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Florence Nightingale (1920-1910)

Figure 1: An image of Florence Nightingale (©Creative Commons).

Florence Nightingale's name is a familiar one. She is known and respected by many as the founder of modern nursing. However, the lady with the lamp's passion and influence in the world of statistics is less discussed.

Her passions for both nursing and mathematics were apparent from an early age. She stated that as a child, she had a desire to nurse the sick and remembered that her daydreams were all about hospitals.[1] And yet, despite her association with nursing, at age twelve, Florence wrote, 'I have the most enormous desire of acquiring. For seven years of my life, I thought of little but cultivating my intellect.' Her juvenile explorations of statistics included organising data from garden fruits and vegetables in a tabular format.[2] She deemed statistical sciences as a substitute for religion. Stating that 'to understand God's thoughts, we must study statistics for these are the measure of His purpose'. She felt that statistical laws provided her with a pathway that could reveal God's providential plan.[3]

Nightingale had a privileged upbringing. Her upper-middle-class family were liberal humanitarians who thought of themselves as intellectually adventurous free thinkers. She was lucky enough to receive a university education at home from her father, a graduate of Trinity College Cambridge. Her families impressive social and political connections allowed her to access many opportunities that, unfortunately, would have been far out of reach for other women of

[1] M. E. Magnello, 'The statistical thinking and ideas of Florence Nightingale and Victorian politicians,' *Radical Statistics*, (2009), Issue 102.
[2] M. E. Magnello, 'Victorian Statistical Graphics and the Iconography of Florence Nightingale's polar area graph,' *BSHM Bulletin: Journal of the British Society for the History of Mathematics* Vol. 27 (1), pp. 13-37.
[3] M. E. Magnello, 'The statistical thinking and ideas of Florence Nightingale and Victorian politicians,' *Radical Statistics*, (2009), Issue 102.

the era. These include access to the works of the Belgian astronomer, meteorologist, and statistician Adolphe Quetelet.[4]

Florence is most commended for her care improvements at Scutari Hospital in Turkey during the Crimean War of 1854–6. She risked her life at Scutari, putting herself in a position where she risked her life to deal with diseases. Upon arriving at the hospital, she noted the filthy state it was in, along with the fact that medical data was in disarray, with many deaths un-recorded; she asserted that the lack of standardisation between hospitals made the comparison of data difficult.[5] Nightingale's experience with statistics was beneficial during the first seven months of the Crimean War, with soldiers experiencing mortality of 60% from disease alone, a rate that exceeded even the Great Plague in London.[6] Having spent her life obsessed with the organised gathering of data, Nightingale analysis helped to reveal the relationship between unsanitary living conditions and endemic diseases. Nightingale's rigorous collection and analysis of data, often supported by close ally and statistician William Farr, resulted in a series of reforms that led to a dramatic decrease in the mortality rates of military hospitals and civilian hospitals. These statistics brought to light the necessity of sanitation in hospitals while highlighting the importance and power of careful collection and rigorous analysis of data. Upon her return from Crimea, Nightingale was summoned to Balmoral by Queen Victoria and Prince Albert. The prince was noted to have been an emphatic supporter and patron of science and statistics, which helped Florence gain support for a Royal Commission on the health of the army.[7]

Aside from her efforts in nursing reform, Florence was an extremely key figure in the evolution of visual data during an era of growing appreciation for the power of statistics.[8] However, many people, including senior politicians, found this new world of numbers difficult to comprehend, resulting in barriers to the development of more evidence-based policy. Nightingale felt that one's power as an individual could have only a minor impact without the support of the government. Despite this, her family's privileged position in society, she had known many influential figures in England since she was a child.[9] This gave her a platform, although she still needed to overcome the statistical language barrier, for which she used graphs. She found that simple visual representations of data were key to bridging the gap between statistics and the general public. Nightingale's invention of a polar area graph helped to persuade government and medical professionals of the importance of sanitation reforms. Another example of Nightingale's

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[4] E. W. Kopf, 'Florence Nightingale as Statistician,' *Quarterly Publications of the American Statistical Association*, Vol. 15 (116), (1916), pp. 388-404.
[5] M. E. Magnello, 'The statistical thinking and ideas of Florence Nightingale and Victorian politicians,' *Radical Statistics*, (2009), Issue 102.
[6] E. W. Kopf, 'Florence Nightingale as Statistician,' *Quarterly Publications of the American Statistical Association*, Vol. 15 (116), (1916), pp. 388-404.
[7] M. E. Magnello, 'The statistical thinking and ideas of Florence Nightingale and Victorian politicians,' *Radical Statistics*, (2009), Issue 102.
[8] M. E. Magnello, 'Victorian Statistical Graphics and the Iconography of Florence Nightingale's polar area graph,' *BSHM Bulletin: Journal of the British Society for the History of Mathematics* Vol. 27 (1), pp. 13-37.
[9] M. E. Magnello, 'The statistical thinking and ideas of Florence Nightingale and Victorian politicians,' *Radical Statistics*, (2009), Issue 102.

pioneering statistical work saw her confront the loss of native races when brought in to contact with new infectious diseases.[10]

Nightingale saw the power of education from an early age. Despite her privileged upbringing, she worked to reform educational standards, focusing on less privileged members of society.[11] She advocated for practical educational methods such as the use of rock and mineral specimens as a prompt for learning in the classroom. She also criticised the state of education in workhouses for the poor, arguing that paupers should not be punished but taught to help themselves. She further advocated for the reformation of the education of natives in colonised lands, suggesting that European educational methods were not suited to the teaching of native populations.

After returning from the war, Florence often found herself bedridden. However, from her bed, she never stopped working. During this time, she produced over 200 books, pamphlets, and reports, and over 12,000 letters relating to her statistical work.[12]

Nightingale has been said to have saved countless lives, military and civilian. It is clear she should be remembered not only for her significant efforts in nursing reformation but also for her passion for statistics and her revolutionary ability to communicate such data. Among many significant achievements, Nightingale was nominated by William Farr as the first woman to be elected a Fellow of the Statistical Society of London in October 1858. In the same year, she was elected to the Statistical Congress as well as being made an honorary foreign member of the American Statistical Association in 1874.[13] She should be an inspiration to all young girls who, like her, find that the sight of a long column of figures is 'perfectly reviving'.

> Were I a man of wealth, I would see that Florence Nightingale was commemorated, not only by the activities symbolised by the 'Lady of the Lamp', but by the activities of the 'Passionate Statistician.' I would have found a Nightingale Chair of Applied Statistics to carry out the ideals expressed in her letters.
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> - Karl Pearson (1924)

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[12] M. E. Garofalo and E. Fee, 'Florence Nightingale (1820–1910): Feminism and Hospital Reform,' *American Journal of Public Health*, Vol. 100, (2010), pp. 1588.
[13] M. E. Magnello, 'The statistical thinking and ideas of Florence Nightingale and Victorian politicians,' *Radical Statistics*, (2009), Issue 102.

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