Toward a National Birth Cohort Study in China

See also Yu, p. 2086.

China has a strong need and good reasons to conduct a large-scale birth cohort study. Environmental pollution is a serious problem in some parts of the country. Infertility, miscarriage, birth defects, childhood asthma, childhood obesity, and sexual prematurity have all reportedly increased in recent years,[1] but the causes remain elusive. With fewer children in each family, child health is often the central focus of a family. Rising maternal and child morbidity raise serious public concerns.

China also has great variations in geographic characteristics, nutrition, regional economy, and tradition. The uneven economic development among regions has resulted in disparities in health status and disease characteristics of the local populations. In some areas, the disease pattern is similar to that of a developed country, whereas in others it resembles that of a low-income country.[2] Thus, a national birth cohort study in China could offer rich opportunities to study a variety of social and cultural factors, environmental exposure, and nutrition, behavior, and genetic factors in child health and development.

Equally important is that China has a well-established maternal and child health (MCH) care system, with almost 100% coverage of women and children. "MCH Centers," an administrative entity for MCH, are instituted at national, provincial, city, and county levels.[3] These centers are usually based in maternity or children's hospitals and are responsible for all MCH programs within their administration region. This vast MCH network with a centralized administration system provides an excellent opportunity to carry out a large-scale prospective cohort study efficiently. In a word, a national birth cohort study in China is important, feasible, and affordable.

China has conducted similar large-scale studies before. The China–US Collaborative Project for Neural Tube Defect Prevention contributed to the dramatic decrease in this defect by promoting folic acid supplementation in the past decades.[4] Much smaller but more comprehensive birth cohort studies have been launched in several cities in recent years.[5] Considering China's population size and vast rural areas, a national birth cohort study is warranted. However, substantial challenges lie at every step in building such a cohort.

It is considered ideal to have a cohort that starts before conception. China is one of the few countries in the world that have an infrastructure that facilitates preconception recruitment. The government promotes preconception care to reduce birth defects and improve pregnancy outcomes by offering free preconception care to couples nationwide who plan to initiate a pregnancy. Investigators can recruit couples at designated preconception care clinics, which are usually located in maternity hospitals. Having a preconception cohort enables us to prospectively study both male and female contributions to reproductive outcomes, early human development, and offspring health.

However, a preconception cohort has drawbacks. For various reasons, some couples do not try to conceive consistently or later decide not to conceive in the near future. Thus, more women and longer time were needed in the preconception cohort than in an early pregnancy cohort.

For example, the Shanghai Birth Cohort Study (www.shyousheng.net) recruited approximately 1200 preconception couples. By the end of a 12-month follow-up, approximately half of the participants were infertile, had miscarried, were still not pregnant, or were lost to follow-up. Furthermore, couples who seek preconception care tend to be better educated and have higher socioeconomic status. Thus, the preconception sample is less representative of the general obstetric population than is the early pregnancy cohort. A hybrid design incorporating both preconception and early pregnancy cohorts may be more practical and can serve different purposes.

With its comprehensive MCH network, China can apply both hospital-based and community-based recruitment strategies. Hospital-based recruitment will be much more efficient when recruiting couples before or in early pregnancy. Conversely, to follow the children for a long time, the community-based approach has advantages. A combination of hospital-based recruitment and community-based child follow-up can make the best use of the system. Thus, the sampling strategies are likely to be complex. Great care must be taken when selecting participating hospitals to achieve a balance between efficiency and feasibility and population representativeness.

Recruitment and biospecimen collection consume a substantial portion of the budget;

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thus, efficiency is paramount. China has more than 16 million births a year, allowing the enrollment of a large number of women in a short period. To do so requires a high degree of cooperation from relevant clinical staff members at all levels. But the high volume of births makes it difficult to achieve this goal. A sufficiently large research staff and simplified procedures must be in place to minimize the workload of the clinical staff.

We have developed a system that streamlines recruitment, information acquisition, biological sample collection, and processing. After a woman has consented to participate in the study, named the "Early Life Plan," her information is entered into the hospital electronic record system. The research database can be linked to the hospital information system to download relevant clinical information.

Nonetheless, the most challenging task of a national birth cohort study in China is to follow the children for a long time. After a six-week postpartum checkup at the birth hospital, routine child health care (e.g., monitoring child growth and development and providing vaccination) is in the hands of community clinics where the children are registered. But the community clinics are numerous and scattered, which increases the difficulty of study management. Calling the parents to bring the children back to designated hospitals at a specific time may incur losses for various reasons. Thus, integrating the follow-up visits with routine child health care visits can improve the participants' cooperation. Occasional home visits may be necessary when the children do not return.

Specialized tests (e.g., neurodevelopmental assessments) may be offered in designated hospitals. Having a local MCH center in hospitals is desirable. The MCH staff members and social workers at the community level can contact the participants and even make home visits more conveniently. Training and standardization will be key to collecting high-quality data.

The identification and confirmation of the child diseases of interest can present another major challenge. China does not have a nationwide medical registry system. The identification of diseases in a cohort study currently relies mostly on parents' report at the follow-up visits. Although some cities have centralized electronic medical records, many areas still do not. Thus, confirmation of self-reported diseases involves reviewing medical records, extracting essential clinical information, and making uniform diagnoses. Until a nationwide disease registry system becomes available, great efforts are needed to identify and confirm diseases of interest.

This complex, long-term study may be led by a team of scientists designated by the funding agency with input from the scientific community, advisory committees, subject matter experts, and field operatives.[6] A transparent, sound governance and data sharing policy is critical. Maintaining the commitment of long-term, high-level government funding and close communication between scientists and policymakers will be essential. The study must be highly visible to the public and engage various communities.

Translating findings from science to medical practice and public health policy is not optional; it is indispensable. Furthermore, international collaboration cannot only increase the sample size to tackle rare diseases but also must confirm findings from one population to another. We believe that a national birth cohort study can have immediate benefits for MCH and long-term impact on adult health in China. Findings from such a cohort will have significant regional and worldwide clinical and public health implications. AJPH

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