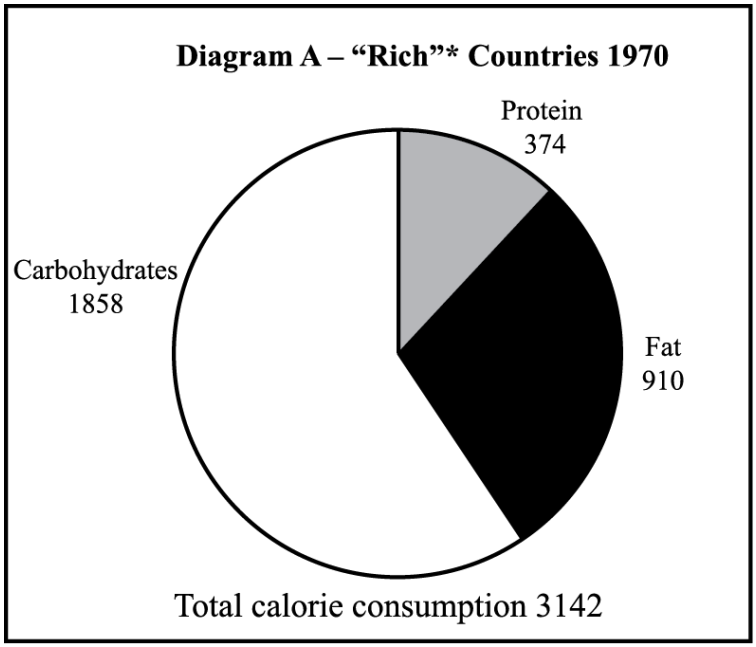
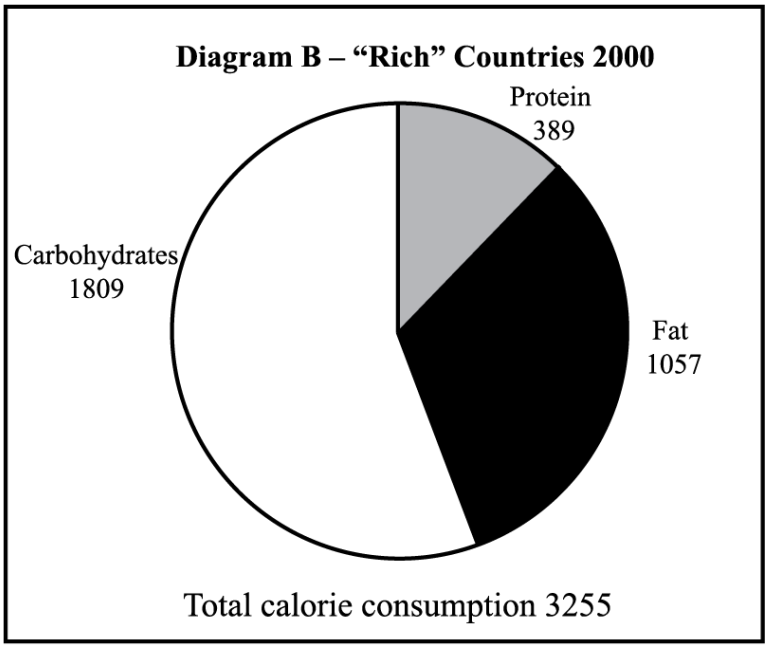
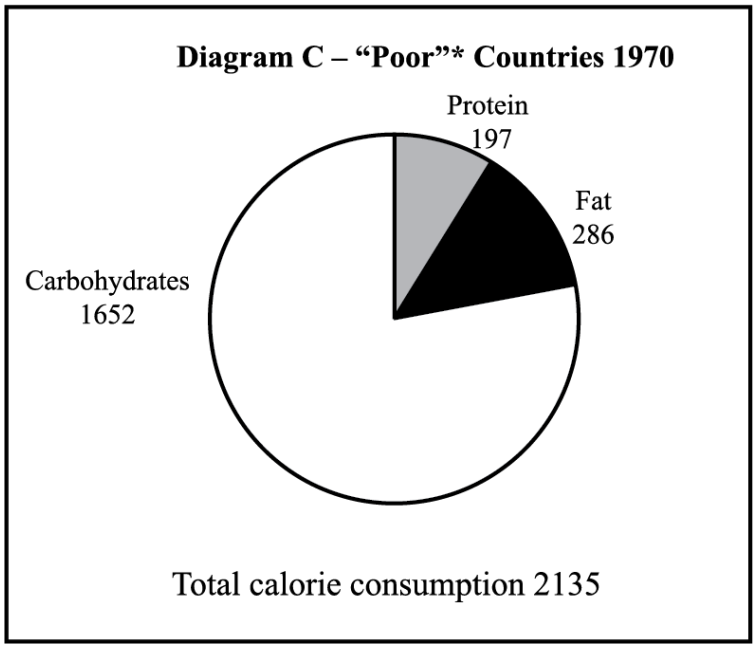
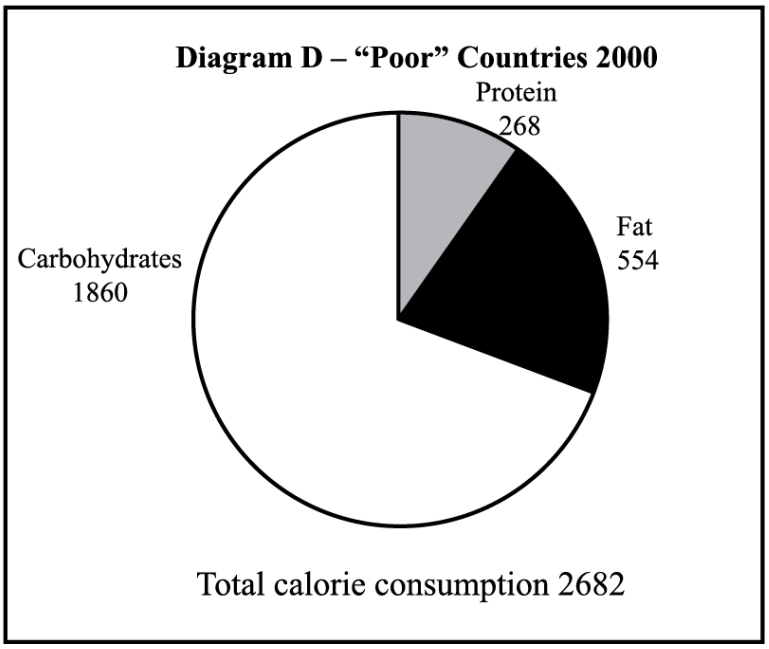
HL Paper 2

The diagrams show the average daily consumption of calories per person.









[Source: FAO Statistics Division]

* Rich and Poor countries according to FAO classification

ai. Outline **two** changes in calorie consumption in poor countries from 1970 to 2000. [2]

aii. Outline **two** differences between calorie consumption in rich countries and poor countries in 2000. [2]

b. Explain why food availability has increased in some areas of the world. [6]

c. Evaluate the sustainability of modern agricultural systems. [10]

Markscheme

ai. The diagrams show that total calorie consumption has increased [1 mark] and in particular more calories are derived from fats and protein, fewer calories from carbohydrates [1 mark]. Accept other valid changes.

Some quantification is required for full marks.

aii. Total calorie consumption of rich countries is greater [1 mark] and carbohydrate consumption in poor countries is greater than in rich countries [1 mark]. Accept other valid changes.

Some quantification is required for full marks.

b. Food availability is dependent upon supplies from domestic production, commercial imports and donors. Food is available if it is in easy reach of consumers and this depends upon access as well as yield. The availability of food has been enhanced through technological progress and increasing agricultural knowledge, both of which have boosted production. Favourable taxing and tariff policies, trading and efficient transport systems have also allowed the effective movement of food from source to point consumption.

Answers which focus only upon food production should be awarded a maximum of 3 marks.

c. Most modern agricultural systems are designed to maximize production through economies of scale, the use of technology and agribusiness. These changes have increased yields, but often at an environmental and social cost. Environmental problems may include soil contamination, soil degradation, eutrophication of watercourses, increased atmospheric methane, energy subsidies, inhumane practices. Associated with this have been agricultural unemployment, outward migration from rural areas and rapid urban growth. Overexploitation of resources and environmental damage are consequences of modern agriculture, which are unsustainable. Some candidates may argue that some modern agricultural systems, including organic farming, have made agriculture more sustainable. Either approach is equally valid and can receive full marks.

Answers which identify, explain and evaluate the sustainability of agricultural practices may access bands E and F.
Marks should be allocated according to the markbands.

Examiners report

ai. [N/A]
aii. [N/A]
b. [N/A]
c. [N/A]

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a(i). Briefly describe what is meant by “diseases of affluence”. [2]

a(ii). State **two** examples of diseases of affluence. [2]

b. Explain why health-adjusted life expectancy (HALE) is a better way to quantify the health of a community than infant mortality. [6]

c. To what extent have the management strategies for **one named** disease been successful? Refer to **one** country or region in your answer. [10]

Markscheme

a(i). Rich societies suffer ***[1 mark]*** (from health conditions not commonly found in poor societies). They include the degenerative diseases associated with different lifestyles and/or increased overall life expectancy ***[1 mark].***

a(ii) Coronary heart disease; cancer; asthma; type 2 diabetes; peripheral vascular disease; obesity; hypertension; some allergies. Some sources also include clinical depression and other mental health conditions. (Do not credit diseases of poverty: malaria, tuberculosis, measles, pneumonia, and diarrheal diseases. Do not credit AIDS.)

b. Infant mortality reflects health of mothers, nutrition, health care education and services. Many countries have reduced infant mortality with relatively small investments in health care services. Infant mortality is a "snap-shot", reflecting a limited time period.

The HALE includes many more health-related issues, and all age-groups. It also reflects a longer time period, including infant mortality, but also including mortality of other age-groups, and more importantly, ill-health throughout the population. Award up to ***[3 marks]*** for the explanation of how each measure is used to quantify health. For full marks, HALE must be clearly shown to be the better measure.

c. The country or region must be clearly named and located. The disease should be identified. More than one management strategy should be examined. Strategies could involve prevention, treatment (palliative or curative), control/containment, public health measures. Each strategy should be clearly outlined in terms of its aims and methods, and the degree of success or failure should be evaluated.

To achieve band D the answer must describe relevant strategies to combat a named disease in a specific location.
To access bands E and F there should be some consideration of the merits of the strategies and a conclusion presented.
Marks should be allocated according to the markbands.

Examiners report

a(i). There were few problems.

a(ii) There were few problems.

b. Generally well answered, with a good understanding of both terms and the benefits of HALE. Most failed to develop both indicators in sufficient depth. Weaker answers were descriptive and did not compare HALE with infant mortality rate.

c. Some very good responses with detailed case studies, a well-located region and disease and evaluation of the effectiveness of strategies. Responses tended to be on HIV/AIDS or malaria although there were a few less successful answers on swine flu. In some cases, the choice of a region or country was a problem, with vague answers being given about sub-Saharan Africa. A surprising number used cures from the last century.

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a. Briefly describe what is meant by "obesity". [2]

b. Suggest why heart disease is considered a "disease of affluence". [4]

c. With the aid of a diagram or diagrams, explain the spatial process of a disease spreading through "diffusion by relocation". [4]

d. Examine the factors which have led to more food becoming available in some areas in recent years. [10]

Markscheme

a. BMI (Body Mass Index) over a certain number / a form of malnutrition [1 mark], usually resulting from energy (calorie) intake exceeding the amount required [1 mark].

b. Rates of heart disease are lower in poorer countries than in richer/wealthier/more developed countries [1 mark]. Award [1 mark] for each factor that is explained. These may include dietary factors e.g. a high fat intake (especially high saturated fat), high levels of “bad” cholesterol, and obesity. Lifestyle factors include insufficient physical exercise, stress levels, preference for sedentary occupations, reliance on powered forms of movement such as motor vehicles rather than walking, and decision to spend discretionary income on particular kinds of food.

   For [4 marks] both dietary factors and lifestyle factors should be addressed. A wide range of suggested factors may compensate for depth of explanation.

c. Relocation diffusion involves the movement of individuals [1 mark], taking the disease with them to new locations [1 mark] where it continues to spread through contact with then more people (e.g. airline passengers) [1 mark]. Credit other valid points, including an example of a disease such as SARS for [1 mark]. Responses which do not include a diagram may not be awarded more than [3 marks].

d. Numerous factors can result in more food becoming available.

   The first major group of factors is those related to the improved productivity and/or total production of food-related agriculture. These factors include: increased area under cultivation as a result of land clearance and/or irrigation; higher yields due to better technology (e.g. drip irrigation instead of flood irrigation), mechanization, improved varieties (including GM crops and livestock).

   Distribution and storage is also important. More food may become available because less is lost or damaged in transit as a result of improvements in the distribution network (highways, rail, planes) or in the vehicles used (e.g. refrigeration). Improved packing methods may also be important. Subsidies to local farmers for food crops, and reductions in food exports may also raise the amount of food available locally. Equally, a rise in income may also increase the availability of food within some sectors of society. Increased food imports also play a part, and this means that increased availability of food may depend on the success of harvests a long way away from their eventual destination.

   While changes of climate may bear some responsibility for increased food availability in some areas, this will normally be restricted to those areas which were previously suffering from a prolonged condition such as an extreme drought.

   It is expected that responses reaching markbands E/F will consider a variety of factors, and support their ideas with accurate examples.

   Marks should be allocated according to the markbands.

Examiners report

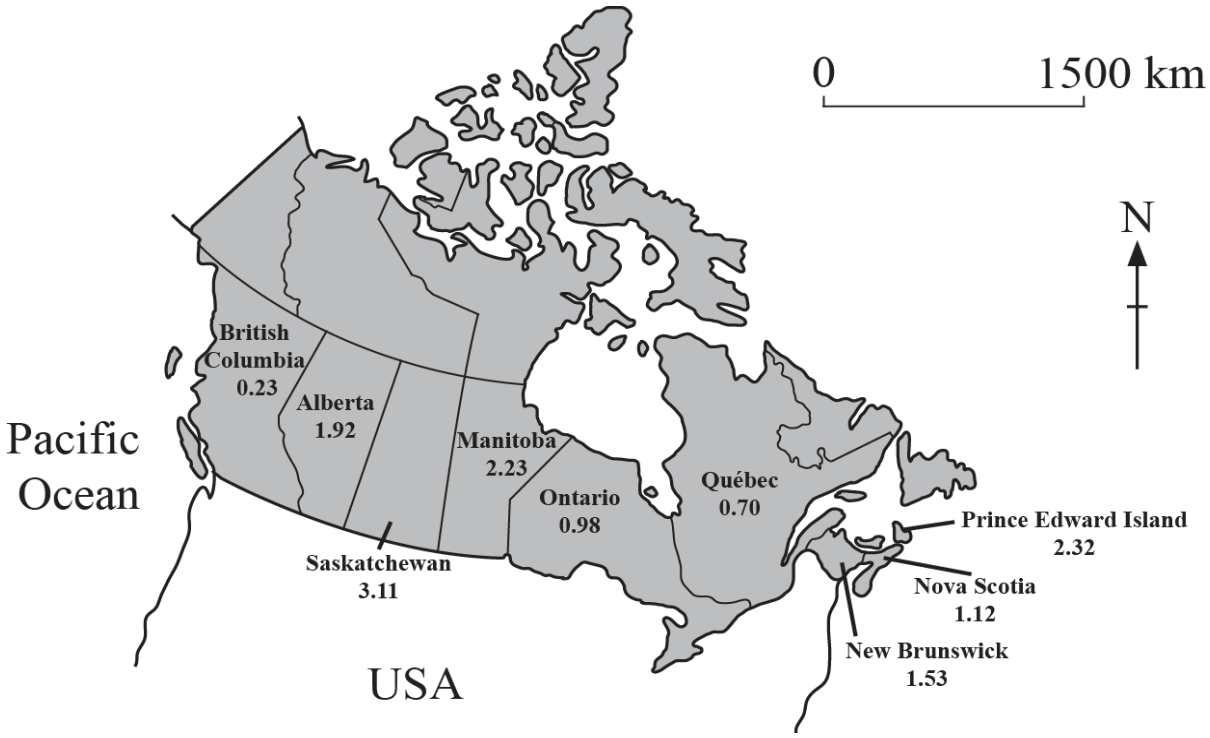
a. Most candidates understood obesity as the result of excessive food intake but references to the BMI were less common.

b. Well-recognized factors were included but there was failure to elaborate sufficiently for all four marks.

c. A common error was the disease seemed to be travelling by plane to another country with no mention of the vector. Or people carrying malaria to another country and passing it on. Most candidates attempted a diagram of some sorts. Generally, the process of diffusion was not well understood and there were few diagrams that related well to the concept.

d. Answers tended to be superficial and were narrowly focused, with few candidates being able to refer to a range of factors other than those related to the Green Revolution, which is hardly a recent phenomenon. Failure to examine in depth was the main issue with this question. Many concentrated just on improved productivity, for example, mechanization, high yielding varieties, and did not really explain how they led to more food availability.

The map shows the energy efficiency ratios for agriculture in selected provinces in Canada.



[Source: adapted from T McRae, CAS Smith and LJ Gregorich (eds.), (2000), *Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project. A Summary*. Ottawa: Agriculture and Agri-Food Canada]

a. Identify the province with the most efficient energy ratio. [1]

b. Describe the pattern of energy efficiency ratios shown on the map. [3]

c. Suggest **three** reasons why energy efficiency ratios vary within a country or region. [2+2+

d. Examine recent changes in agricultural systems that have led to increased food availability in some areas. [10]

Markscheme

a. Saskatchewan.

b. The lowest (least efficient) energy efficiency ratio is in British Columbia; the highest (most efficient) ratio is in Saskatchewan. Larger provinces (in area) tend to have lower ratios than smaller provinces, but overall there is not a very clear pattern. The eastern seaboard has medium to high values; the lowest value is on the west coast.

The overall pattern is of distance decay from Saskatechewan with the provinces in eastern Canada representing an anomaly. Award 1 mark each for any valid statements.

c. Energy ratios depend on numerous factors, including the technology employed in agriculture (for example, glasshouses are much less efficient than open field farming); methods of cultivation (generally, subsistence farming is more energy efficient than commercial farming); the precise crop(s) grown (for example, growing peas has a lower energy ratio than growing wheat or maize); the climate (energy ratios are often more efficient in warmer, wetter areas, than in cooler, drier areas, because of differences in biological productivity); the soil type (which also results in different yields or levels of productivity).

Award 1 mark for each reason stated (provided it links to energy efficiency) and 1 mark for further development.

d. Candidates may interpret the term “agricultural systems” in its narrowest sense, or may adopt a more inclusive definition, to include technological innovations and changes to the area being farmed.

