WHO/NIOSH COOPERATIVE AGREEMENT ON IMPLEMENTING WORLD HEALTH ASSEMBLY RESOLUTION 60.26 WORKERS' HEALTH: GLOBAL PLAN OF ACTION"

Abstract

This report presents the activities carried out and the results obtained under the WHO/NIOSH cooperative agreement "Implementing World Health Resolution 60.26 Workers' Health: Global Plan of Action" (5E11OH010676-03)
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List of terms and abbreviations

AIDS	acquired immunodeficiency syndrome
DALY	disability adjusted life years
DFID	Department for International Development
EU	European Union
EVD	Ebola Virus Disease
GBD	Global Burden of Disease
GCM	Global Coordination Mechanism
GHO	Global Health Observatory
GPA	Global Plan of Action on Workers' Health (2008-2017)
HIV	Human immunodeficiency virus
ICOH	International Commission on Occupational Health
IEA	International Ergonomic Association
IHME	Institute of Health metrics and Evaluation
ILO	International Labor Organization
INAIL	Istituto Nazionale Assicurazione contro gli Infortuni sul Lavoro (National Institute for Insurance Against Employment Injuries, Italy)
IOHA	International Occupational Hygiene Association
ISO	International Organization for Standardization
NCDs	Non-communicable diseases
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
TB	Tuberculosis
UN	United Nations
WCC	WHO Collaborating Centre
WHA	World Health Assembly
WHO	World Health Organization
WONCA	World federation of family doctors

Abstract

The health of the 3.5 billion workers worldwide is a significant prerequisite for better population health and sustainable economic and social development. In 2007, the 184 Member States of the World Health Organization endorsed a ten-year global plan of action on workers' health (2008-2017) to improve the performance of national health systems for protecting and promoting the health of working people.

This project allowed WHO to carry out key activities for implementing the Global Plan of Action on Workers' Health (2008-2017) by the World Health Assembly with resolution 60.26 "Workers' Health. Global Plan of Action". The project contributed to scaling up health coverage of workers and strengthening health system governance. Norms, tools and guidance for workplace health protection in low income settings were developed. The project also built the foundations for WHO's global observatory for statistical information and monitoring of workers' health. The results were reported to the 71th World Health Assembly and accepted with satisfaction by the 194 Member States.

The availability of statistical information and the capacity of WHO to generate country data on workers' health has stimulated government authorities to develop national policies and action plans and to attach higher priority to protecting and promoting workers' health in countries. Furthermore, WHO acquired capacities and tools to protect and promote health at the workplace, in particular on the prevention and control of non-communicable diseases, and on the protection of occupational health and safety in health care facilities and in public health emergencies. WHO's capacities to measure the health impacts of occupational risks and to monitor workers' health globally and in countries were significantly scaled up

The reviews of scientific evidence, data collection, pilot projects in countries, and international workshops resulted in practical recommendations, tools and training materials for development and implementation of policy instruments for workers' health, for prevention and control of non-communicable diseases at the workplace, for protection of occupational safety and health of health workers and emergency responders, and for monitoring workers' health in the 194 countries.

The project stimulated the development of national policies and action plans for covering all workers and specific national programs for health workers were developed by the ministries of health of Togo, United Republic of Tanzania (Mainland and Zanzibar), Botswana, Madagascar, Qatar, Cuba, and Russian Federation

Togo, Tanzania, and Botswana acquired capacities to carry out training on workplace improvement in health care facilities. It also contributed to strengthened WHO capacities to work with countries to protect occupational safety and health workers and emergency responders and occupational health and safety has been included in WHO's global frameworks, monitoring tools and country efforts on emergency preparedness and response frameworks and monitoring tools.

The project implementation involved WHO's national counterparts in the ministries of health of Tanzania, Cuba, Togo, Madagascar, Botswana, Russian Federation, and Qatar, WHO collaborating centers for occupational health, the International Labor Organization and several non-state actors in formal relations with WHO.

Section 1

Significant or key findings

This project allowed WHO to carry out key activities for implementing the WHO global plan of action on workers' health. The results were reported to the 71th World Health Assembly and accepted with satisfaction by the 194 Member States of WHO.

The availability of statistical information and the capacity of WHO to generate country data on workers' health stimulated government authorities to develop national policies and action plans and to attach higher priority to protecting and promoting workers' health in countries.

WHO acquired capacities and tools to protect and promote health at the workplace, in particular regarding the prevention and control of non-communicable diseases, the protection of occupational health and safety in health care facilities and in public health emergencies.

WHO's capacities to measure the health impacts of occupational risks and to monitor workers' health globally and in countries were significantly scaled up.

Translation of findings

The reviews of evidence, data collection, pilot projects in countries, and international workshops resulted in practical recommendations, tools and training materials for development and implementation of policy instruments for workers' health for prevention and control of non-communicable diseases at the workplace, for protection of occupational safety and health of health workers and emergency responders and for monitoring workers' health at the country level.

Research outcomes/impact

National policies and action plans for covering all workers and specific national programs for health workers were developed by the ministries of health of Togo, United Republic of Tanzania, Botswana, Madagascar, Qatar, Cuba, and Russian Federation.

The ministries of health, national and district public health offices in Togo, United Republic of Tanzania (Mainland and Zanzibar), and Botswana acquired capacities to carry out training on workplace improvement in health care facilities.

WHO has strengthened its capacities to work with countries to protect occupational safety and health workers and emergency responders.

Occupational health and safety has been included in WHO's global and country efforts on emergency preparedness and national health security.

SECTION 2

This report contains the collective views of an international group of experts, and does not necessarily represent the decisions or the stated policy of the World Health Organization.

PROJECT BACKGROUND

The action of the World Health Organization (WHO) on protecting and promoting the health of workers is mandated by the Constitution of the Organization and a number of resolutions of the World Health Assembly (WHA). [1] The World Summit on Sustainable Development in 2002 recommended closely linking occupational health to public health and health systems development. Therefore, WHO is addressing all determinants of workers' health, including health in the working environment, social determinants, behavioral risks, and access to health services. The workplace is also being used as a setting for protecting and promoting the health of workers and their families.

Concerned that despite the existence of effective interventions to prevent occupational diseases and injuries there are still major gaps in the health status of workers between and within countries, the 60th World Health Assembly in 2007 endorsed the Global Plan of Action on Workers' Health (GPA) for the period 2008-2017.[2] This Plan provided a political framework for development of policies, infrastructure, technologies and partnerships for achieving a basic level of workplace health protection by the 194 Member States of WHO and its Secretariat (headquarters, regional and country offices).

The GPA had five general objectives:

(1) to devise and implement policy instruments for workers' health;

(2) to protect and promote health at the workplace;

(3) to improve the performance of and access to occupational health services;

(4) to provide and communicate evidence for action and practice; and

(5) to incorporate workers' health into other (non-health) policies.

A large network of national institutes and academic departments designated as WHO collaborating centers for occupational health (WCCs) provided technical support to WHO's work on implementing the global plan of action on workers' health. WHO also has formal collaborations with the International Labor Organization (ILO) and other global partners, such as International Commission on Occupational Health (ICOH), International Occupational Hygiene Association (IOHA), International Ergonomics Association (IEA), the World Federation of Family Doctors (WONCA) and the International Council of Nurses. The 66th World Health Assembly in 2013 reviewed the progress made in the first five-years of implementing the GPA[3] and encouraged the Secretariat to continue this work with a focus on strengthening the capacities of national health systems, particularly in low- and middle-income countries, to address the specific health need of workers.

