

# Letters to the Editor

## Coronary heart disease and stroke in developing countries: time to act

### From PEKKA PUSKA

Sirs—I was greatly confused by the article from Shah Ebrahim and George Davey Smith on 'Exporting failure? Coronary heart disease and stroke in developing countries' in the *Journal*.<sup>1</sup> What was the message?

In some respect it brought to my mind a similar editorial from the *Journal* 28 years ago; 'Shot gun prevention?' in 1973.<sup>2</sup> That editorial started 'Are we yet ready to attack coronary artery disease through prevention programmes in the community?' The text was critical of the start of the North Karelia Project in Finland and stated that further research and development is needed, with reference to another Professor Smith.

In spite of the critics 30 years ago, the work was started in Finland: during the first five years in the Province of North Karelia as national pilot and work on national level was started after that.<sup>3</sup> During the original 5 years (1972–1977), reductions in risk factors in North Karelia were significantly greater than in the original reference area. And in the 1970s the decline in coronary heart disease mortality (among the 30–64-year-old male population, age adjusted) was significantly greater in North Karelia than in all Finland or the reference area.<sup>3,4</sup> After the national work was intensified, the national decline accelerated. By 1995 the (25 year) decline in male CHD mortality was 73% in North Karelia and 65% in all Finland.<sup>5</sup> Tobacco-related cancers among men declined so that by 1995 the annual age-adjusted mortality was 71% less, and the decline was significantly greater than in the rest of the country. Thus in 25 years a dramatic change in CHD and NCD burden has taken place in accordance with the set objectives: a demonstration first in North Karelia and later on in all Finland.

The MONICA results have shown that most of the decline in CHD mortality in Eastern Finland has been due to changes in incidence, not case fatality.<sup>6</sup> Furthermore, separate analyses have shown that most of the reduction in CHD mortality can be explained by the reduction in the population levels of the target risk factors.<sup>7</sup> Thus there is strong evidence that prevention has worked in Finland. Ebrahim and Davey Smith should have made the effort to go through some of the main publications.

The message of Ebrahim and Davey Smith is remarkably similar to the mentioned editorial of 1973: critical of preventive action, and asking for more research. While it is easy to argue that more research is needed, that should not be presented as an alternative to necessary action. When we started work in North Karelia a journalist asked me a critical question 'Is this going to be another academic study or is this project going to benefit the people?'. Although Ebrahim and Davey Smith are

still critical, people in North Karelia and Finland are certainly happy with the results obtained.

Actually the contemporary critics remind me of the oft-repeated story in Finland: A town had both a regular fire brigade and voluntary one—with some rivalry. And the professionals already did not appreciate the amateurs. Once the voluntary fire brigade had arrived earlier and had extinguished the fire. When the regular fire brigade came, their captain gave a sour comment 'Extinguished incorrectly!'. It seems like Ebrahim and Davey Smith think that CVD has been incorrectly prevented in Finland!

When comparing the critics of 1973 and 2001, one feels that little has changed. But the change in heart health in Finland has been great. And in addition to Finland, a number of other countries have started preventive work on various projects at local and national level. More and more countries agree: it is time to act. Of course there are questions on the components of the action, but the comprehensive preventive measures are cheap in comparison with the huge costs of treating CVD and its consequences. Furthermore, inbuilt surveillance and process evaluation guide the work.

Ebrahim and Davey Smith emphasize an important point about 'the role of government in population approaches to prevention'. This is a key lesson from Finland and many other countries. The approach in Mauritius and other early approaches in many developing countries also follow this model: comprehensive national action.<sup>8</sup>

The real question is how to persuade governments to adopt needed preventive policies. My experience is that policy makers listen less to scientists, often seen to be in ivory towers, than to changes and activities actually taking place in their communities. Thus the community based programmes serve necessary political action by mobilizing people, by demonstrating the prevention possibilities and by providing training for personnel.

While I am sure Ebrahim and Davey Smith must have many valuable ideas and points, I am afraid that their message is again interpreted as justification for postponing actions that are necessary to fight the enormous cardiovascular epidemic. I cannot help making a reference to another recent article by the same authors and colleagues 'Dietary fat intake and prevention of cardiovascular disease: a systematic review'.<sup>9</sup> It was a strange review of very mixed small dietary intervention studies with short follow-up. Readers can conclude that dietary changes have little impact on cardiovascular rates, obviously a very harmful public health message.