In general, recent changes have tended to increase crop yields, and improve the availability of food. However, these changes may be at the cost of decreasing the sustainability of farming (since they may cause a decline in energy efficiency), or of higher expenditures on other inputs, such as fertilizers.

Food availability is not only a function of how much food is produced or enters the marketplace. It is also related to political factors and economies, and in particular to the relationship between income levels in a society and food prices. Even in an affluent society, some low income groups may not have access to sufficient food. In other areas, the changes in agricultural systems may be focused on raising the production of non-food cash crops at the possible expense of local food crops.

Answers accessing markbands E and F are likely to examine a number of changes in some detail, and refer to examples and case studies.

Marks should be awarded according to the markbands.

Examiners report

a. This was correctly answered by most candidates.

b. This was correctly answered by most candidates.

c. Responses revealed an almost complete lack of understanding of "energy efficiency ratios". Many of the suggested reasons were irrelevant or inaccurate.

d. Answers were mostly mediocre in quality, with some relevant examples offset by major omissions. The use of "recent" in the question was ignored by some candidates who chose to write about the Industrial Revolution onwards. Discussion of the Green Revolution was credited even though it should no longer be considered "recent".

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a.i. Briefly outline what is meant by the term “food security”. [2]

a.ii. Outline **one** way in which the health of a population can be affected by chronic hunger. [2]

b. Explain **three** geographic impacts at a national scale of **one named** water-borne **or** sexually transmitted disease. [6]

c. To what extent were physical factors responsible for **one** recent famine? [10]

Markscheme

a.i. *Food security involves four basic concepts. Award **[1]** for the description of each of the following concepts, up to a maximum of **[2]**:*

- access to food
- sufficient amount
- safety
- nutritional quality/diet.

a.ii. *Award **[1]** for the problem identified and **[1]** for further development.*

Possibilities include:

- long-term under-nutrition **[1]** resulting in stunting/body weight loss **[1]**

- increased vulnerability to disease **[1]** due to weaker immune system **[1]**
- high maternal/infant mortality **[1]** due to lack of nutritious food **[1]**.

b. *Award **[1]** for recognition of a geographic impact and **[1]** for further development.*

For example, HIV has impacted upon Swaziland's GDP due to lost working hours / lower productivity **[1]**. The HIV prevalence rate in Swaziland is around 30% **[1]**.

Impacts might include:

- high death rates/infant mortality rates
- cost of health care
- decrease in tourism
- cost of prevention policies.

*Response should apply to one or more countries. If no example at a national scale is given, award a maximum of **[5]**.*

c. A famine may be defined as a widespread shortage of food in a region that leads to malnutrition and hunger and results in increased mortality

rates. Famine may be caused by a variety of physical and human factors.

Physical factors might include:

- severe drought, caused by climatic factors
- soil exhaustion, caused by poor farming practices
- crop pests and diseases
- natural hazards, such as major earthquake
- climate change/global warming.

Human factors might include:

- civil war/conflict/refugees
- government policies/corruption
- poor infrastructure
- widespread poverty / high food prices
- rapid population growth/population pressure
- failure of response by outside agencies.

Reference should be made to a recent famine, preferably no earlier than the 1990s. Responses that do not focus on a specific recent famine are unlikely to progress beyond band D.

Good answers might provide a structured evaluation of the causes of a recent famine, and arrive at a considered view of the extent to which physical or human factors might matter most. Another approach might be to show how the factors are interrelated and interact with each other.

For band D, expect some description of physical and/or human factors that have caused a recent famine.

At band E, expect either a more detailed explanation of a range of physical and human factors (do not expect balance), or a structured evaluation of the extent to which particular factors (or the interrelationships between them) were responsible.

At band F, expect both.

Marks should be allocated according to the Paper 2 HL and SL markbands.

Examiners report

a.i. [N/A]
a.ii. [N/A]
b. [N/A]
c. [N/A]

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ai. Define the term *health-adjusted life expectancy*. [2]

aii. State **one** reason why health-adjusted life expectancy is a better measure of the health of a population than child mortality. [2]

b. Referring to **one or more** diseases, explain how **three** geographic factors influence the spread of disease. [2+2+

c. “Affluent societies are less affected by disease than those with a high level of poverty.” Discuss this statement. [10]

Markscheme

ai. Health-adjusted life expectancy (HALE) is the life expectancy [1 mark] adjusted for time spent in poor health due to disease and/or injury [1 mark].

It can also be defined as the equivalent number of years of full health [1 mark] that a newborn can expect to live [1 mark], based on current rates of mortality and ill-health.

aii. There are many possibilities. Child mortality reflects the health of mothers and young children, whereas HALE reflects the entire population, including the elderly. The costs and policies associated with the provision of health services in a society are probably better judged by HALE than by child mortality. Award 1 mark for a valid reason with an additional 1 mark for further development, such as quantification or exemplification.

b. Depending on the disease(s) chosen, many different geographic factors may be relevant, including climate, relief, transport lines and connections, incidence of hazards such as flooding, availability and access to methods of prevention (for example, vaccination) or cure, population density, mobility, religion, politics, poverty.

Award 1 mark for each valid factor, with an additional 1 mark for further development, clearly linked to the spatial diffusion/spread of the disease. Award a maximum of 2 marks if no diseases are named.

c. There are few simple relationships between poverty/affluence and the incidence of disease. At a global level, a distinction is recognized between the so-called “diseases of affluence” (type 2 diabetes, heart disease, cardiovascular disease, some forms of cancer, asthma, allergies, depression, some psychiatric illnesses) and the “diseases of poverty” (AIDS, malaria, tuberculosis, pneumonia, measles, cholera, typhoid, malnutritional diseases, dysentery, diarrhoeal diseases). In practice, both groups of disease often co-exist in any one society, with their incidence depending on income levels and other socio-economic characteristics.

Higher life expectancies in affluent societies may explain the higher incidence of diseases of affluence, most of which are degenerative, chronic and non-communicable. Diseases of poverty tend to be linked to infections, inadequate environmental health regulations or poor hygiene; they are often communicable. Rapidly developing countries may have relatively high levels of both groups.

Candidates should discuss the statement not only in terms of the distribution or incidence of disease, but should also look at other effects. These include the financial costs associated with disease prevention, treatment options and public health facilities, the possible economic consequences of disease in terms of reduced workforce productivity, and the social costs of any disease linked especially to a particular age group, such as women of childbearing age.

Answers with developed examples or case studies are likely to be credited at bands E/F.

Marks should be allocated according to the markbands.

Examiners report

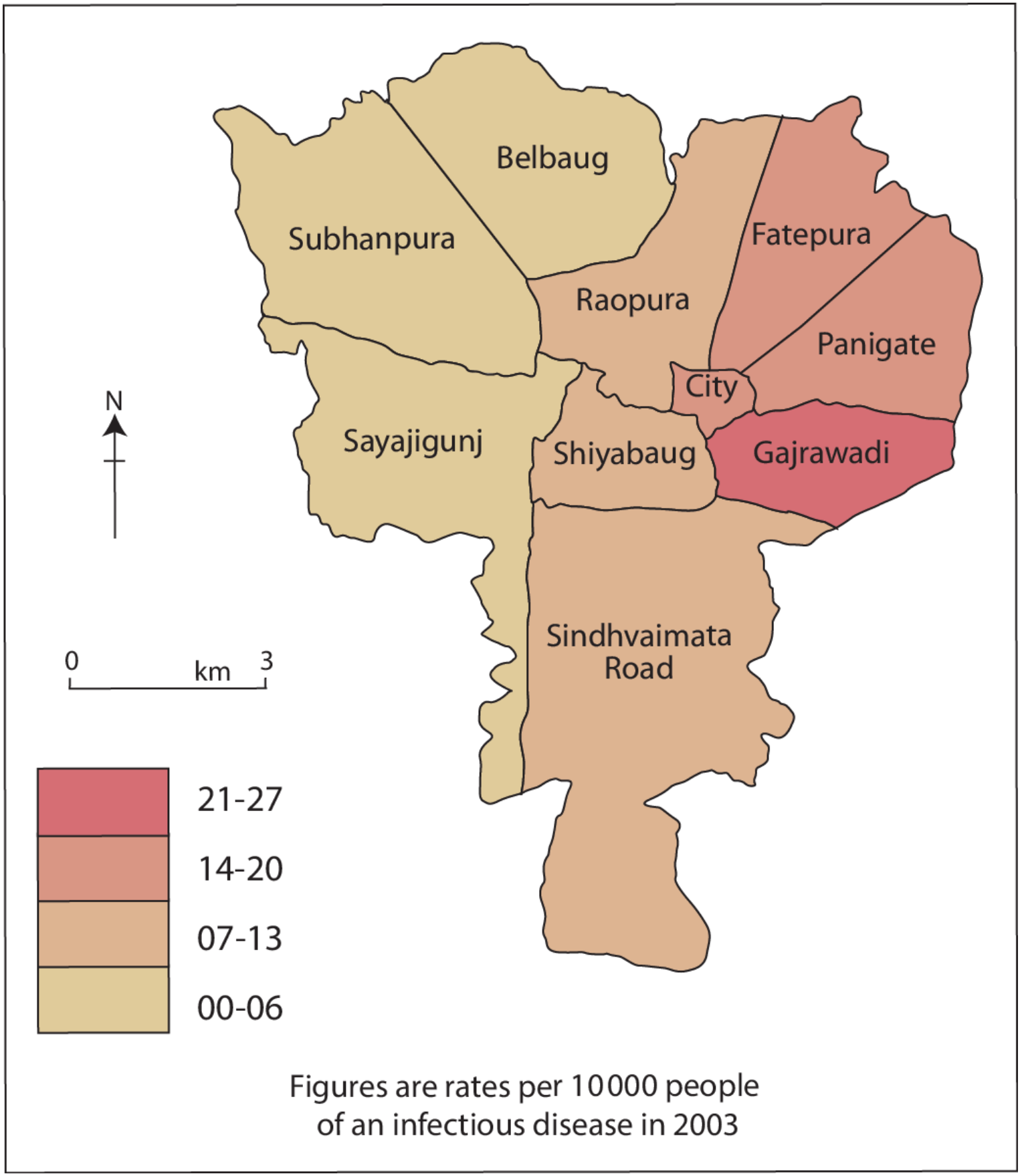
ai. This posed little difficulty for most candidates.

aii. This posed little difficulty for most candidates.

b. It was sometimes difficult to distinguish three factors in rambling accounts where ideas often overlapped or that explained the occurrence of the disease rather than its spread. Weaker responses were superficial and revealed a very limited understanding, even of diseases they had selected as examples.

c. There were some outstanding responses that looked at all the possible nuances of the question, including the occurrence of diseases of poverty in poorer areas of economically developed countries and offered lots of evidence in support. At the other extreme, the weakest discussions were very, very superficial and often were just a list of diseases found in poor and affluent societies.

The map shows the rates of infection (number of cases per 10 000 people) for a water-borne disease in a city in India in 2003.



[Source: Figure 2 ('Vadodara: Trend in the occurrence of diseases') from De, J. (2007) 'Development, environment and urban health in India', Geography, 92,2, pp.158-60www.geography.org.uk]

ai. State **one** other indicator besides infection rates which could be used to map the health of people in this city. [1]

aii. Referring to the map, describe the pattern of this disease in the city. [3]

b. Explain **three** possible reasons, one environmental, one social and one economic, for the pattern considered in part (b). [3x2]

c. “Poverty is the main cause of food insecurity.” Discuss this statement. [10]

Markscheme

ai. Award 1 mark for any valid indicator that might produce a spatial pattern. Possible answers include the number of people per doctor (or per clinic/hospital) in each zone; life expectancy or infant mortality rate in different districts. Accept other valid responses.

aii. This disease is concentrated in the north-eastern sector of the city (Gajrawadi, Fatepura, City and Panigate) [1 mark]. Rates are low in the west of the city (Belbaug, Subhanpura and Sayajigunj) [1 mark]. Some responses may also identify the mid-range concentration forming a north-south belt (Raopura, Shiyabaug and Sindhvaimata Road). Award up to 2 marks for the recognition of the general pattern with 1 mark reserved for specific reference to the map.

b. Examples of possible reasons include:

Environmental: high rate areas may be at lower altitude, where water collects, or may be on unstable ground where water pipes frequently rupture, contaminating the water supply.

Social: people living in overcrowded conditions may be more likely to share contaminated water sources and catch the disease; different ethnic groups may have differing views about drinking untreated water.

Economic: people living in high-rate areas may be less affluent, and therefore unable to afford preventative measures such as water purification or vaccination, and may have to work even during an epidemic, increasing their chances of catching the disease.

Award 1 mark for each valid reason, and a further 1 mark in each case for any valid development or detail.

c. Answers are expected to consider both sides of this question. Poverty may cause or exacerbate food insecurity because families in poverty may be unable to afford food even though supplies are (physically) available. Poverty makes it unlikely that families can retain a reserve of food to tide them over bad times, or guarantee them seeds for planting the following year. On the other hand, food insecurity may also be caused by natural hazards, such as droughts reducing food availability, or by earthquakes and hurricanes disrupting food supply chains and normal distribution channels. Food insecurity may also result from wars, conflicts, and from external forces such as the actions of NGOs and effects of government subsidies.

While it is likely that most responses will conclude by agreeing with the statement, this is by no means the only possible conclusion. All responses should be judged strictly on their own merits.

Responses that discuss both sides of the question and arrive at a conclusion in line with the evidence selected are likely to be credited at bands E/F.

Marks should be allocated according to the markbands.

Examiners report

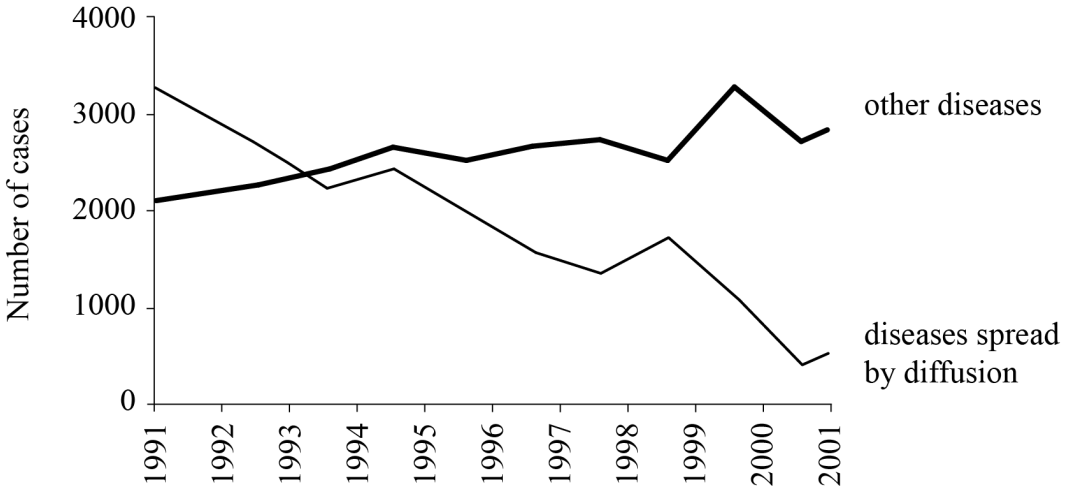
ai. This was usually well done, though some answers wrongly used "calories" as a measure of health.

aii. This was well done though some responses lacked references to places on the map even if they were able to describe the basic pattern of the disease.

b. Responses often referred to diseases that are not water-borne.

c. There were some strong answers at higher level and at both levels a number of candidates were unsure of the precise meaning of poverty or food insecurity. Some answers did not look at other possible causes of food insecurity. At standard level the responses were generally weak and many candidates descended into a stereotyped, blanket account as to why "Africa" has famines and poor diet, once again treating the entire continent as a single country.

The graph shows the rates of disease in a city in India between 1991 and 2001.



[Source: Jayasree De, (2007), This Changing World: Development, Environment and Urban Health in India. Geography, volume 92, issue 2, pages 158–160]

ai. Describe the trend in diseases spread by diffusion between 1991 and 2001. [2]

aii. Describe what is meant by “diffusion by relocation” with reference to a disease. [2]

b. Explain the global distribution of diseases of poverty. [6]

c. Referring to **one or more** diseases, discuss the factors that determine the relative importance of policies of disease prevention as opposed to policies of treatment. [10]

Markscheme

ai. Award 1 mark for the recognition that the number of cases of diseases spread by diffusion fell between 1991 and 2001, and an additional 1 mark for some quantification or recognition of anomaly.

aii. Diffusion by relocation occurs when individuals infected with a disease move [1 mark] to a new, perhaps distant location and the disease spreads [1 mark].

b. Diseases of poverty include many infectious and parasitic diseases, as well as diseases related to vitamin and/or calorie deficiencies. The global distribution is related to economic and social development, though pockets of diseases of poverty can also exist in developed nations.

Factors include lack of access to adequate medical care because of costs and/or poor availability; poor quality of water supply; high levels of environmental pollution; poor levels of sanitation.

At least two distinct factors must be treated in detail for the award of the full 6 marks. Alternatively, a greater number of factors can be explained in less detail for the award of full marks.

Answers that simply describe the distribution should be limited to a maximum of 3 marks.

Alternative approaches should be considered on their merits.

No credit may be given for any explanations that relate directly to diseases of affluence (degenerative diseases, cancers, heart disease).

c. Numerous factors are relevant to this response, depending on the particular disease or diseases chosen. They include: relative costs per patient of treatment compared with prevention; cost, effectiveness and availability of disease-specific preventative measures such as vaccinations; whether or not the disease in question spreads by diffusion, and if so by which type of diffusion; potential long-term health or economic impacts of an outbreak of the disease in question; pressure from disease-specific non-governmental organizations.

Responses which show a good knowledge of one or more diseases and which discuss both prevention and treatment policies are likely to be credited at band D or above.

Marks should be allocated according to the markbands.

