Example Candidate Responses

Cambridge International AS Level

Cambridge International AS Level Environmental Management

8291

Paper 3: Coursework

Cambridge Advanced

CAMBRIDGE International Examinations

A DIVISION OF CAMBRIDGE ASSESSMENT

Version 3

Contents

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge International AS Level Environmental Management (8291) Paper 3 Coursework, and to show how different levels of candidates' performance (high, middle and low) relate to the subject's curriculum and assessment objectives.

In this booklet three candidate responses have been chosen to exemplify different standards. Each response is accompanied by a commentary explaining the strengths and weaknesses of the answer.

Please note: the candidate examples in this booklet are not perfect and due to the wide range of topics that different reports may cover, there are different, equally valid approaches that can be taken when producing a report.

Past papers, Examiner Reports and other teacher support materials are available at **https://teachers.cie.org.uk**

Assessment at a glance

All candidates take

Paper 1	1 hour 30 minutes	Paper 2	1 hour 30 minutes
Lithosphere and atmosphere Paper 1 is divided into two sections. Section A: short answer questions based on sets of data, diagrams or extracts. Section B: Candidates choose one essay question from a choice of three. Each essay question is in two parts. Questions will be drawn from parts of the syllabus not covered in Section A. 80 marks		**Hydrosphere and biosphere** Paper 2 is divided into two sections. Section A: short answer questions based on sets of data, diagrams or extracts. Section B: Candidates choose one essay question from a choice of three. Each essay question is in two parts. Questions will be drawn from parts of the syllabus not covered in Section A. 80 marks	

and

Paper 3: Coursework	Centre-based assessment
Candidates produce a research report of c2000 words covering an issue arising during their course of study. The report may focus on a local, regional or global issue. It may be based on secondary source material and/or internet data, although the use of primary sources and field data collection should be undertaken where practicable. Proposals for Coursework topics must be submitted to Cambridge in advance. 40 marks	

Teachers are reminded that the latest syllabus for 8291 is available on our public website at **www.cie.org.uk** and Teacher Support at **https://teachers.cie.org.uk**

Paper 3: Coursework

Paper 3: Coursework comprises a research report that is internally assessed then moderated by Cambridge International Examinations. The research report makes a 20% contribution to the final marks and is initially assessed out of 20 marks; as the written papers (Paper 1 and Paper 2) are each marked out of 80, this mark is then doubled to a maximum of 40. This section of the Example Candidate Responses booklet contains background to the research report and responses from three candidates.

In undertaking Paper 3 candidates should be able to:

1. formulate hypotheses and predictions on the basis of observations and prior research (including plan, select appropriate apparatus/materials and carry out experiments in order to test their hypothesis or prediction)

2. make accurate observations and measurements and record these in an appropriate form (e.g. graphs, tables, diagrams etc.) and use statistical tools to analyse their data

3. assess the reliability of their data and identify strengths and weaknesses.

Assessment criteria for coursework

There are three skills that will be assessed in the preparation of the report:

Skill	Description	Mark
C1	Research and planning	6
C2	Data collection and presentation	9
C3	Conclusion and evaluation	5

Mark schemes for assessment should be based on the following criteria:

Skill C1: Research and planning

(a) The hypothesis or question is clearly stated. 1 mark

(b) There is evidence of knowledge through a clear explanation of the principle underpinning the hypothesis or question. 2 marks

(c) The plan includes appropriate methods clearly explained. 2 marks

(d) The developed plan is effective at testing the hypothesis. 1 mark

Skill C2: Data collection and presentation

(a) Data observations are clearly presented in a suitable format. 2 marks

(b) Data is collected and recorded accurately and with an appropriate degree of precision. 2 marks

(c) The report is organised in a logical order of presentation (information, description, explanation, diagrams). 2 marks

(d) The quality of written communication. 2 marks

(e) Suitable statistical tools are used to analyse the data. 1 mark

Skill C3: Conclusions and evaluation

(a) Full conclusions are drawn, supported by reference to the data. 2 marks

(b) Knowledge of environmental and management principles are used to explain trends and patterns in own results. 2 marks

(c) There is an evaluative assessment of the report in terms of its limitations and level of success. 1 mark

This total of 20 marks will then be doubled to a mark out of 40.

Each Skill criterion is marked on a scale of 0 to 1 or 2, as follows:

2 = criterion fully met, 1 = criterion partly met, 0 = criterion not met at all.

or 1 = criterion met, 0 = criterion not met at all.

Example candidate response – high

THE PASSAGE OF HEAVY MACHINERY ON THE SOIL AT 'ARSENAL' HAS ALTERED SOIL QUALITY

(B) Background information

1. Soil degradation

Soil degradation refers to the decline in soil quality due to improper use as a result of agricultural, pastoral, industrial or urban purposes.

2. Causes of soil degradation

Soil degradation is associated to both natural factors and human activities such as:

- ✓ Deforestation/Forest clearance
- ✓ Overgrazing
- ✓ Inappropriate agricultural practices such as: monoculture, row cropping
- ✓ Over-exploitation of vegetation (deforestation)
- ✓ Salinisation

However, my study will focus on soil degradation as a result of soil compaction.

3. Soil compaction

Soil compaction is the process in which soil particles are pressed together when a stress is applied to a soil. This can occur as a result of passage of heavy machinery or cows on the soil for the ploughing process.

4. Effect of soil compaction

1) Pore space is reduced.

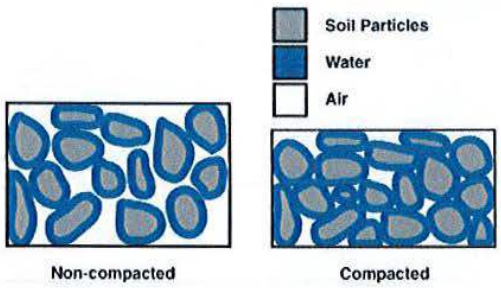

Figure 1: Effects of compaction on pore space

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Example candidate response – high, continued

- As pore space is reduced, the rate at which water percolates the soil is also reduced and thus water accumulates on the surface.
- Exchange of gases slows down fostering aeration problems.
- As soil particles are packed together, it is harder for roots to penetrate the compacted layer to obtain water and food.

5. Ways to prevent compaction

- ❖ Avoid using oversize tractors
- ❖ Avoid tillage of wet soil
- ❖ Maintain minimum tire inflation
- ❖ Add organic matter to soil

Example candidate response – high, continued

(c)Areas chosen for study

(1.) Area A

Figure 1.1: Area A

Area A is 'Arsenal', located at Triolet

- It is a managed land.
- Land is prepared uniquely by human labour.
- Involves an agricultural farm where a series of vegetables are cultivated using various techniques such as mono cropping and row cropping.
- The soil is not prone to compaction as there is no use of heavy machinery or even cows on the soil.

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Example candidate response – high, continued

2.) Area B

Figure 1.2: Area B

Area B is Valley Des Pretes

- It is a Non-managed land.
- It is also an area where various techniques such as row culture and mono cropping are practiced.
- Land is prepared by machinery such as heavy tractors only.
- Thus, it is an area that can be associated to the incidence of compaction.

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Example candidate response – high, continued

(d) Methodology

(A) Quadrat construction

A quadrat refers to a small plot isolated from a larger area, for the study purposes in ecology. It can be rectangular, circular or irregular in shape. Quadrat construction is suitable for sampling plants, animals such as millipedes and insects as well as some aquatic organisms.

i) Sketch of my quadrat:

My quadrat will be designed as follows:

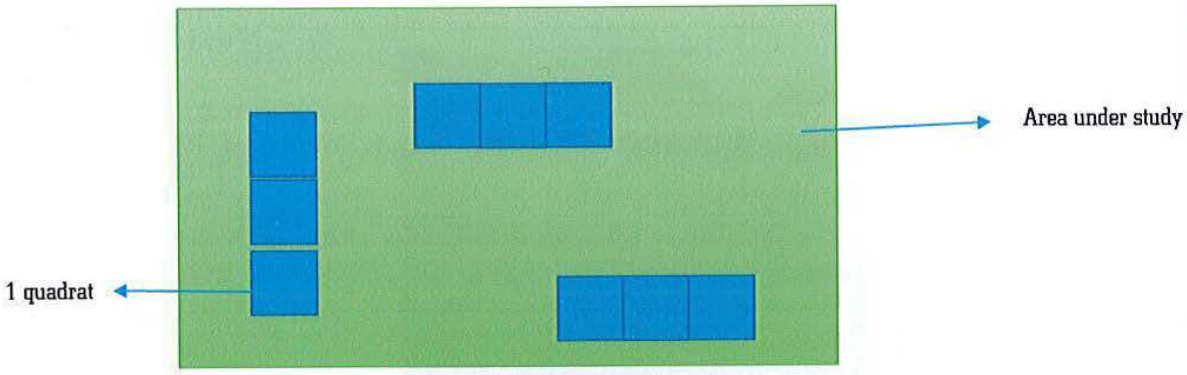

Figure 1.3: Sketch of quadrat

ii) Size of quadrat:

Each quadrat will measure 3m by 3m.

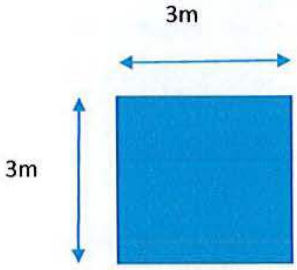

Figure 1.4: Size of quadrat

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Example candidate response – high, continued

iii) Materials needed to construct quadrat:

- Sticks
- Rope
- Measuring tape
- Hammer

iv) Steps involved in Quadrat construction:

Step 1: Choosing an area at random

Step 2: Inserting sticks in soil

Figure 1.5: Step 2 of quadrat construction

Step 3: Tying rope to stick

Figure 1.6: Step 3 of quadrat construction

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Example candidate response – high, continued

Step 4: Measuring the length of the rope

Figure 1.7: Step 4 of quadrat construction

Step 5: Final quadrat

Figure 1.8: Final quadrat

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Example candidate response – high, continued

Data source 1: Qualitative and Quantitative analysis of water logging

(i) Qualitative testing

In order to determine the moisture content of the soil, its color will be visually assessed and classified as:

- Pale brown
- Brown
- Dark brown

Note: The color of the soil in the two areas will be assessed 2 hours after a period of heavy rainfall.

(ii) Quantitative testing

Soil infiltration test, also known as the 'percolation test' refers to measuring the rate at which water infiltrates the soil. It is carried out as follows:

Step 1: Dig 3 test holes, each 20 cm deep

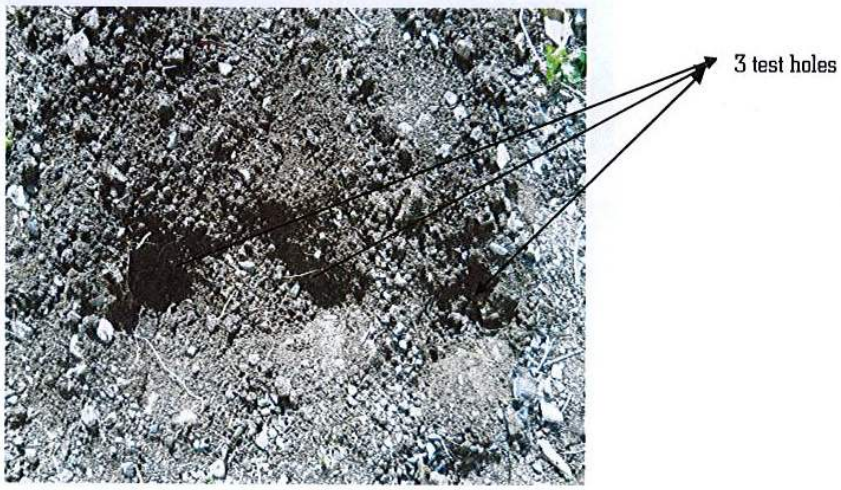

Fig 1.9: Step 1 of percolation test

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Example candidate response – high, continued

Step 2: Add 100 ml of water in the hole

Figure 2: Step 2 of percolation test

Step 3: Measure the time taken for water to completely infiltrate the soil

Figure 2.1: Step 3 of percolation test

Note:

- Make sure water has completely infiltrated the soil before noting the time
- Carry out the test several more times for accuracy of results

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Example candidate response – high, continued

Data source 2: Squeeze test

The squeeze test is a means to evaluate the type of soil. Soil can be classified as clay soil. Sandy soil or loam soil, depending on the percentage of the different soil particles in the soil. The characteristics of the different soil type is as shown in Table 1.

Type of soil	Properties
Clay	Slow draining
Sand	Quick draining
Loam	Retain moisture but does not stay soggy

Table 1: Properties of different soil types

The squeeze test is carried out as follows:

1. Dig a small sample of soil from within the first few meters of the soil
2. Hold it in the palm of the hand an d add a little water to it

Fig 2.2: Step 2 of squeeze test

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Example candidate response – high, continued

3. add a little water to it and press it firmly in the hand

Fig 2.3: step 3 of squeeze test

4. The following observations may result and will equally give an indication of what type of soil is being dealt with.

Observations (when pressed in the hand)	When given a poke	Types of soil
Soil holds its shape	Breaks apart upon poking	Loam
Soil holds its shape	Does not crumble	Clay
Soil breaks apart immediately. It barely holds together	-	sandy

Table 1.1: Observations of squeeze test

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Example candidate response – high, continued

Data source 3: Growth rate of plants

For the purpose if this study, the time frame where harvest has been just been performed was chosen. The soil was then prepared and seeds sown. The time taken for plants to then regenerate, that it start appearing on the soil again was then noted.

Note: The growth rate of same plants was assessed in both areas, to remove any other variable other than who prepared the soil; human labor or machinery

Data source 4: Height of trees

This data will be collected after a period of 2 months after the seeds have been sown. It involves measuring the height trees (using a measuring tape) have reached after the mentioned time frame. It will be related to the type of soil.

