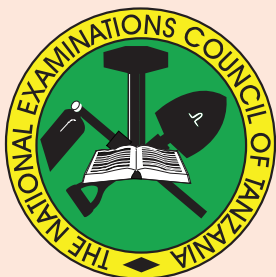


THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



PUPILS' ITEM RESPONSE ANALYSIS REPORT FOR STANDARD FOUR NATIONAL ASSESSMENT (SFNA) 2019

05E SCIENCE AND TECHNOLOGY

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STANDARD FOUR NATIONAL ASSESSMENT
(SFNA) 2019**

05E SCIENCE AND TECHNOLOGY

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PREFACE

This report on Pupils' Item Response Analysis (PIRA) for Standard Four National Assessment (SFNA) 2019 in Science and Technology subject has been prepared to provide feedback to all educational stakeholders on how the pupils responded to the assessment questions. Pupils' responses to the assessment questions serve as an indicator of what knowledge and skills were attained by the pupils for the period of two years (Standard III and IV) of primary education.

In general, the report shows the analysis in each question and specifies the challenges faced by the pupils when responding to the respective questions. It identifies reasons for the pupils' ability or inability to provide correct responses according to the requirement of specific questions. Some of the reasons for the pupils to respond correctly include being competent in the tested concepts. However, the reasons that led the pupils fail to respond correctly include lack of knowledge on the assessed concepts/content, misunderstanding the task of the question, failure to integrate science and real life situations and limited skills in reading and writing.

The National Examinations Council of Tanzania hopes that, this feedback will be useful to various educational stakeholders and will help them to take appropriate measures in addressing the identified shortcoming in order to improve the future performance for Standard Four National Assessment.

Finally, the National Examinations Council of Tanzania would like to express sincere gratitude to Examination Officers and all others who participated in the preparation of this report.



Dr. Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

The report is based on Standard Four National Assessment for Science and Technology subject conducted on 21 November 2019. The assessment intended to measure the pupils' competences as stipulated in 2016 Science and Technology syllabus for Basic Education Standard III – IV.

The assessment paper consisted of 5 questions each carrying 10 marks. The questions were divided into sections A and B. Section A comprised 3 questions while section B comprised 2 questions. The pupils were required to answer all questions.

The analysis of the assessment results shows that, the general performance in Science and Technology Subject was good as out of **1,664,659** pupils who sat for the paper, **1,584,473 (95.18%)** passed and **80,186 (4.82%)** failed.

The pupils' performance in this report is categorized into four groups depending on the marks scored by the pupils such that from 0 to 2 marks weak performance and 4 to 6 marks is an average performance. However, 8 and 10 marks are good and very good performance respectively. Pupils with weak performance are considered to have failed the assessment while those with average, good and very good performance are considered to have passed.

The report analyses the quality of performance of each question. The performance is ranked as weak, average or good if the percentage of the pupils who passed the question lies in the range

of 0 – 33, 34 – 66 or 67 – 100 respectively. The report also pinpoints some possible reasons for observed pupils' performance in each question. In addition, charts have been used to show pupils' performance in each question. Moreover, samples of the pupils' good and weak responses have been extracted and used to exemplify performance in some questions.

2.0 ANALYSIS OF PUPILS' RESPONSES IN EACH QUESTION

The analysis of pupils' responses was done in five questions divided into sections A and B as follows:

2.1 Section A: Multiple Choice and Matching Items

Section A comprised multiple choice items and matching items. All the questions in this section were compulsory. The analysis of pupils' performance in those questions is as follows:

Question 1: Health Care and Environment

This question consisted of 5 items (i) to (v). The pupil was required to choose the letter of the correct response from the given alternatives (A – D) and write it in the provided box. This question assessed the pupil's competence in identifying principles for health, maintaining health and understanding the human digestive systems.

The overall pupils' performance in this question was good as out of 1,664,632 pupils who attempted this question, 1,466,695 (88.1%) passed and 197,937 (11.9%) failed. Generally, this question was the best performed compared to the rest in this assessment.

Figure 1 summarizes the distribution of percentage of pupils in each performance level.

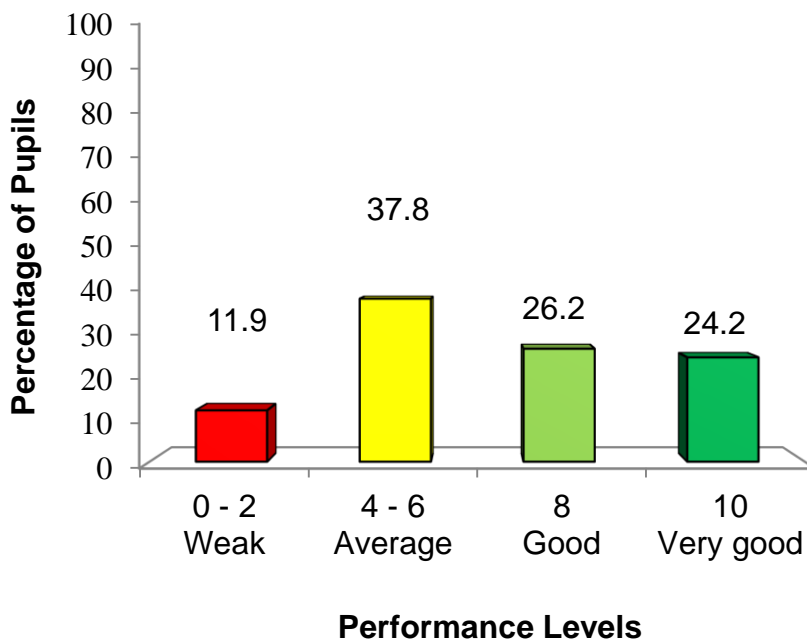


Figure 1: *Pupils' performance Level in question 1.*

Figure 1 shows that, out of 88.1 per cent of the pupils who passed, 37.8 per cent scored 4 or 6 marks, 26.2 per cent scored 8 marks and 24.2 per cent scored all the 10 marks allocated to this question. However, a few pupils (11.9%) who either responded incorrectly to all items or responded correctly to only one item scored 0 or 2 marks.