Examiners report

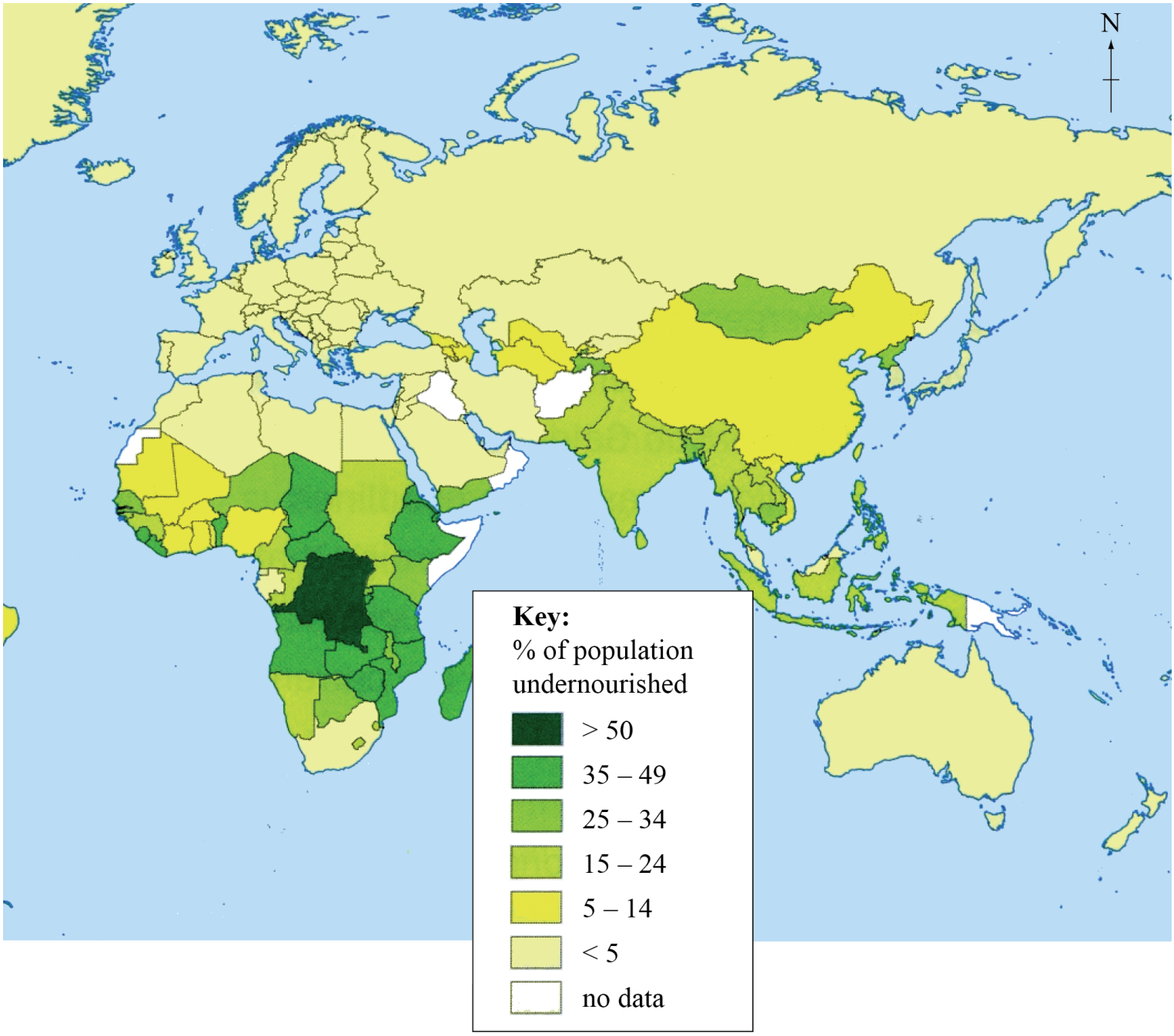
ai. This was answered well with good use of quantification.

aii. This was defined well with good use of supporting examples.

b. Again, there was a strong awareness here, with exploration of the factors of poverty, for example, water supply, sanitation, housing and/or food supply, mainly with reference to areas of the world that lack economic and social development. The best answers explained why some areas in developed nations are also subject to diseases of poverty.

c. There were very good case studies about policies of prevention and policies of treatment. Less well done was the consideration of the factors that determine the relative importance of each, for example, cost, effectiveness, availability of treatment or extent of the disease.

The map shows part of the global pattern of low calorie intake (undernourishment).



[Source: E M Young, (2010), Deadly Diets: Geographical Reflections on the Global Food System. *Geography*, volume 95, issue 2, pages 60–69]

a. Describe the difference between malnutrition and low calorie intake. [2]

b. Describe the pattern of undernourishment shown on the map. [4]

c. Explain **two economic** causes of food deficiency. [2+2]

d. With reference to any **one** vector-borne, water-borne or sexually transmitted disease, compare its geographic impacts at the local and international scales. [10]

Markscheme

a. Malnutrition means an inadequate/unbalanced supply of energy, vitamins or other food-based nutrients (malnutrition includes both under- and over-nutrition) [1 mark]. Low calorie intake is a subset of malnutrition and is therefore a condition where people receive insufficient calories to maintain a healthy weight [1 mark].

b. The highest rate/prevalence of undernourishment (over 50%) is in central Africa [1 mark], especially the DRC [1 mark]. South/south-east Asia is generally lower than Africa but higher than Europe/Russia/Australia [1 mark].

Other important features that may be awarded [1 mark] include: low levels in north Africa and south Africa; lower levels in the Middle East; higher value (may describe as anomaly) in Mongolia/central Asia.

For the award of full marks some quantification is necessary.

N.B. country names are not essential for the award of the full [4 marks].

c. The economic causes of food deficiency include: price increases in staple food items (regardless of why or how they arise, whether from local changes or changes in other regions or countries); transition from food-based agriculture to non-food commercial or export agriculture; inadequate transport infrastructure for food (including food aid) to be supplied and/or distributed efficiently; failure to invest in irrigation projects meaning that the area is unable to cope in times of low rainfall or drought. Credit other valid causes.

Award [1 mark] for each valid cause, with a further [1 mark] for its development.

d. The response will depend on the disease selected. The relative importance of local and international scales will differ depending on the disease selected.

Some diseases, such as river blindness, have a serious local impact (and some national impacts) but relatively few or no international impacts). Other diseases, such as SARS and A-H1N1 influenza have the potential to impact all scales. Knowledge of the biology/pathology of the chosen disease is not expected, except in so far as it determines specific impacts of geographic importance.

Responses accessing band D and above should refer to both scales, though the amount of depth for each scale need not be equal. Credit should only be awarded for a single disease. In the case of responses which consider more than one disease, the disease scoring most marks should be credited.

Responses reaching bands E/F are expected to show accurate knowledge of a disease, and to consider a range of impacts before concluding whether or not the impacts are similar at the two scales.

Marks should be allocated according to the markbands.

Examiners report

a. Most responses correct.

b. A few were very generalized, for example, Africa, or used descriptive terms, for example, top, left.

c. Many candidates found it difficult to remain focused on economic causes – political, environmental and physical causes were included, demonstrating only a very limited understanding of food deficiency.

d. A very open-ended question with a number of diseases that could be chosen. The most common were malaria and AIDS/HIV. Many just discussed the disease and its causes and spread rather than examining its impacts. Although there were some good local scale impacts most had difficulty relating it to the international scale and therefore comparing it.

---

a. Define the health measure HALE and explain how it differs from life expectancy. [2+2]

b. Analyse the advantages and disadvantages of **two** other indices (other than HALE) used to measure the health of populations. [3+3]

c. Discuss the connections between affluence and health. [10]

Markscheme

a. HALE (health-adjusted life expectancy) is based on current rates of life expectancy at birth [1 mark], but includes an adjustment for time spent in poor health (due to disease and/or injury) [1 mark]. It differs from life expectancy which estimates the number of years a person is likely to live, usually from birth [1 mark] according to current age-specific mortality rates [1 mark].

There may be alternative valid points which should be credited.

b. Suitable indices include infant mortality rate, child mortality rate, calorie intake, access to safe water and to health services. There are other possibilities.

Award 1 mark for each measurable health-related index, a further 1 mark for a valid advantage and 1 mark for a valid disadvantage of each one.

c. The interpretation of affluence ranges from a comfortable standard of living to one that involves high levels of resource consumption. It is expected that candidates will recognize the ways in which affluence may promote good health by providing sufficient funds to live comfortably, which may minimize stress and provide access to social and health services. Responses accessing bands E and F should recognize the negative side of affluence where excessive food consumption and sedentary life style may lead to obesity and degenerative diseases.

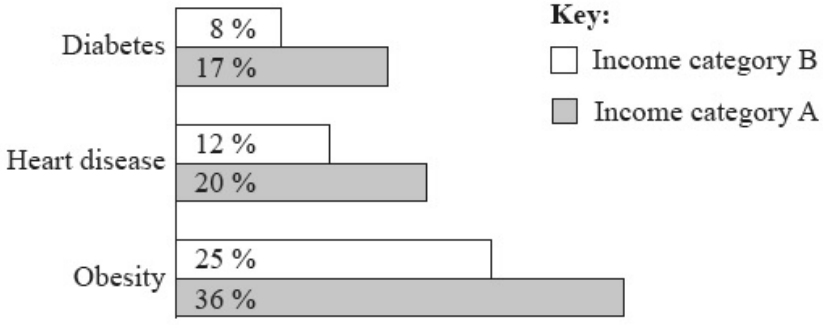
Although unspecified in the question, answers that offer examples and case studies to illustrate their answer are likely to be credited at band D or above.

Marks should be allocated according to the markbands.

Examiners report

a. [N/A]
b. [N/A]
c. [N/A]

The graph shows the percentages of people, aged 55 to 64, experiencing three major health-related conditions in a developed country.



[Source: J Banks, M Marmot, Z Oldfield, JP Smith, New Scientist, 17 July 2010. Original data from the *Journal of the American Medical Association* (JAMA), "Disease and disadvantage in the United States and in England," **295**(17): pages 2037–2045, 3 May 2006]

a. (i) State which income category is likely to represent the wealthier individuals in this country, and justify your choice. [4]

(ii) State which of the three health conditions shown on the graph is most related to income category, and justify your choice.

b. Using examples of diseases, distinguish between diseases of affluence and diseases of poverty. [6]

c. To what extent was **one** recent **named** famine caused by crop failure? [10]

Markscheme

a. (i) B ***[1 mark]***.

Because fewer suffer from each of the three conditions, incidence of which is related to access to education/access to health services/lifestyle (accept any of these, or other valid statement) ***[1 mark]*** (and therefore to relative poverty).

Accept A ***[1 mark]*** and, if justified ***[1 mark]***.

(ii) Diabetes ***[1 mark]***.

Since its (relative) rate more than doubles from Category A to B ***[1 mark]*** (whereas the other conditions increase, but by less than 100%).

b. Diseases of affluence are those diseases such as degenerative diseases that are associated with different lifestyles and/or increased overall life expectancy ***[1 mark]*** typical of wealthy societies. They include coronary heart disease, cancer, asthma, type 2 diabetes, peripheral vascular disease, obesity, hypertension, some allergies.

Diseases of poverty tend to be infectious diseases resulting in lower life expectancy, and associated with poor public health and access to medical services ***[1 mark]***, or malnutrition and poor female education (alternative route to this ***[1 mark]***). They include malaria, tuberculosis, AIDS, measles, pneumonia, and diarrheal diseases.

Award the remaining ***[4 marks]*** for applied use of examples that distinguish between the two types either according to geographical distribution, or how they are acquired or transmitted.

Award ***[6 marks]*** only if the distinction between the two types is fully explicit.

c. Famines usually result from the interaction of a variety of factors including not only physical factors (for example, adverse climate, soil failure) but also demographic (for example, rapidly expanding population), economic (lack of resources) and political (for example, war zones, refugees), among others.

Stronger responses are expected to look at one example of a recent famine and display some understanding of the different factors involved in causing it to occur/develop. Crop failure need not be a significant factor for the chosen example and full credit is available for answers that mainly focus on the role of alternative factors.

Responses that do not focus primarily on a specific recent famine are unlikely to progress beyond band D.

Responses that look at the combination of causes that led to a specific famine occurring, and then draw some conclusion about the relative importance of crop failure, are likely to access band E.

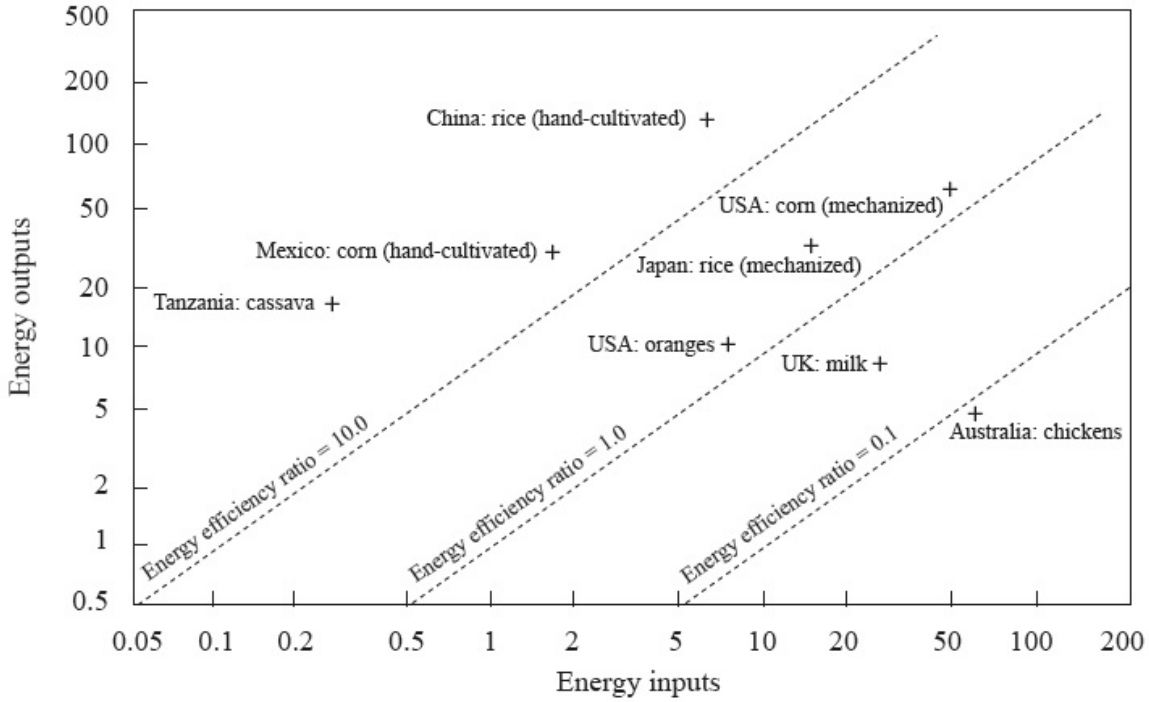
For band F expect the above with a well balanced attempt at evaluation.

Marks should be allocated according to the markbands.

Examiners report

a. [N/A]
b. [N/A]
c. [N/A]

The graph shows the energy inputs and outputs for a number of different farming systems (the units are gigajoules per hectare per year).



[Source: Reprinted from *Food Policy*, volume 1, Gerald Leach, Energy and food production, 1975, with permission from Elsevier]

a. (i) Identify the farming system shown on the graph which has the highest energy output. [2]

(ii) Identify the farming system which has the highest energy efficiency ratio.

b. Referring to the graph, suggest how mechanization contributes to the different energy flows (inputs and outputs) for rice farming systems shown in China and Japan. [4]

c. Explain **two** changes in agriculture, **other than** mechanization, that have helped to boost food production in some areas. [4]

d. "Free trade is more important than food aid in helping to solve (alleviate) food shortages." Discuss this statement. [10]

Markscheme

a. (i) China: rice (hand-cultivated) ***[1 mark]***.

(ii) Tanzania: cassava ***[1 mark]***.

b. Japan's inputs are about double those of China but China's outputs are more than double ***[1 mark]***. Award ***[1 mark]*** for additional quantification, or identification of China's EER as much higher than Japan's.

Up to ***[3 marks]*** for reasons such as:

Mechanization involves high fossil fuel usage ***[1 mark]*** but does not necessarily increase energy output. Output level also depends on the intensity of cultivation (tiny farms may have very high yields) ***[1 mark]***. Mechanization may be responsible for only some of the additional energy inputs, so the higher outputs may be associated with fertilizer or other agro-chemical use ***[1 mark]***.

c. Possibilities include irrigation, HYV crops (Green Revolution) bringing new land into use, better pest controls, (organic) fertilizers, glass-houses, poly-tunnels, subsidies and introducing GM crops. Accept other valid suggestions. For each change, award ***[1 mark]*** for identifying or describing the change and ***[1 mark]*** for a development/exemplification/quantification that helps establish a clear link to an increase in food production in an area.

d. There are many possible approaches to this question.

Responses are expected to show a clear understanding of the differences between food aid and free trade, and also indicate that there are many different kinds of food shortages, such as short-term/seasonal/long-term/chronic (temporal) and local/national/regional (spatial). Strong responses are likely to show that the relative importance of food aid, as opposed to free trade, will depend on the temporal and spatial extent of the food shortage in question.

The very best answers may challenge the role of free trade and/or food aid in alleviating food shortages and offer examples where the reverse is true.

Responses that fail to use any examples or fail to clearly distinguish between food aid and free trade are unlikely to progress beyond band D.

Responses that discuss most aspects of the question with examples, and attempt some conclusion are likely to access band E.

At band F expect a well balanced attempt at evaluation.

Marks should be allocated according to the markbands.

Examiners report

a. [N/A]
b. [N/A]
c. [N/A]
d. [N/A]

---

a. (i) Outline what is meant by the term “diseases of affluence”. [4]

(ii) Briefly describe the global distribution of diseases of affluence.

b. Referring to **one named** water-borne or vector-borne disease, distinguish between policies relating to its prevention and policies relating to its treatment. [6]

c. Examine the effects of transnational corporations (TNCs) and fair trade on the level of sustainability of agriculture. [10]

Markscheme

a. (i)

*Award **[1]** for each valid point from the following:*

- mainly affect wealthier people
- due to longevity/sedentary lifestyle/diet/lifestyle choices
- or an example, *eg* cancer.

(ii)

Primarily economically wealthy countries **[1]**, but also in some socio-economic groups within less wealthy countries **[1]**.

b. *Award maximum **[3]** if no specific disease named, or disease is not either water-borne or vector-borne, eg HIV/AIDS, Ebola*.

*Award maximum **[4]** if policies only relate to either prevention or treatment*.

For example:
Malaria is a vector-borne disease, carried by mosquitoes **[1]**.

Policies related to malaria prevention include: Award **[1]** each.

- removing/covering open bodies of still water (ponds, buckets, puddles)
- eradicating mosquitoes (spraying)
- encouraging use of bednets, preferably pre-sprayed with mosquito pesticide
- encouraging use of anti-malarial tablets.

Policies related to malaria treatment include: *Award **[1]** each*.

- ensuring rapid diagnosis (provision of laboratories, training of medical staff, including doctors) ensuring easy access to medical attention and medicines needed to treat malaria (healthcare systems, education, purchase of stockpiles of malarial medicines)
- establishing a national database of malarial patients so that they might be treated more effectively and appropriately.

c. The relationship between TNCs and sustainability is complex. While some TNCs probably increase agricultural sustainability, others probably decrease it. Equally, the actions of some TNCs probably have no effect on sustainability whatsoever.

An example of how sustainability might be increased is when TNCs introduce/adopt more efficient irrigation techniques (such as drip feed instead of flood irrigation) to grow crops. However, sustainability is only increased if the pumping of water for the new irrigation system does not involve using large amounts of additional energy coming from non-renewable sources.