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Example candidate response – high, continued

Data source 1: Qualitative and quantitative analysis of water logging

(i) Qualitative Analysis: Visual assessment of soil color

The table below shows the results for visual assessment:

Area	Soil color
A	Pale brown
B	Dark brown

Table 2: table showing soil color

The dark brown color of the soil of area A indicates high moisture retention, even 2 hours after the rain. This indicates that the soil takes a lot of time to absorb the water completely. This soil has a low water infiltration rate. There was even surface run-off as shown below:

Fig 2.4: photo showing evidence of water logging

The pale brown color of the soil of area B indicates that the soil has absorb the water quite rapidly. This soil exerts a higher water infiltration rate

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Example candidate response – high, continued

Quantitative Analysis: Percolation test

The table below shows the result for the percolation test:

	Water infiltration rate (seconds)			
Area	Trial 1	Trial 2	Trial 3	Mean
A	19	22	20	20.3
b	42	37	39	39.3

Table 2.1: table showing percolation test results

The mean that is the average of a set of numbers; in this case 'trials', was calculated as shown below:

$$\text{Mean for Area A} = \frac{\text{trial 1} + \text{trial 2} + \text{trial 3}}{3}$$

$$= \frac{19+22+20}{3}$$

$$= 20.3$$

$$\text{Mean for Area B} = \frac{\text{trial 1} + \text{trial 2} + \text{trial 3}}{3}$$

$$= \frac{42+37+39}{3}$$

$$= 39.3$$

The soil of area A has taken a mean value of 20.3 seconds to completely infiltrate the soil while that of area B took an average of 39.3 seconds.

More time was required for water to percolate the soil in Area B.

Area B being the non-managed area is victim of compaction, which is a soil where particles have been pressed together. This result in less pore spaces between soil particles and thus have taken more time to enter the soil. This may lead to surface run-off & eventually soil erosion.

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Example candidate response – high, continued

On the other hand, the managed area is not victim of compaction & thus there is plenty of space between soil particles for water to infiltrate.

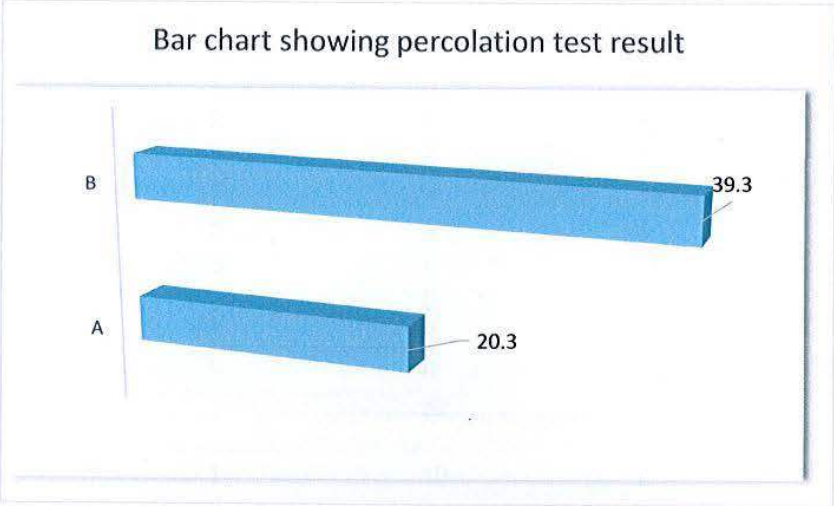

Figure 2.5: Bar chart showing percolation test results

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Example candidate response – high, continued

Data source 2: Height of trees

The table below shows height of trees:

		Height of trees (cm)	
Area	Quadrat	<20cm	>20cm
A	1	6	9
	2	8	12
	3	4	8
	4	7	10
	5	3	7
	6	6	11
	7	5	10
	8	7	8
	9	6	10
Total		52	85
B	1	10	2
	2	9	0
	3	7	4
	4	9	1
	5	8	1
	6	10	3
	7	7	0
	8	9	2
	9	7	1
Total		76	14

Table 2.2: table showing height of trees

In area A, a total of 52 trees were below 20 cm in height while 85 trees were above 20cm in height.

There are slightly more trees that are above 20cm but a quite equal distribution of tree height has been observed. Trees are in different stages of succession: starting from the pioneer community to the climax community. This indicates that the condition in the area A are favorable, allowing trees to grow well.

In area B, 76 trees were below 20cm while only 14 trees were above 20cm. The majority of trees were below 20cm, indicating that plants do not reach their climax community. They stay shorter, probably due to the fact that being a non-managed area, all kinds of human activity is permissible such as

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Example candidate response – high, continued

deforestation, overgrazing and so on. This affect the soil quality, allowing the pioneer community to reach the plagioclimax community only.

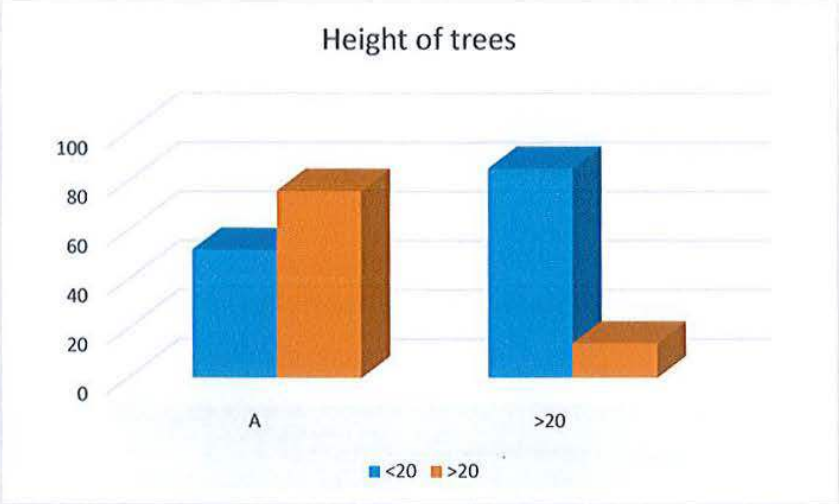

Fig 2.6: bar chart showing height of trees

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Example candidate response – high, continued

Data source 3: Growth rate of plants

The table below shows the results for the regeneration rate of plants in Areas A and B

Area	Growth rate (days)
A	11
B	19

Table 2.3: table showing growth rate of plants

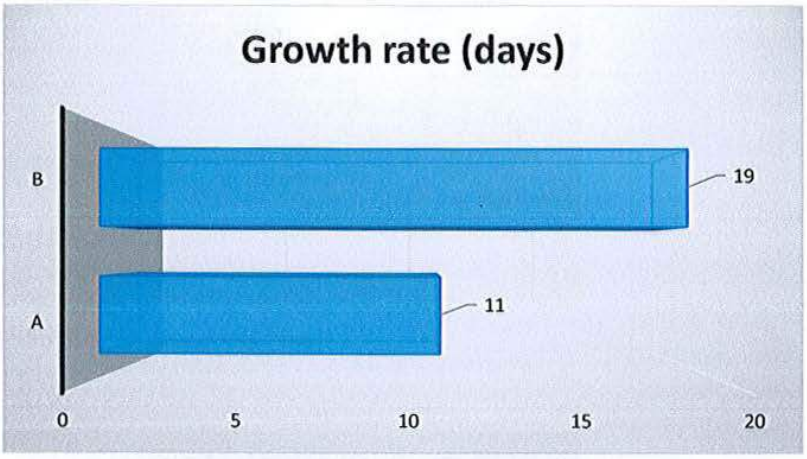

Figure 2.7: Bar chart showing growth rate

In Area A, the plants took an average of 11 days to start appearing on the soil while in Area B it took approximately 19 days for plants to start growing. In Area A plants started growing faster than in Area B. This can be attributed to the fact that:

In Area A, the soil particles are not squashed and water will thus be readily available to plants. Water is a requirement for photosynthesis, which is the process by which plants manufacture their own food. It is through this process that plants grow. This why plants grow at a faster rate in the land managed by human labor.

On the other hand, soil particles being squashed together implies a reduction in the space between soil particles. Reduced pore space means that less water percolates the soil and less water is available to plants to carry out photosynthesis. This is turns leads to stunted plant growth.

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Example candidate response – high, continued

Data source 4: Squeeze test

The results for the squeeze test is as shown below:

Area A:

As the soil crumbles upon poking, the soil is a mixture of sand, silk and clay: loam

Figure 2.8 Showing squeeze test result

Area B:

As the soil retains its shape after poking, it means that the soil is mostly clay.

Figure 2.9 Showing squeeze test result

Area A is made up of loam soil while Area B is made up of clay soil. Loam soil is known as the ideal type of soil as it is rich in nutrients and absorbs water at a fast rate. On the other hand, clay soil has low water infiltration property, which does not make it ideal for plant growth.

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Example candidate response – high, continued

Conclusion

The hypothesis of my study, which is 'THE PASSAGE OF HEAVY MACHINERY ON THE SOIL AT 'ARSENAL' HAS ALTERED SOIL QUALITY' is partly right. This was demonstrated through the results I obtained while carrying out the different tests.

First and foremost, a soil quality namely the water infiltration capacity of the soil was altered. The area that was victim of compaction had an average percolation rate of 20.3 seconds while the area which lacks the incidence of compaction had an average infiltration rate of 39.3 seconds. This was further reinforced by the colour of the soil some hours after rainfall. The soil of Area A remained dark brown, that is still soggy while that of Area B was pale brown, indicating that the soil was already fully absorbed. This change in water quality in turn had a negative effect on:

- Growth rate of plants. As the soil of the non-managed area is squashed, plant roots do not get enough water to photosynthesize and grow quickly.
- The height the trees. Trees normally reach their climax community when they obtain all of their requirement and water is one such need. In the absence of sufficient water, growth is suddenly halted.

The above results shows the need to manage an area and the incidence of compaction by measures such as reducing eight of tractor wheels and so on.

It is to be underlined that the hypothesis is partly right as soil type has also been taken into account.

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Example candidate response – high, continued

Evaluation:

Weakness:

- Determining soil type was an additional variable to my study. It is not related to the testing of my hypothesis.
- In Mauritius, most of the soil is prepared by tractors and it was difficult to identify an area prepared by human labour.

Strengths:

- All of the remaining methods chosen were effective in testing of the hypothesis.
- Construction of quadrats were effective in covering a large part of the agricultural fields chosen for study

How I could have improved my study:

- Should have taken into account more areas showing varying degrees of compaction
- I could have assessed the vegetation cover of the two areas under study
- I should have described the size and weight of the tractors and correlate it to the incidence of compaction

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Examiner comment – high

The research project report for this candidate was of a very high standard. The quantity of text is slightly more than what would be recommended but the overall quality was very high indeed.

The report is well organised with each part adhering to the detailed contents page at the start. In structure the report clearly conforms to the four stages of scientific method including; introduction and hypothesis, a justified methodology, results presented and analysed, a final conclusion and self-evaluation. The quality of the report only slightly fell away in the third skill area with full marks being obtained in the first two.

Skill C1

A clearly stated hypothesis was backed up with full and succinct background information on soil compaction. The methodology concerned with researching soil compaction are accurate and fully justified. The methods provided a full assessment of the hypothesis.

Mark awarded = 6 out of 6

Skill C2

All parts of this skill area were satisfied. Primary data was presented in an effective variety of graphs and tables, backed up by the use of good quality and appropriate photographs. The report is well organised and very well written. Although statistical methods were used they could have been better utilised in the assessment of the data; however there was just sufficient to obtain the mark.

Mark awarded = 9 out of 9

Skill C3

The conclusion provided a good summary and evaluation of the researched topic. The report slightly fell away in reference to environmental principles and management by not referring to data presented in the report. The candidate's self-evaluation was satisfactory.

Mark awarded = 4 out of 5

Research Report Assessment is initially out of 20 marks then doubled to 40.

Total mark awarded = 38 out of 40

Example candidate response – middle

URBAN SPRAWLING AS A CAUSE OF ENVIRONMENTAL POLLUTION

A CASE STUDY OF KIBERA SLUMS, KENYA

INTRODUCTION

This study aims at investigating whether environmental pollution faced majorly by Kenyans in specific areas of Nairobi may be due to the practice of urban sprawling or caused by other factors for example industrialization, transport (road, air), science and research. It will explore ways how urban sprawling leads to pollution, methods used in control of urban sprawl and methods of reducing pollution. This paper will also consider government sectors and organisations in control of urban sprawl and pollution, it will provide an overview on effects of these urban sprawls impacts improvements limitations together with some recommendations.

For the previous decade, the world has faced major shifts in the population distribution. This is where the number of people living in urban areas begins to outnumber those in rural areas Furthermore, with all the rapid urbanization taking place especially in Sub Saharan Africa it's no surprise that current estimates suggest that in the nearby future that's to say by 2050, 60% of world population will be settled in urban areas and of these 3 of every 4 of the new urban dwellers will live in a slum Kenya is among these developing countries that are increasingly urbanizing real fast.

