

Occupational diseases prevention and control in China: a comparison with the United States

Yinling Sun¹ · Hua Shao¹ · He Wang²

Received: 1 April 2015 / Accepted: 31 August 2015 / Published online: 11 September 2015
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Abstract

Aim Occupational diseases have become an important health issue and social problem for countries throughout the world. The United States and China face the serious situation of occupational diseases prevention and control.

Methods This paper compared the prevention and control of occupational diseases in the United States and China in the following aspects: status, law and related agencies, definition and categories, surveillance and reporting systems, diagnosis and identification.

Results China faces more challenges in occupational diseases prevention and control.

Conclusion There is a gap in the overall strength of occupational disease prevention and control between the US and China. There is a lot of work to do for China.

Keywords Occupational diseases · Prevention and control · Policy · Administration

The main points This paper, by comparing the prevention and control of occupational diseases in the United States and China, is aimed at introducing the situation in China, providing a reference for China and other developing countries, improving the management and prevention of occupational disease and promoting future cooperation and common development.

✉ Hua Shao
huashaosci@126.com

¹ Shandong Academy of Occupational Health and Occupational Medicine, Shandong Academy of Medical Sciences, Jinan, Shandong Province 250062, China

² School of Public Health and Tropical Medicine, Tulane University, New Orleans, LA 70112, USA

Introduction

Occupational diseases contribute to human suffering. According to estimates by the International Labor Office (ILO) for occupational accidents and diseases, there are globally about 2.2 million work-related deaths, annually. The annual number of non-fatal work-related diseases has been estimated to be 160 million and 58 million of these cases cause at least 4 days absence from work per year (Zimmer 2008). In all cases there was a degree of suffering, and some suffering was extreme for both workers and their families (Adams et al. 2002), making the prevention and control of occupational diseases has become an important health issue and social problem for countries throughout the world.

China is a unified multiethnic country with a unitary political system and is one of the world's most ancient civilizations. Although it is a large developing country, China has been made the dramatic economic development. Since 2010, China has become the second-largest economy in the world (Huang 2011), second only to the US. According to the data from World Bank, the Gross Domestic Product (GDP) in China reached 9.240 trillion USD in 2013; and at the same year, according to the data from National Bureau of Statistics of China, the total health expenditure reached 497.64 billion USD and accounted for 5.4 % of the country's GDP. The medical and healthcare system covering both urban and rural residents have taken shape, the capabilities of disease prevention and control have been enhanced. The USA is a constitutional republic and representative democracy. It is one of the world's most ethnically diverse and multicultural nations. As a developed country, the USA has the world's largest economy. The GDP reached US\$ 16.77 trillion in 2013. Data from US CDC show that the total national health expenditure reached US\$ 2.9 trillion in 2013, and accounted for 17.4 % of the country's GDP. According to the report from The White

House, health care that works for Americans is now putting in place comprehensive reforms that improve access to affordable health coverage for everyone and protect consumers from abusive insurance company practices.

Although there are different levels of economic development, a different political system, and different national conditions, the United States and China both face the serious situation of occupational diseases prevention. China is still in its initial stage of occupational disease prevention compared with developed countries such as the United States. The United States has had an earlier start, more detailed measures, and more strict supervision on occupational diseases prevention compared with a developing country such as China. Thus, this paper, by comparing the prevention and control of occupational diseases in the United States and China, is aimed at introducing the situation in China, providing a reference for China and other countries, improving the prevention and control level of occupational diseases and promoting future cooperation and common development.

