THE USE OF OFFICIAL STATISTICS IN EVIDENCE BASED POLICY MAKING IN NEW ZEALAND

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Statistics New Zealand has found in its education initiatives for raising statistical capability that one challenge is making sure data is used the right way. Lack of knowledge can lead to unintentional misuse of statistics. The power of official statistics is used to show policy analysts how to gain better value and make evidence based decisions. Statistics provide the quantitative evidence supporting Government decision making. While not the only form of evidence used in policy making, several examples will be given that demonstrate its critical importance. In the social area statistics have informed dramatic changes in smoking policy over the last fifty years and in the economic area the policy uses of the Consumers Price Index are discussed. Commuter data demonstrates local government level use of Census information. The high cost associated with making wrong policy decisions as a result of not using or misusing statistical information is also discussed.

BACKGROUND

In New Zealand, as in many other countries, government's policy advisers are one of the sets of key influencers on the decisions that government makes. Some advisers have a high level of statistical skill but there has been growing concern at the variable, or lack of, statistical skills in many state sector agencies. Statistics New Zealand, recognises that a real challenge to using data is making sure it is used the right way, and lack of knowledge can lead to unintentional misuse and non-use of statistics. The agency has developed a set of initiatives designed to help raise statistical capability. The two most are the National Certificate in Official Statistics (roughly equivalent to first-year university) and a post-graduate paper in official statistics that is run simultaneously across New Zealand universities (Harraway & Forbes, 2013). Both courses are run in partnership with academics who provide the majority of the teaching. The Certificate level course is aimed at government employees, in particular policy advisors. Within the course extensive use is made of real case studies and this paper reports on the use of some of these to demonstrate the importance of quantitative evidence in the policy formulation process. Real life examples are good motivators for students to see the value of increasing their statistical skills, therefore improving the future quality of analysis and policy development.

IMPORTANCE OF OFFICIAL STATISTICS TO GOVERNMENT POLICY

Official statistics provide the quantitative basis for the development and monitoring of Government's social and economic policies and there are many examples where good quality data is essential for Government decision making such as education participation and achievement, health statistics (morbidity and mortality rates), crime and imprisonment rates, tax information, etc. Some of this data comes from the administrative records held by Government, some from surveys (often run by the National Statistics Office) and some from independent or academic research such as Howden-Chapman et al (2007). This study used experimental medical research (a randomised control trial) rather than official data but clearly demonstrated the benefits in terms of improved health and energy savings of housing insulation, and was one of the pieces of quantitative evidence that persuaded the New Zealand Government to offer subsidies to house owners wishing to insulate their homes. The cost of the programme was estimated to be $347 million over its four year lifetime from 2009 until 2013 and aimed to help about 190,000 houses be retrofitted with insulation (Denne & Bond-Smith, 2012). Students are asked to compare the cost of the scheme to potential long term savings in health and heating costs, and increases in jobs as shown by Denne and Bond-Smith (2012).

Another case study used in the classroom to motivate policy analysts in their learning of statistical skills is the history of smoking policy in New Zealand. There have been fifty years of smoking policies in New Zealand that reflect an 180^{o} change in government attitudes from implicit

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support of smoking through the distribution of free cigarettes to soldiers and prisoners, to its current Smoke-free Environments laws and regulations. Over time (anti-) smoking policy has moved from isolated regulatory policies to a complex mix of incentive, disincentive, education, regulation and legislation based on accumulated statistical evidence. The first statistical evidence of a *causal link* between smoking and lung damage leading to early death came from small clinical trials and in-depth studies such as that by Doll and Hill (1950). This type of analysis (medical research) was followed by analysis of lung cancer deaths over time. As shown in Figure 1 there was a dramatic increase in deaths from lung cancer, between 1940 and 1998 beginning almost immediately post the Second World War. Between 1940 and 1969 there was an average annual increase in lung cancer mortality rates for males aged between 35-64 of 6.5% and for females of 7.7%. Combined with statistical evidence of effects from "passive" as well as "active" smoking this led to regulations about the sale of cigarettes, etc., disincentives such as tax rises, incentives for quitting such as subsidies for nicotine patches and legislation restricting where smoking can take place. Further data has shown that smoking prevalence is different across ethnic groups providing information for targeting of policy interventions.