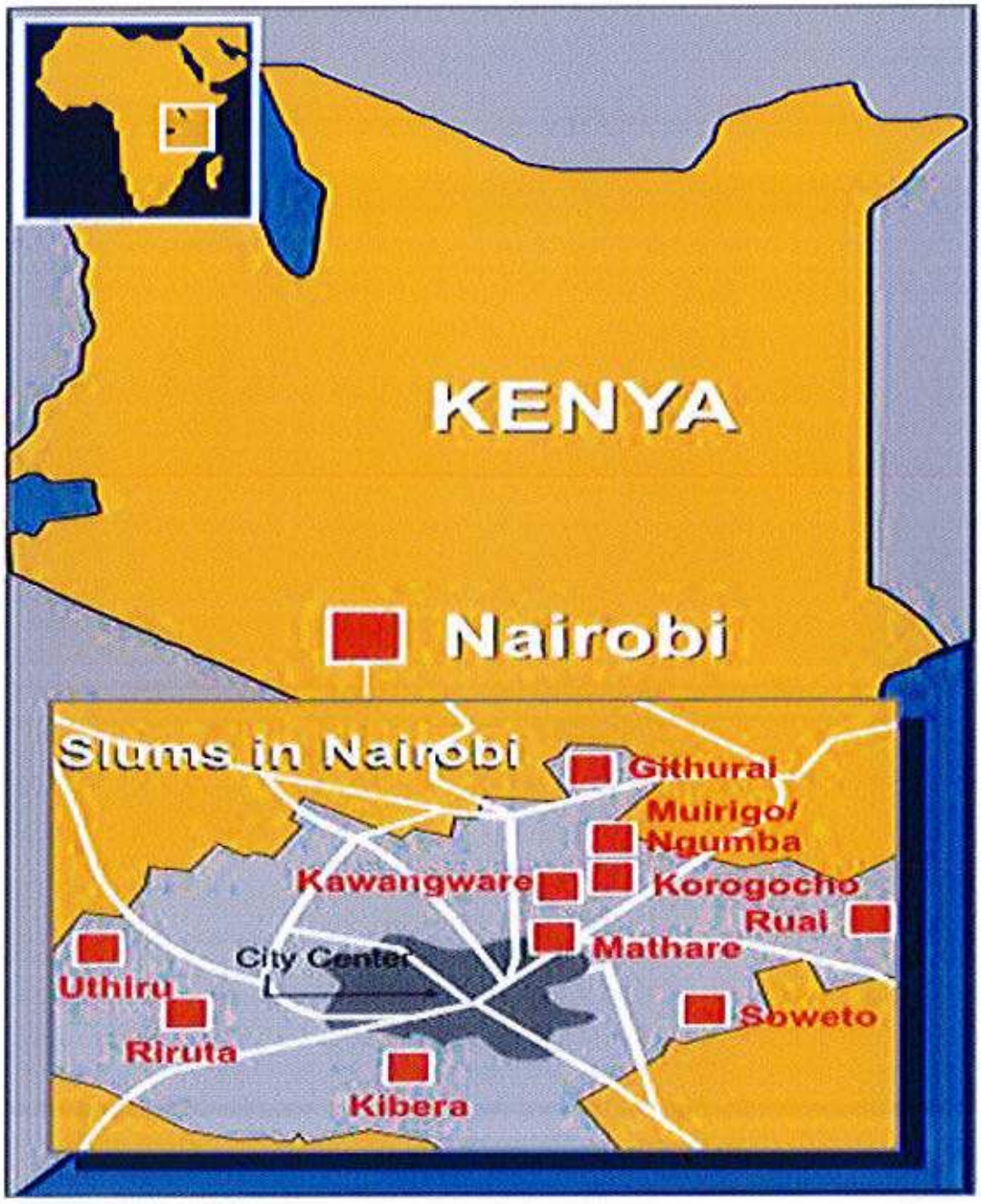
Example candidate response – middle, continued

For the first time in history, more than half of the world's population will live in cities; concentrated on less than 3% of its land area (United Nations Population Fund, 2007). Since the cities are unprepared to accommodate these newcomers, the huge rise in numbers of urban dwellers has contributed to the growth of slums; characterized by hyper-congested, substandard housing, a lack of safe water and sanitation, low incomes, and physical and legal insecurity. Slums make up 30–70% of urban populations. Slum settlements are not an exception within a city; in Africa, slum dwellers constitute the majority of the urban population. In 2005 the estimate of the global slum population was one billion and increasing by 25 million each year. These slums are life-threatening, denying the residents even dignity and they are spreading fast. Africa has long had a challenge with development as member countries are lacking infrastructure and governments capable of delivering services to countries that lack both.

Kenya is a country located in Southeast Africa, boarded by Ethiopia to the north, Somalia to the northeast, Tanzania to the south and Uganda to the western side with the Indian Ocean on the eastern side. Kenya has an estimated population of about 40 million people (Encyclopædia Britannica, 2011); of these 40% of the Kenyan population lives in cities, such as Nairobi, Mombasa and Eldoret. Nairobi is Kenya's capital, highly urbanized for a developing country with skyscrapers, modern shopping centres and rich suburbs. It is situated in the highlands and is well known for its tourism sector mainly contributed by its wide range of endangered animal species, landforms and various cultures. With the high levels of poverty, a significant number of Kenyans head to slum areas like Kibera where the cost of living is cheap. 60% of the capital's population has settled in slums and other squatter settlements within the city. Some of the largest slums in the city include Mathare, Korogocho and Kibera.

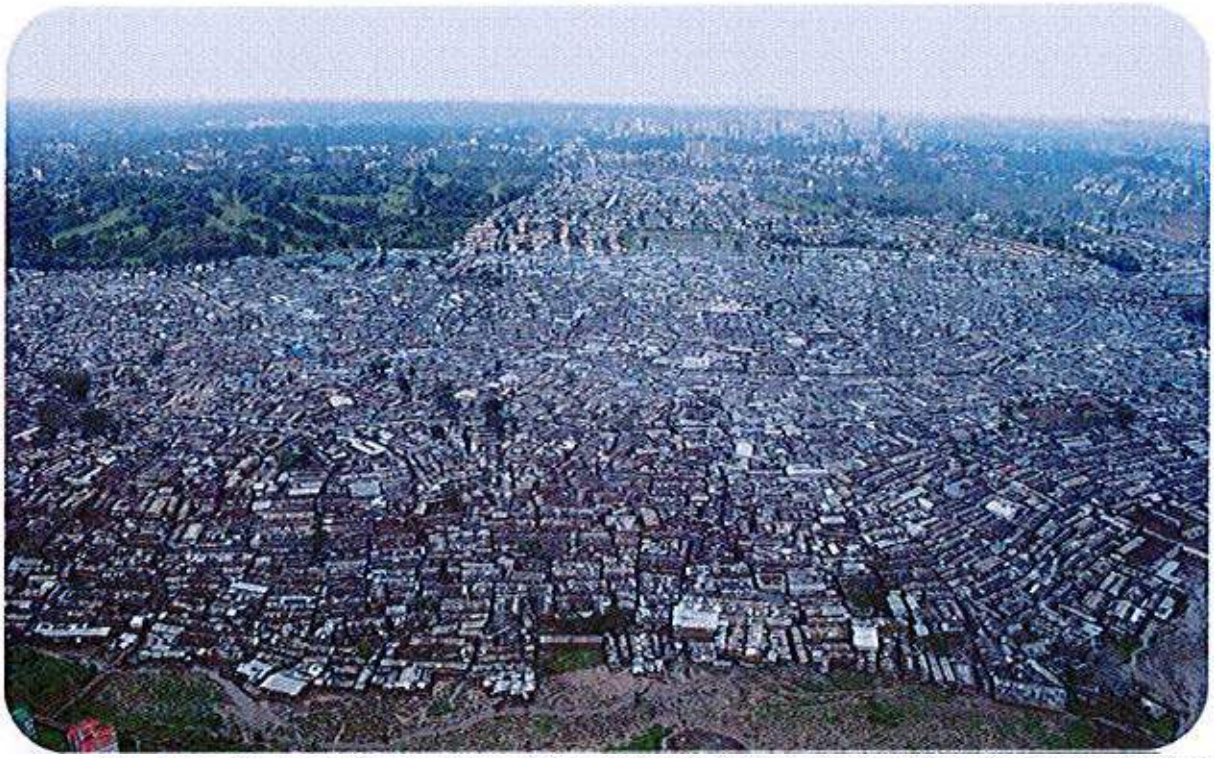
Example candidate response – middle, continued

MAP SHOWING LOCATION OF THE VARIOUS SLUMS FOUND IN NAIROBI



Example candidate response – middle, continued

BACKGROUND ON KIBERA SLUMS



The name Kibera originated from Nubian word "Kibera" meaning forest or jungle, it is an informal urban settlement found in the neighbourhood of Nairobi city in Kenya, in Lang'ata constituency of Nairobi province to be exact. Kibera is situated southwest of Nairobi city centre and is framed by a railroad line and the Ngong River, though only 5 kilometres from city Centre and yet it seems to be worlds apart.

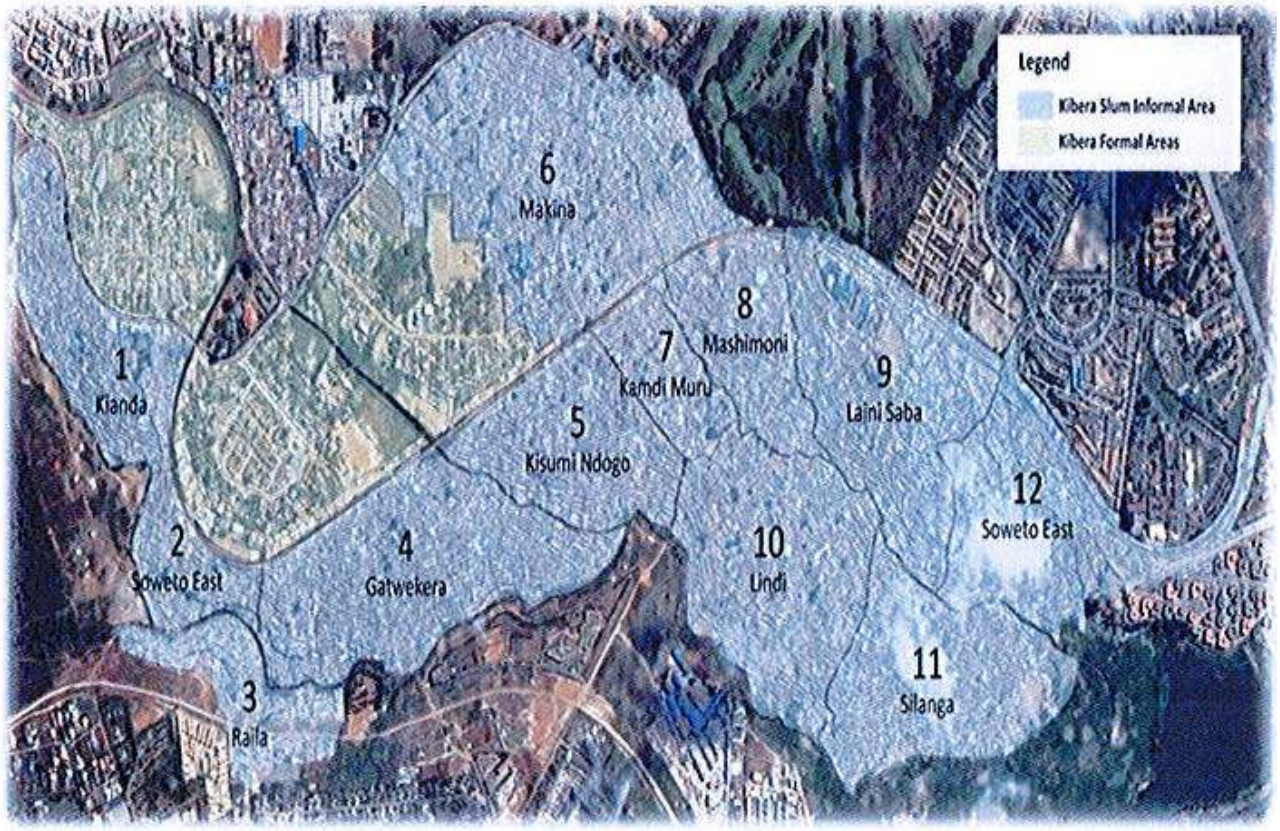
The emergence of Kibera as an informal settlement is connected with the phenomenal growth of the city of Nairobi, as rapid urbanization takes its toll, so has the development and growth of informal settlements. The economic gap between the rich and poor in Kenya is quite large and easily visible, with high cost of living which majority cannot afford people search for cheaper alternative way of life leading to development of these informal settlements. Kenya contains a number of slums namely; Baba Ndogo,Dandora, Fuata Nyayo, Huruma, Kawangware, Kangemi, Kiambiu, Korogocho, Mathare Valley, Mukurukwa Njenga, Nyalenda, Pumwani, Ziwa la Ng'ombe, Majengo and kibera.

Example candidate response – middle, continued

Kibera is one of the most arduous urban living environments in Africa, the largest slum in Africa to be precise. Some say it's the largest slum in the world (though Wikipedia says it's third largest) though I'm sure it's one of the biggest in the world, it houses more than a quarter of Nairobi's population with the highest proportion of Nairobi's population living in the slum, there are approximately 2.5million slum dwellers confined in about 200 settlements in Nairobi representing 60% of the Nairobi population, occupying just 6% of the land. Kibera houses about 1-2 Million of these people (the unseen majority) in about 4 square kilometres there are approximately one million people living and it's also home to around 600 non-government organisations (NGOs).Kenya has an annual informal settlements growth rate of 5%, this according to some is the highest in the world and it is likely to double in the next 30 years if positive intervention measures are not put in place.

"If there was a perfect slum, Kibera would be it, Kibera contains one third or even more of Nairobi's population, the figures are not precise. This area alone includes thirteen villages of Kianda, Soweto East, Soweto West, Gatwekera, Kisumu Ndogo, Lindi, Laini Saba, Kicchinjio, Silanga, Makina, Kambi Muru and Mashimoni. The living conditions within Kibera are different depending on the area.

