

Statistics: a Gendered Agenda

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1. Introduction

The term statistics originally meant sets of data and their summaries, but it has come to include the methods used to collect and report data and to make inferences from samples to populations. Significantly, statistics was originally described as 'political arithmetic' (Shaw and Miles, 1979: 31), reflecting the potential for statistics to serve as ammunition in contests between interest groups. It is certainly the case that data collected by the government statistics service are used in the often contentious allocation of public resources. It is also true that such statistics have a role in influencing public perceptions and in justifying government policies.

The critique of official statistics by sociologists has drawn attention to their social construction, exposing their limitations as 'objective' representations of reality and showing how they reflect the interests and beliefs of dominant groups in society (Irvine et al. 1979). While the interests of professionals are separate from those of the state, professions are nevertheless shaped by a capitalist and patriarchal world-view, leading to the neglect of the concerns of women and other disadvantaged groups. In the case of statistics, sexist assumptions often make women's lives invisible or distort their reality.

Official statistics reflect priorities which are often taken for granted: the formal (exchange) economy is treated as more important than the informal (use) economy (Umfreville, 1990). It is surely no accident that economic statistics measure the kind of work predominantly done by men while ignoring the unpaid work done mainly by women. Yet clearly the domestic economy sustains and reproduces the formal economy; problems arising from the inequitable distribution of resources and power in the family, sometimes manifested as wife-battering, child abuse, neglect and malnutrition, all have adverse consequences for the formal economy. Where women are disempowered and impoverished this has long-term effects on their children's health and achievement, to the detriment of the economy. More comprehensive knowledge of the state of society would be obtained if the prevailing focus on the formal economy in official statistics were shifted.

In this paper, we consider how patriarchal values have influenced the development and dissemination of statistical methods and also the production and use of statistics — both in ways that disadvantage women. We first consider the activities of professional statisticians in the development and use of statistical methods, examining how women are disadvantaged as statisticians and why they generally fail to reach positions of power and influence in the profession. We next review the way in which sexism in the collection and reporting of data has led to

a distorted representation of gender differences in poverty, unemployment, health and pension receipt which has policy implications detrimental to women; we show how secondary analysis can provide a counterbalance to male-dominated official statistics.

2. Professional statisticians at work

The development of powerful statistical methods enabling us to make inferences from large bodies of experimental data began to be important in the 1920s, when the geneticist R.A. Fisher pioneered the use of analysis of variance in agricultural field trials. Since then a huge proliferation of techniques and more recently of software has been both a cause and an effect of statistics being inextricably involved in research in every area of science and many in industry and commerce. Statisticians have a lot to offer almost anyone who has anything to investigate. Unfortunately this is not always possible for potential beneficiaries to appreciate.

The level of abstraction and mathematical complexity in articles in statistical journals has increased to the point where it is not unusual to hear statisticians remark that a journal has become unreadable. Where statistical methods are used (as is increasingly the case) to support investigations which are written up and published in the scientific or business press it is usual to condense the explanations to a degree which renders them scarcely comprehensible even to a statistician and completely opaque to the audience for whom the articles are presumably intended. It is not rare to find errors and misconceptions in such accounts. So while the availability of good statistical software and the increasingly quantitative nature of investigations in many areas mean that there is a large constituency of users of statistical methods, it is hard (and getting harder) for them to identify or understand appropriate techniques (Greenfield, 1993; Wallman, 1993).

In these circumstances we might suppose that the effective communication and explanation of old and new statistical techniques to potential and actual users would be regarded as an important task for statisticians. However, for the career statistician, the important task is the development of new techniques and publication in a sufficiently abstract and mathematical form in statistical journals. The communication of what is already known to those who need to use statistics in the course of their research in other disciplines is not regarded as a serious activity.