Messages like that support the viewpoint, commonly supported by commercial interests, that prevention efforts are not worthwhile; instead we should concentrate on drug approaches and clinical treatment. Because the present article refers to the great burden and growing epidemic of cardiovascular diseases in the developing world, the message should be the

opposite: While treatment and prevention are both important and should support each other, especially in the third world with great scarcity of resources, major public health achievements can take place only as a result of population based prevention.

The global problem is huge: Much firm evidence exists for prevention. It is time to act—with sound theoretical base and sufficient preventive dose—from demonstrations to national policy actions—not exporting, but working in global partnership—and also putting one's heart into the action!

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## Developing effective and affordable models for non-communicable disease prevention and control

From FRANKLIN WHITE

Sir—The editorial on 'Exporting failure? Coronary heart disease and stroke in developing countries', although provocative, is stronger on rhetoric than on scientific reasoning.<sup>1</sup> For example, just because 'one enthusiast' made an inaccurate and refutable statement, this should not be a *cause célèbre*. Critical reviews should be more constructive than this.

An assessment of trends reveals that non-communicable diseases (within which cardiovascular disease is a major category) are increasingly important, and indeed most public health professionals would agree that something should be done about it. The *Burden of Disease* study concluded that by 1990 non-communicable diseases (NCD) had overtaken communicable diseases as the leading cause of mortality worldwide (56% of all deaths, not including injuries which accounted then for 10%, the remaining 34% attributable to communicable diseases). By year 2020, NCD were projected to account for 73% of global mortality, with communicable diseases declining to 15%. The only region not yet heavily affected by this double burden is sub-Saharan Africa. This analysis of trends, incorporating the DALYS methodology, has been widely disseminated.<sup>2</sup>

Other questionable assertions are also made, for example: 'The prevention of cardiovascular disease traditionally relies on the control of risk factors among individuals as a major element of any strategy. Such approaches—generally termed health promotion—are well illustrated by ... the Ottawa Charter'. On the contrary, the Ottawa Charter (1986) was ground breaking in its advocacy of healthy public policy, which the editorial later extols as the preferred approach. The Charter makes no mention anywhere of 'risk factors'. The following is a brief extract: 'The fundamental conditions and resources for health are peace, shelter,

education, food, income, a stable eco-system, sustainable resources, social justice and equity'.<sup>3</sup>

The editorial later digresses into the central role of poverty in determining health and disease. Most public health professionals would agree that addressing the root causes of poverty would likely do more for the health of the poor in all countries, than any number of specific health programmes. However, beyond advocacy, our role requires that we must also develop and test a variety of options for disease control and prevention. The decision framework must be evidence-based, and take into account disease burden, prevention effectiveness, cost effectiveness and affordability.

Regarding the North Karelia project, the editorial takes pains to show that similar declines occurred in the comparison county. However, readers also might like to know more about what happened in Finland, in particular the important finding that the majority (about 75%) of the major decline in heart disease mortality (73% reduction over 25 years in North Karelia itself) was explained by reductions in three risk factors: smoking cholesterol and blood pressure.<sup>4</sup> While a more positive account is given of the Mauritius project (one of the few documented efforts at integrated NCD intervention in a developing country), these two examples should be viewed as complementary and mutually supportive, especially in their recognition of the public policy element. The historical importance of the North Karelia project (initiated in 1972) is that it was the earliest attempt to organize NCD interventions for a large population (an entire province), which eventually influenced a whole country, and spawned the international CINDI network (Country-wide Integrated Non-communicable Disease Interventions) a decade later (1982). To be fair, intervention efforts should be considered in their historical and geographical context, not only with the exaggerated wisdom of hindsight. For example, if it

would serve a useful purpose, one could promote flaws in the work of John Snow.

Under the heading 'So, what do we do?' the editorial cites the 53rd World Health Assembly resolution on the need for a national policy framework. However, the resolution is fully consistent with principles outlined in several earlier statements, including the Alma Ata Declaration (1978). Coincident with the Ottawa Charter (1986), for example, Canada released a policy framework entitled 'Achieving Health for All'. According to its website, CINDI provides participating countries with such a framework.<sup>5</sup> Frameworks themselves of course are only a beginning, and a scientifically sound and managerially feasible approach is essential in order to transform them into practical actions.<sup>6</sup> While the CINDI network process has been ongoing for many years (and now includes 24 countries), since 1995, the Pan American Health Organization (PAHO/WHO) has been promoting a similar integrated model for NCD programming (CARMEN), piloted by Chile. CARMEN differs in emphasis from CINDI, in the context-appropriate inclusion of diabetes, cervical cancer and injury prevention, which are important issues for Latin America and the Caribbean.<sup>7,8</sup> Similarly, the Mauritius project is a member of the INTERHEALTH group of projects, another supportive network, similar conceptually and linked to the other networks.<sup>9</sup> The first step in all these models is a policy framework.

