

The Tristan da Cunha Dental Surveys

Contents: A data analysis exercise concerning the effect of diet on dental decay.

Time: 1 to 2 periods.

Intended use: GCSE Biology and Integrated Science. Links with work on teeth and tooth decay.

Aims:

- To complement work on teeth and tooth decay
- To show the link between tooth decay and diet
- To illustrate the use of scientific evidence
- To provide opportunities to practise skills in data analysis.

Requirements: Students' worksheets No. 606. Graph paper.

This simple exercise shows strikingly the link between dental decay and dietary factors. It also highlights the problem of drawing conclusions from surveys of human populations. The population of Tristan da Cunha up to 1961 was almost unique in its isolation and its freedom from complicating factors such as migration and changes in environment, and the survey provides powerful evidence for the role of refined foods, notably sugar, in causing tooth decay.

The survey data is taken from *New Scientist*, January 1982.

Acknowledgement Figure 2 reproduced by courtesy of Allan B. Crawford, FRGS.

THE TRISTAN DA CUNHA DENTAL SURVEYS

Tristan da Cunha

Tristan da Cunha is a small volcanic island in the middle of the South Atlantic (Figure 1). It is one of the loneliest places in the world.

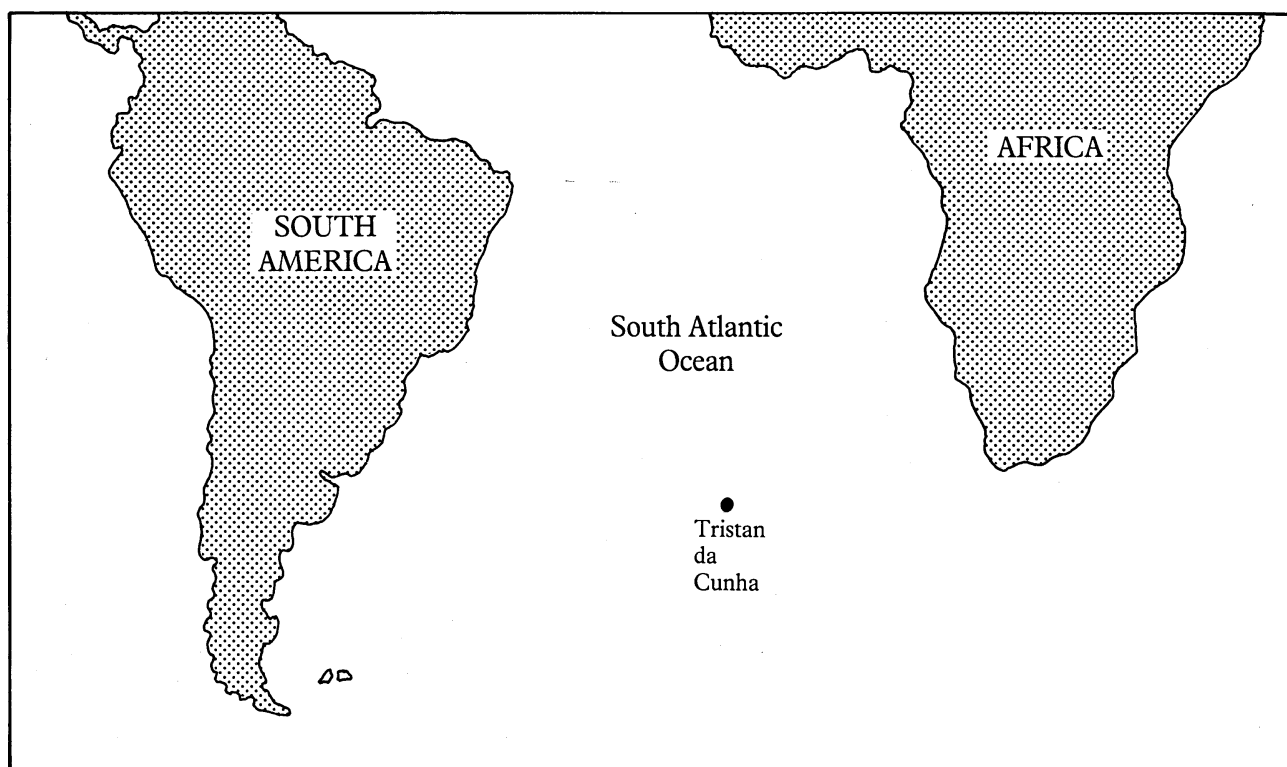


Figure 1 A map showing the position of Tristan da Cunha

The original inhabitants of the island were shipwrecked sailors. By 1880 there were 109 people living on the island. Their food supply came from fishing, from a few animals such as cattle and hens, and from vegetables. The main food was potatoes.