In fact, the activity which brings prestige in statistics, as in some other disciplines, is tool-making, whereas tool-using is regarded as less important, less interesting and easier (Cockburn, 1985). Promotion, in short, depends on publishing something new (Greenfield, 1993). It does not need to be useful or understandable. A former president of the American Statistical Association, a woman, pointed out that almost half the articles in the prestigious journal published by the ASA are never cited or only cited infrequently, and this is true for those in the applications section as well as those in the methods section. Of the articles cited infrequently, most are only cited by their authors in subsequent articles (Belair, 1988). Greenfield claims that articles by statisticians are written only to show other statisticians how clever they are. They must do this though, if they want the rewards of success.

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The people who decide what is important and what should be rewarded, in statistics as anywhere else, are those already in power: in this case journal editors, professors and directors of research units, officials of professional societies and a few people in the government statistics service. Almost all these people are men. In most societies the tasks allocated to men have been regarded as more prestigious and more worthy of reward than those allocated to women, in spite of cross-cultural variation in the gendering of tasks. Thus, in societies where certain tasks are considered to be 'naturally' men's, the tasks carry more prestige than where they are assigned to women (Friedl, 1975). Social processes of gender differentiation in industrial societies lead to a similar devaluation of women's work; women are mainly segregated, through patriarchal exclusionary and demarcatory strategies, into low paid occupations and, within occupations, concentrated at the lower levels of the hierarchy (Walby, 1988; Cockburn, 1991). The appropriation of technology by men has been one tactic in the continuing historical process of excluding women from higher level positions (Cockburn, 1983; 1985). Men have dominated the development of tools and technological fixes, the need for which, ironically, has often arisen because of the social and health problems created by male-dominated industrial/military development.

Women's jobs, on the other hand, are more likely than men's to involve 'emotional work' (Hochschild, 1983); that is, they are concerned with communicating, caring, supporting, listening, sustaining and nurturing, — generally enhancing the well-being of others. Job evaluation, whether informal or a part of formal wage negotiating machinery, has tended to underestimate the skills required in women's jobs (Boston, 1974), limiting the usefulness of the original Equal Pay Act and generating the need for legislation on equal pay for work of equal value.

Our concern in this paper is with the under valuation, within the profession of statistics, of communication skills relative to tool making.

Of course we do need toolmakers, in statistics as elsewhere. New problems are explored and sometimes we have nothing in the toolkit which can do justice to the data. Extending the boundaries of the possible is a fascinating activity for any scientist and there is room in the profession for those who enjoy this more than anything else. It is certainly also true that toolmaking is difficult and not many people of either sex can do it. In mathematics and statistics it seems to need not only a rare blend of skills but also a rare kind of confidence. Women's competence in mathematics is not matched by their confidence (Keith, 1991).

Tool-making may also need an obsessional, almost ruthless concentration, and the life circumstances of most women, in which they are expected to cope with multiple roles, may make it harder for them to find the necessary space and time for tool making (Namenwirth, 1986). A rare skill which is needed should certainly be valued, but tools which none but the maker understand how to use do not benefit the profession or the wider community. Their only purpose is apparently to enhance the reputation of the maker. What is unfortunate is that other activities, in particular that of communicating knowledge of how to use statistics appropriately, are not similarly valued.

Communicating knowledge of how to use statistical methods appropriately is vital. However, not very many statisticians are successful communicators. Scientists often complain that they can't understand the advice the statistician

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gave them, even though he is employed in their unit for the sole purpose of helping them. Successful collaboration with a biologist or a businessperson requires patience, kindness, a willingness to listen, a thorough understanding of the statistics or mathematics needed and the ability to explain the underlying logic while omitting the technical details. These are the activities of nurturing, supporting, sharing, communicating and empowering others which are expected of women in our society and which are not defined or rewarded as work. Statisticians who write to be understood and to empower the reader can be found — some of them form The Radical Statistics Group, but the RadStats Newsletter is not a refereed journal and publishing in it is unlikely to further your career. In this section we have suggested that bridging the communication gap between statisticians and those who need their skills is as important and useful an activity as developing new techniques, but that it is not valued and does not bring success and prestige in the profession. We believe this is because the patriarchal values which deny the importance or even the existence of the communicating and empowering work of women throughout society inform the statistical profession also. In the next section, we consider a second concern; how masculine preoccupations and sexist assumptions in the collection statistics have disadvantaged women and others.