On the other hand, TNCs that introduce GM herbicide-resistant crops may decrease sustainability. For example, some TNCs have patented or otherwise protected their rights to certain types of seed, meaning that farmers have to purchase new seed every year and are no longer allowed to use seed from a previous crop, as is normally done in conventional farming. This may be economically unsustainable, especially over the long term. In other cases, for example where the seed of some hybrid crops will not germinate and grow new crops, the changes brought by TNCs may be ecologically unsustainable.

The adoption of fair trade is designed to increase sustainability, especially the social and economic aspects of sustainability. The discussion of fair trade might extend into considering the sustainability of marketing and supply chains. This should not be penalized but is likely to be self-limiting given the wording of the question.

TNCs and fair trade are not always mutually exclusive. One example of an overlap between TNCs and fair trade is Starbucks coffee. The firm is a TNC, but it advertises and commercializes fair trade products.

Candidates are expected to show some awareness that the concept of sustainability has several strands, including economic, environmental and social. It is also likely that many candidates will refer to ways in which sustainability can be measured/assessed. The strongest responses are likely to include references to food miles and/or energy efficiency as measures of sustainability.

It is not necessary for TNCs and fair trade to be discussed in equal depth for the award of full marks. A strong, evidenced discussion of TNCs may well offset a weaker discussion of fair trade, or vice versa.

Responses at band D are likely to describe some ways in which TNCs and/or fair trade affect sustainability of agriculture.

At band E, expect either greater explanation of how TNCs and fair trade affect sustainability of agriculture or some explicit examination of what is meant by sustainable agriculture.

At band F, expect both.

Marks should be allocated according to the markbands.

Examiners report

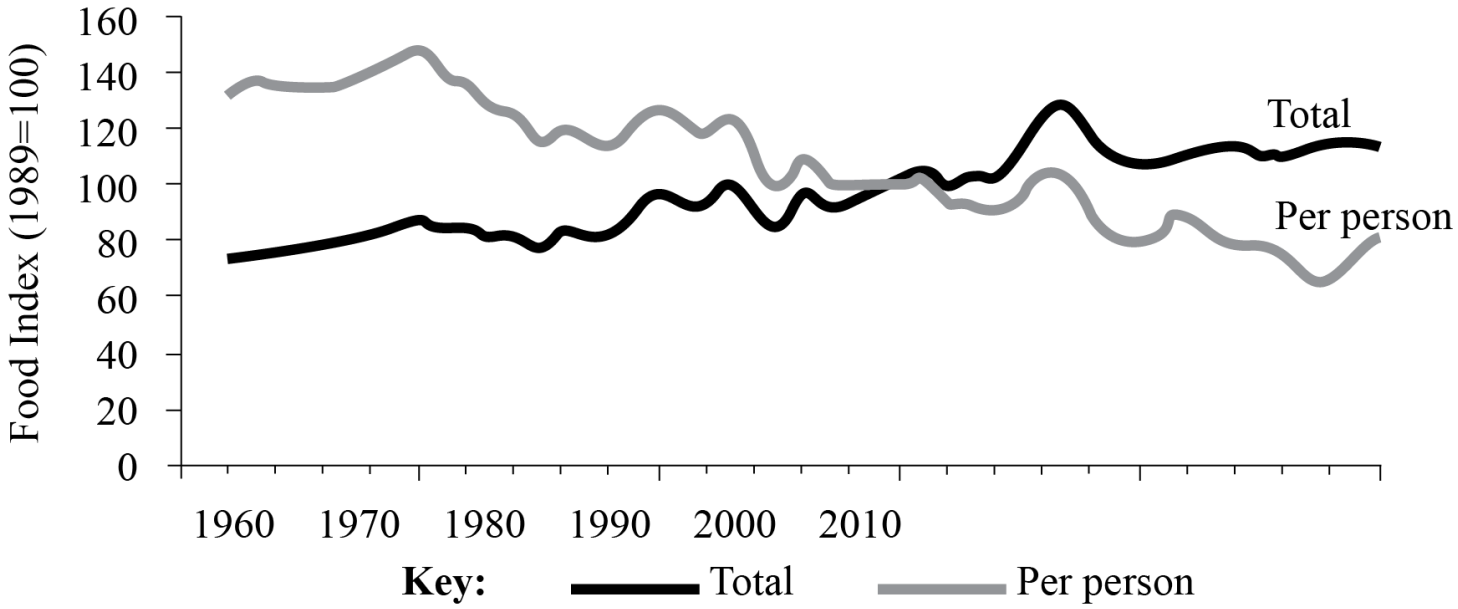
a. (i/ii) There were few problems with this. Relatively few candidates recognized that diseases of affluence can occur in less wealthy countries.

b. This was generally well answered. The question specifically required one named water-borne or vector-borne disease*; Ebola is neither, although some credit was given. Policies of prevention were often answered better than treatment. Unfortunately, some candidates wrote (erroneously) that there is a vaccination for malaria.

* The geography guide requires case studies of two diseases, chosen from two of the following three: vector-borne, water-borne, or sexually transmitted.

c. This question required an understanding of TNCs, fair trade and sustainability of agriculture. There were some very good, detailed responses, using examples. Others had an imperfect understanding of fair trade, confusing it with free trade. Many focused on environmental impacts and sustainability, with less consideration of social and economic aspects. Some recognized that TNCs and fair trade are not mutually exclusive.

The graph shows the total food production and food production per person in Country A, 1962–2010.



[Source: Geofile (Nelson Thornes, 2005)]

ai+aii. (i) State the year when the index of total food production was greatest. [1+1]

(ii) State the value of the food index per person in 1970.

b. Describe the trend in total food production shown on the graph. [2]

c. Suggest reasons for the trends in total food production and in food production per person from 1962 to 2010. [6]

d. Examine the geographic connections between food availability and health. [10]

Markscheme

ai+aii. (i) Accept either 1996 or 1997 [1 mark].

(ii) Accept any answer in range 140–150 inclusive [1 mark].

b. Total food production is rising [1 mark] with another 1 mark for quantification or recognition of any anomaly.

c. Award 1 mark for a brief description of each valid reason, and a further 1 mark for developing it by means of example, explanation or detail. Both total food production and food production per person must be covered, though not necessarily in equal depth for the awarding of the full 6 marks.

Possible reasons for the increase in total food production include: a greater area of land under cultivation due to land improvement (drainage, irrigation) or land clearance; higher crop yields due to better agricultural techniques; the application of fertilizers, biotechnology or improved seeds; higher productivity due to effective pest control measures or application of improved technology.

The main reason for the decline in food production per person is an increase in population, which in turn may be due to either natural increase or in-migration.

Some answers may refer to the anomalies. This is also acceptable, but reasons for anomalies such as natural hazards, wars and plagues, should not receive more than 2 marks out of the total 6 marks available.

d. There are many links between food availability and health. Health is generally better in areas of higher food availability: vitamin and calorie-deficiency diseases would be less likely; immune systems would be more robust; recovery from disease faster. On the other hand, too much food being available can lead to other health issues related to being overweight or obese. Greater food availability is often linked to economic

development. Assuming this link is made explicit, responses may legitimately include reference to related aspects such as improved medical care, vaccinations and preventative measures.

Some responses may subdivide food availability into different categories, such as economic food availability and physical food availability. However, this is not necessary for the awarding of full marks.

To reach bands E and F, responses should look at health issues in relation to shortage and excess food availability.

Marks should be allocated according to the markbands.

Examiners report

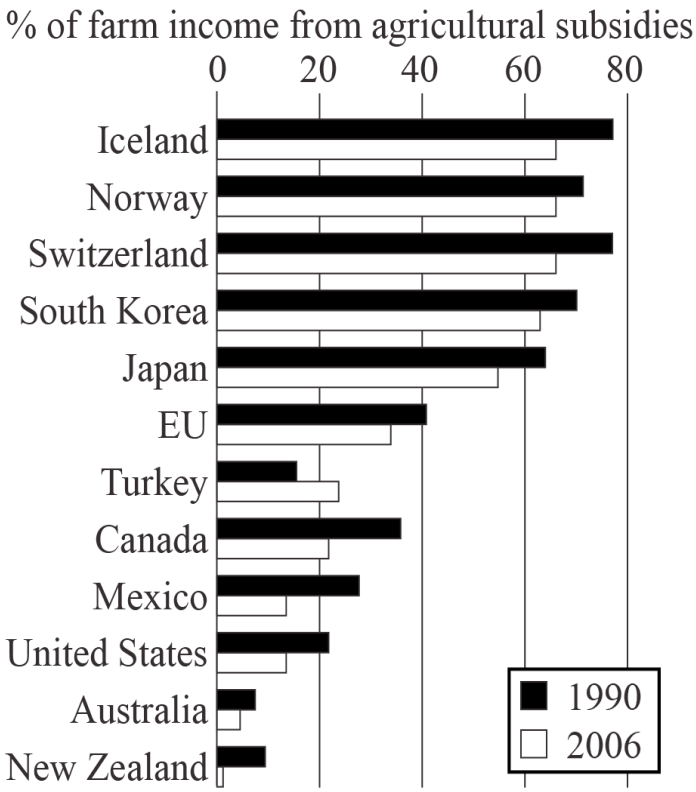
ai+aii. This was generally well done.

b. This was generally well done.

c. Answers were better on "total food production" than on "food production per person"; some candidates wrote about "food availability" which is a different concept, or uneven distribution, which was invalid. Some answers did not appreciate that the graph used index values and thought they could compare the two lines in a quantitative way.

d. There were some interesting answers, which were generally along the right lines. These usually examined the effects of lack of food leading to undernourishment or the availability of excess food leading to dietary problems and obesity. A surprising number of answers showed a lack of awareness of the diseases caused by poor diet related to food availability.

The graph shows the percentage of farm income from agricultural subsidies in 1990 and 2006 for 11 countries and the European Union (EU).



[Source: OECD data, cited in *The Economist*, 10 November 2007]

ai. Describe the pattern of agricultural subsidies in 2006. [2]

aii. State **two** reasons why agricultural subsidies have declined in most countries since 1990. [2]

b. Explain how the actions of TNCs can reduce the availability of food. [6]

c. To what extent were human factors responsible for a recent famine? [10]

Markscheme

ai. Award 1 mark for any valid general statement, such as agriculture subsidies are higher in the northern hemisphere than the southern hemisphere, or agricultural subsidies are higher in European nations than in North America or Australasia, with an additional 1 mark for any supporting quantification.

No credit should be given for a simple list.

aii. Award 1 mark each for any two valid reasons. These reasons include the reallocation of government resources since 1990 into other sectors of the economy; and the influence of the role of civil society or international trade organizations and their attempts to regulate subsidies.

b. There are numerous possible ways in which TNCs can reduce food availability. They may encourage an emphasis on the growing of non-food cash crops rather than food crops. They may gain control of the supply of seed for one or more basic crops; this seed may then be priced beyond the means of the average farmer or the seed may require higher than affordable investments in infrastructure or equipment in order for high yields to be obtained.

At least two actions must be explained for the full 6 marks. Award 1 mark for each valid action, plus an additional 1 mark for explaining it, and a final 1 mark for an example, quantification or further detail.

c. Candidates are expected to consider a range of human factors and other factors (such as physical/environmental, economic and political) in their responses. Answers should clarify how each factor affected the occurrence, severity and outcome of a particular famine.

Possible human factors include: age and education of agricultural workforce; extent to which population is concentrated in a few large cities, or dispersed across a wide area; migration flows.

Economic factors include: ability to purchase food supplies from outside the area or country; deficiencies in the transport system reducing the effectiveness of food distribution; lack of capital to replant or restock farms.

Political factors might include: war and refugee movements; refusal to accept international food aid.

Possible physical/environmental factors include: soil degradation; climate change; natural hazard events such as hurricanes or earthquakes.

While many responses are likely to conclude that human factors are not the main cause of famine, all conclusions should be judged strictly on the merits of the arguments presented and the example chosen.

Answers arriving at a clear conclusion about the relevance of human factors to a specific recent famine are likely to be credited at band D and above.

Where responses refer to more than one famine event in different countries, only the best one should be credited.

Marks should be allocated according to the markbands.

Examiners report

ai. Many candidates listed countries and gave some quantification. Relatively few identified a pattern.

aii. This was answered quite poorly; relatively few suggested valid reasons for the decline in agricultural subsidies.

b. This prompted a variety of responses from those who explained why food availability would increase, to those who gave a variety of reasons why food availability might decrease.

c. There were many good answers that included a variety of human and physical factors, and a recent famine, for example, East Africa 2011. A small minority of candidates used inappropriate examples (that is, not in the candidates' lifetime).

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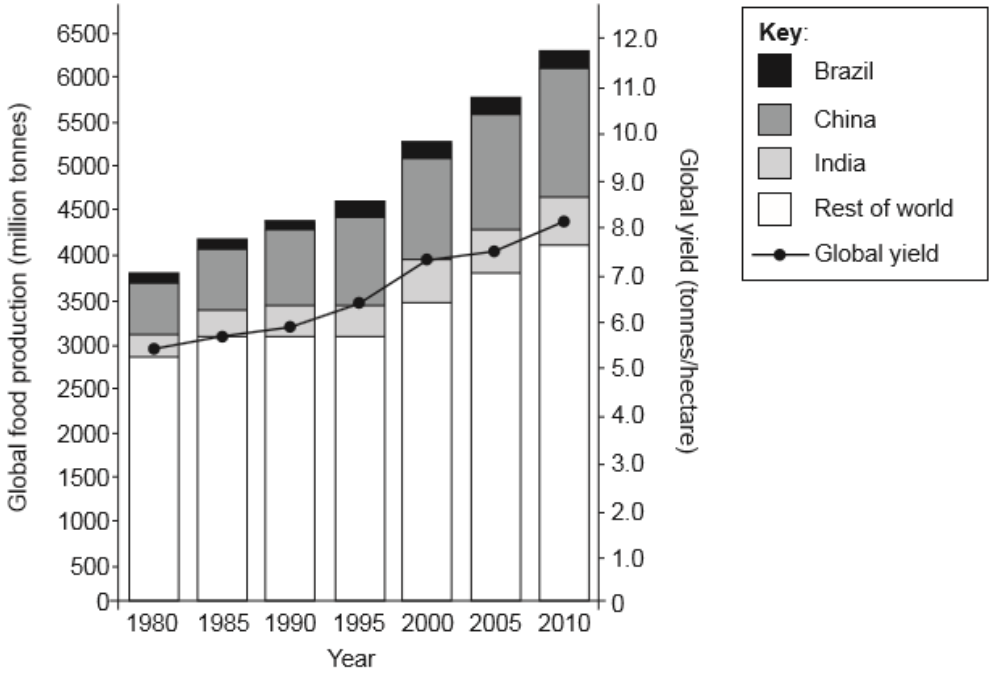
a. The graph shows changes in global food production and global yields of food crops from 1980 to 2010. [4]



[Source: adapted from Ellen MacArthur Foundation, (2013), *Towards the Circular Economy* **2**, page 22]

(i) Referring to the graph, briefly describe the change in food production in India from 1980 to 2010.

(ii) **Other than** increasing global yield, state **one** reason why global production has increased.

b. Explain **two** ways in which the yield of some food crops can be increased. [6]

c. Referring to **two** diseases, compare the factors affecting their spread from place to place [10]

Markscheme

a. (i)

Award **[1]** for recognition of increase, **[1]** for recognition of step/steps and **[1]** for some correct quantification. For example: 250-300m tonnes in 1980 and 500-750m tonnes in 2010 (both years do not need to be quantified for the additional **[1]**.

(ii)

*Award **[1]** for recognizing that a greater area of land (new land) is now being cultivated/farmed. For example, "increased irrigation has led to more land being farmed", or, "the use of HYVs/GMOs allows two or more crops per year from the same plot"*.

b. **Note: yield is not the same as output**.

Reasons for increases in yield include: increased use of fertilizers; pesticides; irrigation; adoption of high-yielding varieties.

Accept other valid suggestions.

*Award **[1]** for identification of valid factor, **[1]** for its development, and **[1]** for a clear link to yield rather than just output*.

For example:
Yield may increase if more farmers apply more or better fertilizers **[1]** to their crops.
This provides plants with extra nutrients **[1]** and means that they produce more crops off the same area of land **[1]**.
Yields (amount produced off a given area of land) **[1]** may increase if farmers use pesticides more effectively **[1]** because pests that normally reduce the yield of that crop are reduced or eliminated **[1]**.

c. Geographic factors include environmental, physical, demographic, socio-economic, *etc*. The factors that are relevant will depend on the two diseases chosen, and on any particular examples utilized in the response.

Good responses may draw comparisons using concepts such as diffusion, spread by relocation, the presence or absence of barriers to diffusion.

Responses at band D are likely to describe some factors that influence the spread of two diseases (do not expect balance).

At band E, expect either greater explanation of the factors affecting the spread of both diseases with located examples, or some explicit comparison focused on key factors/concepts.

At band F, expect both.

If only one disease is referred to, the response may not advance beyond band C.

Marks should be allocated according to the markbands.

Examiners report

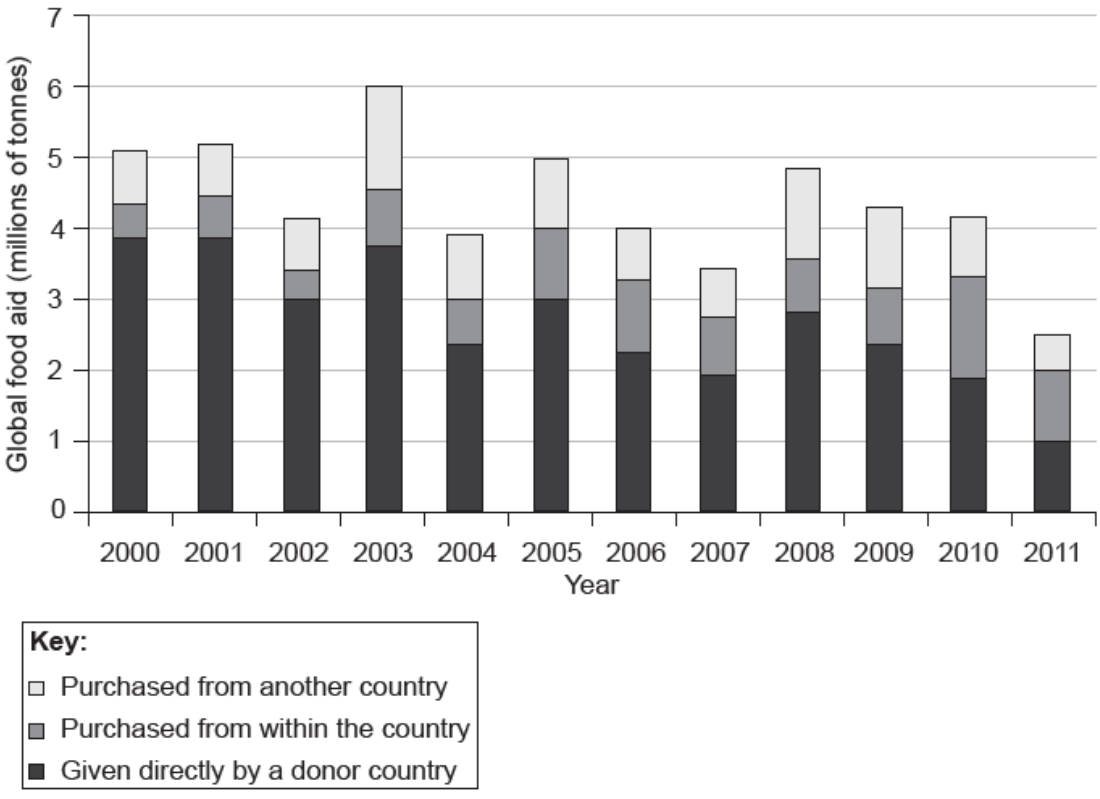
a. (i) Some candidates had problems in interpretation of the graph, although most were able to recognize overall increase. There was some incorrect quantification and candidates frequently used figures for production rather than yield.

