16 **Fig. 16.1**, **Fig. 16.2** and **Fig. 16.3** show some data about life expectancy, including some from the pre-release data set.

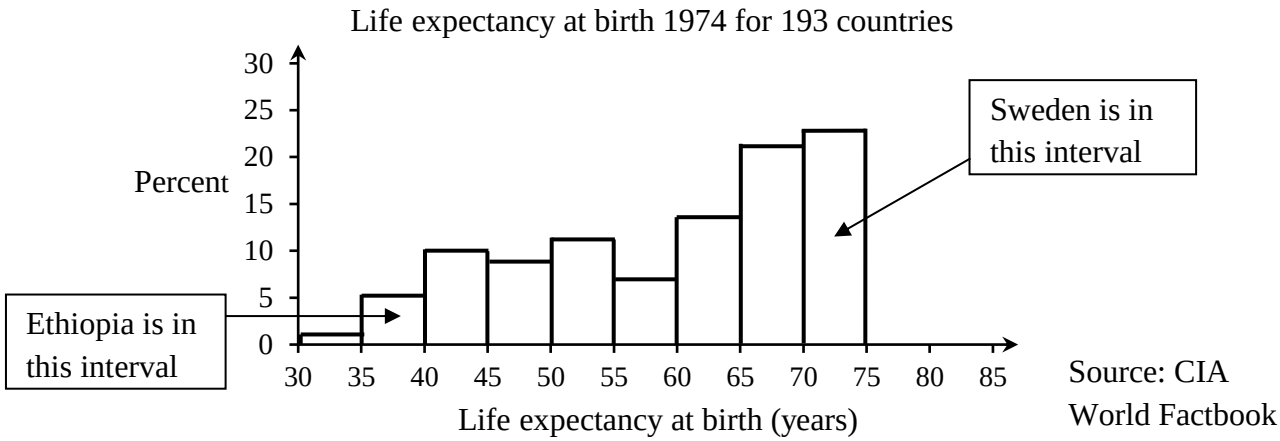


Fig. 16.1

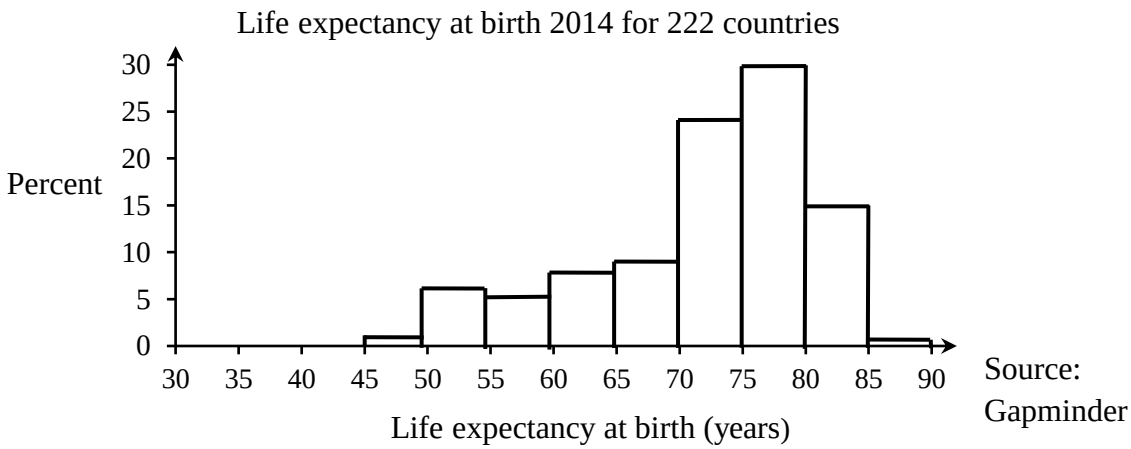
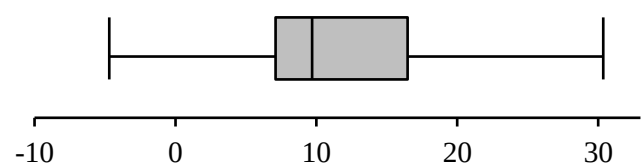


Fig. 16.2



Source: CIA World Factbook and

Increase in life expectancy for 193 countries from 1974 to 2014	
Number of values	193
Minimum	- 4.618
Lower quartile	6.9576
Median	9.986
Upper quartile	15.873
Maximum	30.742

Fig. 16.3

(a) Comment on the shapes of the distributions of life expectancy at birth in 2014 and 1974.

[2]

(b) **(i)** The minimum value shown in the box plot is negative.
What does a negative value indicate? **[1]**

(ii) What feature of **Fig 16.3** suggests that a Normal distribution would **not** be an appropriate model for increase in life expectancy from one year to another year?