3. Bias and Sexism in official statistics

The widespread suspicion of official statistics is partly justified; because of the ability of governments not only to influence the production of statistics but also selectively to present, publish, delay or suppress statistics, these can be manipulated in the interests of government (Roberts, 1990). 'Political arithmetic', as the emerging field of statistics was known in the 18th century (Shaw and Miles, 1979), implicitly acknowledged the value-laden purposes of producing demographic and other figures. More recently, the function of official statistics was explicitly defined by the Government Statistical Service as 'to serve the needs of government' (Macfarlane, 1990).

Many writers have pointed to the ideological function of statistics in promoting acceptance of the social order, emphasising how class inequality is misrepresented in official statistics (Irvine *et al.* 1979). The professional statisticians in the Government Statistical Service are not only middle class but also predominantly white, able-bodied and male. Any population group which is relatively powerless is vulnerable to invisibility or misrepresentation in official statistics, not because individual statisticians intend to discriminate but because their underlying cultural assumptions and world views reflect the dominant ideology and militate against any challenge to concepts and practices already established.

A recent example of the production of figures which would support the government's preferred policy at the expense of a disadvantaged group was the OPCS Report on the extra cost of living for disabled people (Martin and White, 1988). Although it is encouraging that the question of the extra costs of disability are recognised by a government department, the finding, that the average extra cost of disability was £6 per week, has been disputed by the Disablement Income Group (DIG).

They claim that this grossly underestimates the costs of disability through using an over-inclusive screening question and through an inadequate survey

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instrument (Thompson *et al* 1990). DIG's own survey of disabled people involved a longer interview, allowing more thorough recall.

For the most severely disabled group, DIG's estimate of extra costs was £87 per week compared with the OPCS figure of just under £12 per week. The implications of an official underestimate of costs for the level of disabled people's state benefits can be guessed.

The way in which women's lives have been obscured by official statistics has been explored by feminist sociologists (Roberts, 1990; Oakley and Oakley, 1979).

Our aim in this second section of the paper is firstly to show that by misrepresenting women's lives, sexist statistics (those which differentiate between men and women where biological sex is not relevant, or which employ a conceptual framework based on men's lives) contribute to the perpetuation of their disadvantaged position; and secondly to show the positive potential for independent researchers to uncover the bias and to provide alternative statistics. These can be used to argue for policies based on a more realistic picture of women's lives and in this sense are alternative statistics FOR women. We provide recent examples in relation to women's health, informal care, employment and occupational pensions.

4. Women's health

Gender bias in official health statistics can arise from the concepts and definitions applied, the sampling frame used, the processing and presentation of results and the way these are interpreted (Oakley and Oakley, 1979; Arber, 1990; Macfarlane, 1990; Roberts, 1990). An example of the misleading statistics resulting from an inadequate sampling frame was the DHSS figures on employees' sickness rates.

These showed married women employees' sickness rate to be 70 percent higher than men's, but were based on only about half of married women, — those who paid the full NI contribution. This had serious consequences for women: first, insurance companies charged women 50 percent higher premiums for health insurance on the basis of the DHSS figures, and secondly, employers were likely to have discriminated against women as employees because of their supposed higher absence rate.

Secondary analysis of the General Household Survey, which provides a nationally representative sample of married women employees, showed the DHSS figure for women's sickness rate to be a serious overestimate (Dale *et al*, 1982). It also revealed some significant and interesting gender differences: although women employed full time had a slightly higher rate of absence due to sickness than men, women employed part time had a lower rate. Men were more likely than women to have longer periods of absence, but in terms of the annual days of sickness, women's rate was marginally higher than men's, an average of 10 days compared with 9.

It was also possible to establish that there was very little difference in sickness rate between women employees with children and those without (Arber, 1990). Thus independent analysis of government-produced data made more accurate

information about employees' sickness rates available to insurance companies, employers and society generally, with likely benefits to women.