(ii) Very few gave a correct answer. Many gave the reason as increase in population, or use of HYVs (high yield varieties). The question referred to global production, rather than yields.

b. This was often poorly answered; candidates referred to output, rather than yield. Where correct factors were given, they were often not developed as to why yields increased.

c. Generally well answered. Good responses discussed types of diffusion and barriers, and gave located examples. Some focused on factors causing the diseases, rather than why they spread from place to place. Those that selected a lifestyle disease, such as obesity, were sometimes self-limiting in scope.

The graph shows the amount of global food aid in millions of tonnes, from 2000 to 2011.



[Source: World Food Programme / FAIS]

a. Describe the trends in food aid between 2000 and 2011. [4]

b. Explain **two** possible disadvantages of food aid for a community that is currently experiencing food shortages. [6]

c. “Prevention should always be prioritized over treatment.” Discuss this statement, with reference to specific diseases and communities. [10]

Markscheme

a.
- Overall decrease **[1]**
- With significant annual variations (*eg* 2003) **[1]**
- Local purchases becoming more important as proportion of total **[1]**
- Very steep decline in food aid given directly by a donor country **[1]**
- Decline in *relative* importance of food aid given directly by a donor country **[1]**.

*Award a maximum of **[3]** if no quantification.*

[4 marks]

b. *Award **[1]** for each disadvantage, with a further **[2]** for development/exemplification.*

For example:

Food aid may reduce the market for (and/or price of) locally-grown food **[1]**, making it more difficult for local farmers to produce food profitably **[1]**. This may lead to some local farmers choosing to switch from planting food crops to non-food crops, reducing food production in the community **[1]**.

Other possible disadvantages of food aid include:

- it may increase the opportunities for speculation/corruption/power struggles
- it may increase inequalities within the community
- it may deter local innovation/solutions to the food shortage that might be more beneficial in the long term.

[6 marks]

c. There are many reasons/factors that affect whether a community emphasizes prevention over treatment or vice versa, including:

- the nature of the disease
- the diffusion pattern of the disease (relocation/expansion)
- whether the disease is local/endemic or introduced
- the wealth of the community
- the quality/availability of local health care
- the cost of medicines
- the availability of health insurance.

Good answers may unpack the terms “prevention” and “treatment” and provide a structured examination of different communities. Another approach might be to evaluate the statement using context, scale, perspectives, types of disease etc. There may also be recognition that the statement could refer equally to high income countries as well as low income countries, or there could be inequalities within countries depending on factors such as location and wealth.

For band D, expect description of treatment/prevention for two diseases and/or communities.

At band E, expect <u>either</u> more detailed explanation of the treatment/prevention of two or more specific diseases/communities <u>or</u> some discussion of the validity of the statement (for example considers different contexts/scales/types of disease).

At Band F, expect both.

Marks should be allocated according to the markbands.

[10 marks]

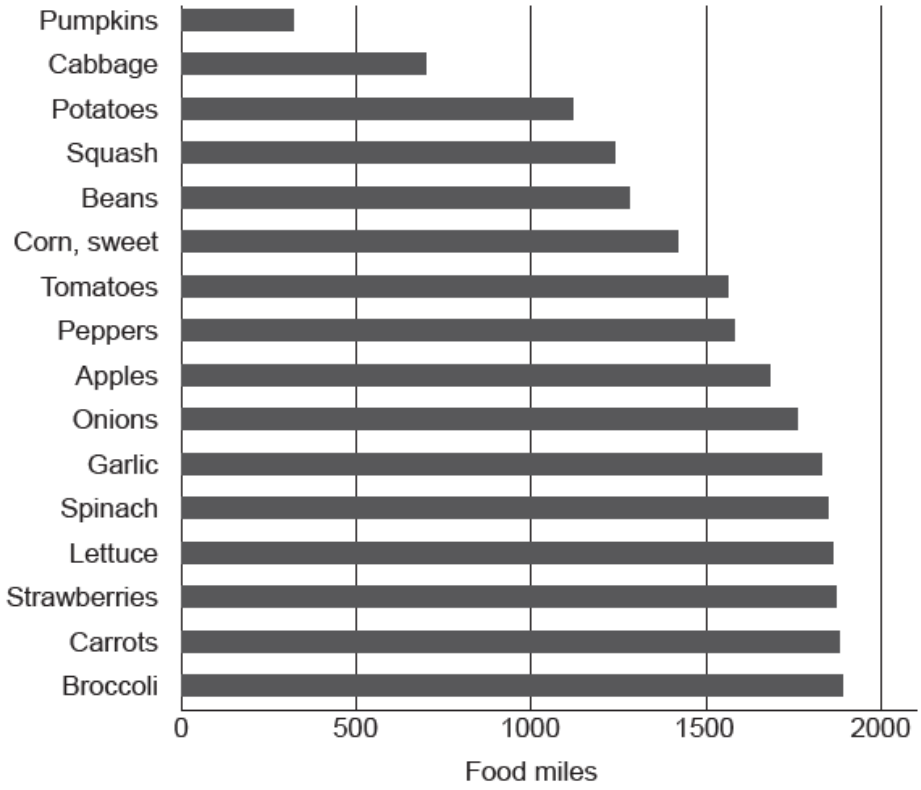
Examiners report

a.

b.

c.

The graph shows the food miles for fruit and vegetables supplied to institutions in the state of Iowa, USA.



[Source: www.leopold.iastate.edu]

a. (i) Define the term *food miles*. [4]

(ii) State the fruit or vegetable that ranks sixth in terms of the highest number of food miles.

(iii) Estimate the average (mean) food miles for the fruit and vegetables shown in the graph above.

b. Suggest **one** advantage **and two** disadvantages of using food miles as an indicator of the environmental impacts associated with food production. [6]

c. To what extent are food availability, malnutrition and diseases of poverty connected with one another? [10]

Markscheme

a. (i) Food miles are a measure of the distance that food travels from its source (farm) to the consumer **[1]**, either in units of actual distance or energy consumed during transport **[1]**.

[2 marks]

(ii) garlic **[1]**

[1 mark]

(iii) 1500 miles (accept 1400–1600 inclusive) **[1]**

[1 mark]

b. *Award **[1]** for each advantage/disadvantage and **[1]** for further development.*

Advantages include:

- they are relatively easy to quantify **[1]**, and therefore simple to state and explain **[1]**
- they provide an indication of the carbon footprint **[1]** from farm gate to retail location **[1]**
- they give consumers information about the origin of the food they consume **[1]** and the likely form of transportation used **[1]**.

Disadvantages include:

- they do not take account of the carbon footprint of the food production methods used **[1]**, or of the energy/water requirements **[1]** of different kinds of farming systems
- they do not give any indication of the farming system employed **[1]** , organic/free-range **[1]**
- they do not give a reliable indication of other environmental aspects **[1]**, such as sustainability, the use of chemical fertilizers, pesticides and herbicides **[1]**.

[6 marks]

c. There is a range of possible different approaches.

None of the three concepts is restricted to economically less wealthy countries.

In general, diseases of poverty and some forms of malnutrition (including under-nutrition) tend to overlap in distribution with areas where food may not always be readily available.

Malnutrition includes both under and over-nutrition and is therefore also found in many areas where diseases of poverty are absent and food is available.

Individuals suffering from under-nutrition, which may be due to poor food availability, may have weakened immune systems and less resistance to catching and suffering from diseases of poverty, such as malaria, tuberculosis and intestinal parasites. Equally, subsistence farmers and others suffering from diseases of poverty may be unable to work as productively as necessary to produce the food they need, thereby causing a lack of food availability and subsequent malnutrition.

Good answers may recognise the links between food availability, malnutrition and diseases of poverty, and provide a structured examination of these links. Diseases of poverty and some forms of malnutrition tend to overlap in distribution with areas where food may not be always readily available. There may be recognition that these areas may be in less economically wealthy countries, or in poorer sectors of the population within more wealthy countries. Another approach might be to challenge the links between food availability and the other concepts.

At band D, expect a description of two links/connections between the concepts/problems.

At band E, expect <u>either</u> a more detailed explanation of some simple linkages <u>or</u> a more thoughtful examination of more complicated connections/interrelations.

At band F, expect both.

Marks should be allocated according to the markbands.

[10 marks]

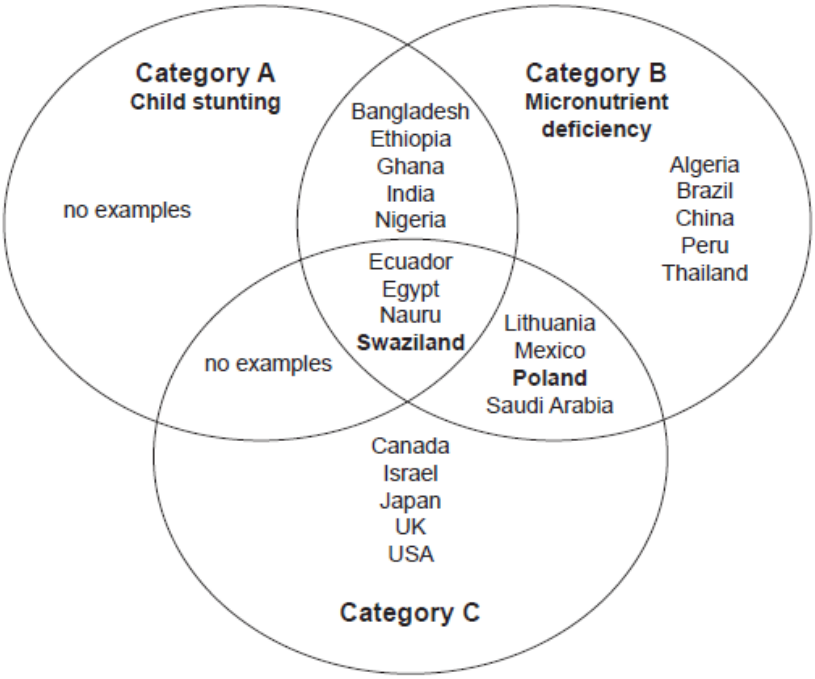
Examiners report

a.

b.

c.

The Venn diagram shows overlapping categories of malnutrition, with some examples of countries in different categories.



[Source: data from Food and Agriculture Organization, *The state of food and agriculture*, (2013), www.fao.org]

a. (i) Identify the malnutrition category experienced in Swaziland, but **not** in Poland. [4]

(ii) Briefly describe how the malnutrition category you have identified in (a)(i) affects an individual.

(iii) Identify malnutrition category C.

b. Briefly describe what is meant by the term famine. [2]

c. Referring to **one** type of agricultural system, explain what is meant by the term energy efficiency ratio. [4]

d. To what extent is access to safe water a good indicator of the health of a population? [10]

Markscheme

a. (i) Child stunting **[1]**

(ii) Children are less tall than they would be with adequate nutrition **[1]**, and have a lower cognitive capacity or a reduced ability to learn **[1]**.

Accept other valid points such as "they are likely to earn less when they grow up".

*If a candidate chooses micronutrient deficiency in part (i) and describes it well in part (ii), award up to a maximum of **[2]**.*

(iii) Adult obesity **[1]** (accept "obesity")

b. A famine occurs when there is a serious shortage of food **[1]**, normally over a wide area or affecting a large number of people **[1]**. Accept other valid statements such as leads to an increase in regional mortality, or severe health consequences, or places a population on the brink of starvation.

c. *Award **[2]** for explaining that "energy efficiency ratio" is the ratio between energy inputs **[1]** and energy outputs **[1]** for any particular type of agriculture.*

*Award a further **[2]** for relating this to a specific type of agricultural system.*

For example: Growing tomatoes in glasshouses in non-tropical countries requires very large inputs of energy **[1]** compared to the energy contained in the crop produced **[1]**, making this form of agriculture very energy inefficient.

Award up to full credit for a diagram that demonstrates this concept.

d. One approach to answering the question is to focus on links between safe water and health. Another approach would be to discuss alternative indicators of health. Some candidates may do both.

Access to safe water has positive effects on a population, not only in relation to nutrition, but also in relation to food production, public health, disease prevention and treatment.

Good answers may evaluate the extent to which the availability of sufficient safe water underpins some of the other factors mentioned, including, for example, indicators. Another approach might be to evaluate the extent to which there are other, possibly better, indicators of health other than safe water, such as such as infant mortality, maternal mortality, the incidence of gastrointestinal diseases, wealth or access to technology.

At band D, expect some description of links are described between safe water and a population's health.

At band E, expect <u>either</u> greater explanation of how water can affect health <u>or</u> some critical evaluation of the extent to which the statement is true.

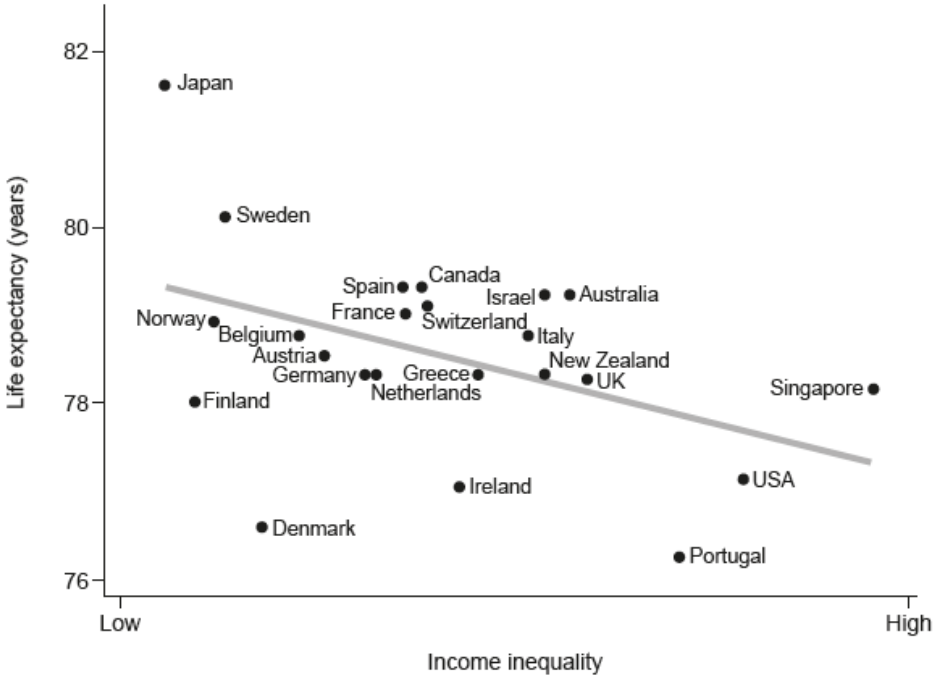
At band F, expect both.

Marks should be allocated according to the markbands.

Examiners report

a. [N/A]
b. [N/A]
c. [N/A]
d. [N/A]

The graph shows the life expectancy (in years) and income inequality (from low to high) for high-income countries.



[Source: R Wilkinson and K Pickett, *The Spirit Level: why equality is better for everyone*, reproduced in *The New Internationalist*, (Nov 2012), http://newint.org/]

a. Describe the relationship between life expectancy and income inequality shown on the graph. [3]

b. Suggest **one** possible reason for the relationship you have described in (a). [3]

c. Using **one** example, explain how agricultural subsidies can affect food production. [4]

d. Examine the relative importance of the human **and** physical factors that led to a recent **named** famine. [10]

Markscheme

a. The relationship is inverse/negative **[1]**, which means that as countries' income inequality increases, life expectancy is lower (**[1]** for this or other appropriate description), with the final **[1]** reserved for some attempt at quantification or identification of any anomaly.

b. Award **[1]** for identifying a reason, and a further **[2]** for developing it, including **[1]** for a clear link to life expectancy.

For example: In countries with greater income inequality, a higher proportion of the population lives in relatively poor conditions **[1]**, with poor/inadequate access to water, food or healthcare **[1]**. These people are therefore disproportionately vulnerable to sickness and disease, reducing their probable life expectancy **[1]**.

It is equally acceptable to link differences in ethnicity to variations in life expectancy, provided they are supported by evidence.

c. The example could include the impacts on more than one country, *eg* subsidies in EU/USA have effects for other countries *eg* Jamaica. Subsidies may either stimulate food production or diminish it, depending on the example used.

Award **[1]** for naming a valid example, and up to **[3]** for its development.

For example, in Europe the Common Agricultural Policy **[1]** established guaranteed minimum prices **[1]** for certain farm products. This led to overproduction of some foods (*eg* butter and some vegetables) **[1]** and a fall in production in other countries **[1]**.

Other possibilities include:

- in the USA **[1]**, subsidies for growing corn for biofuel **[1]** reduced the amount of corn grown for human consumption **[1]**, raising corn prices on the international market **[1]**
- dumping/sale of food from subsidized over-production in high-income countries **[1]** damages the agricultural sector in some low-income countries **[1]**, and may develop the example **[1]**.

Award a maximum of **[2]** if no example is given of either a crop/product or a location or no explicit link made to subsidies.

d. Famine is understood as a widespread decline in the availability of food in a region that leads to hunger and increased mortality rates.

Depending on the example examined, possible physical factors include:

- climate change/fluctuations
- soil exhaustion
- crop pests/diseases
- environmental hazard events such as drought, hurricane, major earthquake, *etc*.

Possible contributory human/economic factors include:

- civil war/refugee movements
- poverty
- inequality
- politics/corruption/governance.

The example should be recent (preferably no earlier than 1990s). The use of an earlier example is permissible but may not be awarded band F. If more than one famine event is cited, credit the best example given. Physical and human factors need not be examined in equal depth for the award of full marks.

