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Original Research

Cross-sectional survey on public health informatics workforce in China: issues, developments and the future

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ABSTRACT

Objective: To explore the current situation and issues related to the development of the public health informatics (PHI) workforce in provincial and prefectural centers for disease control and prevention (CDCs) in China, and to describe the corresponding strategies to address these issues for the future.

Study design: National cross-sectional study.

Methods: One thousand two hundred and eighty-one respondents were selected at random from provincial and prefectural CDCs. The survey used a self-administered, structured questionnaire with an online data collection tool that integrated data quality control and user management. The questionnaire was divided into seven main categories. Score percentage of satisfaction and proportion in each part were calculated. Descriptive statistics were used to analyse the data, stratifying by country region, CDC level, job role and educational level.

Results: One hundred and sixty staff from provincial CDCs and 1121 staff from prefectural CDCs were selected. Only 7.4% (33/445) of prefectural CDCs were not involved in this survey, due to lack of PHI practitioners. CDC staff in the eastern region were predominantly aged 30–39 years (39.5%), which was much younger compared with the other regions ($P = 0.0012$). Only 34 respondents (2.7%) had academic majors in both health and information technology. More staff had Master's degrees and a higher level of education (18.7%) in the eastern region compared with the other regions ($P < 0.0001$). Staff in the eastern region in high-level positions and with a higher level of education were more knowledgeable about PHI strategy. Prefectural CDC staff were more satisfied with their work and training than provincial CDC staff. In the eastern region, 34.9% of staff were hired through competitive recruitment, and 57.8% of staff had received a job description with detailed information about their responsibilities, which was higher than in the other regions. Staff in the western region were more likely to leave if a better job became available (37.7%) compared with staff in the other regions ($P = 0.0116$).

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Conclusion: This study found regional disparities in PHI workforce development, possibly related to disparities in overall regional development. Findings showed a severe shortage of staff with a background in PHI, and occupational development paths were clearly lacking. Based on this study of current workforce issues, a comprehensive strategy for PHI workforce development in China has been described.

Introduction

Public health informatics (PHI) was defined in 1995 as systematic application of information and computer science and technology to public health practice, research and learning.[1,2] The knowledge domain of PHI includes public health, informatics, engineering, social science, management, etc. This concept is better known in the USA, where a number of PHI training programmes have been established, such as the two-year public health informatics fellowship programme at the US Centers for Disease Control and Prevention (CDC),[3] and academic training programmes at Johns Hopkins University, University of Utah and University of Washington.[4]

However, barriers to the widespread application of PHI exist worldwide, including a lack of public health practitioners who have received formal training in PHI.[5] A survey using information from 74 universities and colleges across Canada showed that of the 74 institutions searched, only eight institutions offered full health informatics-related programmes, and of these eight programmes, only one had content relevant to PHI.[6] In Australia, there was no clear definition and categorization of PHI, and PHI first appeared in the Australia's Health Informatics Conference in 2012.[2]

The technology necessary for effective, innovative application of health information to public health practice is available today at very reasonable cost.[7] Following the outbreak of severe acute respiratory syndrome in China in 2003, there were widespread applications for information technology (IT) in public health, such as the national web-based notifiable infectious disease surveillance system, emergency event reporting system, immunization management system, risk factor surveillance system, death and birth registry system, etc. Data centres with requisite hardware and software were also constructed at various CDC levels in China (four levels of CDCs in China cover most public health work, including one national CDC, 32 provincial CDCs, 354 prefectural CDCs and 3096 county CDCs). IT applications to support health reform and accelerate healthcare development will play an important role in the Twelfth five-year Plan period.

PHI is an interdisciplinary field and is relatively new in China, although some IT projects have been implemented in the public health domain. China is in great need of qualified public health informaticians to systematically perform increasingly complex tasks.[8] As the first national survey on PHI workforce development in China, this paper focuses on the current situation and development of a PHI workforce in CDCs in China based on a national cross-sectional study, with the aim of identifying issues and gaps, and describing a strategic direction for sustainable PHI workforce development in the future. The strategy for selection of respondents in the survey was based on a 2010 survey that covered nearly all CDCs in China, and investigated PHI workforce number, IT investments, network, hardware and systems development.[9] The 2010 survey showed an average of 10 informaticians in each provincial CDC, five in each prefectural CDC and four in each county CDC. Considering the lack of PHI workforce in most county CDCs, the 2012 survey was restricted to the informaticians at provincial CDCs, prefectural CDCs and county CDCs in municipalities directly under the Central Government.

Methods

Study design

The national PHI workforce online survey in CDCs in China was launched in July 2012 and completed in December 2012. Respondents were defined as CDC staff whose work was related to PHI, including statistics, information science, computer science, engineering and IT project management. They worked in information centres in CDCs, which were departments responsible for IT technical support. The supportive scope of the information centres covered all aspects of public health, including communicable diseases, non-communicable diseases, environmental hygiene, etc. The routine work of the respondents involved system design, system requirements analysis, data analysis, data mining, data sharing, and network and system maintenance. In total, 1281 respondents were selected at random (five per provincial CDC and three per prefectural CDC) based on the 2010 survey results (approximately 1800 PHI staff at provincial and prefectural CDCs). These respondents had been involved in work related to PHI in the CDCs for more than one year. The Director of the Information Centre in each CDC was responsible for the random selection of respondents. The survey was conducted through a self-administered, structured questionnaire, which was validated by human resources consultants and health professionals. It consisted of seven parts including: (1) demographic information (i.e. age, sex, education); (2) knowledge of PHI development in CDCs, including the goal of PHI development and the strategic plans for PHI in CDCs; (3) self-assessment of personal work (i.e. satisfaction with workload, fitness, salary, job role, clear job description) and CDC support (i.e. clear competency-based certification and workforce promotion pathways); (4) personnel training on PHI, including

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