THE GPS MAP OF KIBERA SLUMS: SHOWING ITS THIRTEEN VILLAGES



Example candidate response – middle, continued

KIBERA FACT PAGE
Country: Kenya

Region: Neighbourhood to Nairobi city, 5km from city centre

Population: 170070 people according to Kenya census reports of 2009 previous estimates of 2.5 million that is 60% of Kenyan population

Area covered: 6% of total land in Kenya

Villages contained: 13 villages

Altitude: 1670 meters above sea level

Latitude: 36 degrees, 50 degrees east and longitude 1 degree, 17 degrees south
about 140 kilometres south of equator

Race: Africans mainly Kenyans majority being Luo, Luhya and the Kamba

Religion: mostly Islam

Land: owned by the government

Life expectancy: 30 years of age compared to 67.2 years of age in the world

Age: Developed over decades since early twentieth century around 1899

Typical size: 9 Ft. By 9 Ft., 630 acres

Annual Informal settlement growth rate: 5%

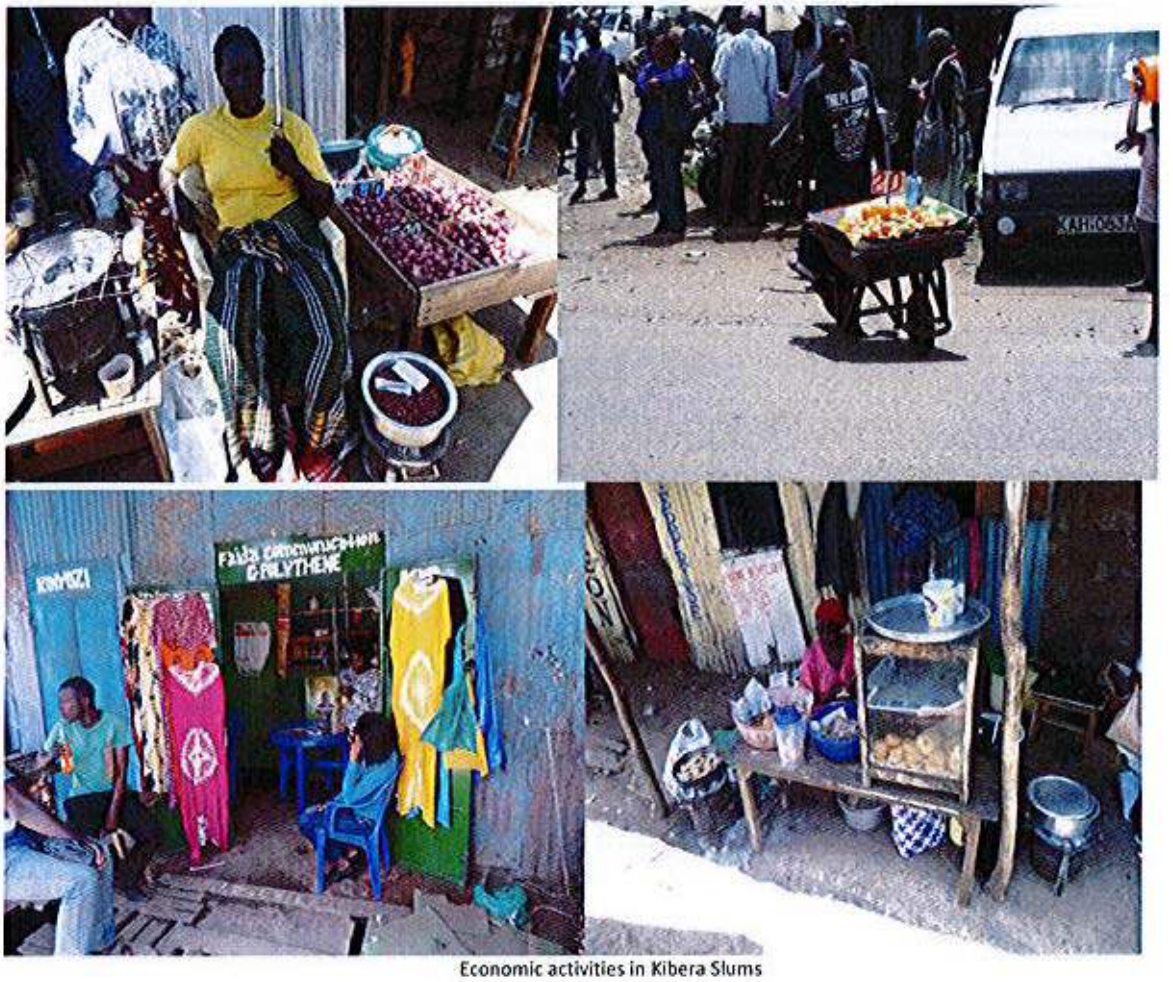
MAJOR CHALLENGES FACED BY KIBERA RESIDENTS

ECONOMIC CHALLENGES

Unrecognized by government, Kibera is a place that over a million people call home. Termed as the "city of hope", the residents focus mainly on survival as the slum dwellers find ways to scramble through their fragile economy. Despite many businesses not necessarily booming, gets them what to feed on for the day though many go with only one meal a day due to the fact that practically most of its population lives in extreme poverty that's to say below the poverty line earning less than $1.00 per day.

Two out of three Nairobians live in a slum, half of them in Kibera. The key to making it in kibera is capital, to equate kibera with idleness and misery is to misunderstand them because as this could be the most entrepreneurial and creative place in the whole of Kenya with over a million customers and retailers with all sorts of businesses. However these economic activities are made difficult or even impossible due to corruption from police and local administration since almost all of the businesses are not licensed.

Example candidate response – middle, continued



Economic activities in Kibera Slums

Example candidate response – middle, continued

During the months between July-August, tourism is at its peak in Kenya, this also known as the tourist season. However in the city of Nairobi, another form of tourism is rapidly gaining popularity, this is called slum tourism where a few small companies take camera-toting foreigners on guided tours of Kibera guided by a local guide to give the wealthy outsiders a glimpse of life in an informal settlement. Many of the slum dwellers are against this act though those that support it argue that it brings money to locals usually the tourists buy crafts like necklaces made from beads and it also shows the tourists the side of Kenya not usually mentioned and expressed in typical travel magazines, internet sites, whereas opponents deride the practice as degrading and exploitative.

Kibera is popular for slum tourism

Example candidate response – middle, continued

In a city where nothing is free, people are seen walking in a big crowd as early as 6:00am in one direction to the high rise centre of Nairobi (Nairobi's business hub) where they provide the unskilled labour to the country as builders, stall owners, drivers, security guards and many in peoples residences as house helps. They walk up to 20kms to and from their homes each day to find work, I can't begin to imagine walking 20kms once, let alone twice (to and from) work each day.

Government intervention in kibera is nearer to zero, absent if I may say it offers the residents which they regards as squatters no services, opens no schools, operates no hospitals, paves no roads, connects no power lines and pumps no water into homes.

Majority of people living in Kibera do not have jobs that's to say the unemployment rate in the area is very high, thus they are forced to get by in various ways. Some illegally brew and sell chang'aa (an alcoholic drink or spirit) distilled from maize or sorghum that is topped up with methanol.

Most of the slum dwellers operate informal enterprises like some are shop owners and stall owners especially women taking to the roadsides that act as vibrant workshops, selling fruits and vegetables, clothing, small utilities like soft drinks, bakeries (home-made), hawking, tailoring, carpentry, food making, and beer brewing among others while the more energetic men attempt to find hard-core employment providing labour in places such as construction sites.

Selling of commodities on the roadside in Kibera

Others can be found making crafts and jewellery from animal bones especially cow bones to sell in the slum but mostly to various shops in Nairobi (highly purchased by tourists), Some people sell coal and a few control the water pipes and sell water to the community and others tap into power grid providing electricity to the people at a price, this is the only way they can afford to get these services in Kibera.

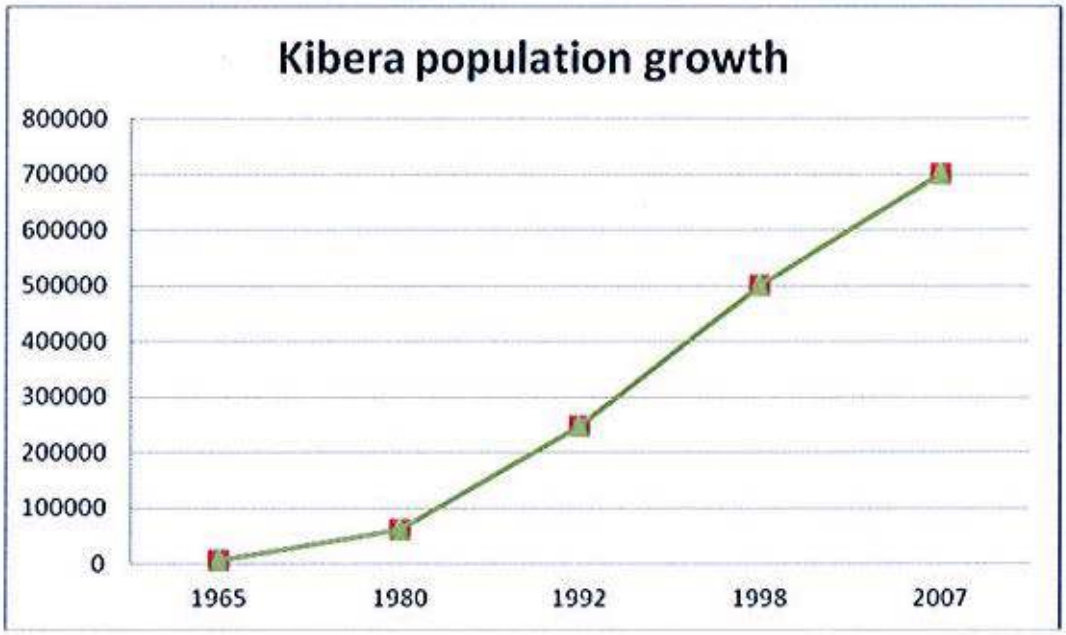
Basic necessities like food, healthcare, electricity and water are far more expensive in Kibera than in Nairobi, as in the greater part of the city the government provides subsidized clean water for purchase and there is better access to variety of places to buy food, like markets and supermarkets where competition keeps prices more affordable.

Also poverty in the slums has also rendered the slum dwellers victims of other social problems such as prostitution, drug use, alcoholism and crime.

Example candidate response – middle, continued

POPULATION DENSITY

Poverty could be the least of their worries with the rapidly ever rising population in Kibera, it is home to perhaps over a million people, nobody knows for sure, this comes with consequences like congestion, high crime rates, pollution, poor health and sanitation and diseases. There are bound to be thousands of deaths shown by the low life expectancy in kibera of about 30 years compared to 65 years in rest of the world and due to poverty in the area the under-five mortality rate in Kibera is high of about 18.7% compared to less than 1.5% in the high-income earner areas in Nairobi but this does not affect the population growth one bit as with a high death rate there is a resultant high birth rate in this area, Grace Wanjiru a resident of Kibera at the age of 21 already has 5 children, the women in kibera give birth like they are paid to, this is as result of traditional ways of life, no knowledge or money for contraceptives, women having no say and also the fact that the highest percentage of the population in Kibera are Muslims with polygamous ways and also to a greater extent the fact that population growth is linked to massive migratory movements as more residents especially from the rural areas in Kenya mainly searching for better living standards (mentality of to live in the city is to be rich, little do they know the reality to it).



All residents being African, Kibera's origins are Western. About a century ago Kenya was colonized by the British, the British colonial rulers gave plots of land on the edge of Nairobi to Nubian soldiers from the Kenyan- Sudan border serving in the King's African Rifles who had participated in the first world war for the British military, these became the original settlers settling in the Kibera woods hence the name kibera meaning forest.

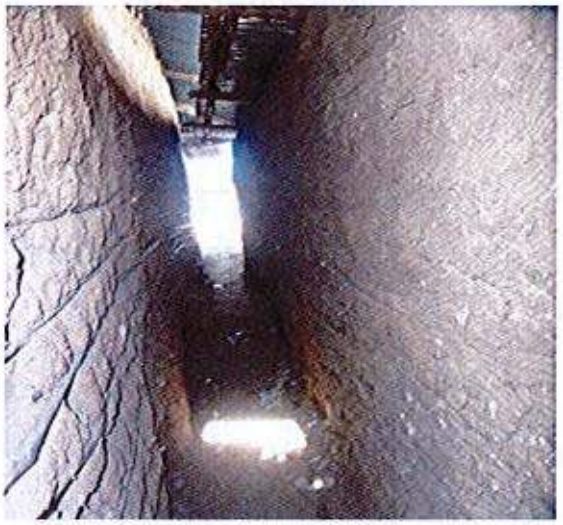
The land was later nationalized but the Nubians stayed and rented parts of it to newcomers; today the Nubians occupy only 15% of Kibera. Government owns all the land in this region. 10% of people are shack owners and many of these people own many other shacks and sub-let them (rent them out), the rest are tenants with no rights.

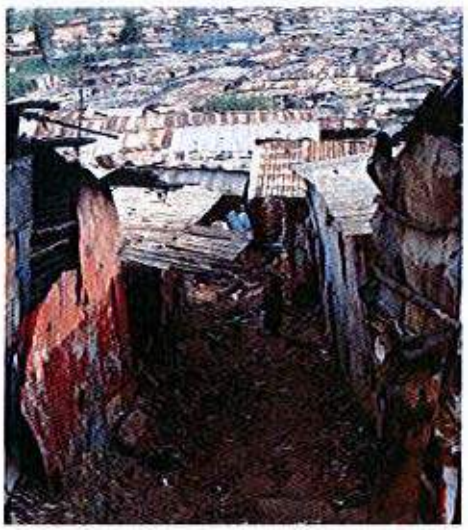
Example candidate response – middle, continued

Inside a shack that acts as a sitting area bedroom and kitchen

Most of the shack owners are Kikuyu (the majority tribe in Nairobi), they rarely live there but are the landlords. The majority of the tenants are Luo, Luhya and some Kamba these people are from the west of Kenya. There are many tensions in Kibera, particularly tribal tensions between the Luo & Kikuyu, also between landlord and those with and without jobs. These shacks are built with mud walls, screened with concrete, a corrugated tin roof, concrete floor. The cost is about Ksh 700 per Month a booming business to be. These shacks are often one to two roomed housing up to 8 or more people, many sleeping on the floor

Congestion in the area is another major case as thousands of rusty corrugated iron homes are jammed into every space available on this rather small piece of land. Today most of the homes are made of ragged tin and reused timber with many or even thousands warren of narrow dirty lanes that divide them also referred to by Secretary General Irene Khan of Amnesty International as the "Arteries of Kibera"





Most times these corridors are only a few feet wide, separating these homes that look to be almost submerged into each other some only shoulder-wide and all of them devoid of cars and yet these streets get narrower by the years as businesses grow people encroach on the once throughways, vendors line on both sides of the already small paths building stalls selling their commodities and also constructing houses on what cannot even be called a plot of land however the government has started building second storeys to expand upwards.

Example candidate response – middle, continued

During the rainy seasons these pathways become small rivers filled with mud combining with open sewer systems clogged together with every kind of garbage imaginable to mankind from human wastes, decaying food stuffs, to non-bio-degradable substances like plastic bags (polythene), metal parts, broken glass bottles, plastics, burning coal, cloth, rubber, wood flowing along these arteries, this mixture is bound to have a pungent scent.

Garbage blocking a water tunnel

To make things worse urban services such as water and sanitation are scarce. Kibera, wedged in between ornate embassies and a well-tended golf course, is an integral part of Nairobi, behind these rows of rusty roofs lays the sad fact about Kibera.

Example candidate response – middle, continued

Power supply

Only about 20% of Kibera has electricity legally, The transformers like all power in Kibera, is run by shady types who tap into the city power grid, these are illegal dangerous unreliable electric systems that everyone supports as they are left with few choices since electricity is very scarce and inconsistent in Kibera, usually referred to as black market.

