Standard

Interpretation of the *Standards of Basic Dataset of Chronic Diseases Behavior Risk Factor Surveillance in Adults*[*]

ZHAO Yan Fang[1,2], ZHANG Mei[1], WEI Wen Qiang[2], SUN Ke Xin[2], LI Xin Hua[3,4], and WANG Li Min[1,3,#]

BACKGROUND

China's Behavioral Risk Factor Surveillance System (BRFSS) originated from the World Bank-funded Health VII Loan Project in the 1990s, which conducted behavioral risk factor surveillance in seven cities and one province[1]. Drawing on the World Health Organization's (WHO) STEPwise approach to surveillance (STEPs) and the U.S. Behavioral Risk Factor Surveillance System (BRFSS)[2,3], China formally established the China Chronic Disease and Risk Factor Surveillance System (CCDRFS)[4] in 2004, and carried out on-site surveys every three years. Six on-site surveys and information collection for surveillance were carried out during the period of 2004–2022, and a relatively sound workflow and working mechanism for collecting, processing, analyzing, and releasing surveillance data were formed. Strict surveillance data quality control is an important prerequisite to ensure that surveillance data from different regions of the country are accurate and comparable. Quality control is consistently applied throughout chronic disease and behavior risk factor surveillance. National Center for Chronic and Noncommunicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention (NCNCD) formulated a unified surveillance work plan, work manual, and questionnaire and conducted national-level training for each surveillance to ensure harmonized indicators and consistent information collection standards for chronic disease and multiple risk factor surveillance throughout the country. However, these working documents such as surveillance plans, manuals, and questionnaires have yet to be established standards to guide chronic disease and risk factor surveillance across the country. Standard setting is the key driving force and main support for guaranteeing the standardization of work and realizing high-quality development within the industry[5]. Due to little coverage of indicators and inconsistency in the definition of indicators[6,7], pre-existing standards in China in relation to chronic disease and risk factor surveillance were unable to meet the needs of assessing domestic and international plans and actions, such as the *Outline of the Healthy China 2030 Plan*, the *Medium and Long-term Plan for the Prevention and Treatment of Chronic Diseases (2017–2025),* and the *Healthy China Initiative (2019–2030)*, as well as the WHO's *Comprehensive global surveillance framework, including indicators, and a set of voluntary global targets for the prevention and control of noncommunicable diseases (2013–2025)*. Therefore, there is an urgent need to develop a set of harmonized and chronic disease and risk factor surveillance information that are in line with international practices and with China's national conditions to improve data collection and chronic disease risk factor assessment by the relevant organizations.

In addition, with the rapid development of information and communication technology such as the Internet and the IoT, chronic disease behavior risk factor surveillance has relied on this new technology to constantly update, develop, and standardize surveillance workflows and mechanisms. Moreover, multi-sectoral and multi-source data sharing and convergence will present opportunities and challenges for surveillance in the future. In the context of informatization and big data, there is an urgent need for surveillance of chronic disease behavior risk factors to clarify standards for information such as metadata and data element

doi: 10.3967/bes2024.063

[*]This work was supported by the National Key R&D Program [2018YFC1311702, 2018YFC1311706].

1. National Center for Chronic and Noncommunicable Disease Control and Prevention (NCNCD), Chinese Center for Disease Control and Prevention, Beijing 100050, China; 2. Cancer Hospital, Chinese Academy of Medical Sciences, Beijing 100021, China; 3. Chinese Center for Disease Control and Prevention, Beijing 102206, China; 4. People's Medical Publishing House, Beijing 100021, China

attributes for basic surveillance datasets.

In the context of China's institutional reform of standardization, combined with the actual needs of China's chronic disease and risk factor surveillance work, the NCNCD submitted an application to the Chinese Preventive Medicine Association (CPMA) regarding the group standard of the *Standards of Basic Dataset of Chronic Diseases Behavior Risk Factor Surveillance in Adults* in June 2020. The latter approved the project in September 2020. The Standard went through several rounds of expert consultation, argumentation, and public opinion solicitation, and it finally focused on the collection standards of the basic dataset for chronic disease behavior risk factor surveillance in adults. Subsequently, the name of the Standard was changed to the *Standards of Basic Dataset of Chronic Diseases Behavior Risk Factor Surveillance in Adults*, which was passed on May 13, 2023, by an expert review meeting. The Standard was officially released and enforced on October 20, 2023, after more than three years of implementation. It was interpreted, as follows, to provide guidance for colleagues to gain insights into the content and promote the application of the standard.