The potential of such frameworks for NCD prevention and control is broader than the editorial suggests: many risk factors and underlying determinants for coronary heart disease and stroke are equally applicable to other NCD outcomes. Measures such as tobacco control, dietary and physical fitness approaches, education regarding care seeking and even promoting quality of care where service is already being provided, are scientifically sound and potentially feasible in many developing countries.

#### From ROBERT BEAGLEHOLE

Sirs—I welcome your timely and perceptive views on the prevention and control of the increasing burden of cardiovascular disease in developing countries.<sup>1</sup> Though your comments are particularly addressed to the problems facing developing countries, they are also relevant for wealthy countries. Despite the limited successes in controlling the CVD epidemics in countries such as Australia, the USA, New Zealand and western Europe, these epidemics are completely uncontrolled in many Eastern European countries and CVD are still among the leading causes of premature death in most wealthy countries.

It is timely to encourage the development of surveillance systems for the major CVD and especially their risk factors. Estimates of the global burden of disease will be improved by these data. The surveillance data are also needed to help countries develop, implement and evaluate their prevention and control programmes. Several carefully chosen sentinel sites are required in each region. Ideally these surveillance sites should be based on public health training institutions. In most parts of the world these institutions are vulnerable and need long-term external support, especially for developing career pathways and

Lessons from the now many CINDI, CARMEN and INTERHEALTH projects around the world are valuable in helping to find a way forward in the prevention and control of NCD.

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research experience of the junior faculty. Surveillance projects could usefully connect these institutions to the communities they serve and to the ministry of health. Critical decisions need to be made about the choice of risk factors to be measured and when to include disease endpoints. There is a danger in overloading new systems and above all the utility of data to policy and action needs to be demonstrated.<sup>2</sup>

In terms of programmes and policies, there can be no serious argument with the need to focus on the population approach to primary prevention. In an ideal world, with unlimited resources, covering the full spectrum of preventive strategies would be useful. But nowhere do we have more than pitiful resources for prevention. It behoves us to make the best use of these resources. Working towards environmental change is the logical place to start. It is difficult to convince our professional clinical colleagues of the importance of this strategy and our lay constituency needs to be actively involved in debates on the use of limited resources.

The primary goal is to shift the risk factor distributions towards the left. Fortunately, we have evidence that this is possible and likely to be highly effective in reducing the burden of CVD.<sup>3</sup> Furthermore, we know that the major risk factors are qualitatively the same in all regions of the world<sup>4</sup> and, that

where the epidemics are fully developed, these risk factors explain the vast majority of new events of CVD.<sup>5</sup>

I trust that your editorial encourages a greater attention to applying the knowledge gained from decades of careful and productive public health sciences.<sup>6</sup> I also hope that the *IJE* will devote more of its pages to explorations of the policies and programmes needed to implement the population approach to primary prevention.<sup>7</sup>

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## Editors' Response—exporting failure

From SHAH EBRAHIM and GEORGE DAVEY SMITH

Our editorial described the limited effects of comprehensive cardiovascular disease prevention programmes, widely evaluated in the developed world, and questioned their relevance to developing countries.<sup>1</sup>

Dr Puska complains that we have not read the findings of the North Karelia study carefully enough. Interpretation of what is shown by the North Karelia study depends on understanding the nature of the intervention, the time frame over which changes were examined, and whether one is primarily interested in 'explaining' the changes observed within North Karelia without reference to other studies examining the same question. The intervention comprised five arms: health education, screening, a hypertension programme, 'intensification of treatment' (secondary prevention), and rehabilitation, and as such, was focused mainly on individuals rather than the population at large.<sup>2</sup> As shown in Table 1 of our editorial, the reductions in risk factors were, in fact, very similar after 10 years intervention in the control and intervention communities.<sup>1</sup> CHD mortality trends over the period 1969 to 1995 show a greater decline in North Karelia than the rest of the country, but the 95% confidence intervals for the slopes overlap.<sup>3</sup> An intriguing pattern of decline is hidden in the overall trend. First, North Karelia experienced an almost immediate and rapid decline, a rise and a fall in CHD mortality (1971–1975). Second, rates of decline were significantly greater in the country as a whole than in North Karelia (1976–1985). Finally, death rates tended to approximate to each other (1986–1995). Such trends do not provide unambiguous support for the hypothesis that the intervention was effective.