The blackouts are often usual and only on rare days in Kibera does the electricity stay on mainly because Kibera is severely underserved and the massively active practice of rigging power from the power grids which becomes overloaded causing these shortages. The slum is connected to about five transformers, one for every 20,000 or so people. Comparing to the greater Nairobi area, where the ratio is closer to one transformer per 1000 people, portrays the level of unfairness.

These means of getting power are less than scrupulous when it comes to safety and they charge heavily as it's their livelihood, the cartels tap power from the power grid thus rigging electricity directly from KPLC's transformers and it's his job to distribute to other households (the customers) at a price. However there are those rigged electricity wires usually seen hanging in the open between buildings, unprofessionally set up by people who legally buy electricity though still share it for a fee with their neighbours. These methods are far below required safety standards, making electrical fires common, but many take the risk since they cannot afford anything else.

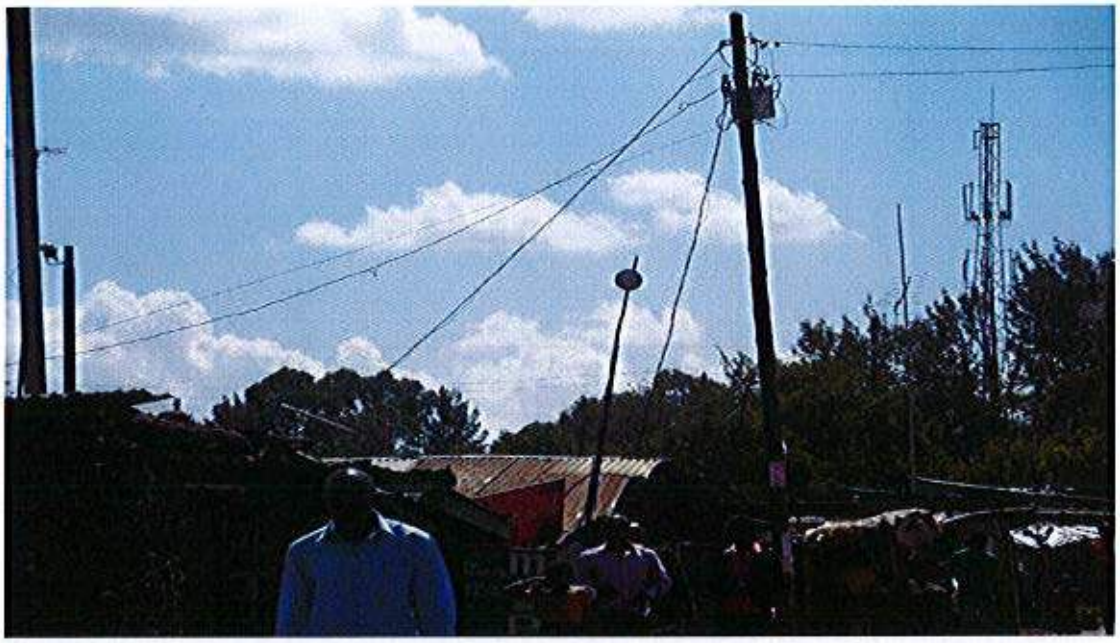
Apart from the cartels, gangs also participate in the tap and supply business. To connect electricity, the gangs charge between KES300 to KES1000 (3-11 USD), depending on the size of the house, paid once after connection. Electricity companies used to disconnect the illegal supplies whenever they discover them, which very often lead to cases of violence in the slums between the gangs and officials carrying out the disconnections.

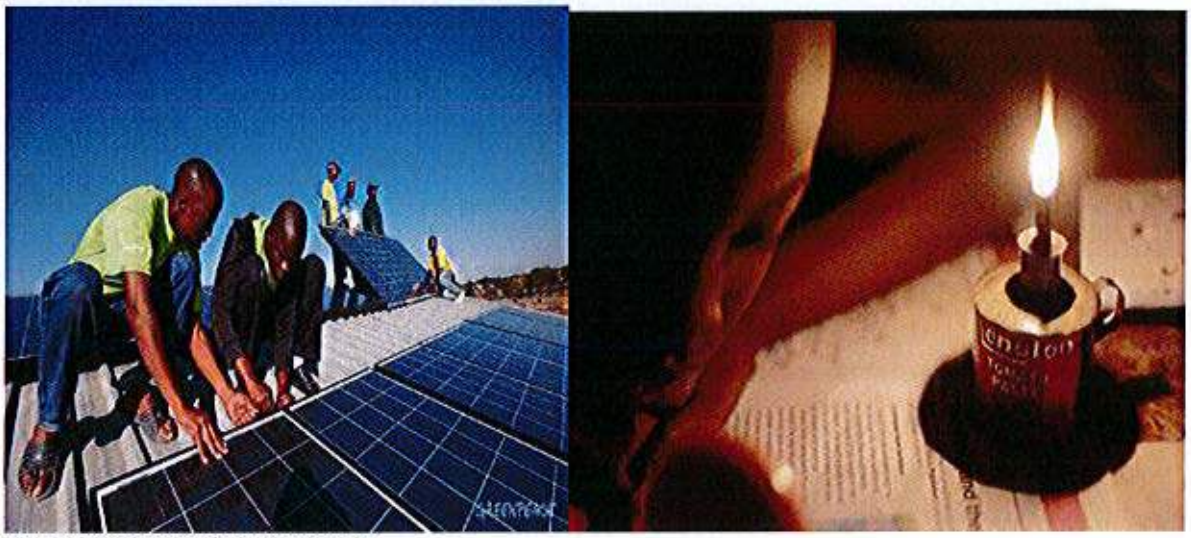
But at least recently Kibera has power, the government, UN-Habitat and other organisations are in the process of providing power to more parts of Kibera, this will include street lighting, security lighting and connection to shacks (this cost Kenya shillings 900 which is still not affordable to many of the residents).

And also the KPLC's employees have in some way encouraged the ridging activity, they understand the reasons that drive the residents to this point and know that the people here are poor and are in need electricity besides removal of the resellers wires would bring up costs and also because the amount of energy stolen by the resellers is less than one percent of total energy in comparison to the over 12 percent lost due to the power grid's inefficiencies. Even more the KPLC has tried to touch more into the issue by connecting more people into the grid providing formal safe electricity and making the payment for electricity easier and accessible through the Kenya mobile money system. Even with these improvements, there are only 1,500 legal connections in slums.

Example candidate response – middle, continued

Furthermore, people have found other alternative ways to deal with the situation like the use of candle light, paraffin lamps and solar energy.





Alternative sources of power in Kibera

The majority of electricity in Kibera is stolen from Nairobi because until recently the government refused to install a safe and affordable means of powering Kibera. There were no streetlights; this increases security issues at night, particularly for women and girls. Many women and girls are victims of rape and abuse at night. The inability to see the perpetrators makes it almost impossible for these victims to find justice. Many unwanted pregnancies result from these rapes and also from the availability of chang'aa and the general fact that men in Kibera still do not use condoms leading to STDs.

At any one time about fifty percent of sixteen to twenty five year old girls become pregnant in Kibera , These pregnancies being unwanted often result in unsafe abortions, often with devastating results, including damage of the uterus(sometimes permanently) and to the extreme death .

Example candidate response – middle, continued

Water supply

Kibera experiences acute scarcity of clean water with limited access to quality water sufficient for human demands.

Generally Kibera has great water shortages, due to the fact that its underserved, residents rely on piped water, boreholes and the polluted Nairobi River due to the economic hurdles crippling these families who can't afford clean water supply.

Drinking water is pumped through plastic pipes alongside sewage trenches causing diseases. Until recently Kibera had no water and it had to be collected from the Nairobi dam. The dam water is not clean and causes typhoid and cholera. Now there are two main water pipes into Kibera, one from the municipal council and one from the World Bank. Residents collect water at Ksh 5 per 20litres.

Most shelters in the slums do not have piped water. However, the gangs install illegal connections without meters to tap into the main water supply. A minimum of KES3 (30 cents USD) is charged for a 20-litre gallon of water, but this price increases in the event of a water shortage. Water companies disconnect the illegal supplies whenever they discover them.

Water being extremely limited in Kibera, each person is only allowed to buy twenty litres at a time twice a week. The cost of water on average in Kibera is twenty shillings for twenty litres, which in the long run is far more expensive than in the rest of Nairobi. All water is pumped through plastic pipes alongside sewage trenches and often carries water-borne diseases like cholera and typhoid. This water is used for all domestic activities including drinking, cooking, showering, and washing dishes and clothes.

Education/ the level of literacy

Education is supposed to be a right of every child but in Kibera, where many families live on one or two dollars a day, education is sadly beyond the capabilities of many poor households as it's an impossible luxury, many students often leave school because they cannot afford the school fees as parents struggle to meet boarding and uniform costs for their children, they give male students priority. As a result, young girls are often forced into early marriages or work at an early age at low-wage salaries and many especially younger ones turn to begging coins on the streets of Nairobi as street kids. Most of the schools in this area rely entirely on the generosity and donations, from international organisations, but mostly from of the community in which they have learned to survive.

The Scholarship Program ensures that a family's material circumstances do not limit a student's ability to excel in school. None of the scholarships are full awards. Families share responsibility for fees as a demonstrated commitment to students' academic success. Most education centres in Kibera are classified as informal; most are not regulated by the government, some start as baby care centres, which later develop into schools. But various initiatives have been underway to add schools as well as several church-owned and privately owned schools. There is the vocational PCEA Emmanuel Technical Training Centre, offering self-employment skills to the residents. Several other local youth organisations, like the football (soccer) team the Kibera Black stars, are also concerned and involved in educational sector

Example candidate response – middle, continued

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While NGOs and missionaries have succeeded in implementing some basic education facilities there are said to be six primary schools and three secondary schools in Kibera and as a result many children find themselves idle spending their days roaming the dirt alleys and roads and getting into trouble, especially the adolescent age group that turn to drugs as alternative. The children that do attend school find themselves in classes among over eighty to one hundred other students. The teachers that are often few in numbers are not able to deal with the class sizes and as a result, very few children actually learn or even pay attention, many just go to school to gain that respect in society.

DRUGS AND ALCOHOL ABUSE

Accessing medical services was a luxury reserved for the few who could afford the cost, especially as it required travelling for some distance.

In Kibera there are no government clinics or hospitals around yet demand for health care services is high as diseases in this area prevail, mainly because of pollution poor damping of rubbish, wastes, human excreta causing diseases like cholera, dysentery, malaria, tuberculosis, respiratory infections, accidents and also diseases caused by malnutrition like kwashiorkor, rickets, marasmus mainly because of poor feeding due to poverty. This area faces high infant mortality rate and death rates since the majority of the residents cannot afford basic health care.

Example candidate response – middle, continued

However the most prevalent disease in this area and main cause of worry has been HIV/ AIDS. Kenya has been one of the countries in Africa to have a high part of its population hit hardest by the HIV/AIDS epidemic, and these cases are not surprisingly concentrated in the slums due to insecurities, high alcohol consumption, and high levels of rape cases, no knowledge or money for use of contraceptives and poverty leading to increase in female sex workers. One-fifth of the population of Kibera lives with HIV, it is estimated to have affected upwards of 25 per cent of the community's residents and at least 50,000 children are orphaned by the epidemic. The effects are widespread including deaths and suffering. The area has an adult HIV prevalence rate twice as high as the national rate due to scarce resources making HIV prevention efforts extremely challenging. It's hard to understand how many of them manage to stay alive at all.

However thanks to the health providers in Kibera ,The Ministry of Health (MOH),the charitable Non-government organisations and some private individuals that came in to help: AMREF, MSF,PAG churches plus other groups .They do an extremely good job, providing HIV awareness and encouraging all people to have a free HIV test and if positive to take free generic ARV medicine, even with this many people with AIDS do not seek treatment from the 'free' clinics because there are nominal fees of one to two hundred shillings per visit that patients are responsible for and cannot afford, people would rather use the money for food, gambling ,school fees and alcohol than seek treatment even when it results in their death, which it often does. Many children are also born with aids and don't take long to die hence deaths in this area are not something shocking.

Also Kenyatta National Hospital, the biggest referral hospital in Eastern part of Africa, is close to the Kibera slums. Though the slum dwellers are still don't get medical attention required as they are crippled by poverty. Attempts have been made to improve the healthcare system in Kibera by the Kenyan government, non-governmental institutions and the private sector though most private facilities operate illegally, leading to malpractice and poor quality of health care provided. The demand for health care services is due to HIV/AIDS, malaria, tuberculosis, malnutrition, respiratory infections, cardiovascular diseases, perinatal diseases and accidents.

Changaa

This is cheap alcoholic brew widely available in this region and is very strong (over 50% alcoholic).It is distilled from maize and sorghum, usually very high in Methanol. The cost is only Ksh10 per glass (which is relatively cheap) and after a couple of glasses people become very drunk. With over 50% unemployment in Kibera, people tend to turn to this drink as it's a source of entertainment and due to idleness hence many start drinking early in the morning leading to problems of violence, crime, rapes. Several charities are trying to help by showing the Changaa makers how to make the drink less dangerous, this drink contains side effects like blindness, cancer and other related kidney diseases. The bar uses half-litre tin cans which are rarely washed instead of glasses to serve customers because they are cost conscious (glasses would be expensive besides the drunken customers would break them). When the price of maize goes up the bar owner cuts a strip of tin from the top of each can. However this does not seem to slow their consumption due to addiction. Better-off residents congregate to better off places at beer taverns which are more comfortable with cement floors and cushioned seats to drink draft beer and have debates on several topics especially politics.

