

Foreword

Precision Public Health in China: Opportunities and Challenges

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“Precision Public Health,” a term proposed in 2013, had riled up mixed feelings and intense debates during the early days of its use (1–6). Critics often considered “Precision Public Health” as a version of “Precision Medicine” at the population level and fretted over the prospect that the concept may take focus away from social determinants of health (1–2). In defense, Richard Horton argued that “Precision public health is about using the best available data to target more effectively and efficiently interventions of all kinds to those most in need.” (3). Khoury et al. defined “Precision Public Health” as “the delivery of the right intervention to the right population at the right time, and includes consideration of social and environmental determinants.” (4). Khoury and colleagues reviewed the evolution of the field of public health genomics, its relations to the core public health functions, and how it contributed to the emergence of the concept of precision public health (5). The coronavirus disease 2019 (COVID-19) pandemic further highlighted the importance of precision public health, a key tool of surveillance through both laboratory tests among infected and at-risk persons and wastewater sequencing (7–8). Genomic information is also critical for the rapid development of COVID-19 therapeutics, in addition to the more prominent case of messenger ribonucleic acid (mRNA) vaccines (9).

As one of the six countries involved in the Human Genome Project, China is a critical player of the global genomic research community (10–12). National registries with genomic information include the China Kadoorie Biobank and the Chinese National Twin Registry (13–14). Home to one of the fastest-growing genomics markets, China has immense potential for its precision public health research and practice (15).

The collection of articles in this special issue addresses aspects of precision public health in the context of China. Sun et al. examined the practice of breast cancer genetic testing in China and suggested that the benefit of genetic testing at breast cancer diagnosis in China could be larger than in Caucasian populations (16). Zhu used a discrete choice experiment and a mixed logit model to assess the preference over direct-to-consumer genetic testing among a Chinese population and provided estimates on the willingness-to-pay for genetic testing for physical traits, personality, and dietary recommendations (17). Jiang reviewed the guidelines for disclosure of secondary (or incidental) genomic findings, i.e., the risks of genetic-related conditions not requested by the patient, and advocated for the creation of local guidelines on secondary findings in China (18). Chen et al. provided a scoping review of studies on ethical, legal, and social implications of genomics in Chinese language and summarized them in four broad themes, i.e., ethical considerations, regulatory framework, perceptions of genomics and precision medicine, and future directions (19).

Indeed, as prior literature forcefully argued, precision public health encompasses the use of genomic information, big data, and traditional means of risk stratification, as well as their ethical, legal, and social implications (4–5,20). This special issue is an attempt to bring together perspectives from public health, economics, ethics, and health policy to understand the opportunities and challenges related to Precision Public Health in China. There is much to be accomplished in using Precision Public Health to improve population health in China and elsewhere.

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REFERENCES

1. Taylor-Robinson D, Kee F. Precision public health—the Emperor’s new clothes. *Int J Epidemiol* 2019;48(1):1 – 6. <http://dx.doi.org/10.1093/ije/dyy184>.
2. Chowkwanyun M, Bayer R, Galea S. “Precision” public health—between novelty and hype. *N Engl J Med* 2018;379(15):1398 – 400. <http://dx.doi.org/10.1056/NEJMp1808000>.