The pupils who performed well in this question were competent in identifying the principles for health, maintaining health and understanding the human digestive systems. However, the pupils with poor performance had inadequate knowledge on those arrears. Some of the pupils failed to understand the demands of

the questions while others could not write the letter of the correct response correctly. This indicates lack of reading and writing skills.

The analysis of pupils' responses in each item revealed the following: Item (i) assessed pupil's understanding of the concept of safe food by asking: Safe food is the one which is

- A sprayed with insect killers.
- B kept in a clean container.
- C kept for a short time.
- D kept in a place where there is light.

Most of the pupils chose the correct response *B, kept in a clean container* because they *had* enough knowledge of the tested concept. The pupils who responded incorrectly, most of them opted for distractor A, *sprayed with insects killer*. Those pupils did not understand that, we normally spray crops with insect killers but not food, because doing so the food will affect the health of the consumer. Others chose distractors C, *kept for a short time* and D, *kept in a place where there is light*. Those pupils did not understand that, food kept in unsafe place can be contaminated by insects like houseflies and coackroaches regardless of how long it is kept. In the same way, insects can contaminate the food regardless of presence or absence of light.

Item (ii) tested the pupils' ability to identify a way for transmission of diseases by asking: The following are the preventive measures against diseases **except**.

- A closing the mouth when coughing.
- B sleeping in a clean and safe place.
- C drinking clean and safe water.

D washing hands before going to the toilet.

Most of the pupils understood the demand of the question as they were able to choose the correct response *D, washing hands before going to the toilet*. Those pupils understood that, washing hands before going to toilet does not prevent against diseases. One is supposed to wash the hands with clean water and soap after going to the toilet so as to kill germs. However, a few pupils who failed in this question, did not understand the demand of the question and some lacked knowledge on the ways of transmitting diseases. Those pupils chose ways of preventing instead of a way which is not preventive against diseases. For example, those who chose option *A, closing the mouth when coughing* did not understand that, this is the way of preventing transmission of airborne diseases like tuberculosis. Also, those who opted for *B, sleeping in a clean and safe place* did not know that this is the way of preventing diseases like malaria. Moreover, those who opted for *C drinking clean and safe water* did not understand that, this is a method of preventing waterborne diseases such as diarrhoea, cholera and bilharzia.

Item (iii) assessed pupils' ability to identify the diseases that are caused by pollution of water sources by asking: Which diseases are caused by pollution of water sources?

- A Whooping cough and measles.
- B AIDS and cholera.
- C Malaria and trachoma.
- D Cholera and bilharzias.

Most of the pupils were able to choose the correct response *D, cholera and bilharzias*. Those pupils had enough understanding of

the diseases caused by pollution of water sources such as cholera and bilharziasis. The pupils who chose incorrect responses lacked the knowledge of diseases caused by pollution of water sources. For example, those who opted for distracter A, *whooping cough and measles*, did not understand that those diseases are caused by germs found in air and not in water. Moreover, those who chose B, *AIDS and cholera* were not aware that AIDS is caused by viruses found in the blood and other body fluids such as semen, vagina and cervical secretions and breast milk. Also, those who chose distracter C, *malaria and trachoma* did not understand that those diseases are caused by germs found in blood and tears respectively.

Item (iv) tested the pupil's understanding of the function of saliva in the digestion of food by asking: Which is the function of saliva in the digestion of food

- A To soften food
- B To soften the mouth
- C To soften teeth
- D To soften the tongue.

Most of the pupils chose the correct response A, *to soften food*. Those pupils had enough knowledge about the function of saliva in the digestion of food. They understood that, saliva helps to soften food so that it can be easily digested. However, the pupils who chose incorrect responses had inadequate knowledge about function of saliva in the digestion of food. For example, those who opted for distracter D, *to soften the tongue* did not understand that, the tongue helps to roll food around so that it can mix thoroughly with saliva. Also, those who opted for distractors B, *to soften the*

mouth and *C, to soften teeth* lacked the knowledge that, mouth is the beginning of the digestive track and the function of the teeth is to break down the food into small pieces for easy digestion.

Item (v) assessed pupil's ability to recognize the part in which the digestion of food starts by asking: In which part does the digestion of food start in the system?

- A In the stomach
- B In the oesophagus
- C In the mouth
- D In the pancreas.

Most of the pupils were able to choose the correct response *C, in the mouth*. Those pupils had enough knowledge of the tested concept. They understood that, digestion of food especially food rich in carbohydrates starts in the mouth. Some of the pupils who failed in this question chose distractors *A, in the stomach* and *D, in the pancreas*. Those pupils were unaware that, the stomach receives food from the mouth. Also, the pancreas is the gland that produces insulin and other digestion hormones and not a site for digestion. Likewise, the pupils who opted for distracter *B, in the oesophagus* lacked knowledge that the oesophagus has no digestive role. It is just a tube through which food passes from the mouth to the stomach.

