

# One in 30 people in the UK take part in cohort studies

On March 21, 2014, the UK Medical Research Council (MRC) published *Maximising the Value of UK Population Cohorts: MRC Strategic Review of the Largest UK Population Cohort Studies*,<sup>1</sup> funded by the MRC and other major funders. The MRC has a 50-year history of supporting population cohort studies, including the 1946 Birth Cohort,<sup>2</sup> the world's longest continuously running birth cohort, UK Biobank,<sup>3</sup> which tracks half a million participants, and the Million Women Study,<sup>4</sup> the largest longitudinal study of women's health. Almost £30 million is spent per year on the 34 largest UK population cohort studies, half of which have been followed for more than 20 years. Most cohort participants are aged 45 years or older (92%) and female (62% after exclusion of the Million Women Study), with men aged 20–40 years less well represented. Given that science is dependent on the support and engagement of the public, it is noteworthy that 2·2 million people in the UK are currently taking part in these large population cohort studies—one in 30 of the general population.<sup>1</sup>

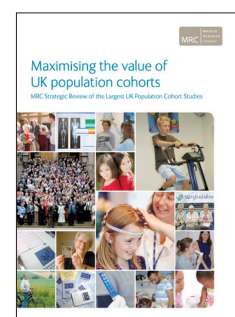
Population cohort studies are a major long-term commitment for participants, study teams, and funders, but their strength is in their ability to identify multiple risk factors over time. This is particularly relevant in assessment of exposures that cannot be randomised, notably health behaviours such as smoking and social circumstances, or in identifying the effect of one risk factor on multiple outcomes. For example, long-term follow-up in the European Prospective Investigation of Cancer (EPIC) Norfolk study showed that exercise, a healthy diet, and not smoking increased life expectancy by 14 years.<sup>5</sup> The Million Women Study has measured the effects of hormone-replacement therapy on fracture incidence, cancers, and other conditions.<sup>4</sup>

The UK population cohort portfolio has wide coverage: from before conception to old age, both sexes, and all major ethnic groups. Cohorts are generally more inclusive than randomised trials which are usually highly selective. Findings from cohort studies can, therefore, be more generalisable to the population as a whole. In addition, some cohorts, such as the Avon Longitudinal Study of Parents and Children (ALSPAC),<sup>6</sup> include data from several generations that enable investigators to study familial clustering of risk and disease and the underlying mechanisms.

The *Strategic Review* highlights how new technologies have been readily adopted by cohort studies. 68% of UK cohort studies have undertaken genotyping, and half have epigenetic or metabolomic data.<sup>1</sup> The inclusion of genotyping in large cohorts with longitudinal phenotypic information enables more robust studies of gene–environment interactions, such as in the Lothian cohort which showed that genetic factors account for only a quarter of change in intelligence with age.<sup>7</sup> Another strength of many cohorts is the collection of serial measurements and samples that enables measurement of changes in exposure and their effect on health outcomes over time. Some findings that have emerged from UK population cohorts are now widely accepted. The 1946 Birth Cohort provided some of the clearest evidence for the long-term effects of adverse early life circumstances on adult health.<sup>8</sup> The Whitehall Study was one of the first to suggest that low sense of control and variety at work contribute to occupational gradients in health.<sup>9</sup> A retrospective cohort study of people born in Hertfordshire was the first to link birth and early childhood weight with adult mortality and show the importance of early environment on lifelong health.<sup>10</sup>

Cross-cohort collaborations are an effective way to increase statistical power. The Healthy Ageing Across the Life Course (HALCyon) collaboration<sup>11</sup> merged data from nine cohorts to undertake studies of ageing that would not have been feasible using any single cohort. Similarly, the Cohort and Longitudinal Studies Enhancement Resources (CLOSER) initiative,<sup>12</sup> funded by the MRC and Economic and Social Research Council, brings together nine cohorts with the aim of combining variables across these studies.

Some cohorts might not be representative of the general population in terms of demographics and lifestyle, but the results may nonetheless be generalisable. The generic weaknesses of prospective cohort studies are that they are time consuming to maintain, costly, and can experience systematic loss to follow-up. New strategies are helping to address some of these inherent problems; many cohorts obtain consent to link participants to routine health records, which reduces loss to follow-up and recall bias and is less expensive than active follow-up, and some use remote data capture through the internet. Remote data



capture techniques could have an adverse impact on recruitment, retention, selection bias, and the ability to collect samples. Therefore, the *Strategic Review* recommends that the merits of adopting these less costly approaches should be considered on a case by case basis and adopted where appropriate. UK Biobank collected extensive data at baseline clinics but all follow-up information is via record linkage and online questionnaires. The *Strategic Review* recommends that, where possible, broad and enduring consent should be obtained from the participants of all cohorts to obtain additional information through linkage to routine data.

Trustworthy research use of personal data using robust governance processes in secure environments with safeguards that protect confidentiality is fundamental to understanding the causes of disease and improving public health. In addition to spotlighting individual cohorts, the *Strategic Review* contains a series of recommendations for the MRC and others. Although enhancing awareness of cohorts and sharing of data and samples are already policy for the MRC and other funders, more could be done to enable well-governed use of these resources. Therefore, the *Strategic Review* recommends that cohorts be included in online directories and appropriate meta-data provided. Also, cohorts should use standardised and validated approaches, where possible, to facilitate cross-cohort comparisons. The findings from the cohorts are of great value in informing policy and practice in the UK, as well as further afield, and the *Strategic Review* highlights the need for closer working with policy makers. It is envisaged that the *Strategic Review* will encourage more

extensive use of UK cohort studies in the future; they are an invaluable national resource that few other countries can match.

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## World TB Day 2014: finding the missing 3 million

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On April 23, 1993, WHO declared tuberculosis a global health emergency.<sup>1</sup> Tuberculosis is now about to come of age as a global emergency—April, 2014 marks the 21st anniversary of that declaration. Arata Kochi, manager of WHO's tuberculosis programme in 1993, aptly called the disease "a forgotten epidemic" and "humanity's greatest killer". Tuberculosis might no longer be humanity's deadliest disease in terms of annual deaths but, 21 years after the declaration, it remains a serious and substantial threat to the health of people worldwide, causing 1.3 million unnecessary deaths every year.<sup>2</sup>

Much progress has been made in the control of tuberculosis in the past 21 years, but we are only halfway to 2035—the target of WHO's Global Tuberculosis Programme as the year that tuberculosis will no longer be a threat to global public health. At that point, 42 years will have passed from WHO labelling tuberculosis a global health emergency; several more years than the average age of the disease's victims. So at this halfway point, we stand at a crossroads. Since 1995, 56 million people have been cured of tuberculosis and 22 million lives have been saved,<sup>2</sup> showing implementation of more effective