Status of occupational diseases

The working population of China is vast. According to recent International Labour Organization (ILO) and World Health Organization data, China had 769.77 million employed persons in 2013. The mean weekly hours actually worked per employed person were 46.6 h. The occupational death rate in China is 10.5 per 100,000 workers; there are 8,028 accidents per 100,000 workers (Alli 2008) and a large proportion of working people were potentially exposed to occupational hazards. The migrant workers, whose total numbers reached 225.42 million persons in 2008 (Gui et al. 2011), worked in small and medium enterprises and were at most risk (Liang et al. 2006; Wang and Li 2012). The total number of migrant workers do not have adequate access to education and health care (Hu et al. 2008; Tang et al. 2008). In 2011, according to a report in the China Dazhong Daily, the annual direct economic loss due to occupational diseases and industrial injury accidents in China has reached 100 billion yuan (about 16 billion USD), and indirect economic losses now equal 200 billion yuan (about 33 billion USD). The ratio of direct and indirect economic losses to the total health expenditure is about 9.85 %. China is still facing a severe challenge from a large number of new cases of occupational diseases in recent years (see Fig. 1). The data comes from the official report of the Chinese Ministry of Health for the years 2008 to 2013 (NHFPC 2010, 2013a, b, 2014; Chinese CDC 2008, 2010). In Fig. 1, it can be seen that pneumoconiosis is the most serious occupational disease. In recent years, there has been rapid growth in new pneumoconiosis cases, whereby in 2010, the number of pneumoconiosis patients increased to 24,000 from 18,000 cases in 2009, which is mainly due to the fact that detection technology has

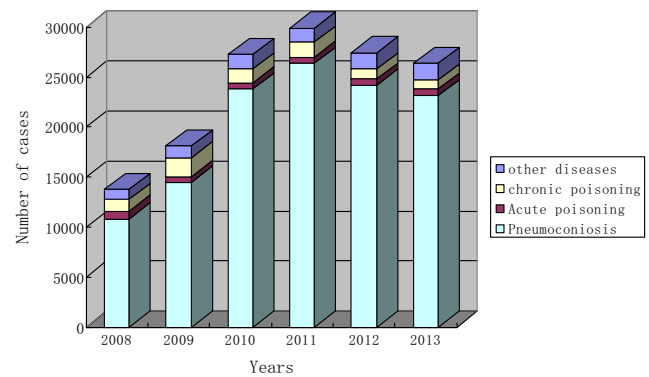


Fig. 1 Number of cases of occupational diseases in China, 2008–2013

been improved in recent years. In addition, the national occupational diseases report showed that the number of pneumoconiosis patients accounted for two thirds of the total number of patients with occupational diseases and the direct and indirect costs of one million pneumoconiosis cases was estimated to have reached about 19.34 billion USD (Zhang et al. 2010). Acute and chronic occupational poisoning cases accounted for 19 % of all occupational diseases. Other prevalent occupational health problems besides pneumoconiosis and occupational poisonings in China are musculoskeletal disorders (MSDs); psychological stress at work; occupational allergic disease; occupational tumors; and occupational nose, ear, throat, and mouth injuries. According to the official report, most of the reported cases were found in coal-mining industries, followed by non-ferrous metal industries, machinery industries and the construction industry. CHINANEWS has reported more than 200 million employees now work in hazardous environments and their health is threatened by occupational hazards.

In the United States, according to the data from ILO, there were 143.93 million employed persons in 2013. The mean weekly hours actually worked per employed person are 38.6 h. The US Bureau of Labor Statistics (BLS) used data from its Census of Fatal Occupational Injuries (CFOI) and Survey of Occupational Injuries and Illnesses (SOII) to show the most dangerous industry in the US. The data shows that agriculture, forestry, fishing and hunting still recorded the highest fatal injury rate of any industry sector at 22.2 fatal injuries per 100,000 full-time equivalent (FTE) workers and the relatively high incidence rates of nonfatal occupational injuries and illnesses at 5.7 injuries and illnesses per 100 full-time workers in 2013. According to the US CDC report, the annual direct and indirect costs are at least \$250 billion. The ratio of direct and indirect costs to the total national health expenditure is about 8.62 %. The number of occupational illnesses was estimated at about 480,000, with cost estimates of \$58 billion in 2007 (Leigh 2011). According to the report from BLS, the total cases of nonfatal occupational illnesses are on decline in the period of 2008–2013 (see Table 1).

