

# Graunt, John

**Born:** April 24, 1620, in London, UK.  
**Died:** April 18, 1674, in London, UK.

John Graunt was a London draper who, in February 1662, published a small book *Natural and Political Observations Mentioned in a following Index and Made Upon the Bills of Mortality*. For this pioneer study of medical statistics and **demography** Graunt is rightly recognized as the founder of statistics as a scientific discipline.

The book attracted immediate attention. Within a month Graunt was elected to the Royal Society; a second edition appeared later in the year, and a third and fourth in the early weeks of the plague in 1665. A fifth edition appeared two years after his death, and there are modern reprints [1, 3, 7].

Graunt was a respected citizen, a Freeman, and eventually Renter Warden of the Drapers' Company. He held various civil and military offices, and his influence was sufficient, before he was 30, to procure the professorship of music at Gresham College for his friend **William Petty**. Graunt's house was destroyed in the fire of 1666, but despite assistance from Petty his business never recovered. A few years later he became a Catholic, resigned his offices, and died in poverty. No portrait is known.

The *London Bills of Mortality* were weekly accounts of the numbers of burials, distinguishing deaths from plague, and christenings, compiled from parish registers from the mid-sixteenth century. **Causes of death** were included from the early sixteen hundreds. Annual summaries were published, but initially only during plague years.

Graunt's study was based mainly on the annual *Bills* from 1604 to 1660. He had no information on population sizes. With this limited material his approach was thoroughly logical and scientific. He described in detail how the data were collected, and their nature; he was critical of their accuracy and completeness; he tabulated the material extensively and informatively, checked his first impressions against more extensive facts, and drew a wide variety of sensible and valid conclusions. Among much else, Graunt directed attention to the very high rates of mortality in infancy (see **Infant and Perinatal Mortality**), and showed that mortality was higher in London than in the country. He

made the first realistic estimates of the numbers of men and women in London and the population of the whole country and showed that both were increasing, with a steady migration into London. He demonstrated that plague was under-recorded by about a quarter, examined the relative mortality in different plague years, discovered the extent to which London depopulated itself in plague years, and showed that it repopulated itself within a year. He distinguished between epidemic and endemic diseases, and noted the stability of accident and suicide rates from year to year, the under-recording of syphilis, and the increase of rickets. Graunt's methods and findings are reviewed in [2, 4], and [5].

Graunt had no information on the ages of the dead or the living. This led him to conceive the first **life table**, describing the dying-out of a population cohort in an attempt to estimate the number of men of military age (16–56) in London (see Table 1). However, not appreciating the need to use age-specific mortality rates, he mistakenly estimated the proportion of *deaths* between these ages from his survivors' column, and not the proportion living [2] (see **Standardization Methods**). His pioneer effort was nevertheless highly influential in stimulating the later **actuarial** development of the life table.

Suggestions that Graunt was not the author of the "Observations" and that these were the work of Petty only arose after Graunt's death, and were revived

**Table 1** Graunt's life table

| Exact age | Deaths | Survivors |
|-----------|--------|-----------|
| 0         |        | 100       |
| 6         | 36     | 64        |
| 16        | 24     | 40        |
| 26        | 15     | 25        |
| 36        | 9      | 16        |
| 46        | 6      | 10        |
| 56        | 4      | 6         |
| 66        | 3      | 3         |
| 76        | 2      | 1         |
| 80        | 1      | 0         |

## 2 Graunt, John

---

during the twentieth century (see [3, 6], and [7]). A comprehensive re-examination by Glass [2] concluded that “there seems little reason to doubt that the volume published under Graunt’s name was in all essential respects Graunt’s work”.

### References

- [1] Benjamin, B., ed. (1964). John Graunt’s “Observations” (reprint of the first edition), *Journal of the Institute of Actuaries* **90**, 1–61.
- [2] Glass, D.V. (1963). John Graunt and his natural and political observations, *Proceedings of the Royal Society, Series B* **159**, 1–37.
- [3] Hull, C.H., ed. (1899, reprinted 1963). *The Economic Writings of Sir William Petty Together With the Observations on the Bills of Mortality More Probably by Captain John Graunt* (includes a reprint of the 5th Ed.). Cambridge University Press, Cambridge.
- [4] Sutherland, I. (1963). John Graunt: a tercentenary tribute, *Journal of the Royal Statistical Society, Series A* **126**, 537–556.
- [5] Sutherland, I. (1972). When was the Great Plague? Mortality in London, 1563–1665, in *Population and Social Change*, D.V. Glass & R. Revelle, eds. Edward Arnold, London, pp. 287–320.
- [6] Willcox, W.F. (1937). The founder of statistics, *Review of the International Statistical Institute* **5**, 321–328. (Also reprinted in ref. [7].)
- [7] Willcox, W.F., ed. (1939). *Natural and Political Observations Made Upon the Bills of Mortality by John Graunt* (reprint of the 1st Ed.). Johns Hopkins Press, Baltimore.

I. SUTHERLAND