SPECIFIC AIMS

Overall objective

Overall, this project aims at enhancing the capacities of WHO to provide leadership of international action regarding the health of workers in collaboration with US NIOSH.

Specific objectives

This project aims to achieve the following specific objectives:

1. to develop effective methods and tools for scaling up health coverage of workers and strengthening health system governance,
2. to elaborate effective norms, tools and guidance for healthy workplaces in low income settings, and
3. to create an efficient global observatory for monitoring of workers' health.

Strategy

This project employed an innovative strategy for addressing workers' health globally. It addressed the provision of occupational health services, workplace health protection and measuring workers' health through mainstreaming with major global health initiatives, such as universal health coverage, non-communicable diseases, and the global burden of disease. To achieve project objectives, we utilized methods and approaches from social medicine and health

systems development adapted to the domain of occupational health and safety. Our particular focus was on reducing health inequalities by addressing the needs of the working poor, and settings with constrained resources such as low- and middle- income countries and working people in small enterprises and the informal sector. This was achieved by pooling together the resources of WHO, US NIOSH and the WCCs network to develop and assess the effectiveness of new methods and tools for health protection and capacity building of health service providers and workplace actors to protect, promote, and monitor the health of workers.

METHODOLOGY

The project was designed and implemented using a health systems approach to workers' health.[4] In this approach, the different building blocks of the health system were critically examined and interventions were designed to strengthen their performance regarding the protection of the health of a specific target population – workers, defined as the economically active population.

A **good health system** delivers quality personal and population (public) health services to all people, when and where they need them. The exact configuration of services varies from country to country, but, in all cases, requires an equitable system for service delivery, robust financing mechanism, well-trained and adequately paid workforce, reliable information on which to base decisions and policies, as well as reliable leadership and governance.[5]

Governance in the health sector refers to a wide range of steering and rule-making functions, carried out by governments/decisions makers, as they seek to achieve national health policy objectives. Governance is a political process that involves balancing competing influences and demands. It includes policy development and implementation, regulations, advocacy, and mechanisms for monitoring and accountability. In most countries, ministries of health share responsibilities for workers' health with the ministries of labor. Therefore, governance and leadership of the health system regarding the health of workers requires strong intersectoral collaboration and strengthening the capacities of the ministries of health in occupational health. Governance can be strengthened through building the capacities of ministries of health to develop and implement national action plans on workers' health in collaboration with other government sectors, and to set universal standards for health protection at the workplace.

Health service delivery can be reinforced through enabling ministries of health to set realistic and measurable targets for scaling up health coverage of workers and shifting towards people-centered care by empowering working communities to protect and promote their health. Health workforce development was supported through building capacities at the primary care level able to respond to the specific health needs and expectations of workers.

The **information function** of health systems was addressed through developing databases, indicators and methodologies for surveillance of workers' health.

Currently, WHO is working with its Member States to reform national health systems based on **primary health care**. The changes necessary to refocus health systems towards health for all include: (1) universal coverage reforms to improve health equity; (2) service delivery reforms to make health systems people-centered; (3) leadership reforms to make health authorities more reliable; and (4) public policy reforms to promote and protect the health of communities. [6]

Universal health coverage combines access to services needed to achieve good health (promotion, prevention, treatment and rehabilitation, including addressing health determinants) with the financial protection to prevent ill health leading to poverty. WHO is using three ways of moving towards universal health coverage – reducing cost sharing of health expenditures by individuals, expanding the range of services provided, and extending access of different population groups to health services.[7] For workers, this means providing financial protection (insurance) for the risk of occupational diseases and injury, increasing the range of interventions from clinical to primary prevention and health promotion, as well as providing coverage to high risk or difficult to reach populations, such as agricultural and rural workers, informal economy, migrants, and small enterprises.[8]

The WHO Global Conference "Connecting Health and Labor" held in 2011 in The Hague, Netherlands, recommended **integrating occupational health in people-centered primary, rural and community healthcare** through a core package of essential interventions for workers' health, such as: (1) primary prevention of occupational risks – providing advice for improving working conditions, for example through workplace visits, health education and training of workers; (2) secondary prevention – early detection of occupational diseases and injuries, their referral, reporting, and eventually treatment and rehabilitation; and (3) tertiary prevention – promoting working capacity, return to work, and reducing sickness absence. In addition,

specialized occupational health services need to be reinforced and linked better to primary care and the rest of the health system.[9]

People-centered care requires planning and delivering health services according to the specific health needs and expectations of people, considering their living context and environment in delivering health care, as well as empowering individuals and local communities to take care of their own health without relying unnecessary on costly health services. [10] WHO works with countries to empower work communities to protect and promote their health through developing healthy workplaces. The WHO Global Framework For Healthy Workplaces[11] was intended to enable employers, workers, and their representatives, to enhance health. It provides strategic directions for planning and implementing workplace-based interventions for health protection and health promotion through collective action by workplace actors with minimal support from external health services. There is extensive body of literature documenting the synergies between occupational health and safety programs and workplace health promotion. [12] For example, NIOSH-supported research in the US found that the success rate of smoking cessation interventions at the workplace significantly increased when they were combined with occupational health and safety programs.[13] For this reason, the WHO framework for healthy workplaces encompasses all health determinants and promotion of health. A healthy workplace, as defined by WHO, is a work setting where workers and managers collaborate continuously to protect and promote the health, safety and wellbeing of all workers by addressing health risks in the work environment, work organization, and individual behaviors, and, improving the health of workers, their families, and the community. The development of healthy workplaces required leadership commitment and engagement, involving workers and their representatives, business ethics, regulatory compliance, as well as a systematic and comprehensive process to ensure effectiveness, continuous improvement, sustainability and integration.[14] NIOSH also adopted a holistic approach to addressing health determinants at the workplace through the Total Worker Health Initiative – a strategy integrating occupational safety and health protection with health promotion to prevent worker injury and illness and to advance health and well-being. Similarly, the European Unions' Network for Workplace Health Promotion advocates for improving work organization and the working environment together with promoting active participation and encouraging personal development.[15]

Another opportunity for leveraging action on health at the workplace is through the global movement on **non-communicable diseases** (NCDs). In 2011 the 66th Session of the General Assembly of the United Nations adopted Resolution 66/2 on prevention and control of NCDs and urged private sector to create an enabling environment for healthy behaviors among workers, establish tobacco-free workplaces and safe and healthy working environments, promote good corporate practices and workplace wellness programs, and provide health insurance plans. [16] In follow up, the 66th World Health Assembly in 2013 endorsed the Global Action Plan on Prevention and Control of NCDs including development healthy workplaces, prevention and control of occupational and work-related non-communicable diseases, such as cancer, diabetes, chronic respiratory and cardiovascular diseases, as well as linking occupational health services to primary and community health care as an innovative way of long-term care of patients with NCDs.[17] The NCD process provided a new context for implementing WHO action on prevention of occupational cancer[18] and on the elimination of asbestos and silica-related diseases.[19]

One of WHO's core functions is setting health-based norms and standards, and promoting their implementation. The 60th World Health Assembly requested WHO to develop a set of **minimum requirements for health protection**, applicable to all workplaces in big and small enterprises whether in formal or informal work settings. Such standards are to guide governments in developing regulations and norms for their countries. WHO has already developed several public health standards applicable to work settings, such as indoor air quality guidelines[20], radiation protection standards[21], international chemical safety data cards[22], and a guide for water safety in public buildings[23]. Other guidelines are currently being developed, such as occupational exposure to nanoparticles, electromagnetic fields, UV and optical radiation, and occupational risks in housing. International occupational safety and health standards and requirements have been also adopted by the ILO and the International Standardization Organization (ISO). Furthermore, norms and regulations developed by NIOSH, OSHA and the European Union are widely used as reference by national standard setting bodies in many countries. WHO regularly receives requests from its Member States to provide information and to advise on setting up national health standards for workplaces. Compliance with a basic set of internationally agreed standards for health protection can support workers' health, healthy workplaces and a more sustainable development, particularly in small enterprises and informal settings that are outside the scope of official occupational safety and health inspection and administration.