Table 1 Numbers of nonfatal occupational illnesses by industry and category of illness, all industries including state and local government, US, 2008–2013 (thousands)

Year	Total cases	Skin diseases or disorders	Respiratory conditions	Poisonings	Hearing loss	All other illnesses
2008	257.8	48.6	22.5	3.3	24.5	158.8
2009	224.5	35.4	21.5	3.2	21.7	142.7
2010	212.8	34.4	19.3	3.2	21.1	134.8
2011	208.4	33.5	18.1	2.5	20.7	133.7
2012	209.1	33.6	19.9	3.0	21.0	131.6
2013	199.4	33.6	19.6	3.2	21.2	121.9

Definition and categories of occupational diseases

Generally, the term “occupational disease” refers to those illnesses caused by exposures at the workplace. In China, “occupational disease” in the Law on Prevention and Control of Occupational Disease refers to “diseases resulting from exposures of workers to industrial dusts, radioactive substances, and other poisonous and harmful substances in the workplace”. In the United States, an occupational illness (or disease) is defined by the Occupational Health and Safety Administration (OSHA) as, “any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to factors associated with employment.”

There are several purposes for categorizing occupational diseases: assisting in diagnosis and treatment; reporting and recording for the purposes of statistics and analysis; ensuring accurate records and statistics in order to set priorities for prevention and control; and ensuring workers receive income and benefit coverage under the work injury insurance systems.

To specify the occupational diseases covered by the Law on Prevention and Control of Occupational Disease in China, the Ministry of Health in conjunction with the Ministry of Labor and Social Security is entitled to define, amend, and publish the “Category and List of Legal Occupational Diseases”. Workers incurring the listed diseases are eligible for “occupational disease compensation” (industrial injury compensation or workers’ compensation). The current list of occupational diseases includes 115 diseases in ten categories. In the United States, for the purpose of classifying recordable illnesses, OSHA provides the categories (and examples) of occupational illnesses and disorders. The examples provided are considered “typical” and are not a complete listing of all types of illnesses and disorders that should be counted in each category (Vincil 1997); additionally, NIOSH has developed a suggested list of the 10 leading work-related diseases and injuries. Three criteria were used to develop the list: the disease’s or injury’s frequency of occurrence, its severity in the individual case, and its amenability to prevention. The list is suggested with three purposes: (1) to encourage deliberation and debate

among professionals about the major problems in this field of public health, (2) to assist in setting national priorities for efforts to prevent health problems related to work, and (3) to convey to a diverse audience the concerns of the leadership of NIOSH and the focus of the Institute’s activities. The list is intended to be dynamic; it will be reviewed periodically for necessary updating as knowledge increases and as conditions change and are brought under better control. The specific categories of occupational diseases in the United States and China can be seen in Table 2.

Law and related agencies

In China, the most important law on occupational diseases control is The Law of the People’s Republic of China on the Prevention and Control of Occupational Diseases. The law was adopted by the 9th PRC National People’s Congress on October 27, 2001 and became effective as of May 1, 2002 (Liang and Xiang 2004). The law defines the occupational health rights of workers, the obligations and duties of employers to protect the health of their employees, the responsibilities of the governments at various levels, and trade unions’ representation in workers’ health protection. The law stipulates basic principles governing the prevention and control of occupational diseases, protective measures, hazards monitoring and management in workplaces, diagnosis of occupational diseases, health authority inspections, and the liabilities incurred by those violating the law (Su 2003). With China’s rapid social and economic development, the decade old Law on Prevention and Control of Occupational Disease needed to be updated. The law was amended according to the Decision on Amending the Law of the People’s Republic of China on the Prevention and Control of Occupational Diseases as adopted at the 24th session of the Standing Committee of the Eleventh National People’s Congress on December 31, 2011. The amended law includes 90 provisions covering general provisions, early prevention, protection and management during employment, occupational disease diagnosis and safeguards for occupational disease patients,