The use of official statistics to monitor smoking use and patterns over time shows the effectiveness of policy interventions. New Zealand's Census of Population and Dwellings and the New Zealand Health Survey are now used to both provide monitoring evidence and to investigate between group differences in smoking. Thomson (cited in Easton, 1995) stated that "The census data had a major effect on tobacco policy in New Zealand, when it gave the anti-tobacco lobbies some idea of the magnitude of the phenomenon. Almost everyone recounting the successes of the movement in the last two decades mentions the census as a major stimulant in the campaign".

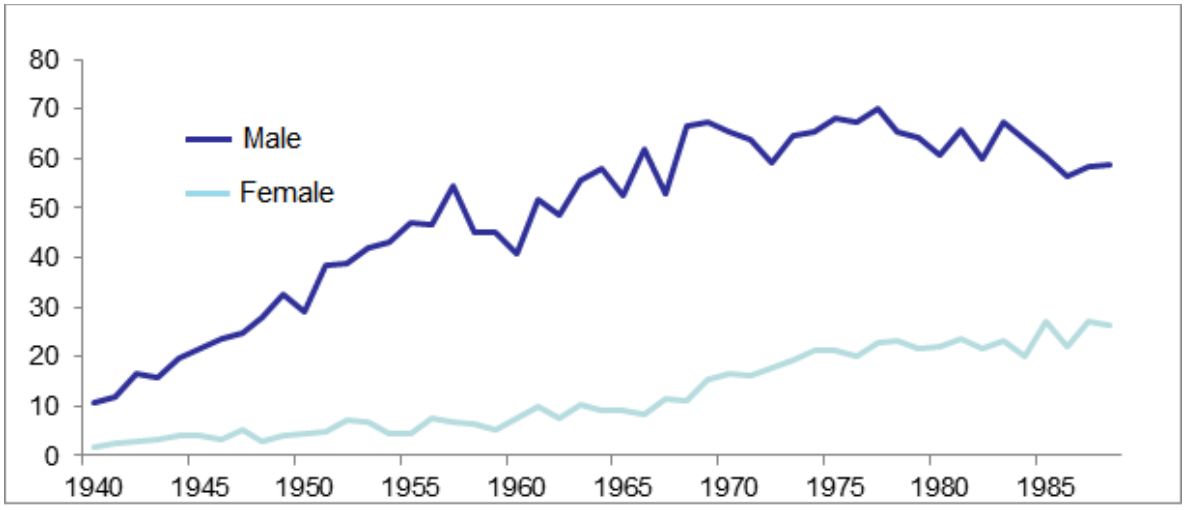

Figure 1: New Zealand Lung Cancer Mortality rates.
Source: *Tobacco Statistics 1991 Trends in Tobacco Consumption and Smoking Prevalence in New Zealand (Department of Statistics & Department of Health, 1992)*

This smoking example demonstrates the response of Government to statistical and official data, but what may have been the costs of delays in policy or of not intervening at all? This can be estimated by analysing the costs of care and hospitalisation for smoking related illnesses and the loss-opportunity costs of early deaths. Easton (1997) and Cancer Society of New Zealand (2004) estimated the social costs of smoking in 1990 to include a reduction in:

- the New Zealand population by about 2.0% (8000 people);
- the overall quality of life (intangible costs) by about 3.2%;
- loss of production from morbidity and premature mortality of about $545 million;
- GDP (tangible costs) by around 1.7%.