Reducing work-related injuries, illnesses, and deaths requires also systematic **measurement and reporting of workers' health.** In 2011, ILO estimated 2.3 million deaths from work-related injuries, illnesses, and accidents. Monitoring progress in improving workers' health requires feasible international indicators with reliable databases for their management. Therefore, the 60th World Health Assembly requested WHO to support the development of information and evidence for action under objective 4 of the GPA by defining indicators for workers' health, promoting regional and global information platforms for surveillance of workers' health, and developing international exposure and diagnostic criteria for early detection of occupational diseases.

The **WHO Global Health Observatory** (GHO) provides access to over 50 datasets on priority health topics including mortality and burden of diseases, the Millennium Development Goals (child health, maternal and reproductive health, immunization, HIV/AIDS, tuberculosis, malaria, neglected diseases, water and sanitation), non-communicable diseases and their risk factors, epidemic-prone diseases, health systems, environmental and occupational health, violence and injuries, and health equity. In addition, the GHO provides on-line access to WHO's annual summary of health-related data for its 194 Member States. GHO data relevant to workers' health include statistics on the global burden of diseases and injuries from selected occupational risk factors and data, and behavioral risks for non-communicable diseases – smoke free public places, prevalence of tobacco smoking in adults, physical activity, obesity among adults, and restrictions on alcohol use in public places. [24] Furthermore, ILO Labor Statistics provide data on economically active populations, employment, unemployment, hours of work, rural labor statistics, working poor and employment in the informal economy (women and men), and occupational injuries.[25]

The **Global Burden of Diseases, Injuries, and Risk Factors** (GBD) is an approach to global descriptive epidemiology. It is a systematic, scientific effort to quantify the comparative magnitude of health loss due to diseases, injuries, and risk factors by age, sex, and geographies for specific points in time. Disease burden can be expressed in deaths, incidence or in disability-adjusted life years (DALY). The latter measure combines the burden due to death and disability in a single index. Using such an index permits the comparison of the burden due to various environmental risk factors with other risk factors or diseases. Using standard GBD methods for occupational risks is a particular challenge because of the big diversity of exposures and

populations at risk. However, when data are sparse or not available, even an uncertain estimate is preferable to no estimate because the lack of estimate is often taken to mean no burden from that condition. For decision-makers, health-sector leaders, researchers, and informed citizens, the GBD approach provides an opportunity to see the big picture, to compare diseases, injuries, and risk factors, and to understand in a given place, time, and age-sex group, what are the most important contributors to health loss. To ensure a health system is adequately aligned to a population's true health challenges, policymakers must be able to compare the effects of different diseases that kill people prematurely and cause ill health and disability.

In 2004 WHO carried out a Comparative Risk Assessment of the burden of disease and injuries attributable to selected health risks, including occupational.[26] This study estimated the number of deaths and DALYs attributable to occupational exposure to carcinogens, particles, fumes, noise, ergonomic stressors, and injuries. In 2010, the Institute for Health Metrics and Evaluation (IMHE) at the University of Washington started a process of new global estimates of the burden of disease and injuries and risk factors expanding further the range of occupational risks and outcomes.[27] Under this project we elaborated further the methodologies used previous by WHO and IHME to measure the burden of diseases and injuries attributable to occupational risks by identifying additions risk-health outcome pairs and carrying out review of evidence on the exposure and the quantification of health impacts.

RESULTS AND DISCUSSION

This section presents the main accomplishments and the outputs of project activities. The section is organized along the strategies in the original project proposal.

Project Objective 1. Scaling up health coverage of workers and strengthening health system governance

1.1. Building the capacities of ministries of health in developing countries to provide leadership for action on workers' health.

In order to facilitate countries to assess the current situation of workers' health and to develop priorities for action we developed a template for national profiles on workers' health. The template included:

(a) guidance on the scope and purpose of the national profile of workers' health, suggested content and ways of data collection, analysis and presentation;

(b) a set of 39 international indicators for workers derived from the database created for the global repository for data on workers' health (see item 3.1. for details);

(c) a set of suggested national indicators for measuring workers' health coverage (see item 1.2. for details), and

(d) core and expanded indicators for measuring progress on health and safety at work in the context of sustainable development.

The template was piloted in six countries (Qatar, Russian Federation, Israel, Cuba, Tanzania, Jamaica and Madagascar). We first extracted the available international data for each pilot country from database of the global workers' health observatory and generated graphs and tables. The data were sent to the national health authorities with instructions how to use in the development of plans and policies for workers' health

In Cuba, Tanzania, Jamaica and Madagascar, the ministries of health with support from national institutes for occupational health and local experts also reviewed the domestic qualitative and qualitative data and developed national reports on workers' health situation. The reports included data and description of the socio-demographic characteristics of the working population, the general health status of the population in working age, as well as the available data on the health impacts of occupational risks from the Global Burden of Diseases Study, work-related social determinants of health data (child labor, working poor, informal employment, gender inequalities), risk factors for non-communicable diseases (smoking and alcohol prevalence, body weights, physical activity, blood pressure, blood glucose and cholesterol) and health coverage (basic health services, health insurance, workmen compensation schemes) available. The national situation reports included also information about the regulations and policies governing the activities for protection and promotion of workers' health and the institutional framework for action. These reports were presented and discussed at national workshops with participation of

stakeholders from health and labor ministries, academic institutions, workers' organizations, business associations and civil society. The national workshops also developed recommendations for priority actions by the ministry of health and the national health system.

In Tanzania, the national multi-stakeholder workshop was held in August 2016 in Dar es Salaam. In follow-up the ministry of health convened additional targeted consultations with major stakeholders and elaborated a strategic five-year plan of action on workers' health 2017 with specific activities and budget estimates.[28] In result, the occupational health program, led by the ministry responsible for health, was made a priority in the national health strategy and several occupational health indicators including into the national health information system. Priority projects for developing national programs for occupational health of health workers were implemented in the Mainland and Zanzibar.

In Madagascar, a national multi-stakeholder workshop was held in Mahajanga in August 2017. Participants from the national health system reviewed the situation report and developed recommendations for priority actions by the ministry of health and the health system to address priority issues of workers' health. The action plan is currently for review and approval by the ministry of health. The ministry of health intends to have further consultations on joint actions with the ministry of labor and its directorate for occupational safety. The actions on the follow-up were delayed due to the outbreak of plague in the second half of 2017.

In Cuba, the national situation report was reviewed at a multi-stakeholder workshop (November 2015, Havana), with representatives of the ministries of health, labor, interior and provincial public health centers.[29] The workshop developed a new national program for occupational health in line with the new economic development in the country, establishment of small enterprises, private economic activities, and international investments. The program is currently under review for approval by the minister of health.

In Jamaica, the national outlook developed with WHO support was reviewed at multi-stakeholder workshop 'Healthy Workplaces – Healthy Spaces – Healthy Workers' (April 2017, Kingston)[30]. The workshop elaborated a framework for the national plan of action on workers' health and recommendations for working with the private sector on priority initiatives, such as prevention and control of non-communicable diseases at the workplace.