INTERPRETATION OF THE STANDARDS' CONTENT AND KEY POINTS

Scope

The *Standards of Basic Dataset of Chronic Diseases Behavior Risk Factor Surveillance in Adults* specifies the metadata attributes and data element attributes of the adult chronic disease behavior risk factor surveillance dataset, and it is suitable for related data collection of monitoring, investigation, intervention and evaluation of behavioral risk factors of chronic and noncommunicable diseases developed by health administrative departments, disease prevention and control institutions, primary-level medical and health care institutions, health examination and management institutions and scientific research institutes.

Normative References

Considering the interconnection and interoperability with existing disease surveillance and information collection practices in China, the drafting of the standard made full reference to the standards and specifications published throughout the country. In particular, the data elements related to administrative divisions and basic personal information (gender, marital status, state of employment, record of formal schooling, and nationality) have referred to national standards such as *GB/T 2260-2007 Codes for the Administrative Divisions of the People's Republic of China, GB/T 2261.1-2003 Classification and Codes of Basic Personal Information—Part 1: Codes for Sexual Distinction of Human, GB/T 2261.2-2003 Classification and Codes of Basic Personal Information—Part 2: Codes for Marriage Status, GB/T 2261.4-2003 Classification and Codes of Basic Personal Information—Part 4: Codes for State of Employment, GB/T 3304-1991 Names of Nationalities of China in Romanization with Codes,* and *GB/T 4658-2006 Codes for Record of Formal Schooling.* The basic personal information data elements such as ID category, name, current place of residence, health insurance category, etc. have referred to health industry standards such as *WS 364.3-2023 Coding standard for value domain of health data element—Part 3: Demographic and social economic characteristic, WS 371-2012 Basic Dataset of Basic Information—Personal Information,* and *WS 364.13-2023 Coding standard for value domain of health data element—Part 13:Healthcare expenditure.* Some of the chronic disease behavior risk factor data elements such as smoking status, age at smoking initiation, and age at initiation of daily smoking have been examined in reference to health industry standards such as *WS 364.5-2023 Coding standard for value domain of health data element—Part 5: Health risk factor* and *WS 375.8-2012 Basic Dataset of Disease Control—Part 8: Behavior Risk monitoring.*

The drafting principles and category format for dataset metadata attributes and data element-specific attributes in the Standard has been established in reference to the provisions of the "*WS/T370-2022 Standard for Drafting of Health Information Basic Dataset.*"

Terms and Definitions

The Standard provides detailed definitions of five important terms–chronic and noncommunicable diseases, behavior risk factor, physical activity, moderate-intensity physical activity, and vigorous-intensity physical activity–to deepen users' understanding of the data element attributes of the basic dataset for adult chronic disease behavioral risk factor surveillance.

Dataset Metadata Attributes

This section focuses on the main features of the

dataset, including information such as the name, identifier, name of the publishing organization, keywords, language, classification category name, summary, and feature data elements. The identifier of this dataset is HDSB1.01_V1.0, the publisher is CPMA, and the classification subject is public health services.

Data Element Attributes

Personally Identifiable Information Personally identifiable information included 11 data elements: surveillance site; urban/rural; ID category code; ID number; name; date of birth; current residence's autonomous region and municipality directly under the central government; current residence's city, territory, and prefecture; current residence's county and district; current residence's township (town and subdistrict office); and current residence's village, street, road, lane, etc.

Sociological Information Sociological information included data elements such as gender, current place of residence, nationality, formal schooling record, marital status, occupational category, and health insurance category. The data elements of the personal basic information module mainly reflect the individual sociological information. Except for the data element of Urban/Rural, the other data elements of this module referred to the current national standards, industry standards and mature group standards in this field to ensure the compatibility of this group standard with other standards or existing monitoring information systems.

Chronic Disease Behavior Risk Factor The standard specified the identifiers, names, definitions, data types, representation formats, and allowable values and other data element specific attributes related to the five major chronic disease behavior risk factors: smoking, alcohol consumption, unhealthy diets, physical inactivity, and sleep disorders.