Official statistics are also important tools in economic policy development. An example is the use of Consumer Price Index (CPI). In New Zealand price indices were originally developed in the early 1900s to assist the Arbitration Court in its determination of basic wages (Forbes et al, 2012). The CPI is still used by employers and employees in wage negotiations but is also used extensively by the media to inform the public (e.g. http://www.3news.co.nz/Consumer-Green-Party-want-official-dairy-inquiry/tabid/367/articleID/204065/Default.aspx) of price (and standard of living) changes. The CPI is used by the New Zealand government to adjust Superannuation and unemployment benefit payments annually to help ensure that these payments maintain their purchasing power. The Policy Targets Agreement between the Governor of the Reserve Bank and the Minister of Finance aims to keep annual inflation (as measured by a modified CPI) movements between 1% and 3% over the medium term. To do this, the Governor increases or decreases the official cash rate and changes in this rate have an impact on mortgage interest rates that households pay. There are, therefore, very few New Zealanders that are not affected in some way by changes in the CPI, and so it is important that analysts understand what it measures (price change not price levels) and how it is constructed (as a weighted index of price changes where the weights are calculated according to household expenses as measured in Statistics New Zealand's Household Economic Survey). Visual tools (such as the Federal Statistical Office of Germany's Price Kaleidoscope, https://www.destatis.de/Voronoi/PriceKaleidoscope.svg) are used in the classroom to reinforce the concepts of weights and price change.

Official statistics are used by local authorities to understand the demographics of their communities and to analyse changes over time. The following case study uses a visualisation of 2006 Census data derived from questions on "where do you live?" and "where do you work?" to produce an estimate of commuting traffic. This would be difficult to interpret in tabular form as, at the smallest Census area breakdown (the meshblock), this would result in a table of approximately two billion cells. But it is at these smaller levels of geography that this information is most useful to city planners so that they can provide public transport services, etc. By providing this data on a map through which the user can zoom to an appropriate level, this massive table can be reduced, viewed and used for planning purposes and can easily be interpreted by students. "Spider" graphs show commuter flows for selected ethnic groups, modes of transport, industry and occupation. For example, in Figure 2 the home locations of staff employed by the central public hospital in Wellington city are given and indicate that many staff live over hills or at some distance from the hospital. This type of information is critical for disaster mitigation planning as the city lies along a major fault line. These visualizations can be used with any type of flow data, including internal migration data (Statistics NZ also released an internal migration visualization alongside Commuterview) and also for policy analysis of the geography of the labour market (Ralphs & Goodyear, 2008).