Good answers may provide a structured examination that arrives at an evidenced conclusion (*ie* the answer arrives gives a substantiated view of which factor is most important. Another approach might be to show how different factors are interrelated/amplify one another. Another approach might be to examine how different factors operate at different scales (global climatic changes *eg* ENSO combine with local factors such as land management).

For band D, expect some description of some physical and human factors that cause famine (do not expect balance).

At band E, expect either more detailed explanation of a range of physical and human factors (do not expect balance), or a structured examination of the relative importance or interdependence of factors.

At band F expect both of these elements.

Marks should be allocated according to the markbands.

Examiners report

a. Candidates had few problems with describing the graph. Many gained full marks, although some omitted the fact that this is a negative/inverse relationship, or did not recognize an anomaly.

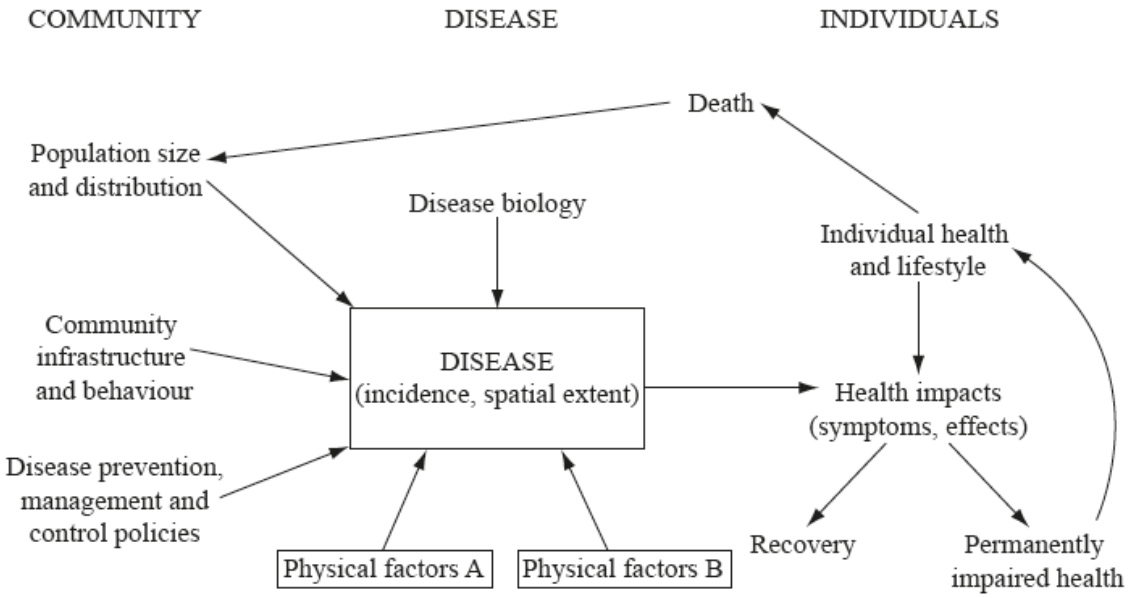
b. Generally well answered.

c. This was quite well answered. For those who were clear on the term “agricultural subsidies”, the question and answer was straightforward and scored full marks, with many using the example of the European Common Agricultural Policy. Weaker responses referred to the Green Revolution or to GM crops in a general way.

d. This question was generally well answered with effective use of detailed examples. Weaker candidates focused only on physical factors. Most examples were on Ethiopia, Kenya, Somalia and the Horn of Africa. Some gave a very good explanation of what constitutes a famine. However there were two shortcomings: either, candidates did not focus on the relative importance of the human and physical factors; or, the description of the famine and the factors was very generic.

   The Irish Potato Famine and Chinese Famine are not considered relevant and recent, and it is alarming that these examples are still being taught. Some candidates tried to use the aftermath of the Haiti (or even the Nepal) earthquake that, although marginally relevant, did not lend itself to the depth and detail required.

The diagram shows some of the factors that affect the likely impacts of a disease on individuals and the community in which they live.



[Source: ©International Baccalaureate Organization 2015]

a. Identify **two** possible physical factors (A and B) that may affect the incidence and/or spatial extent of the disease. [2]

b. Briefly outline how population distribution can affect the incidence of the disease. [2]

c. Explain **two** management strategies that have been used to limit the spread of **either one named** water-borne disease **or one named** vector-borne disease. [6]

d. “For all communities, the prevention of disease is at least as important as its treatment.” Discuss this statement, referring to **one or more** examples of disease. [10]

Markscheme

a. Award ***[1 mark]*** for each factor. Possible responses include: relief and rivers, temperature, humidity, presence/absence of specific fauna such as mosquitoes, and occurrence of stagnant water. Accept other valid factors.

b. Award ***[1 mark]*** for any of the following:

- a concentrated distribution/high density of population may lead to higher rates of transmission/spread/diffusion/incidence in an area
- a dispersed population may mean lower rates of transmission/spread/diffusion/incidence in an area
- credit alternative statements provided they relate population distribution to incidence of a disease, rather than its spatial extent
- accept discussion of effects of the age distribution of a population.

c. Note that the question specifically excludes sexually transmitted diseases. Both strategies must relate to the same disease; if not, award up to a maximum of ***[3 marks]***.

For each strategy, award ***[1 mark]*** for identifying a management strategy (provided the strategy is relevant to the named disease) and ***[2 marks]*** for describing and explaining it. The strategy need not be located, but credit use of a located example if provided.

Possible strategies include: vaccination/inoculation, education, pest control/insect eradication, improvement of water quality, making effective treatment options readily available and affordable.

For example:

- “Drainage of land ***[1 mark]*** means mosquitoes lose their habitat so there is less malaria ***[1 mark]*** as seen in Italy’s Pontine marshes ***[1 mark]***.”
- “Avoiding mixing sewage with drinking water ***[1 mark]*** can be achieved by lining wells ***[1 mark]***. This breaks the oral–fecal transmission route for cholera ***[1 mark]***.”

d. *Credit all content in line with the markbands. Credit unexpected approaches wherever relevant.*

The relative importance of policies of prevention/treatment of a disease will depend partly on the disease in question, and partly on any framework that is used to help shape the discussion *eg* comparing the importance of long-term eradication/mitigation with the short-term ethical imperative to help sufferers; or recognizing the resistance to contraception in some cultures.

Only one disease is required for the discussion. Therefore a range of geographic factors can feature in the answer, such as the economic, social, political, demographic characteristics of the community, country or region involved.

For band D, candidates must describe some ways in which one or more diseases can be both prevented and treated.

Band E should either provide greater exemplified detail of prevention and treatment options and the geographic factors that inform influence choices or offer some more sophisticated evaluation of the statement (*eg* discusses “important”, perhaps by contrasting a short-term and long-term view, or discusses the different viewpoints and perspectives of contrasting cultures).

At band F, expect both elements.

Examiners report

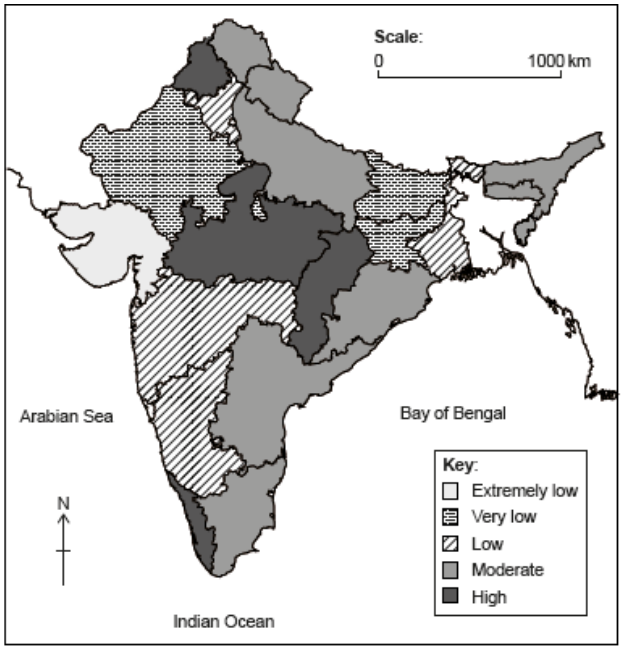
a. Many did not understand the term physical factors and cited human factors.

b. This was straightforward.

c. Management strategies were identified but further description and explanation were, at times, not fully supported. Unfortunately the use of Ebola in responses was not acceptable for this question as it is not water-borne or vector-borne.

d. There were some very good answers to this question; a range of diseases were considered (including the recent Ebola outbreak in Africa) and many were able to discuss the relative merits of prevention and treatment.

The map shows food availability in rural areas of India.



[Source: *Food Insecurity Atlas of Rural India*, M S Swaminathan Research Foundation / World Food Programme (2001)]

a. Describe the pattern of food availability in rural areas of India shown on the map. [4]

b. Distinguish between food availability and food security. [6]

c. Examine how the impacts of diseases are affected by diffusion **and** barriers. [10]

Markscheme

a. Award **[1]** for each valid statement. For the full **[4]** the response should refer to all levels of availability (very low, low, moderate, *etc*), though these need not be in equal depth.

For example: High food availability is found in three separate areas **[1]**: in the north, centre and south-west of the country **[1]**. The areas of very low/extremely low food availability tend to be the north west and north east of the country **[1]**. Most of the country has low or moderate food availability **[1]** including the east coast **[1]**. Valid use of place names in describing the pattern on the map **[1]**.

b. Food availability refers to having a sufficient quantity of food **[1]** available on a consistent basis **[1]**, at an affordable price **[1]** and may be linked to food security **[1]**.

In addition to food availability, food security (as defined by the WHO) also includes:

- access to food/food entitlement **[1]** (*ie* having the resources, economic and physical, to obtain appropriate foods)
- for a nutritious diet **[1]** and
- appropriate use based on knowledge of basic nutrition and care **[1]**.

Credit alternative relevant approaches.

For **[6]** the answer does not need to be balanced but must cover both terms and distinguish between them.

c. Likely responses will focus on named diseases, *eg* malaria or HIV/AIDS, or categories of disease, *eg* water-borne, vector-borne or sexually transmitted. Topical answers may examine the 2014–15 outbreak of ebola in west Africa and the uneven impacts (Nigeria was barely affected due to effective monitoring along its borders).

Diffusion can occur by relocation or expansion.

Different types of barriers include:

- political/administrative boundaries
- relief or water features
- vaccination campaigns.

Good answers may unpack the term “impacts” and may provide a structured examination of different impacts for human health, mobility (travel restrictions), workforce, GDP *etc* (some of these impacts are likely to be more diffusion-dependent than others, and some are more likely to be barrier-dependent). Another approach might be to examine how the effectiveness of barriers may vary according to the nature of the disease.

For band D, expect either some description of some disease impacts that are mostly related to diffusion and/or barriers, or a description of different types of diffusion and barriers.

At band E, expect either more detailed explanation of relevant impacts of diseases or a structured examination of different types of impacts, diffusion or barriers.

At Band F expect both of these elements.

Marks should be allocated according to the markbands.

Examiners report

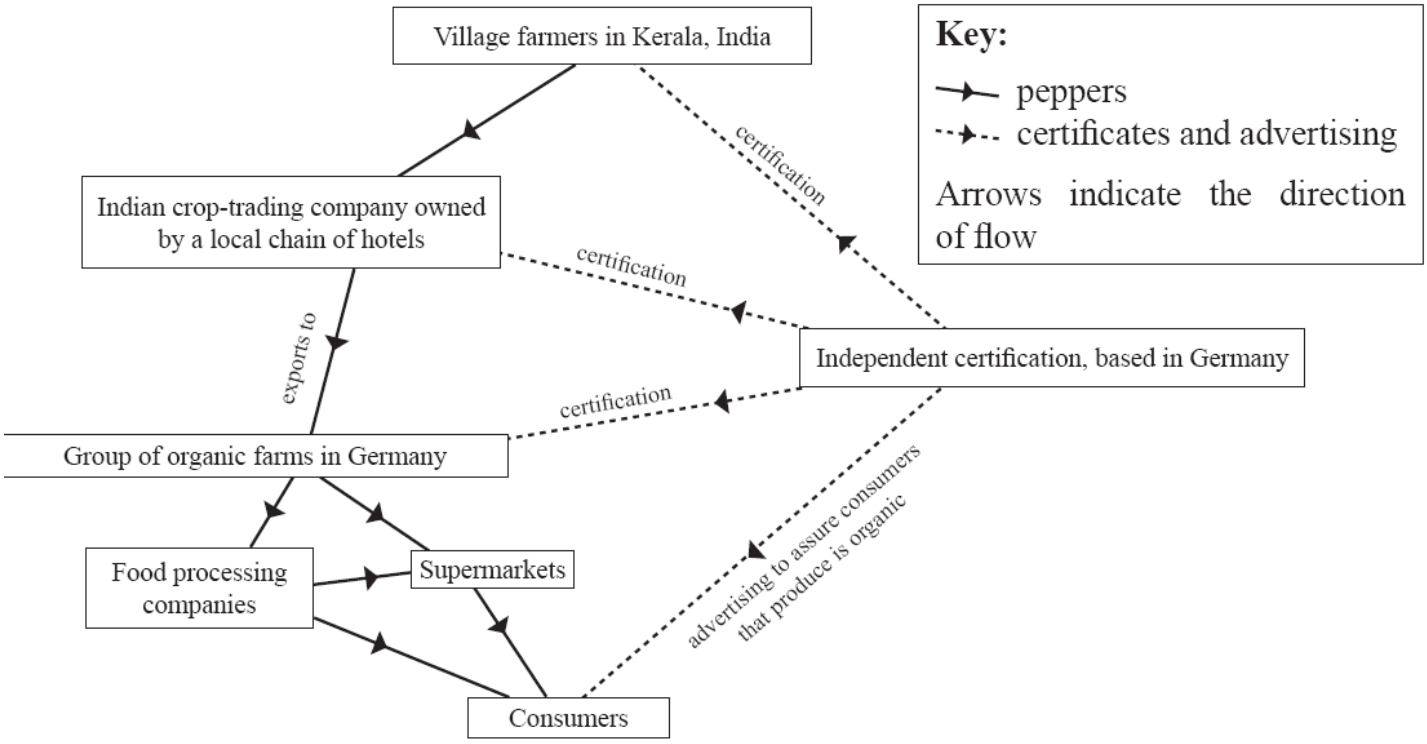
a. This was quite well answered and spatial patterns well described. Weaker answers were more general. Full marks were awarded only if all levels of food availability were referred to.

b. This question caused many problems. Many candidates were not able to distinguish between food availability and security, and many were confused or too brief. This question was worth 6 marks, and while the answer did not need to be balanced, it had to cover both terms and distinguish between them.

c. There were some good responses, but many candidates focused on diffusion and barriers without much reference to the impacts on diseases.

Some good case studies were included, with the recent ebola outbreak being well used for both diffusion and effect of barriers.

The diagram shows a simplified fair trade system for the export of peppers from Kerala, India, to consumers in Germany.



[Source: ©International Baccalaureate Organization 2013]

a(i). Describe what is meant by *fair trade.* [2]

a(ii). Referring to the diagram, identify **two** features of this system that make it an example of fair trade. [2]

b. Explain how fair trade can help to alleviate local food shortages in regions where food crops are grown. [6]

c. "Food miles are an excellent indicator of agriculture's environmental impact." Discuss this statement, referring to examples. [10]

Markscheme

a(i). Credit any two of the following: trade that gives a higher/guaranteed minimum price/bigger profit for farmers ***[1 mark]***, improved working conditions ***[1 mark]***, sustainable methods of production ***[1 mark]***, lack of any "middle man" ***[1 mark]***.

a(ii).
- Lack of middle-men/simplified production chain
- Certification by outside agency
- Purchasers in India are a local firm with vested interests.

Award ***[1 mark]*** for any of these.

b. More income returns to farmers and stays within the country (with an economic multiplier effect); greater possibility of farmers growing food crops, rather than industrial crops; raises likelihood of receiving emergency food aid in times of need from consumers. At least two distinct ideas must be developed for the award of full ***[6 marks]*** or more ideas in less detail.

c. Food miles are a measure of the distance that food travels from its source to the consumer. This can be stated either in units of actual distance or of energy consumed during transport.

The advantages of food miles are that they give an indication of the carbon footprint from farm-gate to retail location and allow consumers to know the origin of the food they are buying. They also provide information about the likely type of transportation used and the relative costs of different forms of transport.

The disadvantages of using food miles as an indicator of environmental impact are that they do not take account of the carbon footprint of food production methods or the energy/water requirements used in different farming systems. Locally produced foods may have low food miles but a very high energy footprint (*eg* growing out-of-season crops in glasshouses). Delivery of farm produce to retailers and consumers may not necessarily take the shortest route available.

Food miles give no indication of the use of organic methods. The food miles concept ignores other environmental aspects *eg* sustainability, indices of water usage, energy efficiency, the use of chemical fertilizers, pesticides, herbicides, and their effect on local ecosystems.

Conclusion – food miles are useful but far from perfect as an indicator of environmental impact.

To achieve band D the answer must describe environmental impacts. To reach bands E and F the answer must look at the advantages and disadvantages of food miles (in respect to the range of environmental impacts). The argument need not be balanced.

Marks should be allocated according to the markbands.

Examiners report

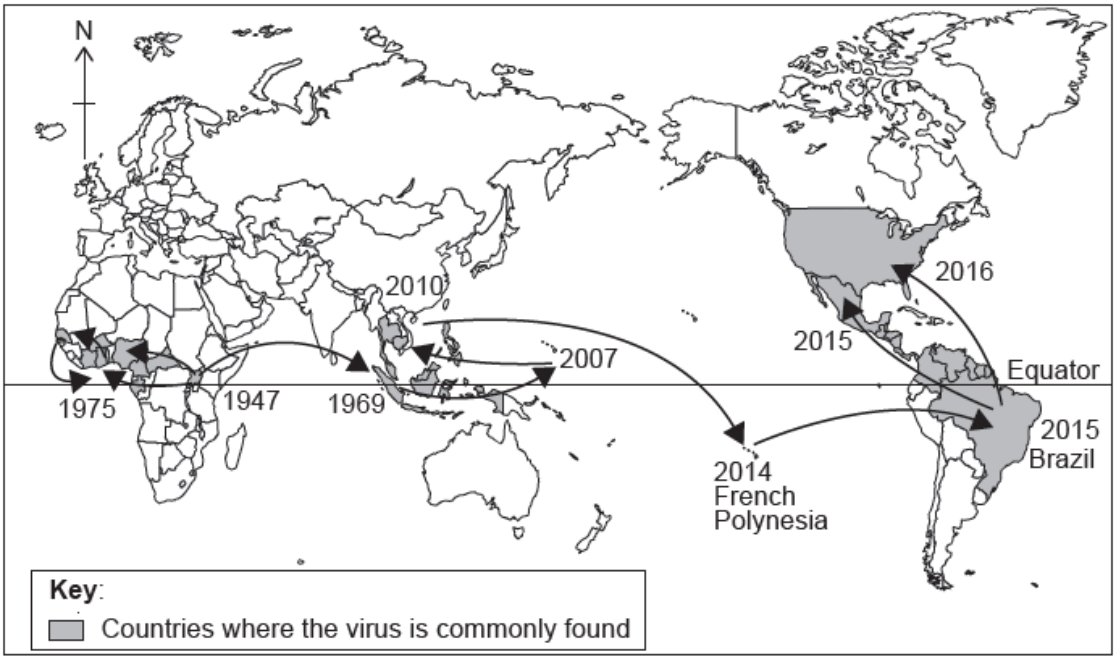
a(i).The concept of fair trade was poorly understood, and there was some confusion between fair and free trade.

a(ii)The concept of fair trade was poorly understood, and there was some confusion between fair and free trade.

b. Not well answered, with limited understanding, and free trade again to the fore.

c. Most candidates did not appreciate the scope of the task, with most getting little further than describing the advantages of food miles. Few were able to challenge the statement, and examine other environmental impacts of agriculture.