Question 2: Perform Scientific Investigation and Technological Discovery

The question consisted of five items which tested the concept of states of matter and its examples. In responding to items (i) – (v), a pupil was required to match sentences in **List A** with its

corresponding answer in **List B** then write the letter of the correct answer in the brackets given. The items of this question were as follows:

List A	Letters	List B
(i) A state of matter which is light.	(....)	A Gas
(ii) A state of matter with fixed shape.	(....)	B Soda
(iii) An example of matter in a solid state.	(....)	C Steam
(iv) A state of matter which takes a shape of a vessel.	(....)	D Liquid
(v) An example of matter in gaseous state.	(....)	E Particles
		F Chalk
		G Solid

The analysis of data indicates that, this question was the most poorly performed compared to the other questions in this assessment. Out of 1,664,632 pupils who attempted this question, 1,034,865 (62.2%) failed. The summary of percentage of the pupils in each performance levels is presented in Figure 2.

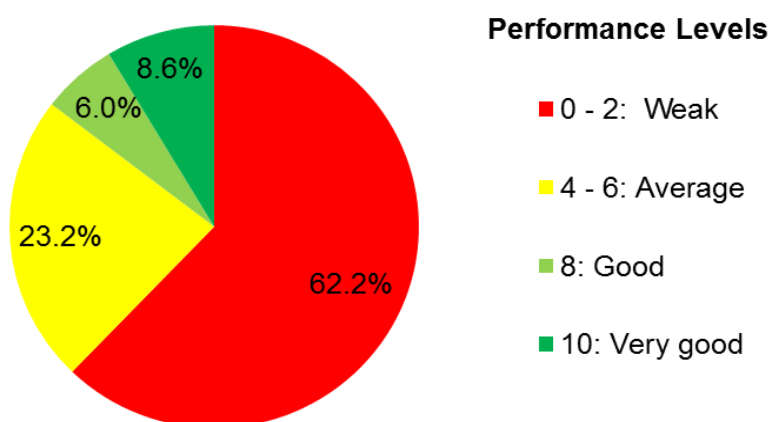


Figure 2: *Pupils' Performance Level in Question 2*

Figure 2 shows that, more than half of the pupils (62.2%) performed poorly in this question by scoring 0 or 2 marks. However, 23.2 per cent scored 4 or 6 marks and 6.0 per cent scored 8 marks. The rest of the pupils (8.6%), scored all the 10 marks allocated to this question.

Poor performance of the pupils in this question was due to inadequate knowledge of matter and its states. Most of the pupils failed to discriminate between examples of matter and states of matter. They also showed incompetence in understanding the characteristics of different states of matter. Extract. 1.1 is an example of incorrect responses from the pupils.

2. Answer items (i) - (v) by matching sentences in **List A** with the states of matter in **List B**. Write the letter of the correct answer in the brackets given.

List A	Letters	List B
(i) A state of matter which is light.	(E)	A. Gas
(ii) A state of matter with fixed shape.	(D)	B. Soda
(iii) An example of matter in a solid state.	(C)	C. Steam
(iv) A state of matter which takes a shape of a vessel.	(A)	D. Liquid
(v) An example of matter in gaseous state.	(E)	E. Particles
		F. Chalk
		G. Solid

Extract 1.1: Pupil's incorrect responses in question 2

Extract 1.1 shows that, the pupil had inadequate knowledge on the tested concepts. He/she failed in all the items of the question.

The pupils who performed well (37.8%), were able to correctly match the sentences with the state of matter. This indicates that,

they had enough understanding of the concepts of examples of matter and characteristics of each state of matter. Extract 1.2 is a sample of responses from the pupils who performed well.

2. Answer items (i) - (v) by matching sentences in **List A** with the states of matter in **List B**. Write the letter of the correct answer in the brackets given.

List A	Letters	List B
(i) A state of matter which is light.	(A)	A. Gas
(ii) A state of matter with fixed shape.	(G)	B. Soda
(iii) An example of matter in a solid state.	(F)	C. Steam
(iv) A state of matter which takes a shape of a vessel.	(D)	D. Liquid
(v) An example of matter in gaseous state.	(C)	E. Particles
		F. Chalk
		G. Solid

Extract 1.2: Pupil's correct responses in question 2

Extract 1.2 is a response of the pupil who was competent in understanding matter and its state. He/she was able to answer correctly all the items of the question.

Further analysis of pupils' responses shows that, in item (i) which required the pupil to identify the state of matter which is light, the pupils who were able to write the correct response A, *gas* had enough knowledge of states of matter. They were able to identify that, of all the three states of matter, gas is light. However, some of the pupils who failed to answer this item correctly wrote C, *steam*. Those pupils misconceived states of matter with examples of matter. The steam is an example of matter in gaseous state. Also, some wrote E, *particles*, D, *liquid*, G, *solid* e.t.c. Those pupils did not know that, particles are tiny bits of matter. Also, liquid is a state

of matter with no definite shape while solid matter has definite shape. Moreover, those pupils could not understand the characteristics of each state of matter as solid and liquid states are always heavier than gas.

Likewise, in answering item (ii) which required the pupils to identify the state of matter with fixed shape, some of the pupils were able to recognize the correct answer G, *solid*. Those pupils had enough knowledge of the characteristics of matter in a solid state. They were able to recognize that, matter in solid state like the stones, tables e.t.c. has a fixed shape. The pupils who failed to identify the correct answer wrote D, *liquid* others E, *particles*. The pupils who wrote response D did not know that, matter in liquid state does not have a fixed shape as it takes the shape of the container. Also, those who wrote option E, did not understand that particles are tiny bits of matter and not a state of matter. Generally, the pupils who wrote incorrect responses to this question were unaware of the characteristics of matter.