Table 2 Classification of occupational diseases in the United States and China

Features	The United States	China
Purpose	For prevention	For compensation
Issued by	OSHA	NIOSH
		Ministry of Health, Ministry of Labor and Social Security
Categories	(1) Occupational skin disease or disorders (2) Dust diseases of the lungs (3) Respiratory conditions due to toxic agents (4) Poisoning (systemic effect of toxic materials) (5) Disorders due to physical agents (other than toxic materials) (6) Disorders associated with repeated trauma (7) All other diseases	(1) Occupational lung disease (2) Musculoskeletal injuries (3) Occupational cancers (4) Severe occupational traumatic injuries (5) Occupational cardiovascular diseases (6) Disorders of reproduction (7) Neurotoxic disorders (8) Noise-induced hearing loss (9) Dermatological conditions (10) Psychological disorders
		(1) Pneumoconiosis (2) Occupational diseases caused by exposure to radiation (3) Occupational poisoning (4) Occupational diseases caused by physical factors (5) Occupational diseases caused by biological agents (6) Occupational skin diseases (7) Occupational eye diseases (8) Occupational diseases of ears, nose, larynx, and oral cavity (9) Occupational cancer (10) Other occupational diseases

supervision and inspection, legal liability, supplementary provisions. The amended law makes clear the governmental responsibility in occupational diseases prevention and control, and emphasizes the employers' duty and further strengthens the protection of workers' rights. Two government bodies are directly involved in occupational diseases prevention in China. They are National Health and Family Planning Commission of the PRC (NHFPC) (created from the former Ministry of Health in 2013) and the State Administration of Work Safety (SAWS). The NHFPC is responsible for the definition of work-related illness, while SAWS is in charge of occupational diseases prevention, accident investigation and enforcement.

In the United States, one of the farthest-reaching laws is the Occupational Health and Safety Act (Public Law 91–596, December 29, 1970 with amendments through January 1, 2004). There are two government agencies that have a special role in occupational diseases management. Within the Department of Labor is the Occupational Safety and Health Administration (OSHA), which has the responsibility of setting and enforcing workplace regulations. The National Institute for Occupational Safety and Health (NIOSH) of the US Department of Health and Human Services has the responsibility for research and prevention activities with regards to workers' health. NIOSH advises as to allowable levels of exposure, based upon scientific review. In addition to government agencies, there are a variety of voluntary groups such as the American Conference of Governmental Industrial Hygienists and the National Safety Foundation, that make recommendations for safe and healthful practices in the workplace.

Occupational diseases surveillance and reporting systems

In China, health surveillance is one of the important approaches to occupational diseases prevention. An occupational disease reporting system was established in the 1980s and has been improved since that time. The general principle of this system was territorial management and hierarchical reporting. A public health information system was established in China in 2003, which provides an opportunity for the improvement of the occupational diseases reporting system. On June 1, 2006, a national network of occupational diseases reporting was started and was being used formally (Zhang et al. 2010). Occupational diseases reporting responsibilities are mainly those of the employer, comprehensive medical institutions which accept acute occupational disease cases and medical institutions which undertake the diagnosis of occupational diseases. The procedure of reporting is: (1) the information about the occupational disease cases diagnosed by the occupational diseases diagnosis institutions is reported to the local occupational diseases diagnosis institution or the local center for diseases control through the Chinese diseases prevention and control information system known as the "Health Hazards Monitoring Information System"; (2) the information is audited and reported to the Chinese Center for Disease Control and Prevention (CDC) class by class and summarized by the national CDC; (3) occupational diseases reports are announced to the public by the Chinese Ministry of Health.