- 1056/NEJMp1806634.
3. Horton R. Offline: in defence of precision public health. *Lancet* 2018;392(10157):1504. [http://dx.doi.org/10.1016/S0140-6736\(18\)32741-7](http://dx.doi.org/10.1016/S0140-6736(18)32741-7).
 4. Khoury MJ, Engelgau M, Chambers AD, Mensah GA. Beyond public health genomics: can big data and predictive analytics deliver precision public health? *Public Health Genomics* 2018;21(5-6):244 – 50. <http://dx.doi.org/10.1159/000501465>.
 5. Khoury MJ, Bowen MS, Clyne M, Dotson WD, Gwinn ML, Green RF, et al. From public health genomics to precision public health: a 20-year journey. *Genet Med* 2018;20(6):574 – 82. <http://dx.doi.org/10.1038/gim.2017.211>.
 6. Weeramanthri TS, Dawkins HJS, Baynam G, Bellgard M, Gudes O, Semmens JB. Editorial: precision public health. *Front Public Health* 2018;6:121. <http://dx.doi.org/10.3389/fpubh.2018.00121>.
 7. Rasmussen SA, Khoury MJ, Del Rio C. Precision public health as a key tool in the COVID-19 response. *JAMA* 2020;324(10):933 – 4. <http://dx.doi.org/10.1001/jama.2020.14992>.
 8. Karthikeyan S, Levy JI, De Hoff P, Humphrey G, Birmingham A, Jepsen K, et al. Wastewater sequencing reveals early cryptic SARS-CoV-2 variant transmission. *Nature* 2022. <http://dx.doi.org/10.1038/s41586-022-05049-6>.
 9. Saravanan KA, Panigrahi M, Kumar H, Rajawat D, Nayak SS, Bhushan B, et al. Role of genomics in combating COVID-19 pandemic. *Gene* 2022;823:146387. <http://dx.doi.org/10.1016/j.gene.2022.146387>.
 10. Evangelatos N, Satyamoorthy K, Levidou G, Bauer P, Brand H, Kouskouti C, et al. Multi-omics research trends in sepsis: a bibliometric, comparative analysis between the united states, the european union 28 member states, and China. *OMICS J Integr Biol* 2018;22(3):190 – 7. <http://dx.doi.org/10.1089/omi.2017.0192>.
 11. Collins FS, Morgan M, Patrinos A. The human genome project: lessons from large-scale biology. *Science* 2003;300(5617):286 – 90. <http://dx.doi.org/10.1126/science.1084564>.
 12. Liu PP, Lu H, Li S, Moureau G, Deng YQ, Wang YY, et al. Genomic and antigenic characterization of the newly emerging Chinese duck egg-drop syndrome flavivirus: genomic comparison with Tembusu and Sitiawan viruses. *J Gen Virol* 2012;93(10):2158 – 70. <http://dx.doi.org/10.1099/vir.0.043554-0>.
 13. Chen ZM, Chen JS, Collins R, Guo Y, Peto R, Wu F, et al. China kadoorie biobank of 0. 5 million people: survey methods, baseline characteristics and long-term follow-up. *Int J Epidemiol* 2011;40(6):1652 – 66. <http://dx.doi.org/10.1093/ije/dyr120>.
 14. Huang T, Gao WJ, Lv J, Yu CQ, Wu T, Wang SF, et al. The Chinese national twin registry: a unique data source for systems epidemiology of complex disease. *Twin Res Hum Genet* 2019;22(6):482 – 5. <http://dx.doi.org/10.1017/thg.2019.85>.
 15. Illumina. Video: A Golden Age for China's NGS Industry. 2021. https://www.illumina.com/content/illumina-marketing/amr/en_US/company/news-center/feature-articles/a-golden-age-for-chinas-ngs-industry.html. [2022-7-10].
 16. Sun L, Manchanda R, Legood R, Yang L. Using genetic testing at cancer diagnosis for breast cancer control. *China CDC Wkly* 2022;4(32):711 – 4. <http://dx.doi.org/10.46234/ccdcw2022.148>.
 17. Zhu C. Demand for direct-to-consumer genetic testing services in China and its implications for precision public health—China, 2021. *China CDC Wkly* 2022;4(32):715 – 9. <http://dx.doi.org/10.46234/ccdcw2022.149>.
 18. Jiang S. A scoping review of global guidelines for the disclosure of secondary genomic findings to inform the establishment of guidelines in China. *China CDC Wkly* 2022;4(32):697 – 705. <http://dx.doi.org/10.46234/ccdcw2022.146>.
 19. Chen Z, Jiang W, Xu J, Jiang L, Wang G. Ethical, legal, and social implications of genomics in China: a scoping review and implications for precision public health. *China CDC Wkly* 2022;4(32):706 – 10. <http://dx.doi.org/10.46234/ccdcw2022.147>.
 20. Khoury MJ, Bowen S, Dotson WD, Drzymalla E, Green RF, Goldstein R, et al. Health equity in the implementation of genomics and precision medicine: a public health imperative. *Genet Med* 2022. <http://dx.doi.org/10.1016/j.gim.2022.04.009>.



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