In item (iii), which assessed pupil's ability to identify an example of matter in solid state, some of the pupils were able to identify the correct response F, *chalk*. Those pupils had knowledge of the characteristics of solid state which helped them to identify its examples. They knew that, the chalk is an example of matter in solid state because it is rigid and has a fixed shape. The pupils who could not answer this item correctly, wrote letter G, *solid*. Those pupils could not differentiate between states of matter and examples of matter. Solid is a state of matter while a chalk is an example of matter in solid state. Also, a fewer pupils who chose letters B, *soda*, C, *steam* and D, *liquid* failed to distinguish between

states of matter, examples of matter and characteristics of each state of matter. Soda and steam are examples of matter in liquid and gaseous state respectively while liquid is a state of matter.

Item (iv) required the pupil to identify a state of matter which takes a shape of a vessel. Some of the pupils managed to identify the correct answer D, *liquid*. Those pupils understood the properties of the three states of matter especially liquid state. However, most of the pupils who failed to respond correctly opted for B, *soda*. Those pupils wrote an example of matter in liquid state instead of a state of matter that takes the shape of a vessel. Furthermore, pupils who wrote C, *steam*, E, *particles* and G, *solid* lacked knowledge of characteristics of states of matter as steam is an examples of matter with no definite volume.

Item (v) assessed pupil's ability to identify an example of matter in gaseous state. Some of the pupils managed to choose the correct response C, *steam*. Those pupils had enough knowledge about examples of matter in different states that helped them to identify steam as example of matter in a gaseous state. They were aware that each state of matter has its examples. The examples of matter in solid state are stone and wood, gaseous state is steam and carbondioxide and examples of matter in liquid state is water and soda. Further analysis reveals that, most of the pupils who failed this question opted for distracter A, *gas*. Those pupils failed to differentiate between a state of matter and an example of matter. Gas is the state of matter but steam is an example of matter in gaseous state.

Question 3: Health Care and Environment

The question consisted of five items. The question asked: Answer item (i) – (v) by choosing the correct word from the box and write it in the space provided.

heart burn, constipation, kwashiorkor, marasmus, flatulence, teeth decay, stomach ulcers.

The items of this question were as follows:

- (i) The condition by which a person produces hard and dry faeces is known as _____
- (ii) The condition which is caused by the excess of gas in the stomach is called _____
- (iii) What is the name of the burning pain in the oesophagus and chest? _____
- (iv) In the digestive system, the sores or lesions in the stomach wall are called _____
- (v) What effect on teeth may result from eating food with too much sugar? _____

This question measured pupils' understanding of the digestion system specifically poor eating habits which leads to disorders in the digestion system. The data indicates that, out of 1,664,632 pupils who attempted this question, 1,023,545 (61.5%) passed and 641,087 (38.5%) failed. Generally, the performance of the pupils in this question was good as summarized in Figure 3.

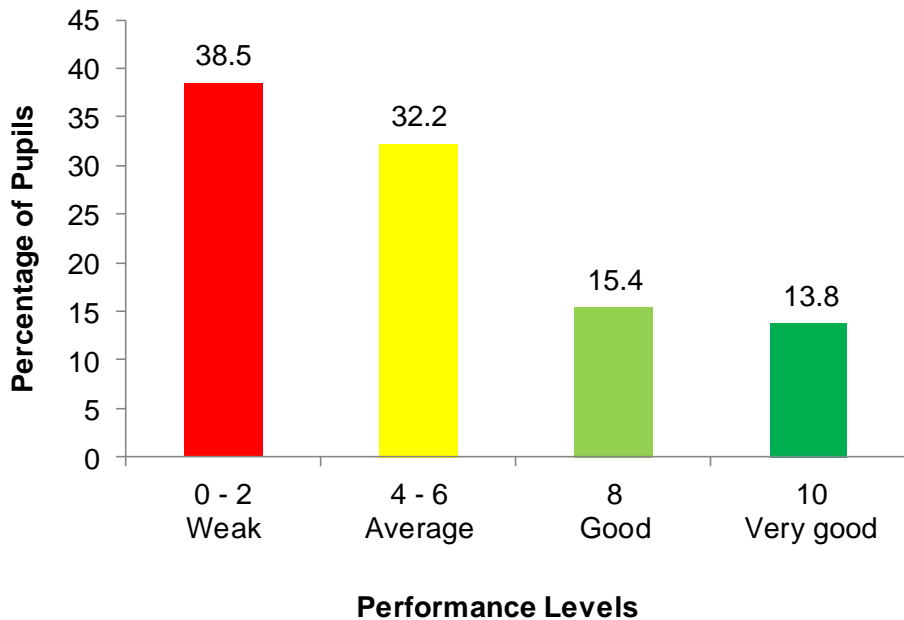


Figure 3: *Pupils' Performance Level in Question 3*

Figure 3 shows that, 61.5 percent of pupils passed by scoring from 4 to 10 marks, out of which 15.4 percent scored 8 marks and 13.8 percent scored all the 10 marks allocated to this question. The pupils who passed this question were competent in identifying different disorders of the digestion system caused by poor eating habits. Extract 2.1 is a good response from one of the pupils.