In the United States, surveillance is the collection, analysis, and dissemination of information on cases of occupational

disease, disability, and death. Occupational diseases surveillance is the cornerstone of efforts to prevent work-related injuries and illnesses. Data sources specific for the occupational disease reporting system are as follows: international registries; governmental surveys; employer-based surveillance; surveillance of public employees; workers' compensation reports; laboratory reports; physicians' reports; and specialized occupational health clinical facilities. A promising innovation in occupational health surveillance in the United States is the emergence of the concept of the sentinel provider, part of an initiative undertaken by NIOSH called the Sentinel Event Notification System for Occupational Risks (SENSOR). A sentinel provider is a physician or other health care provider or facility that is likely to provide care for workers with occupational disorders due to the provider's specialty or geographic location. Since sentinel providers represent a small subset of all health care providers, health departments can feasibly organize an active occupational disease reporting system by performing outreach, offering education and providing timely feedback to sentinel providers.

Diagnosis and identification of occupational diseases

In China, in accordance with the provision of the Law on Prevention and Control of Occupational Disease, the diagnosis of occupational disease should be undertaken by the medial organizations approved by the public health authority under the government at or above the provincial level. The worker can have occupational diseases diagnosed by the occupational disease specific healthcare agency at the location of the employer or at the place of residence of the worker; since many migrant workers from the countryside who become ill return to their often-distant home village, this is a particularly important provision. The responsible healthcare agencies should arrange at least three medical practitioners certified for the qualification of occupational disease diagnosis to diagnose the occupational diseases. In case of disagreement with the occupational disease diagnosis, the party concerned can apply to the public health authority under the government in the location of the responsible healthcare agency. Upon request by the party concerned, the public health authority under the government above the level of district-constituted municipalities should organize the occupational disease diagnosis appraisal committee to appraise the occupational disease in dispute. In case of disagreement with the appraisal result made by the occupational disease diagnosis appraisal committee under the district-constituted municipalities, the party concerned can apply to the public health authority under the government of provinces, autonomous regions and centrally administered municipalities for reappraisal. The occupational disease diagnosis appraisal committee should consist of experts in related fields of study. The public health authority

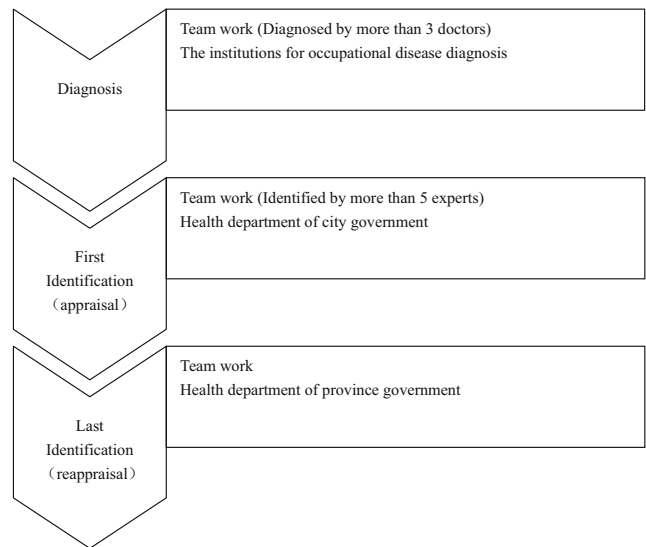


Fig. 2 Occupational diseases diagnosis and identification in China

under the government of provinces, autonomous regions and centrally administered municipalities should set up a related expert pool, which enables the party concerned or the public health authority entrusted by the party concerned to randomly choose the experts to constitute the appraisal committee. Occupational diseases diagnosis and identification in China is shown in Fig. 2.

In the United States, all certified doctors, including general practitioners can diagnose occupational diseases. There is no special organization for occupational diseases identification. Governments do not determine the standards of occupational diseases diagnosis; however, resources and assistance can be obtained from governmental agencies—for example, NIOSH can provide useful and practical information. NIOSH efforts are directed toward the identification of those diseases and conditions that are closely related to or caused by the work environment as a necessary prerequisite to their prevention. It puts forward the principles and methods of determining occupational diseases for helping the government, physicians and occupational diseases compensation institutions to make correct decisions by providing a sound basis in science.

