

**Level 1/2 Cambridge National Certificate in
SCIENCE**

R072/01&02

R072: How scientific ideas have developed (Level 1/2)

Case Study

Pre-release material and Insert to the question paper

Duration: 1 hour

INSTRUCTIONS TO EXAMS OFFICER / INVIGILATOR

- Do not send this Insert for marking; it should be retained in the centre or destroyed.

INFORMATION FOR CANDIDATES

- Question 1 is based on this Case Study.
- This document consists of 4 pages. Any blank pages are indicated.

Sweet foods, obesity and diabetes

Does obesity cause diabetes?

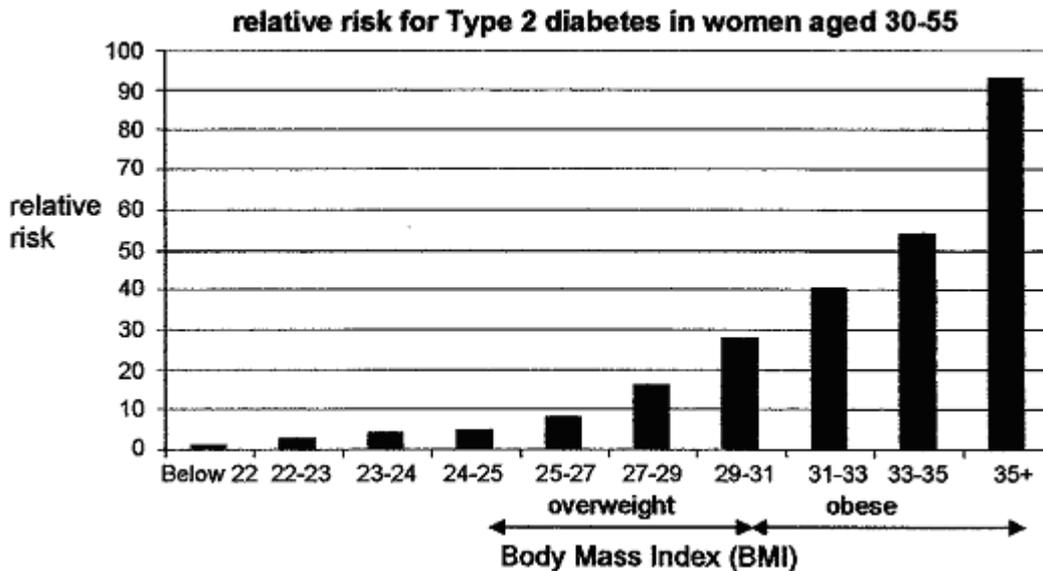
Obesity and diabetes are both increasing problems in the United Kingdom.

The table shows how the percentage of obese people in the UK population increased from 1980 to 2001.

	obese people %		
	1980	1997	2001
men	6	17	21
women	8	20	23

Obese people are at greater risk of contracting Type 2 diabetes. Body Mass Index (BMI) is a measure of obesity which can be calculated as follows:

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in m})^2}$$



Diabetes causes the blood to contain too much sugar, and excess sugar is excreted in the urine. Symptoms of diabetes include thirst, excessive production of urine and weight loss. Without treatment diabetes may lead to problems such as blindness, gangrene, kidney disease and nerve damage. In extreme cases diabetes can cause coma and death.

What makes food sweet?

One cause of obesity is the large amount of sugar in the food that people eat. Many foods are sweetened by adding sucrose, the common type of white sugar that can be bought in supermarkets. It is possible to use other chemicals as a substitute for sucrose in foods for people with diabetes and in 'diet' foods.

chemical	source	relative sweetness
sucrose	naturally occurring	1
fructose	naturally occurring	2
aspartame	synthetic	200

Should we eat fructose?

Fructose is a type of sugar that occurs naturally in honey and many fruits. It is added to many foods including soft drinks, ice cream and frozen desserts to make them taste sweeter. Because it is sweeter than sucrose, less needs to be added to 'diet' foods and drinks, reducing the energy content.

However, some scientists think that using more fructose in foods may lead to more obesity. Results of a ten week study of rats carried out by one group of researchers suggest that fructose may make you think that you are hungry even when you do not need to eat.

Other studies have found that eating foods rich in fructose has an effect on the body's ability to use fat after exercise. A reduced ability to 'burn' fat could also lead to obesity.

Fructose is often used to sweeten foods for people who have diabetes. They normally follow a diet which is low in sucrose and glucose to control blood sugar. But by eating specially prepared foods rich in fructose, they may be at a higher risk of obesity.

What is the risk of eating aspartame?

Another alternative to sucrose used in many sugar-free and 'diet' foods is aspartame. Some people have reported dizziness, headaches, epileptic-type seizures and menstrual problems after eating foods containing aspartame. There have even been reports that link aspartame to an increased risk of brain cancer.

The Food Standards Agency (FSA) has set an Acceptable Daily Intake (ADI) for aspartame of 40 mg per kg of body weight per day. This is an estimate of the amount of aspartame that could be consumed every day over a lifetime with no appreciable health risk. The ADI can be used to calculate the amounts of different foods containing aspartame that can be safely consumed each day by different individuals.

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