The reluctance of the Registrar General to collect information on married and widowed women's own occupations at their death has hampered study of the relationship between women's employment and their health. Registrars of death were instructed in the 1980s only to record such women's occupations if they were in paid employment most of their lives (Macfarlane, 1990). Because of incomplete recording of women's own occupations at their death, the Decennial Supplements on mortality (e.g. OPCS, 1986) classify married women by their husband's occupation.

Less than a quarter of elderly women dying between 1979 and 1983 had their occupations recorded, making it impossible to use this data to discover whether women's mortality is more closely related to the nature of their employment, to their standard of living as indicated by their husband's occupation, or to neither of these. Fortunately, the OPCS conducts nationally representative surveys, such as the General Household Survey (GHS) and the OPCS Longitudinal Study (LS), which do provide information for all women who have ever been employed on their own current or last occupation; this enables analysis of women's morbidity (GHS) and mortality (LS) in relation to their own socio-economic position.

Re-analysis of the GHS showed that women's health, in terms of age-standardised rates of limiting long-standing illness, bore a linear relationship to class when the conventional approach (classifying married women by their husband's occupation and other women by their own) was used; but that when an individualistic approach was used (classifying all women by their own occupations) women employees and managers had illness rates almost as high as those with manual occupations (Arber, 1990).

This tends to confirm what researchers into women's employment have already noted — the inadequacy of the classificatory system developed by the government Statistical Service for men's occupations, due to the concentration of women in a few categories and to the different significance of the same occupational group according to the gender of the individual. For example, women whose occupation is classified as 'sales' generally have a different kind of job, which is lower paid, than men who are similarly classified (Martin and Roberts, 1984). Secondary analysis also indicated the relationship between women's health and their marital status, their own occupation and their material circumstances at home (Arber, 1991).

Secondary analysis of the LS provided some fruitful insights into the relationship of women's mortality, among those aged 15–59 at death, to their employment and to their material circumstances, as indicated by marital status, housing tenure and car ownership (Pugh and Moser, 1990). Classification of married women as non-manual by their own occupation appeared to predict mortality more accurately than classification as non-manual by their husband's occupation.

Such research has been valuable in beginning to redress the previous bias towards considering mainly men's inequalities in health. Although research on women's mortality and morbidity in relation to their class is more complex than for men, it has been pointed out that 'if the difficulties had pertained to men's

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mortality, researchers would by now have found a way' (Pugh and Moser, 1990: 94).

Medical statistics on cause of death are bedevilled by definitional variation, especially in comparisons over time. Where symptoms differ between the sexes, clinical definitions of disease based on symptoms observed in only one sex can misrepresent the proportions of men and women dying from the disease. In this way, it has been claimed, women's death rate from AIDS has been underestimated (Carpenter and Flanigan, 1992).

Because, initially, AIDS was seen as a disease mainly affecting male homosexuals, a definition based on men's disease pattern has until recently been applied and many women dying of AIDS have not entered the medical statistics as AIDS victims, but only as HIV positive.

Now that the distinctive female pattern of AIDS symptoms has been recognised, statistics show AIDS to be the leading cause of death of women in New York aged 25 to 44. It is now estimated that the incidence of AIDS is growing faster in women of reproductive age than in any other segment of the population. The policy implications of AIDS spread in women of childbearing age are arguably even more serious than for men, and the distorted statistics, arising from a largely male medical establishment's preoccupation with AIDS as a disease of male homosexuality, have delayed recognition of the problem.

In the last forty years we have seen in this country a complete take-over of the whole process of pregnancy and birth by mostly male obstetricians (Savage, 1986). This move away from the traditional control of childbirth by women has been justified by falling rates of infant mortality and death in childbirth as recorded in official statistics.

However in 1975 Marjorie Tew noticed that the official statistics did not support the view that the decline in infant and maternal mortality was due to the increasing hospitalisation of birth. She had difficulty publishing her findings and her temporary contract in the department of community medicine in the university of Nottingham was not renewed. In 1976, she began work as a part-time statistician in another medical department and continued her research into birth statistics in her own time.