Discussion

The data of the two countries are not comparable because China only reports the number of cases, and the scope of occupational diseases in China is much narrower than it in the US; thus, the data of occupational diseases in the two countries can not be directly compared. Future study is hoped to make a breakthrough in the comparison of the data from different countries. Although the situation of occupational diseases prevention is very serious for the United States (Schulte 2005), it should be mentioned that China, as a developing

country, faces more challenges in occupational diseases prevention (London 2011). In China, pneumoconiosis and occupational poisoning are the most serious occupational diseases, while in the United States, “pneumoconiosis” is not listed as a category, and “poisonings” is the last of all occupational diseases. In other words, the incidence of traditional occupational diseases such as pneumoconiosis is still high in China, while traditional occupational diseases appear to be under control in the United States. For China, with rapid economic globalization, industrialization, urbanization, as well as profound changes in the economic system and the employment system, the modes of occupational diseases prevention have not kept up. Employers have not assumed responsibility for occupational diseases prevention and have sacrificed workers’ health for economic gains. Some local governments stress economic production and neglect health protection, while some of them even treat occupational health supervision as an obstacle to the production of enterprises, which leads to a series of serious consequences such as severe occupational hazard events and brings great threats to the health of workers. At the same time, China has seen the trend of occupational diseases shifting from traditional hazardous industries to a wide range of other industries, many of which pose both new and old hazards. In addition, the relatively low level in quality and availability of devices in labor safety has not effectively protected the workers’ health. Thus, cases of occupational diseases have been increasing rapidly, and persistent exposures to occupational health hazards have posed serious threats to the vast worker population.

Both the United States and China have a good foundation in the legal system of occupational diseases control; however, the United States has had an earlier start in legislation and has a more complicated legal system compared with China. In the United States, ‘safety’ and ‘health’ are within the same statutory authority. In China, ‘safety’ and ‘health’ are within two distinct statutory authorities, which belong to different departments of government; thus the two different government agencies have difficulty doing the same thing—preventing and controlling occupational diseases. Occupational disease prevention and control is a systematic project, which is related to industrial policies, economy and trade, health protection and work-related injuries insurance and which could be accomplished following the lead of the government and the cooperation of many agencies (Zhang 2014). Chinese government agencies focus on supervision, and do not value the function of service as much as US government agencies; however, in China the supervision of related agencies is not reasonable and sufficient. The Chinese government reported in 2009 that only 125,231 companies or a mere 0.78 % of the 16 million companies were actually inspected, of which less than 60 % have occupational health records documentation for employees as required by law.

Definitions of occupational diseases are diverse and vary according to jurisdiction, since, after all, “occupational disease” is a legal and not a medical term (Zimmer 2008). By the legal definition of occupational disease, it can be seen that in order for an occupational disease to be covered under the workers’ compensation law, the first thing that must be proven, is that work was the prevailing factor in causing both the medical condition and the disability resulting from the claimed occupational disease, whether in the United States or in China. By comparison, it is found that in the United States, related agencies and research institutions put forward the proposed categories of occupational diseases only for prevention; however, China lacks the categories of occupational diseases for the purpose of prevention. The list of occupational diseases is only for workers’ compensation—only the diseases on the list can be considered compensable occupational diseases, while diseases which are not on the list, even though they may be work induced, cannot be identified as occupational diseases. Some work-related illnesses are only considered as occupational diseases if they progress to a very serious degree. In addition, with the applications of new technology and new materials, new occupational diseases constantly appear, but they are not included in the list; thus, to rely only on the list does not fully protect workers’ rights and interests.