In Qatar, the development of the national profile was followed by a country mission of the PI to review the institutional arrangements and provide recommendations for strategic policy directions on workers' health. As a result, the Ministry of Public Health identified healthy and safe employees as priority target for action and included occupational health in the national health strategy (2018-2022).[31] The ministry also initiated several projects for building core institutional and human resource capacities for occupational health in the ministry of health and Qatar university.

In the Russian Federation, the findings from the national profile were reviewed by the All-Russian Congress on Occupational Health in Irkutsk, 2014. Subsequently, the ministry of health with support from the Federal Centre for Occupational Medicine elaborated a concept note for carrying out the state policy in the area of workers' health[32]. The concept note was presented by the minister of health for discussion at a special meeting of the National Security Council devoted to workers' health. The meeting was chaired by prime minister Medvedev.

In Israel, the national profile generated from the data base of the WHO global observatory of workers' health stimulated the ministry of health to set the objective of developing a national occupational health policy. The ministry established a multidisciplinary working group to study the national situation and best practices in OECD countries and to elaborate a proposal for national policy to scale up the protection and promotion of workers' health in the country.

1.2. Scaling up of coverage with interventions and services for workers' health

Bearing in mind the different methods in use for measuring coverage of occupational health services, we developed a draft set of **indicators for measuring and monitoring workers' health coverage**. The set was developed on the basis of the WHO Service Availability and Readiness Assessment (SARA) tool.[33] The indictors were intended to measure the following dimensions of health coverage for workers:

(a) service availability - number and distribution of health facilities offering occupational health services, occupational hygiene laboratories, poison control centers and occupational medicine clinics;

(b) service readiness - number and distribution of practicing occupational health experts and primary care providers trained in occupational health, availability of guidelines, tools and equipment for occupational health interventions in the facilities;

(c) service utilization (tracer indicators) – proportion of economically active population employed in enterprises required by law or collective agreement to provide occupational health service, enterprises receiving workplace risks assessment in a year, incidence of notified cases of occupational diseases and injuries, and proportion of targeted workers receiving preventive medical examinations; and

(d) financial protection - proportion of economically active population covered with employment injury scheme (workmen compensation), number of compensated cases and ratio between compensated and notified cases, and proportion of informal sector workers covered with health insurance.

The indicator set was presented to the ministries of health and WHO collaborating centers at an international consultation on universal health coverage for workers, held in Semnan, Iran, in 2014 and countries were invited to pilot the set. The indicators were piloted in Bulgaria, Singapore, Tanzania, and Iran by comparing with the available national statistics. The piloting demonstrated that the indicators can be used in most countries, however, no country had complete data sets to monitor all indicators. Furthermore, the data format and the definition of indicators differed from country to country. The conclusion from the piloting was that, though the indicators were found to be useful for developing road maps and plans of action for scaling up the coverage of occupational health in the individual countries, it was not possible to standardize and harmonize the indicator set for the purpose of benchmarking between countries and for aggregation and monitoring at the global and regional levels.

A subset of the indicators for workers' health coverage was adapted for measuring the coverage with the essential interventions for prevention and control of occupational and work-related diseases and injuries, targeted particularly at workers in micro, small and medium size enterprises and small and medium farms in formal and informal work settings. These interventions were identified through the systematic reviews of evidence for the delivery of interventions on workers' health at the primary care level of health systems and WHO field studies in Italy, Iran, Colombia, South Africa, Philippines and Thailand supported by previous

CDC/NIOSH grants. The definitions of these interventions, the assumptions for their delivery, including human resources, transport and health system costs, and the indicators for measuring coverage were included as separate Workers' health module in the UN OneHealth Costing Tool[a] The OneHealth indicators include: proportion of targeted workplaces covered with workplace visits by health provider; cases of occupational and work-related diseases notified to public health authorities as percent of the expected cases in a year among the targeted population and proportion of targeted population covered by preventive medical exams and fitness for work assessments. This allows countries to estimate the costs for delivery of these interventions through the health system and to develop realistic scenarios for scaling up.

Furthermore, to facilitate the users of the OneHealth Tool we created a **database for measuring the target populations for the essential interventions** for workers' health in OneHealth. The database covers 130 countries and includes:

(a) number of micro, small and medium size enterprises and small and medium farms in formal and informal sector (data from the International Finance Corporation (IFC) and the Food and Agricultural Organization (FAO);

(b) expected frequency of fatal and non-fatal occupational and work-related diseases (based on previous ILO and WHO estimates by region and income level) and

(c) estimated number of workers in micro, small and medium size enterprises and small and medium farms in formal and informal sector as percent of the economically active population. was developed for uploading in the International OneHealth Costing Tool.

These data were uploaded on the OneHealth tool to allow for estimating the costs for delivery of the essential interventions, to measure coverage and to develop scenarios for scaling up at the country level.

Advocacy for scaling up health coverage of workers in the informal sector was carried out in collaboration with the US Institute of Medicine. The PI participated in the IOM international workshop "Approaches to Universal Health Coverage and Occupational Health and Safety for the Informal Workforce in Developing Countries – A Workshop", Washington DC, 2014, with organizational support and lectures on financial health coverage of informal workforce and on

[a] Avenir Health (2018) OneHealth Costing Tool website http://www.avenirhealth.org/software-onehealth.php

essential interventions for prevention and control of occupational and work-related diseases in low resource settings[b]. The session on occupational health in informal sector was facilitated by NIOSH Director Dr John Howard with participation of Dr Leslie Nickels.

WHO also convened two **international workshops to address the low coverage of workers** with essential interventions and health services for the prevention and control of occupational and work-related diseases and injuries. These workshops provided opportunities for representatives of ministries of health and other government agencies of the participating countries and international experts to exchange views and experience and to develop collective recommendations for scaling up coverage with interventions and services for workers' health. The recommendations were adopted by consensus and constitute basis for action in participating countries and as example and reference for action in other countries.

The International consultation "Caring for all working people: interventions, indicators and service delivery" was organized by WHO and the Ministry of Health of Iran in Semnan, Islamic Republic of Iran, April 2014. The main objectives of the consultation were to: (a) share and document success stories and accumulated experience in delivering essential interventions and basic health services to workers in the informal sector and small enterprises, and rural, agricultural and migrant workers; (b) identify criteria and indicators for measuring progress towards the access of workers to essential interventions for prevention and control of occupational and work-related diseases and injuries; and (c) draw a road map for scaling-up access of all workers in the Eastern Mediterranean Region, particularly those in disadvantaged situations, to essential interventions and basic integrated health services in the context of universal health coverage and decent work initiatives. The consultation was attended by national and regional experts from Bahrain, Egypt, Islamic Republic of Iran, Kuwait, Lebanon, Morocco, Oman, Sudan, United Arab Emirates and Yemen, as well as international experts from Finland, India, Italy, Netherlands and South Africa, and representatives of ICOH, ILO, WONCA and WHO.