In terms of behavior risk factors for tobacco use, pre-existing standards *WS 364.5-2011 Classification and Coding for Value Domain of Health Data Element—Part 5: Health Risk Factors* only defined codes for smoking status, categories of passive smoking establishments, and types of tobacco smoked. The preexisting standard has been updated in 2023 with no change in the definition of tobacco-related data elements[6]. Further, *WS 375.8-2012 Basic dataset of disease control—Part 8: Behavioral risk monitoring* added age at smoking initiation, age at initiation of daily smoking, daily cigarette consumption, length of time since cessation, codes for categories of cessation methods, and number of days of exposure to passive smoking[7]. Pre-existing standards set only one data element for daily cigarette consumption, and estimates of daily cigarette consumption among current smokers who do not smoke every day are subject to large bias[7]. In addition, pre-existing standards lack data related to smokers' willingness to quit and e-cigarette use status. The definition of exposure to passive smoking has changed as research related to tobacco damage has evolved[8]. *WS 375.8-2012 Basic Dataset of Disease Control. Part 8: Behavior Risk Factor Surveillance* defines the number of days of exposure to passive smoking as the number of days of exposure to passive smoking for a cumulative duration of more than 15 min/day within a 1-week period, while current academic definitions of exposure to passive smoking are no longer limited to a cumulative duration of more than 15 minutes[8]. As there is a significant dose-response relationship for health harm due to smoking, more accurate assessments of cigarette consumption and cessation among smokers are needed to assess tobacco prevalence, health threats, and intervention effectiveness[9-11]. Given recent developments, e-cigarette hazards have gradually received increased attention from the industry, and further evidence-based research is needed at both individual and group levels[11,12]. Therefore, based on existing standards and in conjunction with the current key assessment indicators, the standard retains smoking status, age at smoking initiation, and age at initiation of daily smoking in existing standards and revise the definitions of daily cigarette consumption and exposure to passive smoking. Daily cigarette consumption is defined as the number of machine-made cigarettes smoked by the respondent each day. The estimate of cigarette consumption refers to the number of machine-made cigarettes, removes the time limit of the most recent month, and is an estimate of the usual profile of smokers who smoke on a daily basis, whereas weekly cigarette consumption is added for non-daily smokers by asking the respondent how many machine-made cigarettes they smoke per week. In addition, attempted cessation (the status of current smokers who have tried to quit) and willingness to quit (the willingness of current smokers to quit smoking in the future) are added for current smokers; the length of time since cessation is revised as the length of time (in years) since an ex-smoker last smoked, exposure to passive smoking is no longer limited to a cumulative total of more than 15 minutes per week,

and the number of days of exposure to passive smoking was revised as the number of days per week that a respondent would normally be exposed to passive smoking. Moreover, this standard adds an e-cigarette-use status data element and provides a table of e-cigarette-use status codes. The setting of smoking-related data elements in this standard focuses on both machine-made cigarettes and e-cigarettes in terms of the types of tobacco products, as well as both active and passive tobacco exposure, which comprehensively reflects the respondent's smoking status.

In terms of behavioral risk factors for alcohol consumption, pre-existing standards specified codes for the frequency and types of alcohol consumed, standards for alcohol consumption, and daily amount of alcohol consumed[6,7]. In pre-existing standards, the alcohol consumption criterion was defined as whether or not the person had consumed alcohol, making it impossible to measure drinking status across time periods, while the categorization of alcohol consumption frequency was identical to that of dietary frequency, which was not conducive to data collection accuracy, and the types of alcohol consumed failed to sufficiently consider regional specificity. In view of this, this Standards added a data element of "alcohol consumption status," defined as the normal status of alcohol consumption by the respondent during the past 12 months, with allowable values for the data element to take into account alcohol consumption within and beyond a 30-day period, defined as "1. Consumed within 30 days"; "2. Consumed within 12 months, but beyond 30 days"; "3. Consumed beyond 12 months"; and "4. Never consumed". Considering the regional differences in the types of alcohol commonly consumed by adults in China[13], the alcohol categories collected in these standards included liquor with high alcohol content (≥ 42%), liquor with low alcohol content (< 42%), beer, yellow wine, rice wine, and wine. Unique to this survey were the new category of rice wine, and the addition of data elements related to the behavioral status of consuming each category of alcohol, frequency of consumption per day/week/month/year, and average amount consumed per serving. In addition, as hazardous and harmful alcohol consumption is strongly associated with a number of chronic diseases and injuries[14-16], this version of Standard adds the data element of "frequency of heavy alcohol consumption per serving," defined as the frequency with which the respondent consumed more than 60 g of pure alcohol per serving in the past 30 days[17]. In brief, this standard include 38 alcohol consumption-related data elements that can be used to assess whether the respondents consume alcohol, the type of alcohol usually consumed, the frequency of alcohol consumption, the amount of alcohol consumed, whether alcohol consumption was hazardous and harmful, and whether the respondents engaged in heavy alcohol consumption.