Dr Puska suggests that we have not made the effort to go through the publications from the North Karelia group. We have made this effort, but like other readers we end up somewhat confused. For example one of the original North Karelia investigators, Jukka Salonen, dissented from the view held by the more enthusiastic members of the team that a favourable effect on mortality could be attributed to the intervention.<sup>4</sup> Both Dr Puska and Dr White cite a paper<sup>5</sup> which concluded that in Finland 'changes in risk factors explained

almost all of the decline in mortality from ischaemic heart disease in the 1970s, but in the 1980s the mortality declined more than predicted by changes in risk factors'. Obtaining a greater than expected payback is a remarkable achievement indeed, but one of the North Karelia project authors on this paper then went on to co-author a paper stating that 'temporal trends in mortality from coronary heart disease are not adequately explained by the lifestyles of Finnish men and women'.<sup>6</sup> Making the effort to go through the publications actually leads to increased uncertainty and confusion. We would suggest that it is precisely those commentators who have not taken the trouble to read the full range of publications who are the ones who repeat the glib—and traditional—declaration of victory that has emanated from some of the less critical members of the health promotion fraternity.

It is less well known than it should be that the North Karelia study was one of a family of studies using a similar protocol and launched by World Health Organization in 1974 called the Comprehensive Cardiovascular Community Control Programme (CCCP).<sup>7</sup> These other programmes were run in Hungary, USSR, Switzerland, Norway, Italy, Yugoslavia and both German republics. Although the North Karelia project has generated many more publications than other comparable projects conducted over the last three decades, these other projects are worthy of our attention in making a balanced decision about what does and does not work. We are rather surprised that neither Dr Puska nor Dr White refer to these.

Most of these CCCP studies did not find their way into accessible peer-reviewed scientific journals and those that did, together with other related studies demonstrated methodological weaknesses and generally rather disappointing findings.<sup>8,9</sup> A WHO report on the CCCP studies edited by Dr Puska<sup>10</sup> attempted to put a gloss on the effectiveness of the projects that was not supported when the effort was made to read the tables actually published in the book. For example in the case of the Swiss project an increase in antihypertensive therapy in the intervention communities was said not to be 'reflected in mean blood pressure levels'. This is something of an under-statement; a

table in the book shows that blood pressure showed a significant relative increase in the intervention communities! The text suggests that in the then German Democratic Republic male CVD mortality was favourably influenced, whereas a table in the book shows that the intervention community was experiencing a decline in CVD mortality before the onset of the project which reversed to an increase, whereas the control community was experiencing a rise in CVD mortality which continued after project initiation.

The overall findings of these projects, as opposed to cherry-picking the results of the one apparent 'success', are rather similar to those of our systematic review of randomized controlled trials of multiple risk factor interventions, with a relative risk reduction for CHD mortality of -4% (95% confidence intervals -11%, +4%) demonstrating how limited the effects of this approach are.<sup>11</sup>

The 1973 editorial *Shot-gun prevention?*, cited by Dr Puska, suggested that two questions remained to be answered in the context of prevention programmes of this nature: do most cases fall into the high-risk category, and is there evidence that intervention is beneficial?<sup>12</sup> We now have the answers to these questions: No, and Not very. Far from reiterating the arguments in this old editorial we used the evidence that has accumulated over the last 30 years to provoke scientists and policy makers to think seriously about whether our experience and disappointments in not achieving more with CHD and stroke prevention programmes should be applied in much poorer countries, or whether we should carry on wearing the rose-tinted spectacles of those authorities who fail to consider the totality of the evidence.

We greatly appreciate Dr Puska's professional and amateur fire-fighter story; if the fire is put out, who cares how it was done, particularly if the benefit was achieved for less money? But in central Europe and the former USSR, CHD and stroke are increasing dramatically, notwithstanding the major investments that were made in comprehensive preventive services—but presumably Dr Puska would argue that the fire-fighters in these countries are not as good as in Finland. There is no doubt that risk factor declines have occurred, both in Finland and in other countries, over the last two decades and these explain, in part, the declines in CHD mortality.<sup>13</sup> The MONICA studies have also demonstrated that case-fatality declines have occurred suggesting that better medical care has also played an important role.<sup>14</sup>

It is vital that we understand what drives cardiovascular disease trends upwards and downwards if we are to achieve better CVD control. In developing countries with virtually no resources for prevention of non-communicable diseases (NCD) a comprehensive approach, as used in Mauritius, may only be feasible if funded by research programmes.<sup>15</sup> In Mauritius, cholesterol reduction was achieved by switching the supply of cooking oil—a population strategy—and not by dietary advice to individuals and families. The cost-effectiveness of these two strategies is vastly different and while wealthy developed countries may value the potential synergy between population and individual risk factor intervention, it is not without cost.