- (i) The condition by which a person produces hard and dry faeces is known as Constipation.
- (ii) The condition which is caused by the excess of gas in the stomach is called flatulence
- (iii) What is the name of the burning pain in the oesophagus and chest?
heart burn
- (iv) In the digestive system, the sores or lesions in the stomach wall are called Stomach ulcers.
- (v) What effect on teeth may result from eating food with too much sugar? teeth decay.

Extract 2.1: Pupil's correct responses in question 3

Extract 2.1 shows that, the pupil had adequate knowledge of Health Care and Environment. He/She was able to identify different disorders of the digestion system caused by poor eating habits.

However, data shows that 38.5 per cent of the pupils scored 0 or 2 marks. Those pupils either failed to score marks in all items or scored correctly only one item. Those pupils lacked knowledge of disorders in the digestion system. Thus, they failed to identify the disorders caused by poor eating habits. Also, some failed to write the words correctly which contributed to loss of marks. Extract 2.2 is a poor response from the pupils who wrote incorrect responses in all items of this question.

- (i) The condition by which a person produces hard and dry faeces is known as Stomach Ulcers
- (ii) The condition which is caused by the excess of gas in the stomach is called heart burn
- (iii) What is the name of the burning pain in the oesophagus and chest?
Stomach Ulcers
- (iv) In the digestive system, the sores or lesions in the stomach wall are called decay
- (v) What effect on teeth may result from eating food with too much sugar? marasmus

Extract 2.2: Pupil's incorrect responses in question 3

Extract 2.2 shows that, a pupil had inadequate knowledge of Health Care and Environment specifically in identifying different disorders of the digestion system caused by poor eating habits.

Further analysis of pupils' responses in each item reveals that, item (i) required the pupil to identify the name of a condition by which a person produces hard and dry faeces, many pupils were able to write the correct response *constipation*. Those pupils had enough knowledge about this disorder in digestion system. However, some of the pupils wrote incorrect responses such as *flatulence* and *stomach ulcers*. Those pupils lacked knowledge of a condition for a person to produce hard and dry faeces. For example, those who wrote *flatulence* did not know that, this is the word that represents the condition caused by excess gas in the stomach. Likewise, stomach ulcers occurs when there is a sore or lesion in the wall of the stomach.

Item (ii) assessed pupil's ability to identify a word which represents the condition which is caused by the excess of gas in the stomach. Most of the pupils wrote the correct answer *flatulence*. This shows that, those pupils had adequate knowledge on the tested concept. However, some pupils who failed this item chose *stomach ulcers* because they did not understand that stomach ulcers is caused by too much eating acidic food which causes lesions in the inner wall of the stomach. Also, others wrote *marasmus* implying inadequate understanding of the disorders in digestive system since marasmus is a malnutrition problem.

Item (iii) assessed pupil's ability to identify the name of the burning pain in the oesophagus and chest. Most of the pupils were able to answer it correctly by writing *heart burn*. Those pupils had enough knowledge about burning pain in the oesophagus and chest. Also, they were able to correlate the assessed content and the normal condition of heart burn experienced in daily life by eating food rich in starch and cold food. Nevertheless, those who answered this item incorrectly wrote *stomach ulcers*. Those pupils did not know the causes of different disorders in the digestion system. Furthermore, fewer of them wrote distracters *marasmus* and *constipation*. These also had limited understanding of the burning pain in the oesophagus and chest and other disorders related to the digestion system.

Item (iv) required the pupil to identify and write a word which represents the presence of sores or lesions in the stomach wall. Most of the pupils wrote the correct response *stomach ulcers*. Those pupils had knowledge of different disorders in the digestive system and their symptoms including sores in the stomach wall.

However, those who failed to score this item wrote incorrect responses like *marasmus*, *tooth decay* and *flatulence*. Those pupils did not understand the causes and symptoms of disorders in the digestive system.

In item (v), the pupil was required to identify the word which represents the effect on the teeth that may result from eating foods with too much sugar. The analysis indicates that, most of the pupils opted for the correct response *teeth decay*. Those pupils had enough knowledge of the effect of eating food with too much sugar. Also, they were able to use common experiences when parents prohibit them to suck sweets for the logic that they cause teeth decay. Some who failed this item, most of them chose *teeth pain*. They failed to understand that, teeth pain is a result of teeth decay. Again, some chose *marasmus* indicating that they had limited knowledge about the effect of too much sugar on teeth. Also, some of the pupils wrote incomplete words or words which were not given in the box. For example, some wrote words like *bad smell*, *decay*, *ulcers* and *death* implying misunderstanding of the demand of the question. Moreover, others wrote some of the words incorrectly making them meaningless.

2.2 Section B: Short Answer Questions

The section consisted of two compulsory questions. One of the questions required the pupil to read the passage and answer. The other question required the pupil to observe the given picture then answer the questions.

Question 4: Perform Scientific Investigation and Technological Discovery

This question comprised a passage in which the pupils were asked to read and answer the questions. The question asked: Read the following passage and then answer items (i) - (v). The passage was as follows:

Many types of food which we use in our daily life are cooked. Food is cooked using heat energy. The devices used to facilitate the cooking of our food are known as cookers. In Tanzania, the types of cookers mostly used are firewood and charcoal cookers. In recent years, there has been an increase of users of gas cookers in both rural and urban areas. The choice of type of cooker differs depending on the availability, cost and safety of the type of fuel used. These are some of the things to consider when choosing the type of cooker to use.

