

Examining life-course influences on chronic disease: the Ribeirão Preto and São Luís birth cohort studies (Brazil)

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Abstract

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Received August 21, 2007
Accepted August 21, 2007
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More than any other low- and middle-income country, Brazil has the longest research tradition of establishing, maintaining and exploiting birth cohort studies. This research pedigree is highlighted in the present issue of the *Brazilian Journal of Medical and Biological Research*, which contains a series of twelve papers from the Ribeirão Preto and São Luís birth cohort studies from the Southeast and Northeast of Brazil, respectively. The topics covered in this raft of reports vary and include predictors of perinatal health and maternal risk factors, early life determinants of cardiovascular risk factors in childhood and adolescence, use of health services, and a description of dietary characteristics of young adults, amongst other topics. There is also a guide to the background, objectives, sampling and protocols employed across these studies, which, together with similar pieces published in past issues of the *Brazilian Journal*, serve as a very useful starting point, particularly for potential collaborators. In the fervent hope that further follow-up of these cohorts will take place - we provide our own justification for cohort maintenance and extension in this issue - future data collection could include: genetic material, atherosclerosis, ascertained, for instance, by intima-media thickness, and IQ testing in children - scores from which are emerging as potentially important predictors of adult health outcomes up to six decades later.

Key words

- Birth cohort
 - Chronic disease
 - Developing country
 - Epidemiology
 - Life-course
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In an overview published in this issue (1), we briefly describe the significant and growing contribution of birth cohorts from high-income countries (of which there are many) to understanding chronic disease aetiology; outline the reasons why birth cohorts from low- and middle-income countries (LMIC, of which there are few) may yield different findings to those apparent in samples drawn from high-income societies, and the consequent need for the maintenance of such studies and the initiation of new ones; provide an audit of birth

cohorts from LMIC, and finally, advance future directions in this sphere of research. More than any other LMIC, Brazil has a growing reputation, built on a 30-year research tradition, of establishing, maintaining and exploiting birth cohort studies. Other countries considered to be at a similar stage of economic development are, with few exceptions (2), considerably less well represented, or, in the case of east Asia, north Africa, the Middle East, and the former Soviet Union, to our knowledge, do not feature at all (1).

This research pedigree is highlighted in the present issue of the *Brazilian Journal of Medical and Biological Research*, which contains a series of twelve papers from the Ribeirão Preto and São Luís birth cohort studies from the Southeast and Northeast of Brazil, respectively. This contrast of geographical location is important: in keeping with many other countries (3), a North-South divide in socioeconomic circumstances and, therefore health, exists in Brazil. The topics covered in this raft of reports vary and include predictors of perinatal health and maternal risk factors (4-7); early life determinants of cardiovascular risk factors (e.g., dyslipidemia) in childhood and adolescence (8-11); use of health services (12), and a description of dietary characteristics of young adults (13), amongst other topics (14). There is also a guide to the background, objectives, sampling, and methodologies employed across these studies (15), which, together with similar pieces published in past issues of the *Brazilian Journal* (16), serve as a very useful starting point, particularly for potential collaborators. Some papers herein cover particularly topical issues which include individual- and group-level influences on selected risk factors for chronic disease (5,6) and, inevitably, but very importantly given the forecast of rapid nutritional (epidemiological) transition in Brazil and other LMIC (17), determinants of childhood and early adult obesity (8,9,11).

As indicated by the authors (18), one of the principal objectives of these cohorts is the investigation of life course influences on chronic disease. Given that such conditions, at least in their somatic form, only begin to emerge with sufficient prevalence to enable epidemiological investigation in middle-age, it will be many decades before even the longest running of the studies (Ribeirão Preto, established in 1978/79) yields such insights (assuming it continues to be maintained). However, a number of potentially important uses of existing data remain, many of which

are actively being pursued by Barbieri and colleagues and feature in this issue, have been published elsewhere, or are on their agenda (15).

First, as indicated, while chronic somatic diseases are rare in these cohorts given their immaturity, psychiatric illnesses (e.g., depression, generalized anxiety disorder, post-traumatic stress disorder, attention deficit hyperactivity disorder) are presumably not uncommon and, if measured, their aetiology, which may begin in early life (19,20), can be examined. The public health significance of this area of research is potentially considerable: by 2020 it is estimated that clinical depression, for instance, will become the number one cause of disability-adjusted life years in LMIC (21). Second, in what has been termed “the causes of the causes” (22), early life predictors (e.g., foetal growth, post-natal growth, social circumstances) of established (and potentially emerging) risk factors for cardiovascular disease and selected cancers such as raised blood pressure, dyslipidemia, obesity, body composition, cardiorespiratory fitness, physical inactivity, dietary characteristics, smoking, coagulation indices, and inflammatory markers, have been reasonably well examined in developed countries. What is needed now are tests of the same relations in LMIC. Third, an intriguing new hypothesis has linked dehydration in early life (precipitated most commonly by diarrhoea) with later raised blood pressure (23), an established risk factor for stroke and coronary heart disease. While there has been some empirical support for a childhood diarrhoea-blood pressure association (23,24), it is not universal (25). This association, if replicated in studies from LMIC, has particular public health relevance as diarrhoeal illness is more common (23). A higher prevalence of this exposure will also lead to improved precision in studies correlating diarrhoea with blood pressure.

In the fervent hope that further follow-up of these cohorts will take place - we provide our own justification for cohort maintenance

and extension in this issue (1) - future data collection could include: genetic material (in keeping with birth cohorts from affluent societies (26) and LMIC (27,28)); atherosclerosis, ascertained, for instance, by intima-media thickness, and IQ testing - scores from which are emerging as important predictors of adult health outcomes (29-31) (studies of IQ-risk factors may provide clues as to the mediating pathways (32)).

The clear need for a broader worldwide representation of birth cohort studies would be hastened by a greater international collaboration in the sharing of ideas, fieldwork experience, cross-nation cohort comparisons,

and data, in order to carry out the best science in the most productive manner (1). This requires the involvement of a central overseeing agency - such as the World Health Organization - that has the trust of all countries and the resources to develop strategic plans for 'global' life-course epidemiology.

Acknowledgments

I am grateful to Naomi Hemy for bibliographical assistance. Part of this manuscript was written while David Batty was a visiting fellow at Instituto Materno Infantil Prof. Fernando Figueira, Recife, PE, Brazil.

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