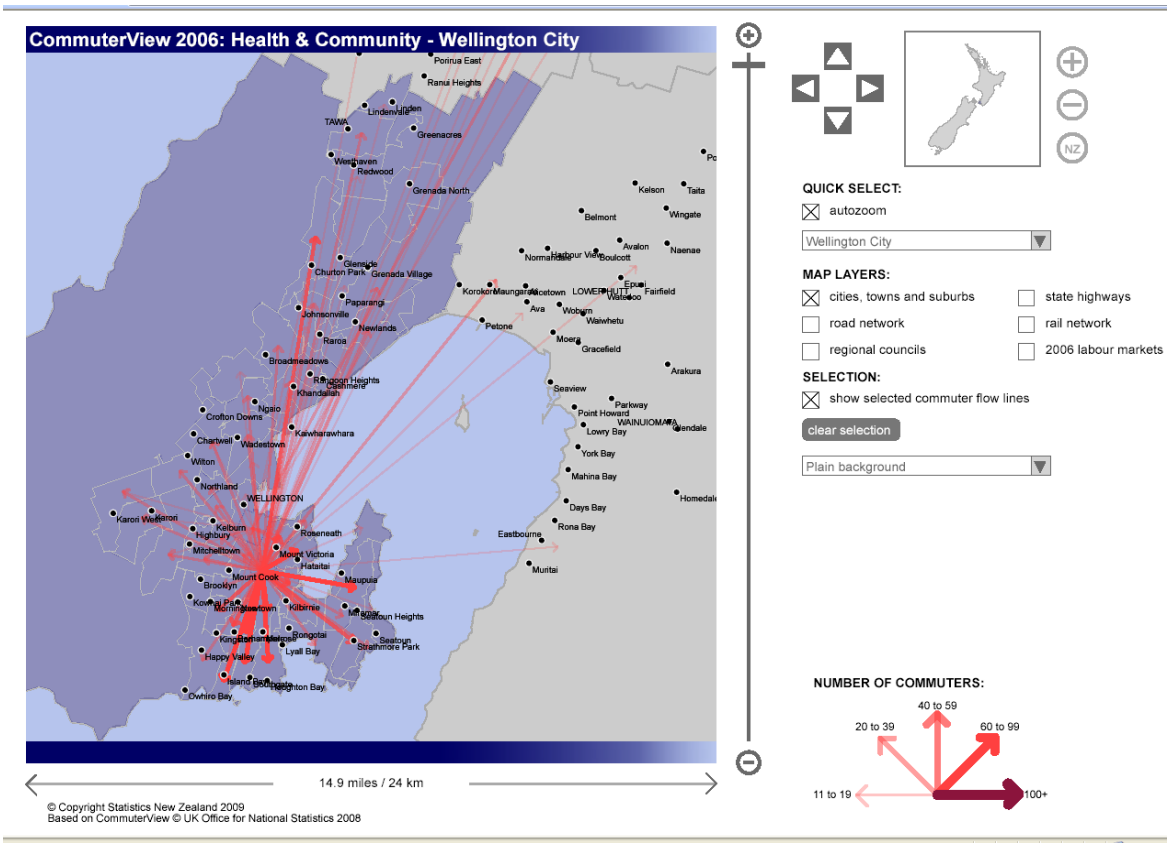

Figure 2: New Zealand Commuter Flows: Work to Home, Wellington City
Source: *Statistics New Zealand 2006 Census of Population and Dwellings.*

COST OF ILL-INFORMED POLICY

The above examples demonstrate how statistics and official statistics provide evidence for good policy making but analysts also need to be aware that there are significant costs associated with ill- informed or delayed policy making. The high cost of premature death associated with non-intervention in smoking or alcohol abuse documented by Easton (1997) and given above is one example. The relative size of the smoking problem is put into perspective in a study released in 2013 that assessed the amount of healthy life lost as a result of illness, and estimated that "tobacco use was the leading major risk factor in 2006, accounting for 9.1% of health loss from all causes". (Ministry of Health, 2013, p. 36). There are now standard methods for estimating health related costs, however there are other examples of the costs associated with a lack of understanding or misinterpretation of statistical information. For example, short term reactions to population change without a longer term view of the demographic transition (from a growing, to an aging, to a declining population) can result in a surplus of schools in some regions and a shortage in others. In New Zealand there was rapid growth in Maori language kindergartens (Kohanga Reo) when these were brought under the same per child funding regime as other state kindergartens in the early 1990s (Figure 3). Underestimation of the percentage of Maori pre-school children that would enroll in these pre-school institutions in New Zealand led to a short-fall of approximately $40 million one year in Government funding.

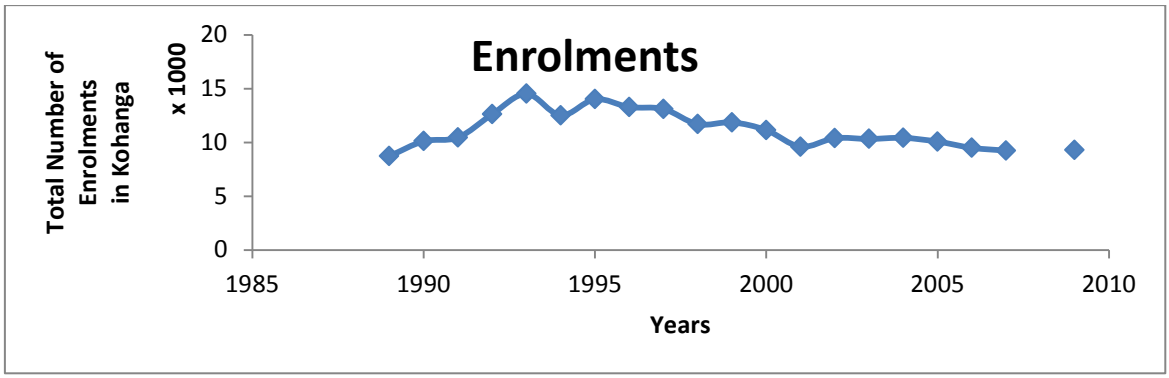

Figure 3: Enrolments in Maori language kindergartens (Kohanga Reo) 1989-2009.
Data source: Education Statistics Booklets, Ministry of Education (various years)