The asked items are as follows:

- (i) Name two types of cookers used by many people in Tanzania.
 - _____
 - _____
- (ii) What kind of energy is used for cooking? _____
- (iii) What differentiates types of cookers? _____
- (iv) What do you think is the reason for many people using the firewood cooker? _____
- (v) Name two other cookers apart from those mentioned in the passage _____

This question assessed pupil's understanding of the types of cookers used in daily environment. The performance of the pupils in this question was average since out of 1,664,632 pupils who attempted this question, 1,066,169 (64.0%) passed. Figure 4 shows the summary of pupils' performance in this question.

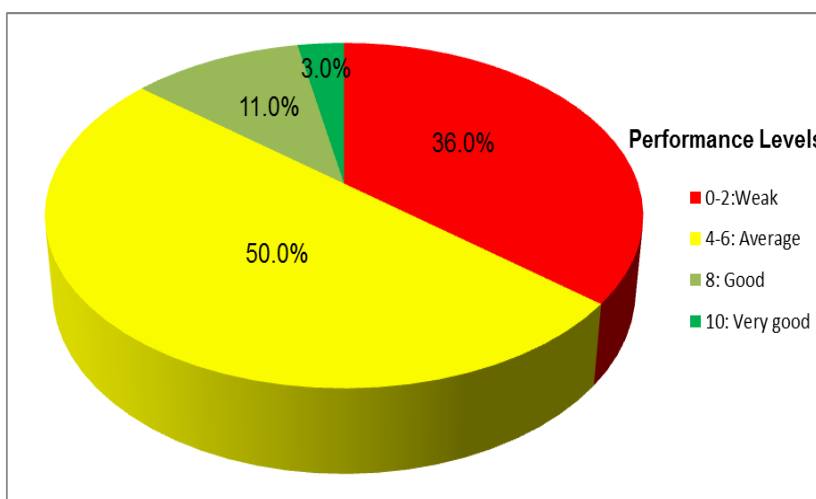


Figure 4: *Pupils' Performance Level in Question 4*

The data in Figure 4 shows that, more than a half (64.0%) of the pupils were able to score 4 to 10 marks out of which 3.0 per cent scored all the 10 marks allocated to this question. Those pupils had good understanding of the types of cookers, fuel and energy used for cooking in daily environment. They knew that food can be cooked using *firewood, charcoal, electric, gas and kerosene cookers*. They also understood that the fuel is used to differentiate the types of cookers. Extract 3.1 is a correct response from the pupils.

- (i) Name two types of cookers used by many people in Tanzania.
- Firewood cooker
 - Charcoal cooker
- (ii) What kind of energy is used for cooking? Heat energy is used for cooking
- (iii) What differentiates types of cookers? The fuels are different
- (iv) What do you think is the reason for many people using the firewood cooker? It is very cheap
- (v) Name two other cookers apart from those mentioned in the passage.
Electrical cooker and kerosin cooker

Extract 3.1: Pupil's correct responses in question 4

Extract 3.1 shows that the pupil was able to answer correctly all items of this question. This pupil had adequate knowledge on the concept of cookers.

Nevertheless, some of the pupils (36.0%) scored 0 or 2 marks, out of which (15.4%) could not answer any of the items correctly and hence scored 0 marks. Those pupils did not understand the types of cookers, fuel and energy used for cooking. Also, they failed to read and comprehend the information given in the paragraph so that they can respond correctly to the questions. Extract 3.2 shows a response from the pupils who wrote incorrect answers to all the items.

- (i) Name two types of cookers used by many people in Tanzania.
 - Heat energy
 - Cookers
- (ii) What kind of energy is used for cooking? charcoal cooker
- (iii) What differentiates types of cookers? heat energy
- (iv) What do you think is the reason for many people using the firewood cooker? food
- (v) Name two other cookers apart from those mentioned in the passage. rural and urban

Extract 3.2: Pupil's incorrect responses in question 4

Extract 3.2 shows that, the pupil failed to understand the need of the questions as he/she gave responses which do not relate to the demand of the question.

Further analysis of pupils' responses shows that, in answering item (i) which required the pupil to name types of cookers used by many people in Tanzania, most of the pupils were able to respond correctly by writing fire wood, charcoal or gas cookers. Those pupils managed to read and comprehend the information provided in the paragraph. Therefore, they were able to name the types of cookers used in daily life. The pupils who failed this question provided responses which were contrary to the given passage. For example, some wrote *Chinese cookers*, *mud cookers* and *electric cookers*. Those answers signify that, the pupils did not understand the information given in the paragraph. Those who wrote *mud cookers* were referring to the materials used to make some of the cookers like charcoal and firewood cookers. Also, those who wrote

Chinese cookers, failed to understand that, these are kerosene cookers which many people nickname them as Chinese cookers.

Item (ii) required the pupil to identify the kind of energy used for cooking. About half of the pupils were able to write the correct response which was *heat energy*. Those pupils were able to read and understand the given passage. They also had knowledge that, heat energy enables us to cook. They understood that, electric energy, light energy and others must be changed to heat energy so as to be used for cooking. The rest of the pupils wrote incorrect responses such as *firewood* and *charcoal*. Those pupils failed to understand the concept of energy as they wrote the types of fuels instead of energy. Others wrote *electric* and *gas energy* because they did not understand that, those are forms of energy which must be converted to heat energy using appliances in order to be used for cooking.