Example candidate response – middle, continued

Drugs

Cheap drugs and glue sniffing are an increasing problem especially among the youth. Initially taken to alleviate boredom and idleness due to unemployment and school dropout but overtime the people find themselves addicted. The drug abuse rate is high; there are lots of drugs peddled around. Kibera is probably like the drug headquarters however no one seems to know where the drugs come from. According to the 2004 National Agency for the campaign Against Drug Abuse (NACADA) national survey of alcohol and drug use among young people aged 10 to 24 in Kenya, the most common substances used by young people were alcohol, tobacco and commonly hard drugs like marijuana known in the area asbhang, cocaine, miraa the so called khat, (a plant used as a narcotic), and inhalants such as glue. Among all these marijuana or bhang is the only illegal drug In the case of drugs Pamoja is the most popular organization in Kibera, providing sensitization programs and awareness against the evils of drug abuse

High levels of insecurity and crime

Kenyan slums in general are famous for all the wrong things from congestion, pollution, HIV AIDs, poverty to crime, Kibera is known for its subculture of thugs and gangsters. Over four in ten slum dwellers claim that they have been victims of crime in just the previous year that's how rampant the vile and violence in the area is. Studies have proven that most common crimes in the slum areas are by the youth, for young people who have difficulty affording education gathered with poverty and unemployment; it's no surprise that many get ushered into vicious lifestyles of idleness, gangs, substance abuse and violence, causing social problems which fuel the cycle of crimes in Kibera.

Police patrols in Kibera

According to the law, The most effective method of controlling these crimes has been undoubtedly police patrols and community policing initiatives, and the various Non-government organizations' for example KCODA, Pamoja FM, Map Kibera, Kamukunji Pressure Group, CREAW, the Langata District Peace Committee, Community Policing groups and the office of the District Commissioner came together to form a network called the Kibera Civic Watch Consortium, a peace keeping body that would provide intervention where possible. Though sometimes allegingly the police go too far and their arrests seem to be brutal, and in the opinion of many of the residents, the police are generally slow, corrupt and unlikely to properly investigate criminal cases for successful prosecution, and that's where the Kibera Law Centre comes in.

Example candidate response – middle, continued

The Kibera Law Centre is a body whose main aim is to act as a watchdog of the police for the population in Kibera Slum, ever reminding the police, the authorities and the government that no matter how poor the people of Kibera are, they are still entitled to rights of protection and due process under democratic law.

Outside the Kibera law court

Insecurity has become a major problem brewing tension in Kibera forcing residents to resort to illegal forms of security like gangs. Gangs providing security is not something you hear every day, all we've known is gangs are the criminals but in this case they are the heroes. Gangs in Kibera charge a security fee of KES100-200 (about 1-2 USD) per month depending on whether residents occupy a permanent or semi-permanent house. Businesses pay KES300-500 (about 3-5 USD) per month depending on the size of the business. For tourists and filmmakers there is a flat security fee of KES5000 (55 USD) that is only paid once. The Gang members have also been used as police informers thus co-operating in solving crimes.

Gangs operating in Kibera include Siafu, 12 Disciples, Kamukunji Pressure Group, Military, Yes We Can, Mungiki, J-10 and Debunchers. All of these operate in Laini Saba and Katwekera areas within the slum. Each has its own territory within these areas. In Mathare 3C and Kosovo areas, the most prominent groups are the Taliban and Mungiki. Despite these gangs having different names, their mode of operation is similar.

Not only do the slum dwellers battle starvation, malnutrition and diseases, but they also face dangers from their fellow residents in the slum such as exploitation, substance abuse, physical, sexual and mental abuse and gang violence. We just cannot talk about insecurity without talking about the violence against women, rape, prostitution, HIV/AIDS, female genital mutilation, poverty, sexual abuse, unequal access to education and lack of reproductive health care are some of the issues women face daily in Kibera.

Example candidate response – middle, continued

There are no cartels in the market in most cases; the slum is very peaceful during the day with less people as most people gone off to work, but as darkness falls, many of the residents take to hiding in their shacks as life happens indoors during this time even the need to use a public toilet which are usually a distance away is put on hold as flying toilets take their course (use of polythene bags to dispose of wastes and throwing it over the walls onto the streets).

Many of these crimes rein in the night, some of the residents have installed metal gates at the entrances to their alleys and lock them by midnight and those still out by night fall especially women are persuaded to hire a watchman as an escort. Most watchmen in Kibera are Masaai, they are summoned and within minutes they arrive dressed in red-and-white beads and a red cloth carrying a torch and spear as a weapon. These Masaai have a reputation for being fearlessness and loyal, they charge about 50 shillings (58 cents) for their services.

Though the crimes still exist, improvements have been noted. Kibera has been receiving a light-up by Adopt a Light Company, these days as night approaches, the residents of Nairobi's Kibera slums are no longer haunted by fear of darkness. The once-dark alleys are now illuminated by street lights and the slum dwellers have a relaxed sense of security, especially because of the increase in number of police posts that have been set up mostly in areas identified as crime hot spots by the Nairobi Metropolitan Crime Observatory Report.

This has greatly helped to keep off rampant crime, robbery and gang violence, as well as gender based domestic violence. With the lighting from high mast, such cases have surely reduced.

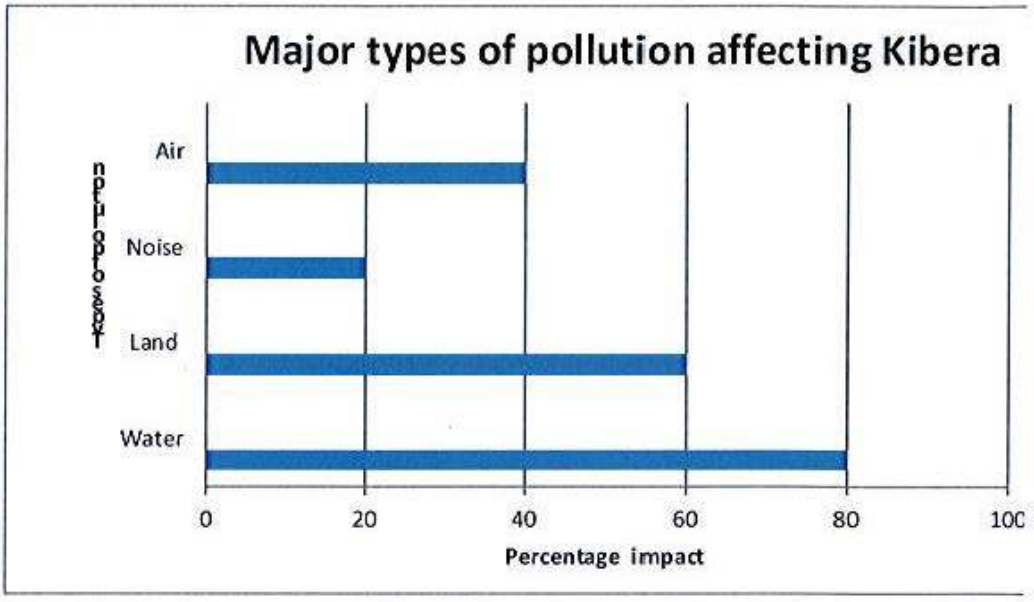
POLLUTION IN KIBERA

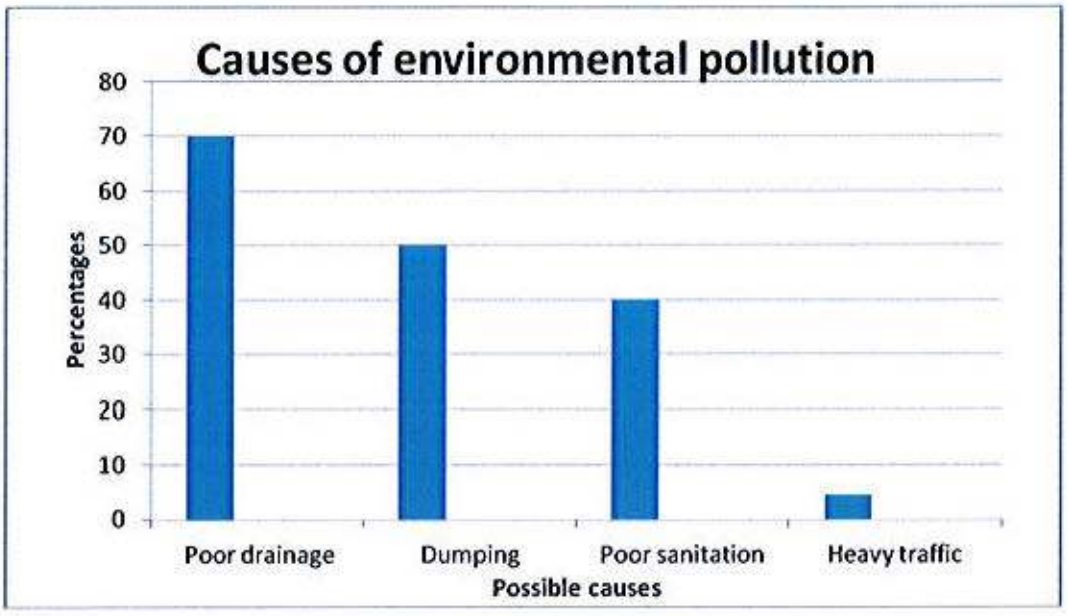
Kibera has been termed as Kenya's greatest embarrassment. This is visible by the congestion, litter on the streets, sewage flowing along the pathways like it belongs there, rubbish piled up next to people's houses yes houses where people cook eat and sleep and don't even get me started on the flying toilets. If it's got to be pollution Kibera does have it there is no argument there, a champion at it in fact. Many wonder how the residents even survive in this situation, but they seem to be living, adapted to the situation to be precise.

Food being cooked near garbage

Example candidate response – middle, continued

Kibera is not the only slum facing the challenges of sanitation and hygiene; this has now become a characteristic of most slums all over the world especially among the developing countries, in the cities specifically. The widespread issue of sanitation and hygiene are as a result of poor political leadership, mismanagement of resources and mainly poverty. Kibera contains all types of pollution from soot, dust, and other wastes to open sewage routes.,





There is no doubt Kibera suffers from acute environmental degradation due primarily to overcrowding, shortages of sanitary facilities like toilets, taps and designated rubbish dumps and also secondarily due to factors like lack of knowledge because of the poor educational facilities, poverty and shortages in electricity supply.

Example candidate response – middle, continued

Currently some parts of the slum have water and electricity supplies but none have proper sewerage system leading to the use of the famous "flying toilets" (using of plastic bags to dispose of wastes then depositing it on the street), as existing toilets are inadequate and sparsely located, with each toilet being shared between 50 to 100 people and being shallow these pits get filled fast and being close to the river, making it easy for discharge (once full young boys are employed to empty the contents into the river), besides the sewage from the flying toilets run downhill into open trenches, resulting in stagnation and pooling problems that breed insects and unbearable odour. This poses a health hazard to all inhabitants of the slum and these hazardous living conditions make life uncomfortable for community in general.

The net result of the fast growing pool of decomposing human waste aggravated by the lack of adequate personal, domestic hygiene and sanitation has implicated in the spread of many infectious diseases including cholera, typhoid, dysentery, malaria, hepatitis, polio and cryptosporidiosis to the residents of the vast slum. On average most of deaths in slums are caused by the consumption of contaminated water and water-borne diseases, according to a recent UNDP report, over 106 out of 1000 infants in Kibera slums die as a result of poor sanitation and waste and excreta management, It's no surprise that the consequence for all this is shown by the high death rate in this area.

Diarrheal diseases are among the major illnesses affecting children of the slum residents of Kibera. According to the report by APHRC in 2002, prevalence of diarrhoea was 32% among children below 5 years of age in the slums, which is double the rate for the rest of Nairobi residents and World Health Organization estimates that 10% of the population of the developing world are severely infected with intestinal worms related to poor waste and excreta management.

First of all the toilets are scarce, the distance of the toilet from the users houses is quite a distance walk, toilets are located beyond 15 metres from the house this creates insecurity especially for women and children due to fear of rape, theft, murder.

In addition, the tendency of time wastage once the individuals finally reach the toilets, as there are long waiting queues due to the high number of users compared to the available toilets which leads to incontinence besides these toilets or pit latrines are filthy and dirty with worms, flies, cockroaches and even rats that cause disease additionally these toilets contain an unbearable stench which one can smell from a distance away.

This is mainly because of insufficient cleaning, lack of water, poor construction, ventilation and poor management, lack of proper sewer systems. With all the above people find it more convenient to use plastic bags, buckets or even with no shame relieve themselves in bushes or in dark corners of the streets. According to UNDP (2006:38-39), about two thirds of Kibera residents use flying toilets as the basic mode of human waste disposal, I can't begin to imagine what life must be like for the residents of Kibera.

Example candidate response – middle, continued

The latrines themselves maybe a great cause of pollution, with one latrine being shared by over 50 shacks it's no surprise it gets full fast. According to an interviewee who deals in the toilet business, "A pickup truck is called to collect the waste when latrines are full", but even she didn't know where the content is disposed. Other sources claim that this very content is damped in the river as Kibera is known to be with no formalized waste disposal infrastructure.

Temporary sewage system where raw sewage flows just below people's houses

Damping constitutes another aching challenge in Kibera, this area has been a recipient of diverse sorts of damping especially from residential wastes. Solid waste from used plastics, like plastic bags, plastic bottles and waste food stuffs, rubbish (garbage) and other unwanted materials that keep piling up each and every day, becoming the heaps and heaps of garbage seen practically on every turn in Kibera.

The strong odour, emitted alone is unbearable but the real nightmare comes when it rains, the garbage is washed into streets blocking tunnels and is scattered all over the place.This poses a health hazard to the residents and makes the whole scene of Kibera be termed filthy, congestion and over population seems to make the situation worse.

Example candidate response – middle, continued

The city council is responsible for collecting this garbage and cleaning up the place, however it seems not to be fully dedicated to its work, but from the looks of the situation they wouldn't even know where to start from, though have tried to occasionally tidy up the area.

According to Violet Lukolwe a vendor who blames the Kibera public, she says they are the main cause of pollution claiming it's the ignorance and laziness of the residents of Kibera to even clean the around their homes, " In normal cases the residents should be even volunteering to clean up Kibera".

Ways of minimising pollution

How glorious the world would be if we all dedicated ourselves to the task of ensuring that, one day, we will live in a world of cities without slums. Our health generally depends on the state of the environment we live in; research indicates that maintaining a clean urban environment promotes good health, social harmony and a longer life expectancy. There are organisations and individuals and governments set to at least make the slums a better place to live in, a place people will be proud to call home. From the looks of things, this Initiative has indeed transformed Kibera for the betterment of individuals and the community at large.