The map shows the spread of the Zika virus between 1947 and 2016.



[Source: Adapted from 'Zika virus: a previously slow pandemic spreads rapidly through the Americas' in *Journal of General Virology* by D. Gatherer and A. Kohl. Lancaster University.]

a.i. Referring to areas on the map, describe the spread of the Zika virus between 1947 and 2010. [3]

a.ii. State what type of diffusion accounts for the spread of the Zika virus from French Polynesia to Brazil. [1]

b. Explain **three** health improvements that have led to an increase in life expectancy in many low-income countries in recent years. [6]

c. Examine the strengths and limitations of the energy efficiency ratio as an indicator of sustainable agriculture. [10]

Markscheme

a.i. *Award **[1]** for each of the following, up to a maximum of **[3]**:*

- starts in East/Central Africa, 1947
- spreads to Southeast Asia 1969
- spreads to West Africa 1975
- spreads to Pacific Islands 2007
- spreads to Thailand/Laos/Cambodia/Southeast Asia 2010.

Dates and countries/regions should be identified, if not, award marks as follows:

- *3 correct regions and no dates = 2*
- *2 regions and 2 dates = 2*
- *2 regions and 1 date = 1*
- *2 regions and 0 dates = 1*

a.ii. Relocation.

b. *Award **[1]** for each valid improvement, and **[1]** for further development.*

For example: Improved access to safe water **[1]** resulting in a reduction in waterborne diseases, such as cholera and diarrhea **[1]**.

Other possible improvements include:

- incidence of vector-borne diseases, such as malaria, has been reduced by strategies such as bed nets, spraying, clearing of stagnant water
- reduction in sexually transmitted diseases, such as HIV, due to better education, use of condoms
- the rollout of anti-retroviral therapies (ARTs) has increased the life expectancy of people with HIV
- improvements in medical care, numbers of doctors/health professionals; vaccinations
- improvements in food supply, reduced incidences of death from malnutrition.

c. Energy efficiency ratio is a measure of the amount of energy input into a farming system compared with the energy outputs. A ratio of greater than

1 is considered efficient, as outputs will be greater than inputs. Inputs into the system include labour, machinery, pesticides, fertilizers, irrigation

and fuel, while outputs refer to the quantity/yield of food that is produced.

Energy efficiency ratios differ for many farming systems around the world. Capital-intensive systems, such as irrigated rice farming, are likely to have high inputs and high yields, and might be considered as efficient. Subsistence farming systems, with high inputs of labour, might also be regarded as efficient if the outputs are high.

Farming systems differ in their EERs and their relative sustainability. EER might be a good indicator of the efficiency of a farming system, but it neglects the wider environmental and social impacts of farming. Agricultural systems that have a high EER might produce plentiful food supplies, but they are not necessarily sustainable. The farming system might have an adverse impact on the land or water – for example, irrigation might lead to salinization and depletion of groundwater; pesticides might result in eutrophication, and soil quality might be degraded.

Good answers may examine the extent to which EERs are a useful indicator of sustainability in its fullest sense (social, economic and environmental). Another approach might be to examine differing perspectives on the usefulness of the EER relative to other agricultural indicators.

For band D, expect some description of strengths and limitations of EERs.

At band E, expect either a more detailed explanation of the strengths and limitations of EERs, or a structured examination of the value of EERs in relation to sustainable agriculture.

At band F, expect both.

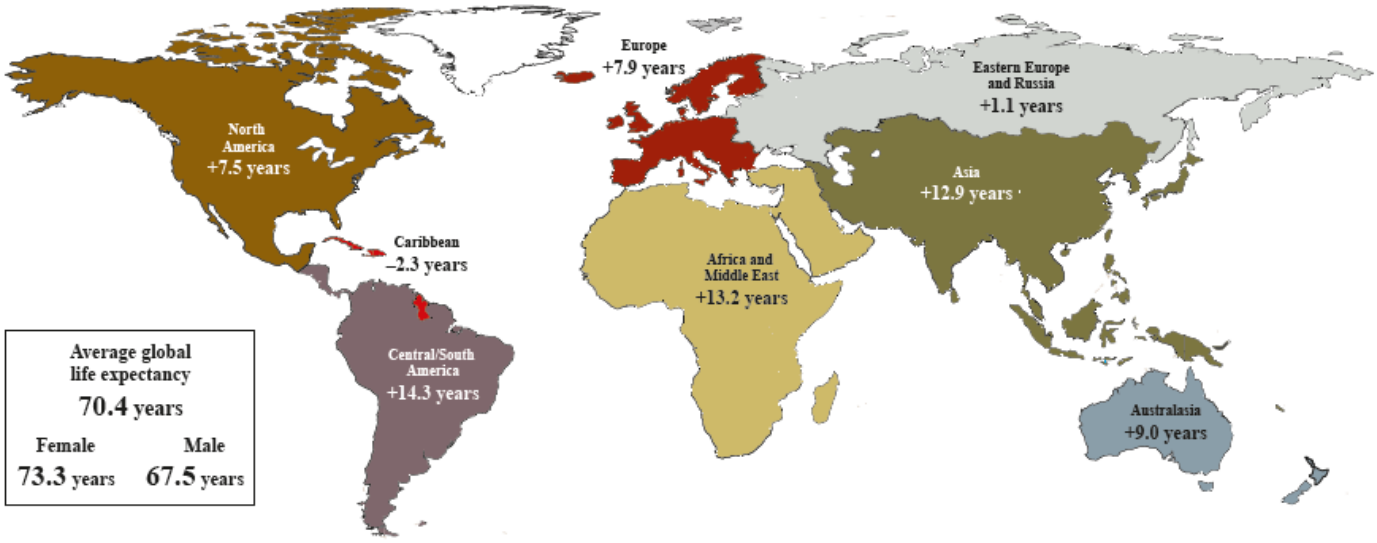
Marks should be allocated according to the Paper 2 HL and SL markbands.

Examiners report

a.i. [N/A]
a.ii. [N/A]
b. [N/A]
c. [N/A]

Option F — The geography of food and health

The map shows the changes between 1970 and 2010 in the average life expectancy for different regions of the world.



[Source: adapted from J Hamzelou, (2012), Global Health Report Card, *New Scientist*, **216** (2896–2897) pages 6–7]

a. Describe the pattern of the changes in average life expectancy shown on the map. [4]

b. Suggest **three** reasons, **other than** improved health programmes, why life expectancy has increased in **named** regions in recent years. [6]

c. Referring to examples, examine how transnational corporations (TNCs), including agribusinesses, affect food production and food availability. [10]

Markscheme

a. Award ***[1 mark]*** for each of the following patterns, and exceptions to/clarifications of the patterns identified:

- overall pattern is one of increases in almost every region
- the exception is the Caribbean
- the largest increase in life expectancy is in Central/South America
- less wealthy regions have higher increases than more wealthy regions
- illustrates points using data/provides some quantification.

Credit alternative approaches.

A list of regions and rates, with no pattern, should gain ***[2 marks]*** only.

b. Award ***[1 mark]*** for identifying a reason, and ***[1 mark]*** for some development for a named region. Award only ***[1 mark]*** if no region is specified.

Possible reasons include:

- improved food supply ***[1 mark]*** means fewer deaths from famine in Africa ***[1 mark]***

- improved access to safe water ***[1 mark]*** means fewer cholera deaths in Asia ***[1 mark]***
- rise in incomes ***[1 mark]*** means improved nutrition in Asia ***[1 mark]***
- improved surgery/medical response ***[1 mark]*** means reduction in mortality from accidents in Europe ***[1 mark]***
- fewer women die in childbirth (maternal mortality reduction) ***[1 mark]*** due to spending on MDGs in Asia and Africa ***[1 mark]***
- fewer deaths from disasters *eg* flooding ***[1 mark]*** due to improved flood response/adaption measures across Asia ***[1 mark]***
- credit other valid reasons and developments.

c. *Credit all content in line with the markbands. Credit unexpected approaches wherever relevant.*

There are many possible approaches to this question, but essentially TNCs and agribusiness either increase or decrease food availability. TNCs and agribusinesses, such as Cargill, Dole or Del Monte, may increase food availability through producing food crops, though not necessarily in the regions where the agribusinesses are located. Examples may be **either** of regions where food is produced, **or** of the TNCs/supply chains.

TNCs and agribusinesses specializing in the production of non-food cash crops or exotic foods may reduce the amount of food available locally, as less land is available for food crops or people leave their own plots of land to work as an employee on land farmed by TNCs/agribusiness.

There are alternative, equally valid, approaches such as looking at the environmental damage that can result in some cases from agribusiness practices and which could adversely impact local farmers.

For band D, candidates must describe some ways in which TNCs generally affect food production and/or availability for named places/TNC operations.

Band E should either provide greater exemplified detail of food production/availability issues or offer some more sophisticated evaluation of the distinction between production and availability (*eg* distinguishes between who is producing the food and who is consuming it).

At band F, expect both elements.

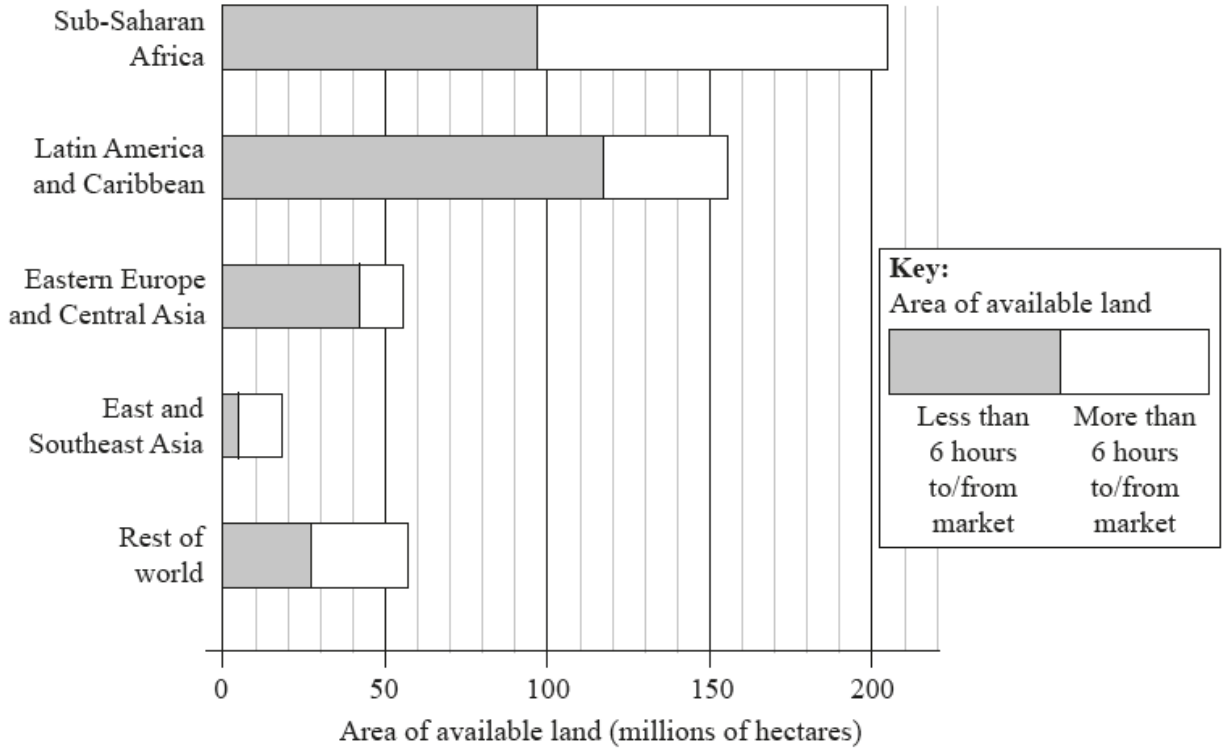
Examiners report

a. Overall well answered.

b. Most candidates were able to cite three reasons for increased life expectancy, but these sometimes included improved health programmes. Some did not score full marks as they did not provide named regions.

c. This question was generally poorly answered, with little idea of the role of TNCs and agribusinesses in food production/availability, and limited understanding of the question. The weakest answers discussed the merits of Starbucks and McDonald's. A few good responses looked at the role of TNCs in production, distribution and marketing/retail.

The graph shows how much unused land is still available for farming in several major regions, and how accessible it is to local markets.



[Source: ©The Economist Newspaper Limited, London (February 26, 2011). Data sourced from the World Bank.]

a. Referring to the graph, describe the global pattern of land available for farming. [4]

b. Using examples, explain how trade barriers and/or trade agreements can affect the production of food. [6]

c. Contrast the geographic impacts of **two named** diseases. [10]

Markscheme

a. Award ***[1 mark]*** for each valid descriptive statement. Possibilities include:

- sub-Saharan Africa has the most available farmland
- in sub-Saharan Africa more than 50% of land is more than six hours from the market
- in Latin America only 25% of land is more than six hours from market
- East/Southeast Asia has the least
- almost all the available land is in low-income regions
- the region with the most available land within 6 hours of markets is Latin America and Caribbean
- the region with the least land within six hours of markets is East/Southeast Asia, *etc.*

If there is no quantification, maximum ***[3 marks]***.

Very simple listing should be limited to ***[2 marks]***.

b. Examples may be given of trade barriers/agreements (EU), of food (bananas), or both. (There should be at least two examples of trade agreements/barriers, or of food such as bananas.)

Award ***[1 mark]*** for each example of a barrier/agreement/country *eg*, EU/CAP and ***[1 mark]*** for each basic explanation of how production is affected by a rule *eg*, import tariffs. Award ***[1 mark]*** for further development or exemplification *eg*, difficulties created for Kenyan farmers seeking access to EU markets.

Other barriers/agreement that could be explained include:

- choice of crops
- amounts grown (quotas)
- preferential trade access

- agreement to use GM crops
- health hazards/bans
- set aside
- fair trade.

If no actual examples of barriers/agreements given, no more than ***[4 marks***] should be awarded.

Two exemplified ideas, well-explained, can gain ***[6 marks]***.

c. The command term “contrast” requires candidates to give an account of the differences between the two diseases (not their similarities).

The focus should be on the impacts of the diseases, rather than their causes. Impacts could be related to contrasting levels of economic development (LEDC versus MEDC).

The impacts will depend on the two diseases chosen. Some imbalance in the coverage of the two diseases is acceptable, even when awarding full marks. Geographic impacts may be subdivided into demographic, economic, social, political, *etc*, or by scale into local, national, regional, international. Either approach is acceptable for full marks, though it is likely that stronger responses will combine these approaches in some way.

The term “impacts” is understood to include measures taken with respect to the prevention, treatment, cure (if applicable) and management of the diseases, as well as mortality rates, lost working hours, health care costs, *etc.*

Responses at band D are likely to be a *descriptive* account of the impacts of any two diseases (do not expect balance).

At band E expect either a range of impacts of two named diseases examined/discussed or some explicit contrast(s) made using concepts such as scale, timescale, severity, *etc*.

At band F expect both.

Marks should be allocated according to the markbands.

Examiners report

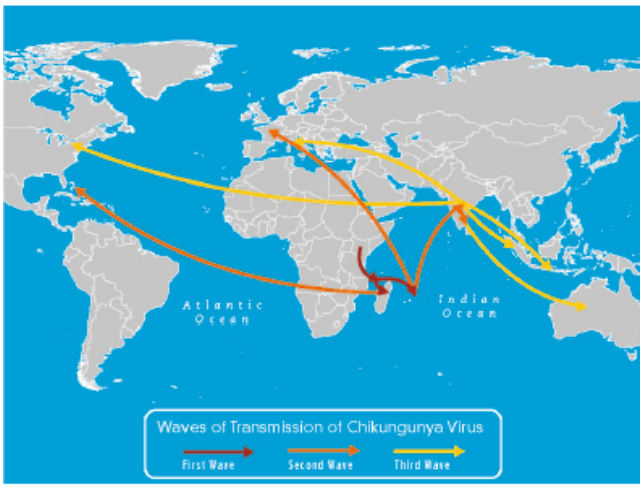
a. The interpretation of the graph posed few problems, with some good attempts at quantification.

b. There were some very good answers to this question, but also many generalized responses with little or no reference to actual trade agreements, and sometimes not referring to food production.

c. This was a popular question and produced some good answers. However, often responses were very descriptive of the causes of disease, rather than its geographic impacts. Nor were they able to make explicit contrasts. Many candidates answered the question by writing “all I know about how/why the disease occurs/spreads” with no indication of demographic, social or economic impacts. Some were able to include some discussion of prevention and treatment. Candidates had problems with the command term contrast, and while stronger candidates attempted this many ignored the command term.

Optional Theme F — The geography of food and health

11. The map shows the spread of a disease between 2005 and 2009.



[Source: Used with permission from the CDC.]

a. Referring to the map, describe the spread (diffusion) of this disease between 2005 and 2009. [4]

b. Suggest **three** possible reasons why the disease spread to some countries and not others. [6]

c. Referring to **named** areas, examine the reasons why their populations may experience food deficiency. [10]

Markscheme

a. Award ***[1 mark]*** for each of the following:

- starts in a single place
- starts in Central Africa/East Africa
- moves in waves, or a sequence
- first wave ends in two places, second wave in three places, *etc*
- disease jumps/leapfrogs over many unaffected places
- spreads from low to high income places
- shows a pattern of diffusion by relocation/expansion/recognizes types of diffusion
- uses map evidence to identify at least three affected places (*eg*, Australia, USA, France/Europe).

b. Possibilities include movement of tourists/travellers; location of transport links such as regular flights; transmission to relatives living in another country; effective prevention campaigns in some countries (hence it did not spread there). Accept comments about commonality of climate provided they are related to countries or regions of broadly similar climate (*eg*, from Madagascar to Bahamas). Also accept: preventative measures, vaccinations, border controls, migration, transport, trade.