In responding to item (iii) which required the pupil to name a factor used to differentiate types of cookers, the analysis shows that, most of the pupils failed to write the correct response which was *type of fuel used*. Those pupils did not know that, cookers are named based on the type of fuel used. Charcoal cookers use charcoal, gas cookers use gas fuel e.t.c. Most of these pupils wrote *availability, cost and safety of the type of fuel used* which are incorrect. However, a few pupils managed to write the correct answer which was the *type of fuel used*. Those pupils had enough knowledge about basis for differentiating the types of cookers. They also used domestic experience where we use different types of cookers according to the fuel available.

Item (iv) required the pupil to give the reason which causes many people to use firewood cookers. Many pupils failed to respond correctly. Some of the incorrect responses from the pupils include: *there were no electricity and gas, they cannot afford to buy charcoal cookers, they do not have electric cookers and cutting down trees*. These responses show that, the pupils did not comprehend the information provided in the passage. However, some of the pupils managed to write the correct answer which was *availability, less cost or safety of the type of fuel used*. Those pupils read the passage and comprehended it well.

Item (v) required the pupils to name two other cookers apart from those mentioned in the passage. A few pupils managed to write the correct answers which was *electrical and kerosene cookers*. Those pupils had enough knowledge about different types of cookers. For the pupils who responded incorrectly, most of them did not understand the demand of the question as they mentioned the names of the cookers listed in the passage like *charcoal, firewood and gas cookers*. Those pupils were also not aware of the other types of cookers such as electrical and kerosene cookers. As a result, they failed to name them.

Question 5: Understanding the Basics of Science and Technology

The question consisted of items (i) to (v), which required the pupil to study the picture and answer the questions. The question asked: Observe the picture given, then answer items (i) – (v).



The items for this question were as follows:

- (i) What is the name of the object in the picture?
- (ii) Label the part which carries electrical power from the socket by using letter **A**.
- (iii) Label the part which displays pictures by using letter **B**.
- (iv) Label the part that picks up signals in the air by using letter **C**.
- (v) Why is the device shown in the picture important to us?

The pupils' performance in this question was good as out of 1,664,632 pupils who attempted this question, 1,178,025 (70.8%) passed and 486,607 (29.2%) failed. The summary of pupils' performance in this question is presented in Figure 5.

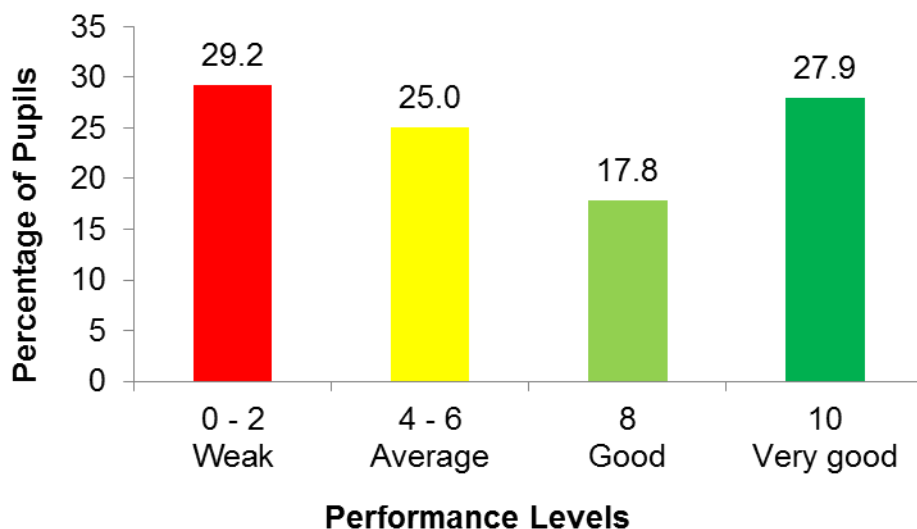


Figure 5: *Pupils' Performance Level in Question 5*

The statistics in Figure 5 shows that, 27.9 percent of the pupils scored all the 10 marks while 25.0 percent scored 4 or 6 marks and 17.8 percent scored 8 marks. The pupils who scored higher marks in this question were competent in identifying the parts of the television and its importance. Those pupils also were able to understand the demand of the questions. For example, in items (ii), (iii) and (iv), the pupils managed to use letters A, B and C to show the required parts of the television. Extract 4.1 is a correct response from one of the pupils.

5. Observe the picture given, then answer items (i) - (v).



- (i) What is the name of the object in the picture? A TELEVISION
- (ii) Label the part which carries electrical power from the socket by using letter A.
- (iii) Label the part which displays pictures by using letter B.
- (iv) Label the part that picks up signals in the air by using letter C.
- (v) Why is the device shown in the picture important to us?

BECAUSE GIVES US NEWS WITH BOTH SOUND AND PICTURES
{AUDIO VISUAL}

Extract 4.1: Pupil's correct responses in question 5

Extract 4.1 shows that the pupil had adequate knowledge of parts of the television as he/she managed to respond correctly to all the items of the question.

A few pupils (29.0%) failed to identify the parts of the television and their importance. Some of those pupils (13.9%) responded correctly to only 1 item and thus scored 2 marks. The rest (15.0%) scored 0 marks as they responded incorrectly to all the items. Those pupils were incompetent in identifying parts of the television and their importance. Some interchanged the parts signifying that they had limited competence in the tested concept. Also, some did not follow the instruction given in answering this question as they named the parts by words instead of using letters A, B and C. Extract 4.2 is a poor response from one of the pupils.