In one of Africa's biggest urban informal settlement- Kibera, contains series of cases of humanitarian issues, with lack of reliable clean water and formalized sewage systems being the main challenges. A low-tech water filtration project seems to try to solve this. All this project requires is plastic water bottles which Kibera, has in abundance evidenced by the piles on the streets and trenches. These large numbers of bottles could not only alleviate these water problems but also reduce on amount of non bio degradable plastic bottles on the streets of Kibera.
This is among the various projects that have worked as sewage disposal systems. These plastic bottles provide higher surface area to volume ratio and these expanded surfaces encourage pathogen-eating bacteria which occur naturally in water cleaning the waste (grey) water and sewage (black) water.

Example candidate response – middle, continued

Another sewage disposal project being the peepoo, as you have read over and over again Flying toilets are a common problem in slums like Kibera. To provide access to safe and hygienic toilet system in Kibera were such infrastructure is scarce with a dense and generally poor population, The Peepoo toilet could be the alternative solution. It is a biodegradable toilet for single-use (a slim bag with a larger liner tucked inside, made of biodegradable plastic), can be used where and whenever the user wants and it is easy to carry around. After use it can be stored odour free up to 12 to 24h until it is handed over to the collection system and finally buried in the soil, it serves as fertiliser and is used in agricultural businesses a logistical infrastructure is required for the collection of used Peepoos. After use, the bag is knotted and taken to a drop-off point – where the family gets a small refund on the bag's small purchase price because the contents are sold on for fertiliser.

A local organic farming company called Green Dreams in conjunction with Kibera Youth Reform Group saw this vacant land as much more than a heap of garbage and decided to put it to good use thus became Kenya's first locally-certified organic farm in 2004(Finding land in rubbish)." The problems [in the slums] might be big but we also have the solutions," says Eric Agoro Simba, the youth reform group co-ordinator to IRIN News, Given that the post-election violence in 2007 seriously disrupted farming in Kenya's Rift Valley where agriculture is a major economic motor, the group's new farming skills are an asset to Kibera. This youth reform group comprises of reformed criminals, the young people, who had previously only known a life of crime, began with the massive job of clearing all the garbage off the land. Converting garbage into organic manure and garbage dumps into organic farms.

First step was the collection of the three metres deep in garbage dumped by nearby residents .the garbage was compacted and tied down under tarpaulins on one side of the plot.

Planting sunflower to reduce soil toxication

Secondly soil testing as the soils has been in contact with elevated levels of heavy metal, if found intoxicated sunflower or pumpkins are planted to reduce toxin levels, these flowers are burnt afterwards

Example candidate response – middle, continued

Drip irrigation offered the most cost-effective and conserving way to water the crops and use of natural manure and use of technology, pesticides and natural fertilisers like kitchen wastes

Irrigation and application of fertilisers

President Uhuru Kenyatta launched a lighting project in Kibera on 12th December 2014 this proved the presence of the government in Kibera with programmes that will uplift the living standards of residents in Kibera. This lighting program led to setting up street lights in Kibera, this not only improved security in the area during the night but it also reduced the flying toilets as it insures the residents security thus they can walk to the toilets and back safer than before.

The construction of community public latrines in Kibera slums by the existing agencies take for example The National Youth Service and The UN-Habitat, since the toilets are cleaner and more maintained than before, the slum dwellers will be willing to pay a small amount of money for using the latrine. By doing so, sanitation and hygiene will be highly enhanced let alone flying toilets that have been mentioned over and over dealt with.

One of the public toilets constructed

Education and sensitisation of Kibera residents on sanitation and hygiene, the public is encouraged to participate in community groups like NYS, drama sessions, dances, songs and poems which are all involved in encouraging good sanitation and hygiene. Also education programs that are implemented in education curriculum for school goers are an effective way for the promotion of hygiene and sanitation practices among these children and community.

Example candidate response – middle, continued

National Youth service (NYS)

Various organisations have been set up as an initiative for development of Kibera, among these and the most famous being the NYS. The National Youth Service (NYS) along with the Ministry of Devolution and Planning came together for the Kibera Slum Upgrade Initiative (Progress of Kibera Slum Upgrade Initiative). The initiative, started by the National Youth Service, in coordination with local youth volunteers from the Kibera community, the project has provided clean sanitary facilities that's to say construction of toilets, showers, toil and gabions and alter the once termed filthy environment by enforcing a clean sanitary environment by cleaning up sewers, trenches, bridges and various clean up exercises in Kibera where raw sewage and garbage was affecting nearby homes, This has indeed proven that growth is possible in one of the Africa's largest slums.

These volunteers are youth from the Kibera slum that underwent training before being integrated into the project and were provided necessary attire for the projects like gum boots, dust masks and gloves they collect and dispose of garbage and earn some money(Sh385 and Sh470 a day). This project has promoted a hygienic culture with a bonus of improving security as the once idle youth have been given something to do thus reducing the temptation of crime.

Port of the NYS cleaning up the Nairobi River

THE SLUM UPGADING PROGRAM

Example candidate response – middle, continued

The Kenya Slum Upgrading Project (KENSUP) launched in 2003 by the Kenyan Ministry of Land and Housing in partnership with AHI (Affordable Housing Institute) and the support of UN-Habitat and several other donor organisations for slum upgrading in Kenya, using Kibera as an example. This encouraged the construction of transport, water and sewer infrastructure apartments with formalised services like water, electricity and sanitation just at the outskirts of Kibera also referred to by the local residents as "The Promised Land".

The "Promised land" of Kibera in the background

The apartments are temporary residence until more permanent housing is completed in Soweto East one of the neighbourhoods in Kibera. However the problem comes in as the relocated residents of The Promised Land leave their new homes and return to Kibera. Most of the chosen Kibera residents who were given apartments through this programme and those that secured apartments in the new buildings through the informal systems of bribery saw a business opportunity that they could not pass on.

This source of income and rented their flats to middle class tenants at four and five times the subsidised rate. Then they moved back to the slum with extra money in their pockets. Due to the skyrocketing rents and high demand for housing in Nairobi, they were bound to get market especially from the middle class searching for affordable housing in a city.

Youth participating in the upgrade project

The upgrading project in conjunction with the NYS have led to clean up and improvement in the general appearance of Kibera, from the cleanup of the Nairobi river to collecting garbage on the streets of Kibera, constructing toilet and sewerage facilities. These energetic and determined young people have proved that for Kibera to develop it requires the public of Kibera themselves to come up and volunteer for the upgrading project to work.

Example candidate response – middle, continued

In conclusion, I therefore deem it appropriate to say my research has proven that urban sprawling is indeed a cause of environmental pollution, as the impact of congestion combined with overcrowding and limited facilities like water and sewerage facilites take their toil.

Note ; All pictures in the study with exception of the ariel view of Kibera on pages 4, 6, 7 and 15. Map of Kibera showing slums in Nairobi [pg5], the first three pictures of slum tourism [pg 10 & 11], last two pictures of sources of power [pg18], schools in Kibera [pg 21], police patrols [23], masaai security guard [pg 25], peepoo in Kibera [33], finding land in rubbish[pg 34], irrigation system on page 35 and photos on NYS [pg 37 & 38], were edited and taken by Lagum Ruth Winny and all graphs and pie charts with help of questionnaire.

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Example candidate response – middle, continued

Questionnaire

Qn1: How long have you lived in Kibera?

.....

Qn2: What age bracket do you fall under?

10-20 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ Above 50 ☐

Qn3: What is the major type of pollution affecting Kibera?

Water ☐ Land ☐ Air ☐ Noise ☐

Qn4: Which of these is the main cause of environmental pollution in this area?

Heavy traffic ☐ Dumping ☐ Poor sanitation ☐ Poor drainage ☐

Qn5: What are the major challenges faced by the majority of the residents in Kibera?

Pollution ☐ Overpopulation ☐ Poverty ☐ Lack of water ☐

Shortage of government services ☐

Qn6: Who do you blame for poor planning in Kibera?

NEMA ☐ City Council ☐ Ministry of roads ☐ the government in general ☐

Qn7: How successful has the slum upgrading project been so far?

Not ☐ 1-20 ☐ 21-40 ☐ 41-60 ☐ 61-80 ☐ 81-100 ☐

Example candidate response – middle, continued

Qn8: What would you recommend should be done for reduced pollution and better planning?

Pollution: .....

Better planning: .....

Qn9: What reasons have made the project fail?

.....

.....

Qn10: Has the project met its objective?

Yes ☐ No ☐

How?

.....

Qn11: What effects of pollution have you witnessed in Kibera on human health?

.....

.....

Qn12: What has the National Youth Service done in keeping Kibera clean?

.....

.....

THANK YOU FOR YOUR COOPERATION

Examiner comment – middle

The project title is 'Urban sprawling causes environmental pollution'.
This is a lengthy report into a relevant environmental management topic involving urban sprawl and pollution. Overall the report suffered from being over descriptive with a lot of photographic material but little quantitative data. The rates of urban sprawl and an environmental impact assessment would have yielded the data needed for a high mark.

Skill C1

The hypothesis was stated in both general terms as well as within the title. The general introductory background contained a good description of urban sprawl as a cause of pollution. The report contained no reference to a research methodology thereby invalidating criteria C1 c and d (see above) i.e. there was no plan aimed at testing the hypothesis.

Mark awarded = 3 out of 6

Skill C2

Although there are clearly presented photographs there is little evidence of primary research; the photographs and tables have been copied and pasted. Thus the report failed to achieve full marks for data collection, collation and presentation; the questionnaires were not utilised. The photographs were combined with a lengthy description lacking the precision required in a research report. No statistical tools were used to analyse and assess the significance of the data. The candidate displayed effective written communication skills.

Mark awarded = 6 out of 9

Skill C3

Because of the lack of data the conclusion became very general. There is an effective assessment of the environment and management principles with reference to the photographs. Unfortunately, there was no assessment of the strengths and weaknesses in the research.

This candidate would have benefited from:

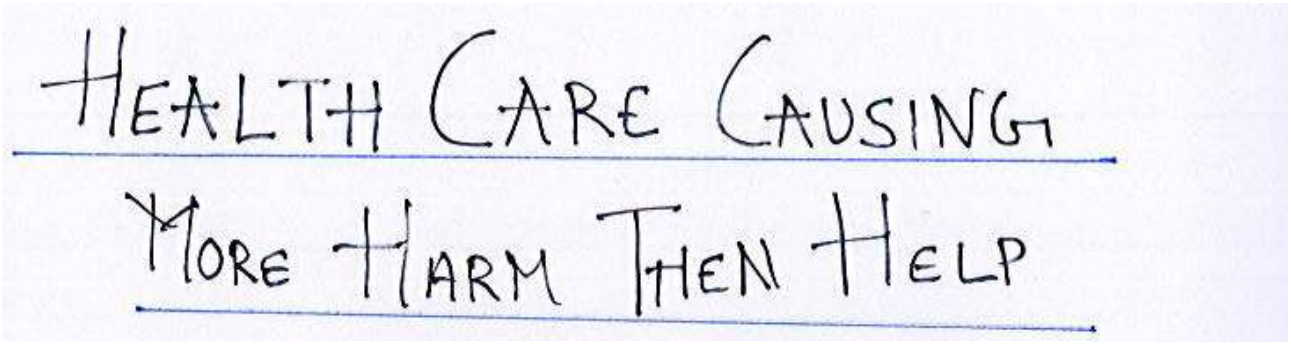
- clearly stating a methodology targeting the acquisition of data that could be used to assess the hypothesis
- using the questionnaire to produce graphs and/or tables
- avoiding a purely descriptive approach.

Mark awarded = 3 out of 5

Research Report Assessment is initially out of 20 marks then doubled to 40.

Total mark awarded = 24 out of 40

Example candidate response – low



INDEX

Example candidate response – low, continued

INTRODUCTION

Biomedical waste is waste that is either putrescible or potentially infectious. generated from biological and medical sources and activities, such as the diagnosis, prevention, or treatment of diseases.e.g., packaging, unused bandages, infusion kits, etc. as well research laboratory waste containing biomolecules or organisms that are restricted from environmental release. this project talks about the medical waste in india.Disposal of this waste is an environmental concern, as many medical wastes are classified as *infectious* or *bio-hazardous* and could potentially lead to the spread of infectious disease.

Biomedical waste must be properly managed and disposed of to protect the environment, general public and workers, especially healthcare and sanitation workers who are at risk of exposure to biomedical waste as an occupational hazard. Steps in the management of biomedical waste include generation, accumulation, handling, storage, treatment, transport and disposal.

The goals of biomedical waste treatment are to reduce or eliminate the waste's hazards, and usually to make the waste unrecognisable. Treatment should render the waste safe for subsequent handling and disposal. There are several treatment methods that can accomplish these goals.but this is what lacking in india due to less awareness and facilities.

HISTORY

- Beach Wash-ups Of Medical Devices In NJ And NY In 1980's
- 1986 EPA Published "EPA Guide To Infectious Waste Management
- 1988 Congress Passed The "Medical Waste Tracking Act Of 1988
- EPA Issues A Report On The Efficacy Of The MWTA

In India, The Bio-medical Waste (Management and Handling) Rules, 1998 and further amendments were passed for the regulation of bio-medical waste management. Each state's Pollution Control Board or Pollution control Committee will be responsible for implementing the new legislation.

In India, there are a number of different disposal methods, yet most are harmful rather than helpful. If body fluids are present, the material needs to be incinerated or put into an autoclave. Although this is the proper method, most medical facilities fail to follow the regulations.

Example candidate response – low, continued

Many studies took place in Gujarat, India regarding the knowledge of workers in facilities such as hospitals, nursing homes, or home health. It was found that 26% of doctors and 43% of paramedical staff were unaware of the risks related to biomedical wastes. After extensively looking at the different facilities, many were undeveloped in the area regarding biomedical waste. The rules and regulations in India work with The Bio-medical Waste (Management and Handling) Rules from 1998, yet a large number of health care facilities were found to be sorting the waste incorrectly. Worldwide, there are specific coloured bags, bins and labels that are recommended for each type of waste. For example, syringes, needles and blood-soiled bandages should be all disposed of in a red coloured bag or bin, where it will later be incinerated.

Example candidate response – low, continued

Example candidate response – low, continued

PROBLEM CAUSED BY MEDICAL WASTE

Many hospitals and health care facilities are not properly disposing of their waste, and many incidents occurred to draw attention to this fact. damaging amounts of mercury and other dioxins has been reported to been released into the environment. This is just a things that result from the improper disposal of medical waste.