In terms of dietary information collection, although the pre-existing standards defined diet type and diet frequency, food consumption frequency only focused on defining codes for consumption frequency per day and per year. The definition of diet-related data elements was not qualified to indicate the diet type and frequency of consumption in terms of the respondent's normal state, and there was insufficient information regarding the amount of food consumed[6,7]. Although *WS 375.8-2012 Basic Dataset of Disease Control—Part 8: Behavioral Risk monitoring* added codes for food consumption frequency per week and per month; it failed to specify the consumption status for each type of food and the amount of food consumed, which would reduce the standards' significance as guides to actual surveillance work[7]. Based on pre-existing standards, this standard defined the data elements of frequency of consumption per day/week/month/year, and average amount consumed per serving for different food categories normally consumed by the respondent within the past 12 months, according to the Food Frequency Questionnaire[18]. It reflects the frequency and consumption status of cereals and grains, fresh vegetables, fresh fruits, livestock meat, aquatic products, fresh eggs, milk and their products, legumes and their products, preserved or smoked foods, sugar-sweetened carbonated beverages, and sugar-sweetened fruit juices.

In terms of physical activity, the pre-existing standards only defined the physical activity frequency codes and physical activity category codes. They failed to collect information regarding activity hours and days according to physical activity category and intensity[6,7]. To more specifically guide the collection of information for chronic disease and behavior risk factor surveillance, this standard, based on pre-existing standards, defined data elements related to occupational vigorous intensity and occupational moderate-intensity physical activity status, frequency, and cumulative duration per day; transportation physical activity status, frequency, and cumulative duration per day; and recreational vigorous-intensity and recreational moderate-

intensity physical activity status, frequency, and cumulative duration per day, according to physical activity intensity and type[19]. In addition, as lifestyles continue to change, sedentary and static behaviors become increasingly harmful. In particular, with the widespread use of communication devices and applications such as smartphones and social apps, people's reliance on digital products has led to an increase in the amount of time they spend looking at screens every day, which is bound to have a negative impact on their physical and mental health[20,21]. Therefore, these standards separately cover the spare-time static behavior hours in addition to the total static behavior hours, and they add a data element related to spare-time screen hours.

With rapid urbanization and modernization, people's lifestyles have undergone significant changes, and the combination of factors such as increased work-life stress and aging has led to the increased prevalence of sleep disorders within the population. According to the *White Paper on Exercise and Sleep 2021* released by the China Sleep Research Society, more than 300 million people in China suffer from sleep disorders[22] that seriously affect their physical and mental health, as well as their social and emotional functioning. Therefore, the prevalence of sleep disorders and related problems within this population should be considered. Regarding sleep-related data elements, in addition to total sleep and nap times, these standards also include sleep disorder-related data elements such as difficulty falling asleep, sleep maintenance disorders, early awakening, sleep-related daytime dysfunction, snoring or apnea conditions, and medication-assisted sleep conditions. These standards not only assess the respondent's sleep adequacy, but also their sleep quality.

Health Behaviors The standards include four health behavior-related data elements related to chronic disease prevention and treatment, such as weight measurement status, blood pressure measurement status, blood glucose test status, and blood lipid test status. These are used to assess the respondent's self-management abilities and their attention to the four indicators of weight, blood pressure, blood glucose, and blood lipid levels.

RATIONALE FOR AND SIGNIFICANCE OF SETTING STANDARDS

Based on an understanding of the current status of surveillance and assessment needs for chronic diseases and their risk factors at home and abroad, and with reference to the relevant guidelines and standards, the *Standards of Basic Dataset of Chronic Diseases Behavior Risk Factor Surveillance in Adults* was drafted. It specifies the metadata and data element attributes of adult chronic disease behavior risk factor surveillance datasets and defines a set of collection indexes and standards for a basic dataset related to adult chronic disease behavior risk factor surveillance with definitions that are in line with international practices and China's national conditions. Drafting these standards may address the paucity of current standard indicators for chronic disease behavior risk factor surveillance, as well as the fact that they are unsystematic, not uniformly defined, and not fully consistent with indicators for the assessment of relevant policies and actions at home and abroad. These standards are applicable to the collection of behavioral and lifestyle-related data for surveillance, surveys, intervention, and assessment of chronic disease behavioral risk factors by health administrative departments, disease prevention and control institutions, primary healthcare organizations, health screening and management institutions, and research institutes. They provide a data collection model that is of great practical significance for standardizing adult chronic disease behavior risk factor surveillance and conducting survey work across the country, as well as carrying out scientific assessment of the effectiveness of the Healthy China Initiative.