She found that the mortality of mothers and babies was higher in teaching hospitals than for home births or GP units in all risk groups. (There were two risk scores developed by the analysts of the 1970 British Births Survey: one assessed risk from factors known near the start of pregnancy and the other added data collected during pregnancy to give a cumulative predicted risk shortly before delivery.)

When her work was finally published, the medical establishment reacted with outrage and ridiculed her findings. But she was a careful statistician and had, if anything, understated her case (Senn, 1979). It is hard to know whether Tew's efforts influenced obstetric practice, since not long after the publication of her papers the consultant obstetrician Wendy Savage was suspended for alleged incompetence amidst enormous publicity. She had challenged the powerful medical establishment more directly by attempting to return to her patients some control over the births of their babies.

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The subsequent enquiry, and her vindication and reinstatement, forced into the open the issues of women's safety and rights in childbirth. Birth statistics had been used to justify the disempowerment of women in an area central to sexual politics; Tew and Savage both challenged this process in their different ways and both had to overcome opposition which threatened their livelihood and reputation.

5. Women's Poverty

Methods of estimating the proportions of populations living in poverty under-represent women for several reasons. First, estimates of the prevalence of poverty have generally been based on the household as the unit of analysis and a commonly used measure of the poverty rate is the percentage of households with either income or expenditure below a certain level, adjusted for the number of adults and children in the household.

This approach assumes that resources are equally distributed among household members, whereas research has shown that women and children tend to have less access to household resources (Millar and Glendinning, 1989; Brannen and Wilson, 1987; Pahl, 1983; 1990). For example, in families with a car, women usually have less access to it than their partners (Dale, 1986).

Because their income is aggregated with their husbands' for means tests, the proportions of married women with a personal income below subsistence level is nowhere to be found in official statistics. This is a matter of some importance, since the spending patterns of women and men differ, women usually being responsible for feeding and clothing family members. If women have insufficient money, the effects are arguably more serious in terms of health and welfare than if men lack spending power. It would therefore make sense for poverty estimates to be based on individual income and spending within the household.

More fundamentally, using money income (or spending) as the sole indicator of poverty is questionable; and the relationship of income to total resources is likely to differ for men and women.

For example, occupational welfare, such as a company car, subsidised meals and generous occupational pensions are far more available to men than to women (Green and Small, 1984; Mann, 1989; Sinfield, 1978). More men than women can take advantage of tax relief, for example as owner occupiers (Watson, 1986). Poor housing conditions, such as overcrowding and damp, are related to health for both men and women, but as women's domestic role compels them to spend more time at home, they will suffer the adverse effect on their health disproportionately (Payne, 1991; Bartley et al, 1993).

Finally, if we are to gain a fuller understanding of inequality, it is necessary to assess not only material poverty but other aspects of deprivation, such as lack of time. Statistics on hours worked in the paid economy, by ignoring women's work in the domestic economy (often in addition to their paid employment) obscure the fact that women have a great deal less time for leisure activities, for education and training, and for participation in political life. The value of women's unpaid contributions to society is, of course, uncounted in statistics on the performance of the economy.

In all these ways, the collection of statistics on poverty reflects male priorities and, in doing so, gives a distorted picture of women's circumstances. The uphill task of re-analysing data on poverty so as to assess the extent of women's poverty and deprivation is, however, underway.

6. Pensions

Finally in this section, we consider how official statistics work to women's disadvantage in later life. Demographic statistics might appear to be relatively unproblematic in providing a breakdown of populations by sex and age. However, even these apparently innocuous figures can be used to women's disadvantage. British figures show that women's life expectancy at birth is five years longer than men's — 77 compared with men's 72 (CSO, 1989). In Britain actuarial tables used to calculate the cost of annuity pensions (and used in other aspects of pension arrangements) take into account women's greater average longevity, so that for the same purchase price their annuity is smaller.

This is a legal and apparently rational (if not morally justifiable) practice whose statistical basis seems unassailably objective. But is it? The statistical basis is selective in ignoring the fact that whites live longer on average than ethnic minorities, non-manual workers than manual and non-smokers than smokers. None of these (equally valid) criteria for discriminating between risk groups is used in actuarial tables. It is in the choice of which statistical 'fact' to use that the influence of patriarchal power is expressed.