As the twentieth century progressed communications improved. The islanders began to develop products for sale. In 1949 a crawfish company began operations on the island, and opened a canning factory. The islanders began to have more money to spend. This led to a change of diet as increasing amounts of refined food were imported.

On 23 October 1961 the volcano, which was thought to be extinct, erupted. The whole population was rescued and settled temporarily in Britain. In 1963 they returned and resettled in Tristan da Cunha. The population in 1982 was 325.

The dental surveys

Until 1961, the population of Tristan da Cunha had a relatively fixed genetic pattern and a constant environment. This provides an ideal opportunity to study the effects of changes in the environment.

Between 1932 and 1955, four dental surveys were carried out by Dental Officers from the Royal Navy. They examined the islanders' teeth for signs of decay. The results of the survey are given in Table 1.

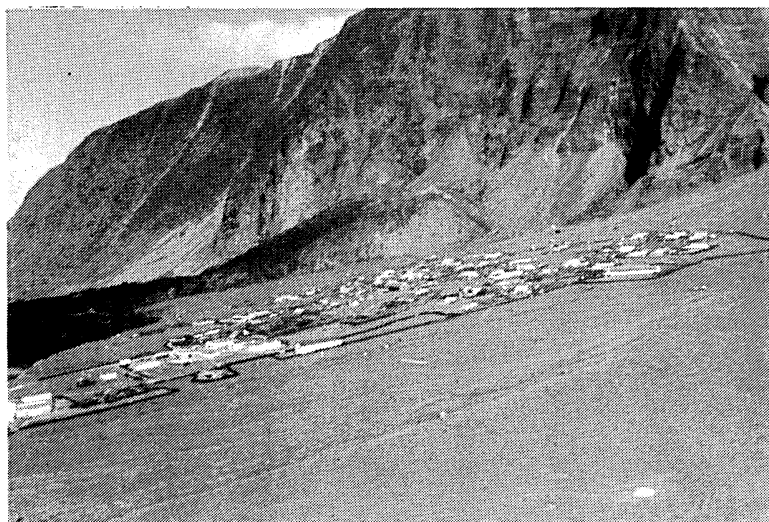


Figure 2 This aerial view shows the village of Edinburgh on Tristan da Cunha. Behind the village is the volcano which erupted in 1961.

Table 1 Results of the Tristan da Cunha dental surveys

<i>Date of survey</i>	<i>Percentage of teeth examined that showed decay</i>	<i>Percentage of people completely free from decay</i>	<i>Conditions and diet</i>
1932	1.8	83.3	A home grown diet of eggs, milk, fish, meat, potatoes and a few other vegetables. There was no bread or cakes. Sugar, tea, coffee and cocoa were novelties.
1937	4.2	50.2	Standard of living had improved. Scones and bread were made on several days in the week and always on Sunday.
1952	9.1	22.2	Islanders had begun to work for money at the crawfish canneries. A week's grocery order for the 230 islanders included 124 kg of sugar, 188 kg of flour and 46 kg of jam.
1955	12.6 (these figures are similar to those obtained in European countries at the same time)	12.4	Consumption of sugar had risen to 223 kg per week and flour to 528 kg. Jam had dropped a little but was replaced by chocolate, icing sugar and sweets.

Questions and activities

- 1 *Explain why, until 1961, Tristan da Cunha had a 'relatively fixed genetic pattern and a constant environment'.*
- 2 *Explain why this was no longer true after 1961.*
- 3 *Explain why the population of Tristan da Cunha provided 'an ideal opportunity to study the effects of changes in the environment'.*
- 4 *Plot a graph of the percentage of teeth that showed decay against the date of the survey. Put the date along the horizontal axis.*
- 5 *Plot a graph of the percentage of people completely free from decay against the date of the survey. Put the date along the horizontal axis. (You could use the same set of axes as for question 4, though you might need to use a different scale for the vertical axis.)*
- 6 *What do the results of the survey suggest?*
- 7 *Suppose a similar survey had been carried out on the same dates on a population of 200 people in a village in Britain. Would the results have been as useful as the results of the Tristan da Cunha survey? Explain your answer.*
- 8 *Suggest a reason why no surveys were carried out between 1937 and 1952.*
- 9 *Use your graph to estimate the number of people who were completely free from tooth decay in 1945.*
- 10 *Use your graph to estimate the percentage of people who were completely free from tooth decay in 1985. Explain how you got your answer.*
- 11 *Using your own knowledge, and if necessary a biology textbook, write two or three sentences on 'Dental decay and its causes'.*