The Semnan consultation produced a consensus statement with recommendations for action by

[b] See presentations and videos from the workshop at http://www.iom.edu/Activities/Global/PublicPrivatePartnershipsForum/2014-JUL-29/Day%201/Panel%201/7-Ivanov-Video.aspx and http://www.iom.edu/Activities/Global/PublicPrivatePartnershipsForum/2014-JUL-29/Day%202/Panel%205/27-Ivanov-Video.aspx

the ten participating countries from the WHO Eastern Mediterranean region to scale up the health coverage of workers in the following directions:

> (a) strengthening governance, including political commitment, intersectoral collaboration and building human and institutional resources for workers' health;
>
> (b) scaling up service delivery for workers' health by defining essential interventions, devising regulations and service delivery models, referral pathways, specialized support, expanding the coverage of occupational health services to communities and workers' families and introducing mechanisms for financial protection and tools for costing interventions;
>
> (c) building up health workforce by including occupational health in pre-service education of health providers, in-service occupational health training programs and career pathways, training primary care providers, programs for protecting the occupational safety and health of health care workers and integrating of occupational and environmental health and safety measures into the accreditation systems of hospitals and other health care facilities;
>
> (d) improving health information, by including workers' health indicators into national health information systems, improving the registration and recording of occupational diseases and injuries, indicators for monitoring coverage and strengthening research and access to knowledge on the coverage, quality and effectiveness of occupational health services and interventions and work capacity.[34]

The international workshop "Scaling Up Workers' Coverage with Essential Interventions and Basic Occupational Health Services in Asia" was organized by WHO and the Ministry of Public Health of Thailand from 29 August to 1 September 2016, in Bangkok, Thailand. The workshop was attended by representatives of ministries of health from Viet Nam, Sri Lanka, Indonesia, Thailand, Maldives, Bhutan, Nepal, Timor Este, Cambodia, Laos, Malaysia, Brunei, experts from WHO collaborating centers for occupational health from Sri Lanka, Thailand and Viet Nam, CDC/NIOSH, and experts from WHO, ILO, and WONCA. The Bangkok workshop developed recommendations for scaling up workers' health coverage with essential interventions and basic occupational health services in the participating countries. Particular opportunities for actions were identified under the Sustainable Development Goals, such as:

(a) SDG1 to end poverty in all its forms everywhere, through expanding the coverage of social protection, in particular extending employment injuries schemes to all workers, including in the informal economy, self-employed, agricultural, and migrant workers, as well as improving the detection and reporting of occupational diseases and injuries,

(b) SDG3 to ensure healthy lives and promote well-being for all at all ages, in particular through: preventing occupational and work-related non-communicable diseases, extending health coverage to workers in the informal economy and enhancing the prevention of occupational poisonings;

(c) SDG 8 to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, through developing tool and mechanisms for detecting and reporting hazardous child labor and its elimination, improving the indicators, data and monitoring of occupational diseases and injuries, national and workplace occupational safety and health programs, regarding women, migrant and informal workers, and enhancing the protection of health and safety of health workers to stimulate health employment; and

(d) SDG 13 to take urgent action to combat climate change and its impacts, by protecting workers from heat stress, in particular outdoor workers and integrating measures for protection of health and safety of workers into the preparedness and response to extreme weather events.

1.3. Building capacities of primary care providers for workers' health

Following the definition of a package of essential interventions for workers' health included in the International OneHealth Costing Tool, we embarked on the development of **WHO modules for training of primary care providers** to carry out workplace risk assessment and health education, case management of occupational diseases, and health surveillance of workers. In addition, we considered the development of a module on protecting occupational health of workers in primary care centers.

We collected existing education materials for training of primary providers in occupational health through an open call to the WHO collaborating centers for occupational health and search of the training repositories. More than 25 training materials were collected. In collaboration with

Dr Leslie Nickels from NIOSH, we assessed the collection of existing English language curricula on occupational health and developed recommendations for inclusion in the curriculum for primary care providers. The materials were evaluated using 28 variables, such as competencies needed to deliver the package of essential interventions, what tools are currently available to build these competencies and what would be the strategy for developing future tools for low resource settings. Five criteria were used to categorize the materials as effective for addressing essential interventions and core competencies in occupational health at (a) the primary care level (b) the general occupational health level and (c) advanced, generally academic, occupational health level. Those materials that were effective at the primary care level will be used to inform the development of a curriculum for training on primary care providers in core competencies for delivering the essential interventions for workers' health.

Next, we established an international working group to develop the four training modules. The working group was composed by experts from the WHO collaborating centers at CDC/NIOSH, University of Maryland, University of Colombo (Sri Lanka) and the Bureau of Occupational and Environmental Diseases (Thailand). The group met face-to-face in May 2016 in Geneva and in September 2016 in Bangkok. So far, two out of the four modules have been developed – workplace risk assessment and case management of occupational diseases. The modules on health surveillance and occupational health of workers in primary care centers required additional review of literature to understand better the context for the implementation of these interventions at the primary care level.

1.4. Early detection of occupational diseases

WHO organized the contribution of the WCCs from University of Illinois in Chicago, International Centre for Rural Health (Italy) and the Federal Centre for Occupational Medicine, (Russian Federation) to the **elaboration of diagnostic and exposure criteria for the occupational diseases** included in the 2010 ILO list of occupational diseases. The working group reviewed the criteria for about 100 diseases and conditions caused by occupational risks. A face-to-face meeting was organized in June 2017 in Milan, Italy, to finalize the drafts. The diagnostic and exposure criteria for another 20 diseases and conditions remain to be completed.

We also elaborated a concept note for the **development of methods for early detection of occupational diseases**. The concept note covers the most frequent occupational diseases,

according to the WHO country questionnaire survey from 2008 – noise induced hearing loss, contact dermatitis, occupational respiratory diseases (asthma, COPD, pneumoconiosis), occupational cancer (lung cancer, skin cancer, leukemia, bladder cancer) musculoskeletal disorders (low back pain), occupational poisonings (lead, pesticides) and occupational infections (HIV, TB, Hepatitis B). A working group led by the WCCs at the University of Illinois at Chicago and the International Centre for Rural Health was established by WHO to develop methodologies form systematic reviews of evidence on the effectiveness and cost effectiveness of the methods for early detection of these groups of diseases. This work will continue in 2018 and 2019.

Project Objective 2. Norms, tools and guidance for healthy workplaces in low income settings

2.1. Development of healthy workplaces in countries

In 2011 UN General Assembly High Level Meeting on Non-Communicable Diseases (NCDs) , the Heads of State and Government committed themselves to work with the private sector to prevent and control NCDs in several strategic directions, including to "promote and create an enabling environment for healthy behaviors among workers, including by establishing tobacco-free workplaces and safe and healthy working environments through occupational health and safety measures, including, where appropriate, through good corporate practices, workplace wellness programs and health insurance plans."[c] For this purpose, under the Global Coordination Mechanism for Non-Communicable Diseases (GCM), WHO established a working group of country experts to develop authoritative recommendations on how governments could realize their commitments to engage with the private sector for the prevention and control of NCDs. The GCM/NCD working group issued a report that contains **recommendations on prevention and control of NCDs at the workplace**. Governments were urged to:

> (a) engage with the diverse range of private sector entities and other relevant stakeholders in promoting and creating an enabling environment in order to develop comprehensive

[c] Paragraph 44 of the Political Declaration of the High-level Meeting of the United Nations General Assembly on the Prevention and Control of Non-communicable Diseases available at http://www.who.int/nmh/events/un_ncd_summit2011/political_declaration_en.pdf?ua=1

workplace health programs combining occupational health and safety, workers' health promotion, and health and workers' compensation coverage, in both the public and private sectors, and

(b) revise, update and implement a strong regulatory framework to achieve greater coherence for national workplace health initiatives in both the public and private sectors, taking into account existing international obligations to protect workers' health in workplaces.

In addition, the report of the GCM/NCD working group outlined priority actions, evidence and experience to date and the bottlenecks for implementation of the recommendations. [35]

To support the implementation of these recommendations at the country level, WHO and Pan-American Health Organization, together with the ministries of health and labor of Jamaica organized a country workshop of stakeholders in Kingstone (April, 2017) with co-funding from the Japanese government. As a result, several private sector entities committed to establish programs for prevention and control of NCDs and workplace health promotion. The experience of the Jamaica project is currently being replicated in the Philippines.