Regarding occupational health surveillance, the United States and China both face the same problem such as underreporting and a lack of follow-up and control efforts; however, more problems exist in China than the United States—for example, the problem of underreporting is more serious in China. The validity of statistics of incidence and severity of occupational diseases is largely undermined by the massive number of undiagnosed cases among migrant workers; migrant workers in China are mostly people from impoverished regions in China who go to more urban and prosperous coastal regions in search of work (Qiu et al. 2011); hence, they are the main force for urbanization in the People’s Republic of China. Many migrant workers return to their place of origin after they are dismissed by their employers for their illness and thus rarely receive any form of workers’ compensation or are they counted. According to the report from WHO, in comparison to industrialized countries, where occupational health surveillance and services coverage ranges from 20–50 %, the coverage in China is estimated to be in the 10 % on average. The actual figures of unreported and unidentified cases are not known, let alone the figures on the occurrence of deaths among the vulnerable migrant workers in China. In fact, the Chinese government has admitted that the official statistics do not include workers in village and township enterprises or in small informal workshops, where workers’ health and safety situations are much graver.

China has defects in the system of occupational disease diagnosis and identification such as that the diagnostic and identification procedures are chaotic, the period for diagnosis

and identification is not clear, there is a lack of effective supervision of diagnostic and identification institutions, remedial measures are deficient and punitive measures to diagnostic and identification institutions who fail to comply with the law are too lax. For example, Article 45 in the newly amended law on Prevention and Control of Occupational Diseases states: “The workers may have their occupational diseases diagnosed in the medical and health institutions that undertake diagnosis of such diseases in accordance with law and are located in the place of the employers’ location or the workers’ residence or origin”. There is a lack of inter-provincial and inter-municipal collaboration mechanisms within the health administration between labor-exporting and labor-importing regions in China. In many cases of occupational diseases of the victims, different diagnoses were given by the authorized occupational diseases hospitals in the location of the employer and the authorized hospitals in the location of workers’ origin; thus, it has led to chaos in identification procedures. In essence, these problems illustrate that though China has carried out a series of steps to reduce the incidence of occupational diseases, it cannot meet the demand for efficient prevention, control and workers’ compensation.

Conclusions and perspectives

From the preceding analyses, it can be concluded that there are differences in the overall level of occupational diseases prevention and control in the US and China. Generally speaking, the reasons why the differences exist are because the two countries are at different stages of social and economic development and they have a different mode of government management and a different political system, as well as a different culture; therefore, that there is a gap in the overall strength of occupational disease prevention and control between the two countries is understandable.

There is a long road yet to go down and work to do in China in order to fulfill the aim of preventing and controlling occupational diseases—for example, strengthening the management of employers and the rights of migrant workers, especially in industries with high risks; motivating the government to improve practice in law and promoting the cooperation of different agencies; strengthening the supervision network and improving the reporting of occupational diseases cases; and perfecting the diagnosis of occupational diseases. The importance of cooperation on work safety and health issues between the United States and China has been recognized. The Memorandum of Understanding between the Department of Labor of the United States of America and the State Administration of Work Safety of the People’s Republic of China Regarding Cooperation on Work Safety and Health was put into effect in 2011 and can deepen further development of cooperation in occupational health. Through

cooperation, the US and China can better understand and learn from each other and promote an exchange of experiences. It is hoped that there are more opportunities for the two countries to cooperate in the field of occupational diseases prevention and control. For other countries, the study can help to convince government officials to include occupational diseases concerns as part of national development plans to stimulate high-level decision makers at the government level to allocate funds for occupational diseases prevention, and to encourage the entire society to take the necessary steps to improve occupational health. Occupational diseases are preventable, and with sufficient support and proper systems, obstacles can be overcome. This paper is just an early start in the study on the occupational diseases prevention and control between the US and China. In order to seek ways to better occupational disease prevention, the study will be continued.

Acknowledgements We thank Catherine Elizabeth Walker, Consultant on Occupational Health and Safety, Environment, Workers’ Compensation, and Labor Relations, for invaluable assistance on this article.

Conflict of interest The authors declare that they have no conflicts of interest.

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