety in Our Environment, Nutrition, Health and Immunity, Transport of Materials in Living Things, Classification of Living Things, Introduction to Biology, Cell Structure and Organisation and Gaseous Exchange and Respiration	1	79.8	Good
3.	Introduction to Biology	5	56.5	Average
4.	Balance of Nature	3	49.8	Average
5.	Safety in Our Environment	11	34.0	Average
6.	Cell Structure and Organisation	8	33.8	Average
7.	Health and Immunity	7	29.5	Weak
8.	Nutrition	6	29.1	Weak
9.	Gaseous Exchange and Respiration	4	25.4	Weak
10	Transport of Materials in Living Things	9	12.3	Weak
11	Classification of Living Things	10	11.1	Weak



**Appendix II:** Comparison of the Students' Performance Topic-wise in FTNA  
2020 and 2021

SN	Topic	FTNA 2020			FTNA 2021		
		Question number	Percentage of Students With a Score of 30% or Above	Remarks	Question number	Percentage of Students With a Score of 30% or Above	Remarks
1.	Transport of Materials in Living Things, Nutrition, Gaseous Exchange and Respiration, Classification of Living Things, Balance of Nature, Safety in Our Environment; and Health and Immunity	2	97.1	Good	2	96.0	Good
2	Cell Structure and Organisation, Health and Immunity, Gaseous Exchange and Respiration, Transport of Materials in Living Things, Introduction to Biology, Nutrition, Balance of Nature, Classification of Living Things and Safety in Our Environment	1	90.6	Good	1	79.8	Good
3	Introduction to Biology	6	72.9	Good	5	56.5	Average
4	Health and Immunity	3	65.9	Good	7	29.5	Weak
5	Safety in Our Environment	9	56.6	Average	11	34.0	Average
6	Balance of Nature	7	32.9	Average	3	49.8	Average
7	Cell Structure and Organisation	5	21.0	Weak	8	33.8	Average
8	Classification of Living Things	10	19.2	Weak	10	11.1	Weak
9	Gaseous Exchange and Respiration	4	15.2	Weak	4	25.4	Weak
10	Nutrition	8	13.6	Weak	6	29.1	Weak
11	Transport of Materials in Living Things	11	11.9	Weak	9	12.3	Weak