We also recruited consultants and carried our review of evidence about the occupational health impacts of different technologies and processes for reducing carbon emissions and for greening the economy. The initial findings from review were issued as WHO discussion paper entitled "**Health in the green economy: Co-benefits to health of climate change mitigation**" in the WHO Health in the Green Economy Series. [36] The review suggested that health and safety at work values must be given high priority and visibility as core components of just transition to green economy. Greener, more energy-efficient building and transport infrastructure also can produce co-benefits for workers' health. Occupational hazards and risks associated with "green technologies" are often similar to those in conventional industries. Some climate mitigation measures and green technologies present new hazards or risks to worker health. Adoption of certain green technologies and climate change mitigation measures may reduce gaps in access to basic services and goods necessary for workers´ health. Equity in reducing occupational health risks and enhancing benefits associated with green technologies can be promoted through "life cycle" or "supply chain" approaches. Countries that promote green economy policies have an unprecedented opportunity to develop more inclusive health and occupational policies

concerning workers with vulnerable employment conditions. In a green and sustainable economy, workers must be active participants who propose their own initiatives and advocate their communities' interests.

2.2. Minimum requirements for workplace health protection

We collected, reviewed and systematizes existing international standards for health protection at the workplace, i.e. standards that aim at eliminating as far as possible the risk of adverse health consequences attributable to environmental and occupational hazards at the workplace. We considered physical, chemical, biological and ergonomic, and psychological hazards, workspace, buildings, processes, practices, and sanitary facilities, air quality, noise, illumination, thermal comfort, drinking water and sanitation. The focus was on internationally applicable standards, such as WHO norms and guidelines, ILO conventions, recommendations and codes of practice, ISO standards, EU health and safety directives, NIOSH guides and US federal regulations.

Based on the review we prepared a WHO report **"International minimum requirements for health protection at the workplace**"[37] The report provides an analysis of the current spectrum of global, regional and national norms including conventions, standards, directives, regulations, guides, and codes directly relating to protecting health in the workplace. Consideration has been given to exposure to hazardous substances, noise and vibration, radiation, musculoskeletal and psychosocial risks, as well as general workplace and welfare issues such as lighting, thermal comfort, drinking water and sanitation, first aid and health surveillance.

2.3. Workplace health and safety in health care facilities and public health emergencies

In response to the demand from numerous countries for technical assistance on occupational health in the aftermath of the Ebola outbreak in West Africa, we developed different training materials and organized capacity building on the workplace health and safety protection in health care facilities and in public health emergencies. This work was co-financed by the Department for International Development of the United Kingdom and was carried out in collaboration with the WHO Health Emergencies Program and the ILO.

In 2015 in Liberia, a set of **education materials for training of workers with responsibility for occupational health and safety in healthcare facilities** and district environmental health officers was prepared and piloted together with the Ministry of Health and WHO Country Office

in Liberia. The set included presentations and training materials from products by WHO and ILO and 66 environmental health technicians were received two-day training on the basic measures for protecting occupational health and safety in healthcare facilities.[38]

In 2016, with contribution from the ILO and WCCs (CDC/NIOSH, National Institute of Occupational Health of South Africa and the University of Maryland) we organized a three-day **workshop for African countries on integrating occupational health and safety in the preparedness and response to outbreaks and public health emergencies** (Johannesburg, South Africa, June 2016). The workshop also aimed at training national public health officers in developing national programs for occupational health and safety of health care workers and to implement tools for workplace improvement in healthcare facilities The workshop was attended by national public health officers responsible for occupational health and safety and for outbreak response in the governments of Benin, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Ethiopia, Gambia, Ghana, Guinea Bissau, Madagascar, Malawi, Mauritania, Niger, Senegal, Tanzania and Togo, WHO collaborating centers and research partners from Benin, South Africa, Tanzania and the United States, as well as WHO and ILO experts.

The Johannesburg workshop demonstrated that most African countries lack capacities for protection of occupational health and safety in outbreaks and public health emergencies. Therefore, it was deemed necessary to ensure that health workers are trained on occupational health and safety principles prior to their engagement in response to outbreaks and public health emergencies. Since in many countries the national regulations for occupational health and safety do not cover public health care facilities, special national programs including regulations, standards and management for occupational health and safety of health workers should be developed. Poor working conditions in the health sector are linked to low resilience of local health services and shortage of human resources for health. Occupational health and safety of health workers should be given priority and should be linked to national strategies and initiatives for strengthening human resources for health and health service delivery. Though most countries have already in place some elements of protection of health and safety of health workers, such as infection prevention and control and programs for HIV and tuberculosis at the workplace, these elements need to be further expanded with prevention and control of other occupational health risks and linked in the management of occupational health and safety in all healthcare facilities.[39]

In parallel, together with ILO and the WCCs (University of British Columbia, University of Maryland and CDC/NIOSH) we developed a **WHO/ILO manual on protecting occupational health and safety in public health emergencies**. The earlier version of the manual was used as a basis for standard WHO training on basic occupational health in Ebola response (PROTECT) that was offered routinely as face to face and online training to all persons deployed by the UN system to the Ebola affected countries in West Africa. The final version of the manual takes an "all hazards" approach to public health emergencies and includes measures to protect occupational health and safety of health workers and emergency responders in outbreaks of infectious diseases, chemical spills, radiological incidents, extreme weather event and humanitarian emergencies. The manual is intended to assist countries in organizing the protection of occupational health and safety of health workers and emergency responders in their national preparedness plans and in the response to public health emergencies. It covers the context and challenges for protection occupational safety of health in emergencies and the main risks specific to emergency settings – such as heat stress, infections, musculoskeletal disorders, injuries, intoxications, burnout, stress, and mental health problems, as well as the development of systems for managing occupational safety and health in emergencies and the rights and responsibilities of managers and staff involved in the response to emergencies.[40] The publication was translated to French and Spanish and will be disseminated through the WHO country offices in countries classified at high risk of public health emergencies. The manual was used to develop a training module on occupational safety and health under the WHO package for training of Emergency Response Teams and to guide the work of the Safety Officers under the Incident Command System of the WHO Emergency Response Framework.

In addition, in response to the global health emergencies in the period 2014-2017 we developed two **guidelines for occupational health and safety addressing specific emergency situations**. These include:

(a) Protecting the health and safety of workers in emergency vector control of Aedes mosquitoes: Interim guidance for vector control and health workers, available in English, French, Portuguese and Spanish[41] , and

(b) Ebola virus disease (EVD): occupational safety and health : joint WHO/ILO briefing note for workers and employers, available in English and French[42]

As a follow up of the Johannesburg workshop, capacity building for occupational health and safety in healthcare facilities was organized in the United Republic of Tanzania (Zanzibar, and 3 locations in the Mainland) and in Botswana. These were three-day training workshops for district environmental health officers with responsibilities for inspecting healthcare facilities and for facility focal points for occupational and environmental health and infection prevention & control in major institutions. The trainings utilized the **WHO/ILO package on work improvement in healthcare facilities (HealthWISE**), including establishing a system for managing occupational safety and health at facility level, prevention and control of occupational infections, musculoskeletal disorders and workplace violence, management of personnel and supplies and facility hygiene.[43] [44] The ministries of health followed up of the introduction of work improvements in the health facilities and in the district health plans as results of the trainings. Training on workplace improvement in health care facilities (HealthWISE) was carried also in Togo[45] with support from the WCC for occupational health at the University of Abomey-Calavi, Benin. We worked with the ministry of health of Togo to carry out supervision and follow up of the pilot healthy centers that were trained in HealthWISE. The follow up demonstrated that improvements were introduced in 60% of the pilot health centers. The HealthWISE materials were adapted for the context of public health emergencies to carry out training in one region in Togo affected by the 2017 outbreak of epidemic meningitis and 45 health workers received a five-day training on work improvement in healthcare facilities. A total of 270 officers in Togo, Tanzania and Botswana were trained in work improvement in health care facilities.