Happily, in the US the use of sex-based actuarial tables was successfully challenged by the Women's Liberation Movement and outlawed for company-sponsored pension schemes by a Supreme Court decision in 1983. There is no sign yet of the British government removing this injustice to women by requiring sex-neutrality in actuarial tables, although recent deliberations by the European Court of Justice are expected soon to result in a Directive to this effect.

The invisibility of married women's low personal incomes, noted above, is relevant to pension policy. The desire by the Conservative government to cut public spending has led recently to consideration of means-testing the state pension and of raising the state pensionable age for women. In support of these and other cuts in welfare provision, statements have been made by officials and Ministers to the effect that two thirds of pensioners have an occupational pension.

For example:

'Now almost two thirds of those who retire can do so with an occupational pension' (Social Security Advisory Committee Report, July 1992: 12).

'the additional element of occupational provision comes into play. Nearly 70 percent of those now retiring in the UK will have supplemented their income in this way'. (Peter Lilley, September, 1992: 8).

The authorship and context of these statements (see Ginn, 1993) shows they are produced in support of the contention that for most elderly people the state pension is of minor importance as a source of income. The figures given above for occupational pension receipt serve to legitimate the government's policy of dismantling the welfare state bit by bit and promoting private provision instead.

However, the statements on occupational pension coverage are very misleading, as they do not indicate the unit of analysis. The figures quoted can only refer to men or to 'pensioner units' (i.e. married couples and non-married individuals) so that married women's very low rate of receipt conveniently vanishes from the statistics.

Research on occupational pensions has found rates of receipt by individuals much lower than those quoted above, and has also revealed substantial differences by gender and marital status (Groves, 1987; Ginn and Arber, 1991; Arber and Ginn, 1991). Among those aged over 65, fewer women than men had an occupational pension (26 percent compared with 62 percent in 1985-6) and among married elderly women only 12 percent had their own pension. Where elderly married women did have income from occupational pensions, the amounts received were very low (Ginn and Arber, 1994).

The consequences of an over-optimistic presentation of the financial well-being of elderly people through statistics based on households could be far-reaching; if the current overwhelming public support for the state pension is eroded, means-testing for eligibility could be introduced. In this case, many elderly married women would lose the small state benefit which is their only personal income, because their husband's income would be taken into account in the income assessment.

Other elderly people with a low income would face complex form-filling to claim what is currently an entitlement based on National Insurance contributions; pensioners with a small occupational or private pension could lose (through means-testing) part of the state pension to which they had contributed. They would, in effect, be penalised for having invested in non-state pensions.

If women's state pension age is raised to 65, as is intended by the government (DSS, 1993), women will have to wait an extra five years for the state pension, losing up to 14,500 (at 1992 rates) in pension income. Since the majority of women aged 60 to 64 are unlikely to obtain jobs due to the lack of employment opportunities for older people, raising women's state pension age would force them either into total dependence on their families or onto Income Support until they reached 65.

We have shown how the social construction of official statistics in a male-dominated society contributes to women's disadvantage, and have also indicated the potential for secondary analysis to provide alternative information with which government arguments and policies can be challenged.

7. Conclusions

Determined and careful work can succeed in exposing the gender and other biases in official statistics and in bringing to light the discriminatory effects of government policies. Such work may threaten powerful interests and those undertaking it may have to overcome opposition to publication. Nevertheless there is a useful and increasing body of such studies and in some areas the beginnings of an awareness that official statistics are indeed 'political arithmetic' with often damaging results for powerless groups. What is less often recognised is

that the biased picture of society and the economy provided by misleading statistics can hinder the government's own purposes.

The prevailing devaluation of women's contributions to society and of their more human-centred co-operative style of working can be seen in the statistical profession and is an important reason for its failure to communicate its knowledge more widely and to improve the use of statistics in other disciplines.

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SATURDAY 25th FEBRUARY 1995

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Needed for AGM

Speakers

Participants

Session Organisers