[#]Correspondence should be addressed to WANG Li Min, Researcher, Master, 86-15010927830, E-mail: wanglimin@ncncd.chinacdc.cn

Biographical note of the first author: ZHAO Yan Fang, MS., born in 1983, Master, Associate Researcher, majoring in chronic disease epidemiology.

Received: February 21, 2024;

Accepted: April 1, 2024

REFERENCES

1. Lecture 2 behavioral risk factor surveillance system in China. Dis Surveill, 1996; 11, 78-9. (In Chinese)
2. World Health Organization. STEPwise approach to NCD risk factor surveillance (STEPS). [2023-10-11]. https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps.
3. Center for Disease Control and Prevention. Behavioral risk factor surveillance system. [2023-10-11]. https://www.cdc.gov/brfss/about/index.htm.
4. Wang LH. Chronic and noncommunicable disease prevention and control. People's Medical Publishing House. 2018, 69-70.
5. Zhang L, Zhang Y, Zhuge K. Group standard: power engine for high quality development. Sci Technol Manag Res, 2020; 40,

193−8. (In Chinese)
6. Ministry of Health of the PRC. Classification and coding for value domain of health data element—part 5: health risk factor: WS 364.5—2011. Beijing: Standards Press of China, 2012. (In Chinese)
7. Ministry of Health of the PRC. Basic dataset of disease controlna, 201: Behavioral risk monitoring: WS 375.8—2012. Beijing: Standards Press of China, 2012. (In Chinese)
8. Yang GH. Tobacco control in China. Springer. 2018, 23.
9. Fischer F, Kraemer A. Meta-analysis of the association between second-hand smoke exposure and ischaemic heart diseases, COPD and stroke. BMC Public Health, 2015; 15, 1202.
10. Chen ZM, Peto R, Zhou MG, et al. Contrasting male and female trends in tobacco-attributed mortality in China: evidence from successive nationwide prospective cohort studies. Lancet, 2015; 386, 1447−56.
11. Kathuria H. Electronic cigarette use, misuse, and harm. Med Clin North Am, 2022; 106, 1081−92.
12. Gordon T, Karey E, Rebuli ME, et al. E-cigarette toxicology. Annu Rev Pharmacol Toxicol, 2022; 62, 301−22.
13. Lv Y, Guo Y, Bian Z, et al. Regional differences in patterns of alcohol consumption: findings from the China Kadoorie Biobank study on half a million people from 10 regions. Chin J Epidemiol, 2014; 35, 875−81. (In Chinese)
14. World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. [2023-10-15]. https://www.who.int/publications/i/item/9789241563871.
15. GBD 2016 Alcohol Collaborators. Alcohol use and burden for 195 countries and territories, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet, 2018; 392, 1015−35.
16. İlhan MN, Yapar D. Alcohol consumption and alcohol policy. Turk J Med Sci, 2020; 50, 1197−202.
17. World Health Organization. Global status report on alcohol and health 2018. [2023-10-15]. https://www.who.int/publications/i/item/9789241565639.
18. Liu D, He L, Zhang X, et al. Establishment and application of food frequency questionnaire method among Chinese. J Hyg Res, 2018; 47, 744−8,755. (In Chinese)
19. National Disease Control and Prevention Administration, Ministry of Health, People's Republic of China. Physical activity guidelines for Chinese adults (trial). People's Medical Publishing House. 2011, 4-7.
20. Nakshine VS, Thute P, Khatib MN, et al. Increased screen time as a cause of declining physical, psychological health, and sleep patterns: a literary review. Cureus, 2022; 14, e30051.
21. Lavie CJ, Ozemek C, Carbone S, et al. Sedentary behavior, exercise, and cardiovascular health. Circ Res, 2019; 124, 799−815.
22. Yang Y. The research on sleep staging and quality assessment based on feature extraction of EEG signal by matrix decomposition. Central South University of Forestry and Technology. 2023.