We agree with Dr Beaglehole that surveillance systems are an essential component of any prevention strategy and welcome WHO's work in developing better NCD systems particularly in the third of countries where DALY estimates can only be guesses.<sup>16</sup> The various networks, described by Dr White, that

have arisen following the CCCP initiative are clearly valuable in providing a range of frameworks for action and research. We are grateful to Dr White for correcting our misrepresentation of the Ottawa Charter which, unlike other policies of that time, provided the ideological template for the 53rd World Health Assembly resolution.

Unfortunately, our best guesses about what to do to reduce the levels of common risk factors in the population—exemplified by the complex comprehensive community interventions tested in the COMMIT study, the Stanford Studies, the Minnesota and Pawtucket Programmes—do not appear to deliver. Surely these intervention failures teach us that their application in poorer countries is unlikely to be of much help, but will certainly use resources. We therefore support Dr Beaglehole's view that we should try to find out how we could do better.<sup>16</sup>

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## What's the good word—preventive or preventative?

From **BOBBY JOSEPH**

Sirs—While perusing the list of members of the International Epidemiological Association Council, I was surprised to find that one of your members (Dr Babu L Verma) as belonging to the Department of Social and *Preventative* Medicine of the MLB Medical College in India.

My knowledge of English (obviously limited) convinced me that the word *preventative* did not exist in the language. I was further influenced by the fact that in India most departments dealing with the subject are referred to as the Department of Social and Preventive Medicine. In addition the most commonly used textbook on the subject in India, over the past thirty years, is referred to as a 'Textbook of Preventive and Social Medicine'.

This led me to a dictionary that informed me that *preventative* is an irregularly formed doublet meaning 'one of two

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words from the same language derived from the same original'.

In this day and age of computers, internet and online searches of medical literature this etymological issue has certain implications. For instance, I searched Medline for topics related to the subject using the key words 'preventive medicine' and found 20 545 articles related to the topic, while the words 'preventative medicine' elicited 101 articles on the topic. A search on PubMed revealed similar results—18 122 for 'preventive medicine' and 90 for 'preventative medicine'. The obvious point is that those who are accustomed to using the word *preventative* should bear in mind that the use of the common word *preventive* would yield significantly more results on an electronic search of medical literature. It seems though that in the opposite case researchers would not lose more than 0.5% of the material.

Further, journals should be encouraged to use the more common term in order to facilitate a process of optimum benefit to users of electronic literature searches.

## Editor's response—preventive or preventative?

From **SHAH EBRAHIM, Co-Editor**

We are indebted to Dr Joseph for pointing out an error in the departmental title of a council member. This has now been changed. But which is correct—preventive or preventative? The Oxford English Dictionary provides both spellings but states that the former is the preferred formulation. A recent medical usage is cited: 'Many of the people are illiterate and it takes a lot of patient talking and convincing before they can see the benefits

of preventative medicine'. (*Oxf. Mission Q. Paper July/Sept. 15, 1976.*) The word can also be used as a noun: 'I shall not trouble Government with suggestions of remedies or preventatives'. (*Wellington in Gurw. Desp. (1838) IX. 462.*) Perhaps it was the use of the word 'preventative' to mean a contraceptive that has resulted in its declining usage in the context of departments of public health medicine.

## Childhood Cancers and the Viral Hypothesis

From **ALICE STEWART**

Following the discovery of a high frequency of childhood leukaemias in mixed populations, Kinlen and Doll postulated the existence of a virus which causes leukaemia in a sensitive child, and decided that these cases are the reason why leukaemia clusters are relatively common both in new towns and in regions which have experienced a big influx of nuclear workers.<sup>1</sup> But other possible explanations need to be considered.

For example, according to the Oxford Survey of Childhood Cancers juvenile neoplasms have foetal origins and are caused by mutations which have teratogenic as well as carcinogenic effects.<sup>2</sup> Competing causes of death are common and may come from faulty maturation of tissues which are essential for *in-utero* survival (abortion hazard), from faulty maturation of haemoglobin (stillbirth hazard) and from loss of immunological competence during the latent phase of all childhood cancers, especially leukaemia (infection hazard).