- (i) What is the name of the object in the picture? picture.
- (ii) Label the part which carries electrical power from the socket by using letter A. Swich.
- (iii) Label the part which displays pictures by using letter B Screm.
- (iv) Label the part that picks up signals in the air by using letter C. Antearn.
- (v) Why is the device shown in the picture important to us?
because is important thing

Extract 4.2: Pupil's poor responses in question 5

Extract 4.2 shows the responses of the pupil who responded incorrectly to all the items of the question. That pupil lacked enough knowledge about the television.

Further analysis of pupils' performance in each item shows that, in item (i) which required the pupil to observe the picture and give the name of the object represented in the picture, most of the pupils managed to write the correct response which was *television*. Those pupils were aware of the object in the picture. They also had the ability to observe and interpret pictures correctly. On the other hand, most of the pupils who responded incorrectly, wrote *video*, *computer* and *picture* which imply that they failed to identify the device shown in the picture. A few of them wrote the word television incorrectly as *tivi*.

Likewise items (ii), (iii) and (iv) required the pupil to use letters A, B and C to label the parts which carries electrical power from the socket, displays pictures and picks up signals respectively. Most of them responded incorrectly. Those pupils did not understand the

demands of the questions as some wrote the names of the parts instead of labelling using the given letters. Others drew the parts. There were few who labeled the parts incorrectly. These responses show that, the pupils were incompetent in understanding the demand of the question and did not understand the parts of the television. On the other hand, the pupils who managed to respond correctly to those items were competent in understanding the basics of science and technology, specifically in identifying parts of the television. They also understood the demands of the questions and correctly observed the picture and identified it. They were able to correctly locate the parts which were required.

Item (v) assessed pupils understanding of the importance of the device shown in the picture (television). Most of the pupils managed to explain the importance of the television which is to get information and entertainment. Those pupils had enough knowledge of the importance of television. They managed to intergrate the object seen in the picture with daily real life situation where they use this device for watching different programs. Yet, the pupils who responded incorrectly to this question, did not understand the demand of the question as their responses focused on issues which are not the importance of the television. Some pupils wrote *food* and *devices*, others wrote parts of the television like *wire*, *antenna* and *switch*. A few of them wrote specific events which they once saw in the television like *it helps to see how a ship sinks* and to *watch games*.

3.0 EVALUATION OF PUPILS' PERFORMANCE IN EACH COMPETENCE

The SFNA 2019 questions in Science and Technology subject assessed 3 general competences analysed in the 2016 Science and Technology Syllabus for Basic Education Standard III – IV. Data shows that, out of the 3 general competences tested, pupils had good performance in 2 competences which are *Health Care and Environment* (74.8%) and *Understanding the Basics of Science and Technology* (70.8%). However, they had an average performance in *Perform Scientific Investigation and Technological Discovery* (50.9%). None of the competences had poor performance. Comparison of pupils' performance between 2018 and 2019 has shown a decrease from 69.6 percent in 2018 to 65.5 percent in 2019 implying a fall of 4.1 percent. However, there was a rise by 14.2 percent in the competence of *Health Care and Environment* and 4.5 per cent in *Understanding the Basics of Science and Technology*. The competence of *Perform Scientific Investigation and Technological Discovery* has dropped by 31.2 per cent. The summary of performance in each competence is presented in the **Appendix**.

4.0 CONCLUSION

The analysis of pupils' responses in Standard Four National Assessment in Science Subject in 2019 has revealed that, the pupils' general performance in this assessment was average since 65.5 per cent of the pupils passed. The good performance of the pupils in the competences of *Health Care and Environment* and *Understanding the Basics of Science and Technology* was contributed by: pupils' competencies in the assessed concept,

ability to read and write and understanding of the demands of the questions. Those pupils also managed to contextualize the learnt knowledge with daily life experiences. However, poor performance in some questions was influenced by: inadequate knowledge on the tested concepts, failure to recognize the demands of the question, inability to connect Science Subject with the real life experiences and inadequate reading and writing skills.

5.0 RECOMMENDATIONS

In order to improve future pupils' performance in Science and Technology Subject, the following are recommended:

- (a) Teachers should make sure that, they provide adequate classroom activities which demand the pupil to learn by doing. For example, in teaching and learning about changes of states of matter, the pupils are supposed to do activities concerning the change of water from liquid to solid, liquid to gas and solid to liquid. They are also supposed to do activities on identifying the characteristics of different states of matter for them to have a long term memory.
- (b) Teachers should teach Science and Technology subject practically using locally available materials instead of teaching theoretically.
- (c) Pupils in the lower levels should be given activities which encourage construction and witting of simple statements. For example, pupils can be given simple practical activities which demand them to write their observation. This will help in developing thinking and writing skills.

APPENDIX A

COMPARISON OF THE PUPILS' PERFORMANCE IN EACH COMPETENCE ASSESSED IN SFNA 2019

05 SCIENCE AND TECHNOLOGY

S/N	Competence	SFNA 2018				SFNA 2019			
		Performance in each Question		Average performance (%)	Remarks	Performance in each Question		Average performance (%)	Remarks
		Question number	% performance			Question number	% performance		
1	Health Care and Environment	4	65.0	60.4	Average	1	88.1	74.8	Good
		5	55.8			3	61.5		
2	Understanding the Basics of Science and Technology	2	78.6	66.3	Average	5	70.8	70.8	Good
		3	53.9						
3	Perform Scientific Investigation and Technological Discovery	1	82.1	82.1	Good	4	64.0	50.9	Average
4						2	37.8		

APPENDIX B