Award ***[1 mark]*** for each reason, with a further ***[1 mark]*** for development or exemplification, which should be related to country–country spread. For each reason, award only ***[1 mark]*** if reference is only made to spread within a country.

For example: disease only spreads to some countries with very regular flights ***[1 mark]*** *eg*, Australia and France, as these are rich countries where people fly frequently ***[1 mark]***. Or, the disease spreads to countries where many citizens have moved abroad ***[1 mark]*** as economic migrants may return home at intervals ***[1 mark]***.

Credit may be given for reference to a disease other than the one shown on the map.

c. A clear understanding of food deficiency is expected in stronger responses. In a broad sense, food deficiency refers to an overall lack of available food. This food deficiency may result from: physical factors such as climate, droughts, soil degradation; human factors such as overcrowding; economic factors such as insufficient income to purchase; demographic factors such as rapidly rising population; political factors such as reluctance or inability to trade in world markets.

Food deficiency may also be used to describe situations where the dietary needs of (some) people for a healthy life are not met, despite a sufficient quantity of food being available (*eg*, lack of vitamins in the diet). However, it is not necessary to include this aspect to be awarded full marks.

At band D, at least two reasons should be *described* and related to food deficiency. Responses that do not refer to a specific area (whatever the scale) may be credited as high as band D.

At band E there should be either more than two reasons examined/discussed, in more detail, with example(s) (*eg* rapid population growth in LEDCs and climate problems such as drought) or an examination that shows the reasons are complex/interrelated/do not apply to all parts of the population.

At band F, expect both.

Marks should be awarded according to the markbands.

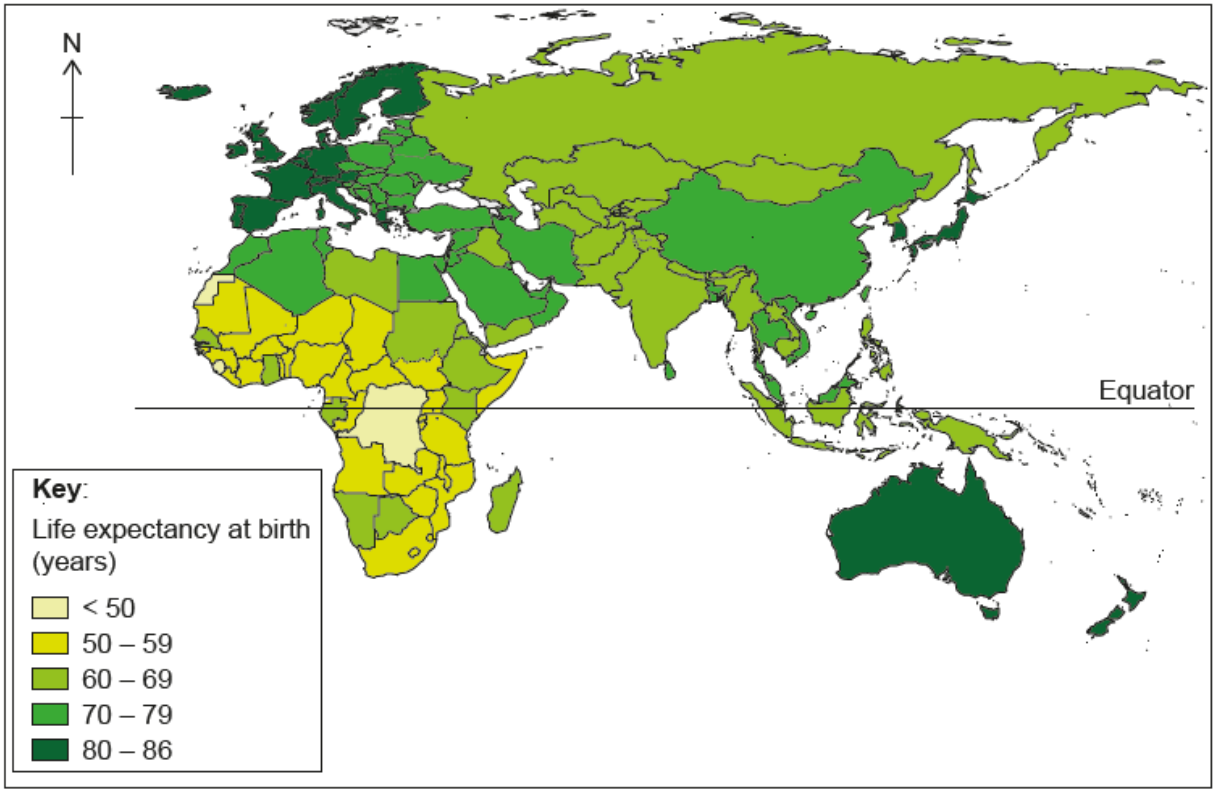
Examiners report

a. This question was quite well answered, although few gained the full four marks. Weaker candidates merely listed places.

b. This was quite well answered, with understanding of the importance of movement of tourists or migrants, of transport links, and effective prevention campaigns. There was often a focus on why a disease did not spread within a specific country when the disease arrived. The reasons given tended to be repetitive and/or overlapping. Development of the reasons was missing. There was also an overwhelming idea that birds, insects, animals and food transported the disease, rather than focusing on the movement of people. Some candidates discussed spread within countries, rather than between countries.

c. This question elicited some good responses with detailed case studies, such as Ethiopia, and an understanding of the causes of food deficiency and the idea of the interrelationships between factors. Stronger responses were able to link deficiency with physical, human, demographic and political factors. A few briefly mentioned causes and then spent the majority of the answer discussing solutions (some credit was given for this). There were an alarmingly large number who used very out-of-date case studies, such as the Irish potato famine.

The map shows the life expectancy at birth for countries other than those in the Americas.



[Source: Reprinted from WHO: Life Expectancy, http://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends/en, accessed 2015]

a. Describe the pattern of life expectancy shown on the map. [4]

b. Explain **three** indicators, **other than** life expectancy, which can be used to measure the health of the population in a country. [6]

c. "Food miles are an excellent indicator of the environmental impact of agriculture." Discuss this statement. [10]

Markscheme

a. *Award **[1]** for each of the following, up to a maximum of **[4]**:*

- low (50–59 years) life expectancy in much of Africa
- lowest (<50 years) in central Africa
- highest life expectancy (80–86 years) in Western Europe/Japan/Australasia
- high (70–79 years) in Southeast Asia/North Africa/E. Europe
- moderate (60-69 areas) Russia/Central Asia/India/South Asia.

Allow other valid points (*eg* anomalies)

*Some use of data is necessary for the full **[4]**.*

b. Possible indicators include:

- infant mortality rate
- HALE (health adjusted life expectancy)
- calorie intake
- access to safe water.

*In each case, award **[1]** for a valid indicator and **[1]** for further development relating to how it is used to measure health*

For example: Calorie intake **[1]** – countries where adults have fewer than 2000 calories a day would indicate undernourishment **[1]**.
Infant mortality rate **[1]** – high rate would indicate lack of access to clean water/healthcare **[1]**.

c. Food miles are a measure of the distance that food travels from its source to the consumer. This can be stated either in units of actual distance or the energy consumed during transport.

The advantages of food miles include:

• they give an indication of the carbon footprint and allow consumers to know the origin of the food they are buying
• they are a relatively simple concept to apply
• they also provide some indication of the type of transport being used and the relative costs of different forms of transport.

The limitations of food miles as an indicator of environmental impact include:

• they do not take into account the carbon footprint of food production measures or the energy/water requirements of different food production systems
• locally produced food may have low food miles, but have very high inputs of energy, pesticides and fertilizers (such as intensive growing of fruit and vegetables under glass or in poly-tunnels) and therefore have a greater environmental impact
• food miles give no indication of the use of organic methods
• food miles ignore other measures of environmental impact of agriculture, such as the use of pesticides and chemical fertilizers.

Good answers will consider the concept of food miles and the extent to which they measure the environmental impact of agriculture at different scales.
Candidates will provide a structured discussion of the advantages and limitations of food miles, and evaluate the concept as a measure of environmental impact.

For band D, expect some description of food miles and their advantages and disadvantages in measuring environmental impact.

At band E, expect either some greater range/depth of explanation of the advantages and disadvantages of food miles, or a structured discussion of the environmental impacts of agriculture and the value of using food miles as an indicator of this.

At band F, expect both of these elements.

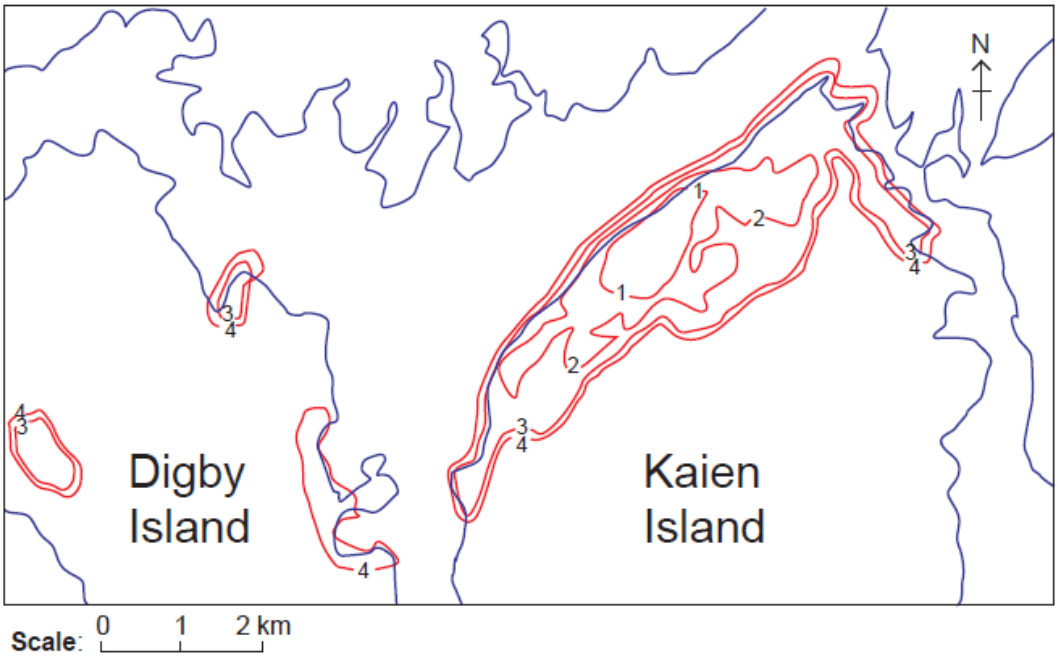
Marks should be allocated according to the markbands.

Examiners report

a. [N/A]
b. [N/A]
c. [N/A]

Map A shows the spread of an influenza (flu) outbreak in the area over a four-week period. All people catching flu in the first week lived inside the area marked 1, all people catching flu in the second week lived inside the area marked 2, and so on.

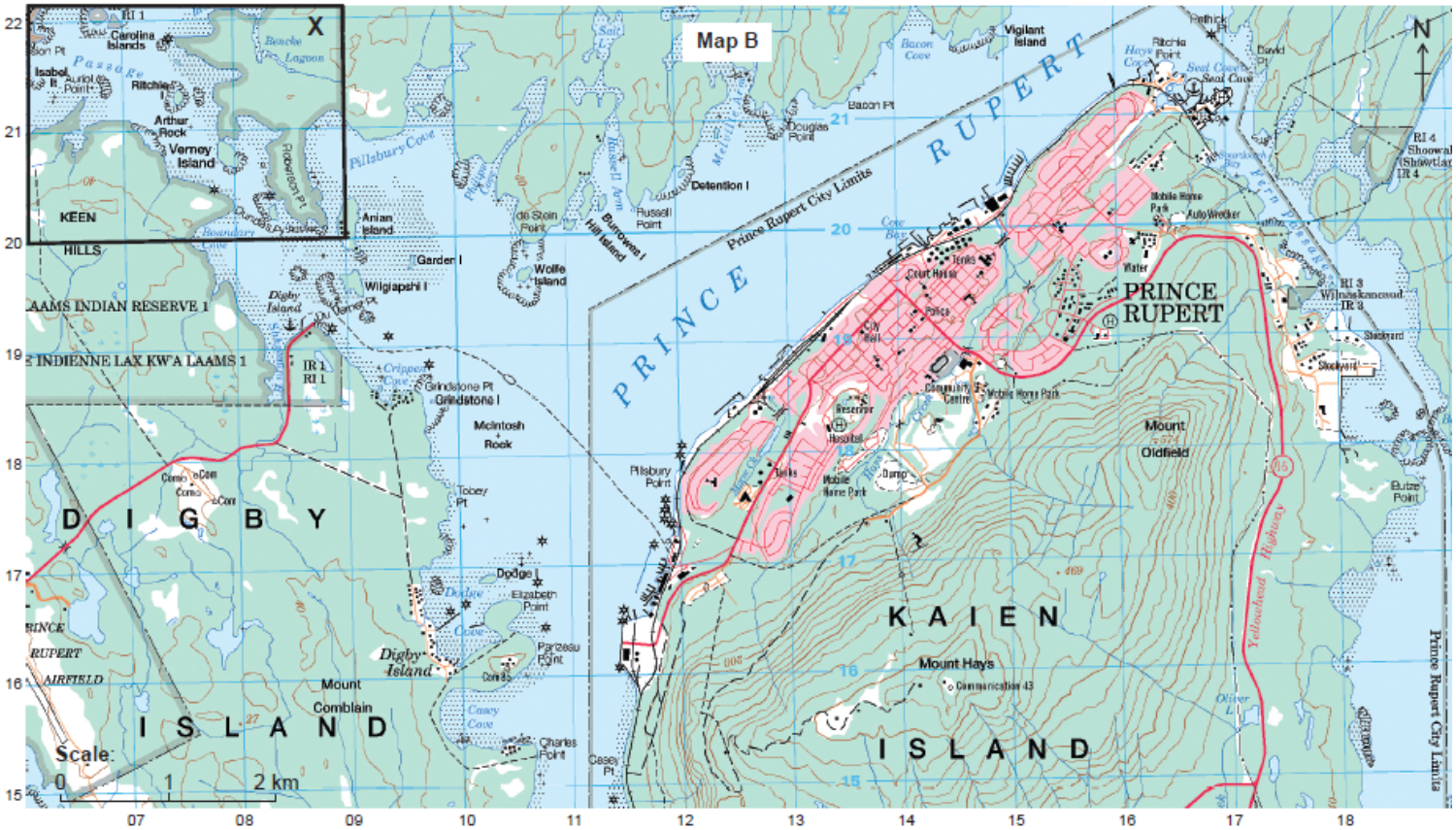
Map A



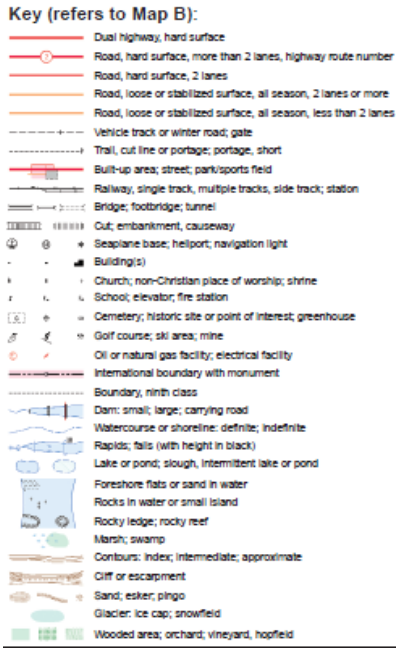
[Source: copyright International Baccalaureate Organization, 2015]

Map B

Map B shows the area around the city of Prince Rupert (population: 13 000) on the west coast of Canada. The scale of the map is 1:50 000. The contour interval is 40 metres.



[Source: http://geogratis.gc.ca]



a. (i) Identify the type of diffusion shown on map A by the spread of flu in the first two weeks. [4]

(ii) Identify the type of diffusion shown on map A by the spread of flu in week four to new areas such as the settlement of Digby Island.

(iii) Using evidence from map B, suggest why the flu outbreak started in square 1419.

b. Using evidence from map B, suggest **three** reasons for the spread of this disease between the end of week one and week four. [6]

c. Examine the reasons why some communities enjoy greater food security than others. [10]

Markscheme

a. (i) Expansion diffusion

(ii) Relocation diffusion

(iii) Possible suggestions would be “outsider” arrived in the city by boat, or was brought to the court house or police station.

Award **[1]** for the map feature that is identified and **[1]** for the justification given, *eg* “there is a marina in 1419 and someone with flu may have sailed here”.

If the wrong square is used (*eg* identifies City Hall in 1319), only **[1]** can be awarded for the justification.

b. In week two, the high density of population in the central area of the city leads to people infecting others around them; this area includes the city hospital (likely to be visited by many people with weakened immune systems and who therefore help spread the disease), as well as the community centre and local sports clubs (*eg* golf).

During week three, the movement of people, including travellers using the ferry and visiting the airport, result in the flu area expanding rapidly (more to the west than the east) to include not only outlying parts of Prince Rupert (*eg* around Oldfield), but also jumping to Digby Island, with cases reported from the areas near the ferry dock and around the airport).

Communication links during week four result in flu reaching the settlement of Digby Island, perhaps because some residents of Digby Island settlement work at the airport.

*Award up to **[2]** for each developed reason.*

*For example: During week three, someone from Prince Rupert travelling on the ferry **[1]** carries the flu to a previously unaffected area **[1]**.*

No marks should be awarded for reasons not supported by map evidence.

Full marks may be awarded even if the reasons suggested cover only part of the time range.

c. The WHO defines food security as “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”

(*ie* people are not living in hunger or fear of starvation).

The concept of food security has three different aspects/assumptions:

- food availability (having sufficient quantities of food available on a consistent basis)
- access to food (having the resources, economic and physical, to obtain appropriate foods for a nutritious diet) and
- use of food (making appropriate use of food based on knowledge of basic nutrition and care, as well as adequate water and sanitation).

Some communities live on more fertile land and get higher agricultural output or have more wealth enabling the community to purchase more food.

Good answers may explicitly examine disparities in different aspects of food security. Another approach might be to examine disparities for communities at varying scales, *eg* from village to nation, or even to examine how food security may vary for individuals within a community.

At band D, expect some description of reasons why food security/availability may vary for communities.

At band E, responses are likely to either provide greater depth/breadth of explanation for the reasons why food security/availability varies or offer some examination of the concept of food security or community.

At band F, expect both.

Marks should be allocated according to the markbands.

Examiners report

a. [N/A]
b. [N/A]
c. [N/A]