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When infections were common causes of infant mortality, myeloid and lymphatic forms of childhood leukaemia were equally rare conditions. But the big increase in childhood leukaemia which accompanied a fall in the infection death rate was restricted to lymphatic cases<sup>3</sup> and left a strong impression of fewer mutations in myeloid than lymphatic components of the reticulo-endothelial system.

Following the discovery of antibiotics the infection hazard lost much of its potency; and from being events which reduced the cancer risk (by killing the patient) pneumonia and other serious infections became events which increased the cancer risk by a) prolonging the lives of children who had already reached a late stage of pre-leukaemia and b) causing further loss of immunological competence. By this time an analysis of official statistics of mortality had revealed a strong negative correlation between two causes of early death (pneumonia and leukaemia)<sup>4</sup>; and haematologists had discovered that, in children with myeloid leukaemia, levels of foetal haemoglobin are much higher than normal.<sup>5</sup>

According to these observations the viral hypothesis is not serving any useful purpose and we should be looking for the causes of leukaemia clusters, not among possible effects of a hypothetical virus, but among factors which cause early mutations and influence the behaviour of mutant cells.

In short, the scarcity of myeloid leukaemia in children could be the result of a stillbirth and sudden death hazard;<sup>6</sup> the high frequency of lymphatic leukaemia in mixed populations could be the result of cross infections and antibiotics, and clusters of lymphatic leukaemia in populations which have experienced a big influx of nuclear workers could be the result of cross infections, antibiotics and high levels of background radiation.

Finally, among children who have survived repeated attacks of malaria the commonest cancer is an unusually localized lymphoma (Burkitt tumour). It is customary to ascribe these tumours to a virus but they could be the result of exceptionally

high levels of immunological competence preventing metastatic spread of cancer cells.

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## Gay life expectancy revisited

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Over the past few months we have learnt of a number of reports regarding a paper we published in the *International Journal of Epidemiology* on the gay and bisexual life expectancy in Vancouver in the late 1980s and early 1990s.<sup>1</sup> From these reports it appears that our research is being used by select groups in US<sup>2</sup> and Finland<sup>3</sup> to suggest that gay and bisexual men live an unhealthy lifestyle that is destructive to themselves and to others. These homophobic groups appear more interested in restricting the human rights of gay and bisexuals rather than promoting their health and well being.

The aim of our research was never to spread more homophobia, but to demonstrate to an international audience how the life expectancy of gay and bisexual men can be estimated from limited vital statistics data. In our paper, we demonstrated that in a major Canadian centre, life expectancy at age 20 years for gay and bisexual men is 8 to 21 years less than for all men. If the same pattern of mortality continued, we estimated that nearly half of gay and bisexual men currently aged 20 years would not reach their 65th birthday. Under even the most liberal assumptions, gay and bisexual men in this urban centre were experiencing a life expectancy similar to that experienced by men in Canada in the year 1871. In contrast, if we were to repeat this analysis today the life expectancy of gay and bisexual men would be greatly improved. Deaths from HIV infection have declined dramatically in this population since 1996. As we have previously reported there has been a threefold decrease in mortality in Vancouver as well as in other parts of British Columbia.<sup>4</sup>

It is essential to note that the life expectancy of any population is a descriptive and not a prescriptive measure.<sup>5</sup> Death is a product of the way a person lives and what physical and

environmental hazards he or she faces everyday. It cannot be attributed solely to their sexual orientation or any other ethnic or social factor. If estimates of an individual gay and bisexual man's risk of death is truly needed for legal or other purposes, then people making these estimates should use the same actuarial tables that are used for all other males in that population. Gay and bisexual men are included in the construction of official population-based tables and therefore these tables for all males are the appropriate ones to be used.

In summary, the aim of our work was to assist health planners with the means of estimating the impact of HIV infection on groups, like gay and bisexual men, not necessarily captured by vital statistics data and not to hinder the rights of these groups worldwide. Overall, we do not condone the use of our research in a manner that restricts the political or human rights of gay and bisexual men or any other group.

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- <sup>3</sup> Based on correspondence with Olli Stålström regarding use of our paper by some Finnish citizens to oppose a proposed to legalize civil unions between members of the same gender (website: [http://www.finnqueer.net/juttu.cgi?s=80\\_10\\_1](http://www.finnqueer.net/juttu.cgi?s=80_10_1)).
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