We also provided technical assistance to the ministries of health of Togo, Tanzania and Botswana to develop **national programs on the protection of occupational safety and health of health workers** in line with the WHO/ILO global framework for national programs on occupational health of health workers.[d] The purpose of these programs is to reinforce political commitment and accountability for improving working conditions in the health sector, to establish management systems and core institutional and human resource capacities for the protection of occupational health and safety of all health workers in all health settings, including

[d] 309th Session of ILO Governing Body (2010) The sectoral dimension of the ILO's work: Review of sectoral initiatives on HIV and AIDS, Document GB.309/STM/1/2, appendix II, available at http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_145837.pdf

in emergencies at national, sub-nation and health facility levels. The program in Togo was approved by the ministry of health and is now operational. The program in Tanzania (both Mainland and Zanzibar) and Botswana were completed and submitted to the government for approval. The development of the national programs included the following steps:

(a) national workshop with key stakeholders to identify the existing elements for protection of occupational health in health care facilities, the main occupational health problems and the possible strategic actions for improvement;

(b) development of draft programs, with responsibilities and indicators of performance at the national, district and facility levels

(c) field visits to typical health care facilities and health districts to test the feasibility of the list of responsibilities and indicators and adapt to the specificities of each country

(d) review of the draft program by stakeholders

(f) finalization and submission to approval by the competent authority in the ministry responsible for health, after consultation with the ministry responsible for labor

The key elements of the national program were integrated into the health workforce element of the Joint External Evaluation Tool for monitoring and evaluation countries' preparedness for public health emergencies under the International Health Regulations.[46] This work also resulted in making occupational health and safety of health workers and emergency responders a priority under the ILO-OECD-WHO five-year global action plan on health employment and inclusive economic growth, adopted by the 70th World Health Assembly in 2017.[47]

Project Objective 3. Global observatory for statistical information and monitoring of workers' health

3.1. Global repository of data on workers' health

With the help of a consultant we carried out an **analysis of existing international statistical databases relevant to workers' health**. This included reviewing databases used for WHO CRA and IHME GBD studies, ILO labor statistics, databases on NCDs, other international data sources, such as OECD and European Union statistics. The analysis focused on the content of the

databases and their potential use for monitoring workers' health, as well as on data availability and updates, access, time series, geographical coverage, strengths and constraints.

Next, we downloaded and compiled the data on 39 indicators of workers' health available by country and by gender. The indicators include general health and demographic statistics of the working population, occupational burden of disease from selected risk factors (carcinogens, asthmagens, fumes, particles, ergonomic risk factors and noise), social determinants of workers' health (working poor, employment in informal economy, child labor etc.), modifiable risk factors for NCDs among working population (tobacco and alcohol consumption, obesity, physical activity, blood pressure, glycemia, and cholesterol levels in blood) and for health coverage (health insurance, labor inspection, workmen compensation). First, we used Excel and then we migrated the database to SPSS software with assistance from the WCC at INAIL, Italy. The database was updated with the latest available datasets for each of the 39 prioritized indicators. Data from the database were extracted, prepared and delivered to ministries of health for their development of national outlooks of workers' health for several countries, such as Dominican Republic, Tanzania, Russian Federation, Qatar, Cuba, Colombia, Israel, Jamaica and Madagascar. The database was presented to over 70 representatives from ministries of health, international organizations and WHO collaborating centers for occupational health, at a regional expert meeting for South-East Asia in December 2017 in New Delhi, India, and at a global expert meeting on action on workers' health in April 2018 in Geneva, Switzerland.

WHO has further considered the opportunity to use existing online platforms for making the updated database openly accessible. A working group on OSH data was introduced to the Global OSH Coalition, co-chaired by WHO and ILO, to make the global workers' health indicators available in an open-access facility. We discussed with the EU Agency for Safety and Health at Work, which has recently developed an open-access visualization facility for European OSH indicators, the opportunity to work with WHO towards an open-access facility for the global database on workers' health.

WHO has also started to work towards establishing a more **comprehensive global monitoring system for workers' health.** The development of the first global outlook of workers' health has been initiated. With support from WCC at INAIL, Italy, the updated data for the indicators included in the WHO global database for workers' health indicators were harmonized across

countries, indicators and time points, to ensure the international comparability needed for robust international benchmarking. For each indicator, a method was developed for presenting the data for the indicator in a way that is consistent and comparable with other indicators. First inequality analyses have been conducted, in the first place focusing on monitoring inequality by gender.

3.2. Global Burden of Disease

WHO produced estimates of the burden of disease that can be prevented through action on the working environment and carried out a review of evidence on corresponding interventions This builds on the WHO report published in March 2016 entitled ”Preventing disease through healthy environments: a global assessment of the burden of disease from environmental risks”.[48] The spotlight report on working environment was written based on: (a) systematic review of the links between occupational risks and conditions and major disease groups, with special focus on the non-communicable diseases; (b) synthesis of available information on fractions of diseases attributable to the occupational risks, using comparative risk assessment and expert opinion; and (c) synthesis of the literature on interventions.

This assessment was published in a comprehensive WHO report “**Preventing disease through healthier and safety workplaces”** which contains the evidence linking diseases and injuries to occupational risks, the results of the quantitative assessment of the disease burden attributable to selected occupational risks, and compilation of general interventions and selected examples of occupational and environmental interventions that successfully improve health. [49]

This WHO study estimated that in 2015, more than 1.2 million deaths globally were attributable to occupational risks, which represent 2.1% of all deaths in the general population. When accounting for both deaths and disability, the fraction of the global disease burden in the general population due to occupation amounted to 2.7%. Noncommunicable diseases contribute 70%, injuries 22% and infectious diseases 8% to the total disease burden from occupational risks. Low- and middle-income countries were disproportionally affected by occupational deaths and disease.

This study provided an approximate estimate of how much disease can be prevented by reducing occupational risks to health. The analysis used a combination of approaches with a clear focus on comparative risk assessment methods, which apply detailed exposure and exposure-risk

information. Of the 1.2 million deaths attributable to occupation, 1.1 million (90%) were estimated using comparative risk assessment methods, and the remaining using more limited epidemiological data and expert opinion. While the evidence has shown that many diseases are caused by occupational risks to health, to date, only a limited number of those could be quantified, suggesting that the disease burden from occupational risks presented in this report remains a conservative estimate.

Furthermore, this assessment summarized extensive information on interventions to reduce the burden of disease due to occupation. It listed general interventions by disease or injury as well as selected examples of occupational and environmental interventions from the epidemiological literature. Occupational risks, in this study, included physical, chemical, biological and psychosocial risks, working conditions and the built environments of workplaces.

Currently, WHO and ILO still have separate and different estimation methodologies for occupational disease burden, and consequently the organizations' official estimates differ considerably. The existing methodologies do not cover several pairs of occupational risk factors and health outcomes that are likely to have a large burden of disease, leading to a probably large underestimate of the work-related disease burden.

Therefore, in 2016, WHO and ILO came to an agreement to develop a **joint methodology for estimating the global burden of work-related disease and injury** ("joint methodology"). The methodology is expected to estimate the numbers of deaths and healthy lives lost from occupational risk factors based on the WHO data for the total burden of disease and the ILO data for occupations. The methodology would allow for producing regular estimates at the global level and also by regional and income groupings of countries, by sex and age.