Effect on People

The major problem with medical waste is the burning of the material in large incinerators and the improper disposing of the medical products. Incineration has been practiced for many years now. People believed that burning waste was the easiest and most effective way to eliminate the spread of contaminants, but they did not realize that by doing this, they are exposing people to many more dangers. The gasses released by hospital incinerators, which are coincidentally located in very highly populated minority areas,example mankhurd mumbai are polluting the air. Many people in those areas have been reported to be suffering from respiratory diseases/illnesses, and related heart diseases.To make matters worse, not only are the people living in those areas getting sick. Municipal incinerating companies are taking actions toward.

Environmental Effect.

Incineration of medical waste also has great effects on environment.the effects of this action are the contrary, if not properly done. When burned, medical waste emits several air pollutants including, dioxins, acid, and dangerous metals like mercury. These pollutants then fall to the land and the waters and cause damage to a lot of the wildlife exposed to it. When fish ingests mercury, it turns into the form of Methylmercury which bioaccumilates, meaning it is stored in the tissues of organisms instead of being broken down and dissipated.

The Methylmercury is then passed on from many different organisms through the food chain, which is a process called biomagnification or bioamplification. At each level of the food chain, organisms digest higher amounts of mercury than they are excreting, which causes an excess of mercury in that organism. Organisms in the higher trophic levels suffer more because they have the largest amounts of mercury in their systems. This is the case for dioxins as well.

Example candidate response – low, continued

GENERAL EFFECT

The effects of these toxins are very detrimental to both humans and wildlife. Both mercury and dioxins have no known benefits to any organisms that they are exposed to, and although they are not harmful in small amounts, the accumulation of them can have disadvantageous effects. Mercury is a teratogen, which is a drug or substance that has the capability of interfering with the development of a fetus, causing birth. Mercury is also a mutagen and a carcinogen, meaning it may cause mutations in the cells of organisms, and different types of cancers. Dioxin is the general name for chlorinated hydrocarbons, which like mercury, may be both teratogenic and carcinogenic.

The burning of medical products that contains PVC creates them. These toxins were reported to cause edema in chickens, ultimately causing hydropricardium syndrome ("The chick edema," 2009), which is sudden death in chickens. Fish exposed to the toxins were also reported to develop reduced gonads, or become cross-sexed, which is neither male nor female (Monks, 1994). The effects of these toxic chemicals are similar in humans. Dioxins cause problems with the reproductive, endocrine, and the immune system. Mercury is a neurotoxin and causes damage to the central nervous system, brains, kidneys and lungs.

Another problem that comes along with excess of medical waste is the illegal dumping of it. The dumping of medical waste is very risky and grants access to dangerous things like syringes and infected body fluids and tissues. This was the case in Indianapolis, Indiana when twelve children were found playing with valves of blood; two of them were valves containing blood infected with AIDS. The valves were discarded in a dumpster outside of a medical office. In some instances, medical waste has been reported to wash up on beaches. In 1988, syringes, needles, and prescription bottles were found on the shore of Long Island beach, New Jersey beach, and many other beaches from the Maine to the Gulf of Mexico, forcing them to close several times. This leads to an excessive amount of water pollution. Illegal dumping of medical waste doesn't only affect people, but it affects animals as well. In some instances, medical waste can be dumped in a part of forest, which is allowing animals' free access to infectious medical waste. This can have different effects on the ecology of that environment, which can in hand have major effects on the ecosystem as a whole.

Example candidate response – low, continued

ARGUMENTS

Arguments for incineration

- The concerns over the health effects of dioxin and furan emissions have been significantly lessened by advances in emission control designs and very stringent new governmental regulations that have resulted in large reductions in the amount of dioxins and furans emissions.
- The U.K. Health Protection Agency concluded in 2009 that "Modern, well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable.
- Incineration plants can generate electricity and heat that can substitute power plants powered by other fuels at the regional electric and district heating grid, and steam supply for industrial customers. incinerators and other waste-to-energy plants generate at least partially biomass-based renewable energy that offsets greenhouse gas pollution from coal-, oil- and gas-fired power plants.
- The bottom ash residue remaining after combustion has been shown to be a non-hazardous solid waste that can be safely put into landfills or recycled as construction aggregate. Samples are tested for ecotoxic metals.
- In densely populated areas, finding space for additional landfills is becoming increasingly difficult.Fine particles can be efficiently removed from the flue gases with baghouse filters.
- Incineration of medical waste and sewage sludge produces an end product ash that is sterile and non-hazardous.
- Most municipalities that operate incineration facilities have higher recycling rates than neighboring cities and counties that do not send their waste to incinerators. Metals recovered from ash would typically be difficult or impossible to recycle through conventional means, as the removal of attached combustible material through incineration provides an alternative to labor- or energy-intensive mechanical separation methods.

Example candidate response – low, continued

Arguments against incineration

- The highly toxic fly ash must be safely disposed of. This usually involves additional waste miles and the need for specialist toxic waste landfill elsewhere. If not done properly, it may cause concerns for local residents.
- The health effects of dioxin and furan emissions from old incinerators; especially during start up and shut down, or where filter bypass is required continue to be a problem.
- Incinerators emit varying levels of heavy metals such as vanadium,manganese, chromium, nickel, arsenic, mercury, lead, and cadmium, which can be toxic at very minute levels.
- Incinerator Bottom Ash (IBA) has elevated levels of heavy metals with ecotoxicity concerns if not reused properly. Some people have the opinion that IBA reuse is still in its infancy and is still not considered to be a mature or desirable product, despite additional engineering treatments.
- Alternative technologies are available or in development such as Mechanical Biological Treatment, Anaerobic Digestion(MBT/AD), Autoclaving or Mechanical Heat Treatment (MHT) using steam or plasma arc gasification (PGP), which is incineration using electrically produced extreme high temperatures, or combinations of these treatments.
- Incinerators produce fine particles in the furnace. Even with modern particle filtering of the flue gases, a small part of these is emitted to the atmosphere.
- Prevention, waste minimisation, reuse and recycling of waste should all be preferred to incineration according to thewaste hierarchy. Supporters of zero waste consider incinerators and other waste treatment technologies as barriers torecycling and separation beyond particular levels, and that waste resources are sacrificed for energy production.
- Some incinerators are visually undesirable. In many countries they require a visually intrusive chimney stack.
- The reduced levels of emissions from municipal waste incinerators and waste to energy plants from historical peaks are largely the product of the proficient use of emission control technology. Emission controls add to the initial and operational expenses. It should not be assumed that all new plants will employ the best available control technology if not required by law.

Example candidate response – low, continued

INTERVIEWS

DR. SHEELA .R. VERMA (Bombay Maternity Nursing Home)

1) how is medical waste managed in your hospital?

According to Hospitals for a Healthy Environments, hospitals produce a combined 6,600 tons of waste on average every day. This is partly due to an increase in disposable products. Rather than reusing items, it is just thrown them away. because we are use to decompose in bags but after all this it goes to dumping ground.

2) how long have your hospital been caring about this waste?

We r now here for 25 years and I think in so many years we have not seen improvement.

3) what improvement is happing in your hospital if any? or no?

Not much has been consider as the incinators are been used now a days.. so we send them with all care. so how hospital and patients are not affect by it..

4) what do you think should be done for this?

Biomedical waste is often incinerated. An efficient incinerator will destroy pathogens and sharps. Source materials are not recognizable in the resulting ash.

An autoclave may also be used to treat biomedical waste. An autoclave uses steam and pressure to sterilize the waste or reduce its microbiological load to a level at which it may be safety disposed off.For liquids and small quantities, a 1-10% solution of bleach can be used to disinfect biomedical waste. Solutions of sodium hydroxide and other chemical disinfectants may also be used, depending on the waste's characteristics.

Example candidate response – low, continued

DR. GOPAL SHARMA (Sion Hospital)

1. how is medical waste managed in your hospital?

around combined 6,600 tons of waste on average every day is produce This is partly due to an increase in disposable products. it is just thrown them away. because we are use to decompose in bags but after all this it goes to dumping ground and this is governmental hospital so not much care.

2. how long have your hospital been caring about this waste?

We r now here for 30 years and I think in so many years we have not seen improvement.

3. what improvement is happing in your hospital if any? or no?

Not much has been consider as the incinators are been used now a days.. so we send them just.

4. what do you think should be done for this?

An autoclave may also be used to treat biomedical waste. An autoclave uses steam and pressure to sterilize the waste or reduce its microbiological load to a level at which it may be safety disposed off.For liquids and small quantities, a 1-10% solution of bleach can be used to disinfect biomedical waste. Solutions of sodium hydroxide and other chemical disinfectants may also be used, depending on the waste's characteristics.

Example candidate response – low, continued

MR. MITAL SHETTY (responsible citizen)

1) how much harm does this burning fuel does? for you and for others?

Medical waste, especially biological waste, can become the breeding ground for pathogens that weren't present at the time the waste was discarded. Though these wastes may be human tissue or blood, since they are no longer in the body, the body's immune functions are not present to keep pathogen populations in check. This can result in population explosions of pathogens that live on human tissue and blood. These populations may develop to sufficient quantities or mutate into forms that our immune systems cannot suppress. These populations could infect other animals that forage in waste, or they may contaminate the environment, including water and food sources.

2) how long this is happening?

Since this plant has been situated, around 12 years.

3) what do you think should be done?

Biomedical waste must be properly managed and disposed of to protect the environment, general public and workers, especially healthcare and sanitation workers who are at risk of exposure to biomedical waste as an occupational hazard. Steps in the management of biomedical waste include generation, accumulation, handling, storage, treatment, transport and disposal

SUGGESTION

There are many solutions that were proposed by many different people in many different fields but not all of them seem plausible.

- Some people felt that hospitals can develop ways of waste reduction and recycling. Most of the waste accumulated and incinerated in hospitals is believed to be recyclable. If that is the case, the recycling of these materials will decrease the amount of waste incinerated and decrease the amount of pollution. This doesn't seem like a reliable solution due to the fact that most of the burned materials from a hospital are infectious
- Autoclaving is another alternative for incineration. Autoclaving is the process of disinfecting materials by using intense amounts of heat and pressurized steam. This will eliminate the harmful contagions on the material making it safe for them to be dumped in landfills. This is good but they don't take into account that many of the landfills are filling up and adding more waste to them will cause them to overflow.

Example candidate response – low, continued

ARTICLE

POOR MEDICAL WASTE DISPOSAL STANDARDS CAUSING HEALTH PROBLEMS IN INDIA

BY http://www.waste-management-world.com/articles/2011/01/poor-medical-waste-disposal-standards-causing-health-problems-in-indla.html
10 January 2011

The improper disposal of bio-medical waste by several health centres, mainly dental clinics, primary health centres, community health centres and diagnostic centres poses a health hazard to the general public, sanitation workers and rag pickers in the East Godavari District of the north coastal area of Andhra Pradesh, India according to the Deccan Chronicle.

More than 400 health centres exist in the district at present and a large number of hospitals are located in Ra-jahmundry and Kakinada.

Even though a good number of such hospitals subscribe to the common bio-medical waste treatment facility located in Palla Kadiam village for the safe disposal of such waste, a large number of dental clinics run by private parties, primary health centres and community health centres are reportedly disposing of waste in open drains and garbage bins maintained by sanitation workers of the municipal corporation in urban areas.

The Deccan Chronicle claims that most field level sanitation jobs are outsourced and workers are not given hand gloves, shoes and mask to wear while at work.

This poses a grave threat to their health as they come into contact with blood soaked cotton pieces, used syringes and remnants of flesh generated at the time of surgery and other bio-medical waste.

Rag pickers are also vulnerable for getting infected when they come into contact with such waste.

Though there is no record being maintained by health authorities, sanitation workers and rag pickers reportedly complain of frequent health problems.

Bio-medical waste being generated in rural health centres is being buried in small pits near the centres itself and gets exposed when stray dogs and pigs dig it out in search of food. Lack of funds is said to be the reason for rural health centres failing to subscribe to the common bio-medical waste treatment facility.

Lack of regular supervision of health centres by the Pollution Control Board on disposal of bio-medical waste complicates matters further. Some health centres have given up their subscription to the treatment facility midway, while some others show low bed strength to avoid payment of more money to the authorities of the common treatment facility.

Example candidate response – low, continued

Conclusion and RESULT

I have touched upon a few of the issues that come along with the excessive amounts of medical waste. This is just a small part of bigger issue, which is excessive amount of waste in general. We need to come up with more innovative ways of doing things that can be beneficial to both us and the environment. And as we can see in this project the damages caused by the convenience of incinerating waste, that convenience is not always the way to go. We need to take the time to evaluate all of the factors and consequences that comes along with making decisions on things that can possibly affect us and our environment. We need to stop taking advantage of the earth and we can do this by first fixing the imperfect medical system. we need to do things in ways that will benefit the environment, and us, we can work to reduce the size of our huge carbon footprint

BIBLIOGRAPHY

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en.wikipedia.org/wiki/Incineration#Arguments_for_incineration

Examiner comment – low

The project title is 'Health Care causing more harm than help'.

A relatively brief and descriptive report into health care causing more harm than good. The project was weakened by the implicit rather than stated connections with environmental management. The report suffered from being more of a descriptive essay than one structured to the stages of the scientific model.

Skill C1

Whist the general description was full and relevant there was no hypothesis nor justified methodology; criterion C1 d was invalidated.

Mark awarded = 3 out of 6

Skill C2

The collected data consisted of five copied and pasted pictures and descriptions with the text; no use had been made of the interviews. Marks could not be awarded for data presentation, accuracy and the use of a statistical tool. Written communication skills were adequate and the report lacked structure.

Mark awarded = 3 out of 9

Skill C3

The conclusion was brief and did not refer to data contained in the main part of the report. The final section did not refer to any environmental management principles and no attempt was made to assess the strength and weaknesses in the research.

Mark awarded = 1 out of 5

Research Report Assessment initially out of 20 marks then doubled to 40.

Total mark awarded = 14 out of 40

Cambridge International Examinations
1 Hills Road, Cambridge, CB1 2EU, United Kingdom
tel: +44 1223 553554 fax: +44 1223 553558
email: info@cie.org.uk www.cie.org.uk