Using United Kingdom (UK) data, Blastland and Spieghalter (2013) define a MicroMort as the "one-in-a-million chance" (p. 16) of an average person doing average activities having a fatal event on an average day. They then calculate (in MicroMorts) the risk associated with various activities. For example, climbing in the Himalayas is about 12,000 MicroMorts per climb, giving birth is equivalent to 2,100 MicroMorts, having a traffic accident (in the UK) less than 1/365 MicroMorts. They use transport interventions to derive how much the UK government would pay to save someone from a MicroMort (1.60 pounds). Micromorts could be used as a proxy for estimating the cost of non-intervention by a Government. Blastland and Spieghalter (2013) also estimate that, in the UK, "One cigarette reduces life-expectancy by around 15 minutes on average" and "each extra inch on your waistline", "two pints of strongish beer", "an extra burger a day" and "watching two hours of TV" reduce life expectancy by 60 minutes (p. 184-5). Reduced life expectancy is a major contributing factor to estimates of lost national productivity (e.g., Easton, 1997).

CONCLUDING COMMENTS

There is a greater and greater call from Governments to have data on which to base and prioritise policy interventions. It is therefore essential that any statistics educator both motivates and enables students to have the skills to evaluate the relative quality of the data Governments are presented with. Students should be are encouraged to use, as well as understand and therefore avoid misuse of official statistics.

The case studies presented here were chosen to represent the diverse environments (social, economic and local authority) that policy students work in. They demonstrate how current government policies are influenced by official statistics and how this has a roll-on impact on the individuals affected by these policies. Students are also made aware of the potentially high national costs of delaying or not developing policy interventions. From a teacher's perspective this does seem to increase students' motivation to develop statistical literacy skills needed to inform public policy.

REFERENCES

Blastland, M., & Spiegelhalter, D. (2013). *The NORM chronicles. Stories and numbers about danger*. London: Profile Books.

Cancer Society of New Zealand (2004). *What smoking costs*. Wellington. New Zealand: Author.

Denne, T., & Bond-Smith, S. (2012). *Impacts of the NZ Insulation Fund on Industry and Employment.* Report prepared for the Ministry of Economic Development. Wellington, NZ: COVEC.

Doll, R., & Hill, A. B. (1950). Smoking and carcinoma of the lung; preliminary report. *British Medical Journal, 2,* 739-748.

Easton, B. (1995). Smoking in New Zealand: A Census Investigation. *Australian Journal of Public Health, 19*(2):125-9.

Easton, B. (1997). The social costs of tobacco use and alcohol misuse. *Public Health Monograph Series, Vol. 2*. Department of Public Health. Wellington, NZ: Wellington School of Medicine.

Forbes, S., Higgs, C., Keating, J., & Roberts, E. (2012). Prescriptivism to positivism? The development of the CPI in New Zealand. *New Zealand Economic Papers*, *46*(1), 57-77. DOI: 10.1080/00779954.2011.645222.

Harraway, J. A., & Forbes, S. D. (2013). Partnership between national statistics offices and academics to increase official statistical literacy. *Statistical Journal of the IAOS: Journal of the International Association for Official Statistics, 29*(1), 31-40.

Howden-Chapman, P., Matheson, A., Crane, J., Viggers, H., Cunningham, M., Blakely, T., Cunningham, C., Woodward, A., Saville-Smith, K., O'Dea, D., Kennedy, M., Baker, M., Waipara, N., Chapman, R., & Davie, G. (2007). Effect of insulating existing houses on health inequality: Cluster randomised study in the community. *Bmj, 334*(460), 1-9. doi:10.1136/bmj.39070.573032.80 (published 26 February 2007).

Ministry of Education (various years). *Education Statistics Booklets*. Wellington, NZ: Ministry of Education.

Ministry of Health (2013). *Health loss in New Zealand: A report from the New Zealand Burden of Diseases, Injuries and Risk Factors Study, 2006–2016*. Wellington, NZ: Ministry of Health.

Ralphs, M., & Goodyear, R. (2008). *The daily commute: An analysis of the geography of the labour market using 2006 Census data*. Paper presented at the Labour Employment and Work Conference, Victoria University of Wellington, New Zealand.