[1]

(iii) Software has been used to obtain the values in the table in **Fig. 16.3**.
Decide whether the level of accuracy is appropriate. Justify your answer. **[1]**

(iv) John claims that for half the people in the world their life expectancy has improved by 10 years or more.
Explain why **Fig. 16.3** does **not** provide conclusive evidence for John's claim. **[1]**

(c) Decide whether the maximum increase in life expectancy from 1974 to 2014 is an outlier.
Justify your answer. **[3]**

Here is some further information from the pre-release data set.

Country	Life expectancy at birth in 2014
Ethiopia	60.8
Sweden	81.9

(d) **(i)** Estimate the change in life expectancy at birth for Ethiopia between 1974 and 2014.

(ii) Estimate the change in life expectancy at birth for Sweden between 1974 and 2014.

(iii) Give **one** possible reason why the answers to parts **(i)** and **(ii)** are so different.

[4]

Fig. 16.4 shows the relationship between life expectancy at birth in 2014 and 1974.

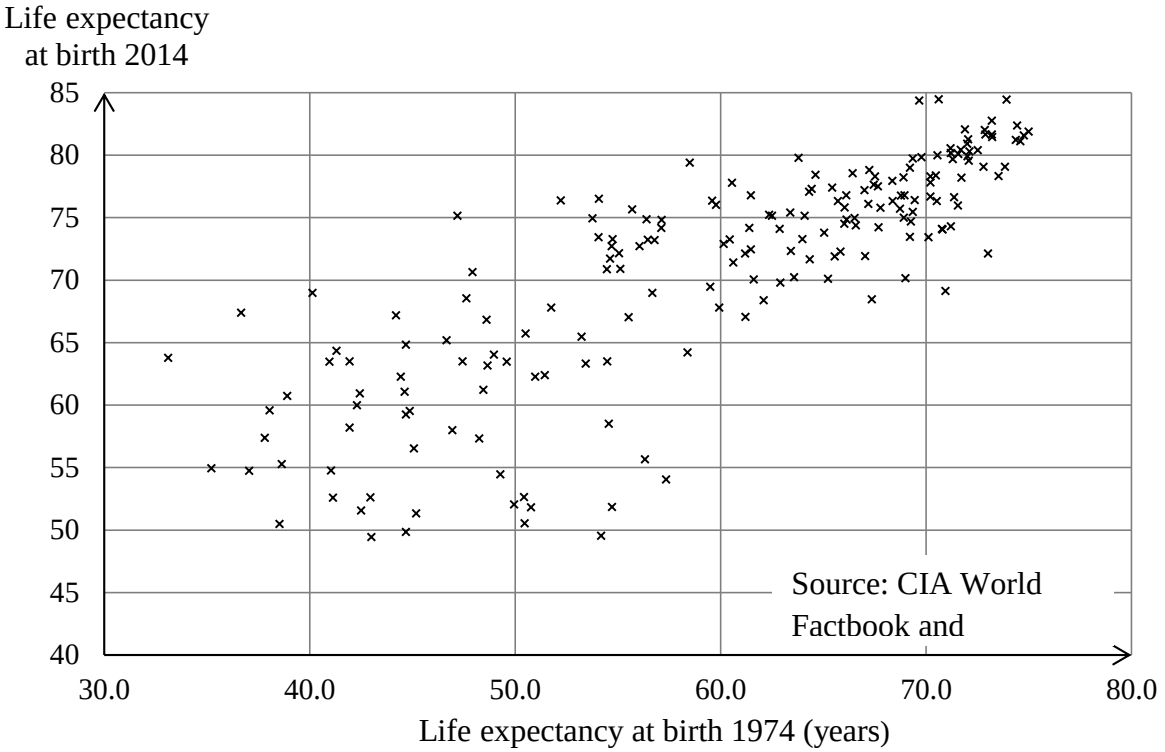


Fig. 16.4

A spreadsheet gives the following linear model for all the data in **Fig 16.4**.

(Life expectancy at birth 2014) = 30.98 + 0.67 × (Life expectancy at birth 1974)

The life expectancy at birth in 1974 for the region that now constitutes the country of South Sudan was 37.4 years. The value for this country in 2014 is not available.

(e) **(i)** Use the linear model to estimate the life expectancy at birth in 2014 for South Sudan. **[2]**

(ii) Give two reasons why your answer to part **(i)** is not likely to be an accurate estimate for the life expectancy at birth in 2014 for South Sudan.
You should refer to **both** information from **Fig 16.4 and** your knowledge of the large data set. **[2]**

(f) In how many of the countries represented in **Fig. 16.4** did life expectancy drop between 1974 and 2014? Justify your answer. **[3]**