The joint methodology builds upon the existing robust methodologies for estimating the occupational disease burden for 22 pairs of occupational risk factors and health outcomes. In addition, we are developing methodologies for estimation of the burden of 13 additional occupational risk factor-outcomes pairs that are likely to account for a large disease burden. .

For the 13 additional risk factor-outcome pairs, we are currently carrying out **systematic reviews of evidence and meta-analysis** to produce the parameters required to estimate the corresponding disease burden. WHO and ILO have established and are facilitating 14 working groups to conduct reviews of evidence comprising 130 individual experts from 25 countries from five WHO regions.

These experts also received training in the latest methods for synthesizing evidence and modelling disease burden in occupational health. Nine journal articles describing the protocols for systematic reviews have been already submitted for publication in peer-reviewed journal Environment International. [505152535455565758]

The scientific approach for developing the official estimation methodology has been designed to ensure that the methods are scientifically robust and produce transparent, accurate official estimates that adhere with the stringent statistical requirements of both WHO and ILO and will utilize innovative models for evidence synthesis and statistical modelling for occupational health are being applied.

The methodology and the first estimates will be published as joint WHO/ILO report in 2019. The WHO and ILO statistics departments will assess the proposed WHO/ILO joint methodology for transparency and accuracy. The estimates will launched at the press-conference and will be disseminated through social media and WHO and ILO websites. In addition, the systematic reviews will be published in open-access in peer-reviewed, academic journals.

3.3. Workers' health indicators

See 3.1.

Project management

Dr Ivan Ivanov, Team leader of the WHO Global Occupational Health Program, served as project director. Project activities were also supported by the following WHO staff:

1. Dr Annette Pruss Ustun, expert in quantification of health impact, carried out the WHO study on the burden of disease attributable to unhealthy and unsafe work environment
2. Dr Frank Pega , expert in epidemiology, supported the work on the data and metrics for workers' health and the development of WHO/ILO joint methodology on work-relate burden of disease and injuries.
3. Dr Evelyn Kortum, expert in occupational psychology, provided support to project activities on healthy workplaces during the first year of the project.

4. Ms Lisa Ravenscroft, Ms Aubrey Musngi-.Anouar and Mr Pablo Perenzin, administrative assistants, provided administrative support to carry out all project activities, including organization of meetings, contracting, correspondence and financial management.

The implementation of project activities was also supported by the following WHO international consultants:

1. Dr Doohee You provided expertise to develop the global database of indicators and data of workers' health
2. Dr Shubhendu Mudgal developed the manual on occupational safety and health in public health emergencies and provided technical support to project activities on occupational health of health workers and rapid response teams
3. Dr Charu Garg developed the Workers' Health Module of the International OneHealth Costing Tool along with step by step instructions for users
4. Dr Rene Mendez and Dr Tee Guidotti, experts in occupational health, carried out the review of occupational health impacts of green technologies

The following WHO collaborating centers participated in the implementation of project activities: University of Colombo, Sri Lanka; Bureau of Occupational and Environmental Health, Thailand; National Institute of Occupational Health, South Africa; University of Abomey-Calavi, Benin; University of Maryland, USA; CDC/NIOSH; University of British Columbia, Canada; INAIL, Italy; International Centre for Rural Health, Italy; University of Illinois at Chicago, USA; Federal Centre for Occupational Medicine, Russian Federation; Muhimbili University, Tanzania; National Institute of Workers' Health, Cuba

Project activities were implemented in collaboration with the ministries responsible for health in Togo, Botswana, Madagascar, Tanzania (Mainland and Zanzibar), Israel, Russian Federation, Iran, Thailand, Jamaica, Cuba, Colombia.

Several project activities benefited from collaboration with the International Labor Organization, the International Commission on Occupational Health, the Word Federation of Family Doctors and the International Council of Nurses.

The results of this project were reported to the WHO Member States at the 71st World Health Assembly in May 2017 as part of the report of WHO Director General on the implementation of

the WHO global plan of action on workers' health in the period 2014-2017 acknowledging the financial contribution of the US government for this work.. [59]

CONCLUSIONS

This project allowed WHO to carry out key activities under World Health Assembly Resolution 60.26 "Workers' Health Global Plan of Action" in period 2014-2017. The support contributed significantly to the ability of WHO Secretariat to complete its obligations under the global plan of action on workers' health (2008-2017). The progress made under this plan of action was reviewed and appreciated by the WHO Member States at the 71st World Health Assembly in May 2018.

The accomplishments under the five objectives of the WHO global plan of action on workers' health in the period 2014-2017 include:

1. To devise and implement policy instruments on workers' health

- Technical support to 13 countries in developing national outlooks and action plans for workers' health, and for strengthening the relevant capacities of health ministries.
- Global framework for the national programs for occupational health and safety of health workers elaborated jointly with ILO
- Guidance provided to 12 countries for developing such national programs for occupational health of health workers.

2: To protect and promote health at the workplace

- Recommendations for governments working with the private sector to stimulate healthy behaviors among workers and for prevention and control of NCDs at the workplace
- International standards for workplace health protection.
- WHO guidelines for occupational safety and health in emergency vector control and outbreaks of Ebola virus diseases
- Practical tools and capacity building materials for workplace improvement in healthcare facilities published jointly with ILO

- WHO/ILO manual on occupational safety and health in outbreaks and public health emergencies published covering different types of risks and emergencies
- Training for the national focal point for occupational health and emergency preparedness from 17 countries from the African region
- Capacity building for work improvement in healthcare facilities in eight countries.

3. To improve the performance of and access to occupational health services

- Regional workshops on scaling up workers' health coverage with essential interventions and basic occupational health services were held in Semnan, Islamic Republic of Iran (2014), Bangkok, Thailand (2016) to develop indicators and road maps, to disseminate good practices and to promote inter-country collaboration.
- A set of essential interventions for workers' health included in the International OneHealth Costing tool to allow countries to plan and cost their delivery at the primary care level and to develop scenarios for scaling up.
- A toolkit for building capacities of primary care providers to deliver these essential interventions under development.
- Access of migrant workers to occupational health services promoted under the WHO framework of priorities and guiding principles to promote the health of refugees and migrants.

4. To provide and communicate evidence for action and practice

- Contribution to ILO's diagnostic and exposure criteria for occupational diseases.
- Design for developing a joint WHO/ILO joint methodology for measuring work-related burden of disease and injuries
- Global workers' health database of existing international indicators measuring workers' health status and its determinants
- WHO study on burden of disease preventable through healthier and safer workplaces

5: To incorporate workers' health into other policies

- Overview of the occupational health aspects related to green technologies.

The global network of WHO collaborating centers for occupational Health (currently 45 institutions) provided support to the WHO in the prevention of occupational NCDs, safety of health-care workers, capacity building, occupational diseases, workers' health metrics, and health of workers in the informal economy.

This cooperative agreement allowed us to mobilize additional financial support of 650,000 USD from UK DFID for WHO activities on health workers and public health emergencies. Additional resources were mobilized from ILO through the development of joint products, where the ILO covered the cost for publications and for meetings of experts.

In addition, several regional initiatives to implement the global plan of action on workers' health were initiated as a spinoff of this cooperative agreement:

- Plan of Action on Workers' Health in the Americas (2015-2025);
- Regional Framework for Occupational Health in the Western Pacific
- Southeast European Network of Occupational Health

Priority actions on workers' health were also included in Regional Strategy for the Management of Environmental Determinants of Human Health in the African Region 2017–2021, the Arab strategy on health and environment, and in the outcomes of the European Ministerial Conferences on Health and Environment.

ENDNOTES

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