Preventing and mitigating COVID-19 at work

Policy brief

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Executive Summary

Transmission of SARS-CoV-2, the virus that causes COVID-19, has occurred in a wide range of workplaces outside of healthcare facilities. Policies aimed at protecting workers serve to help prevent community transmission of the virus and protect national economies by maintaining open and safe workplaces.

To date there has been a lack of consistency in national and sub-national policy recommendations to guide workplaces on how to prevent transmission and protect workers from COVID-19. This policy brief summarizes recent evidence and provides comprehensive action points for governments and workplaces in implementing the relevant WHO and ILO recommendations on COVID-19 and occupational safety and health.

Although this brief provides an overview of published research on transmission of SARS-CoV-2 in the workplace and measures for prevention, it is worth noting that most publications are of small cross-sectional or ecological studies that are prone to selection bias, misclassification or confounding. More research on occupational exposure and illness is needed to establish an evidence-base strong enough to inform clear policy options.

Nonetheless in some sectors there are clear trends indicating increased risk of transmission. This is notable for service and sales workers, cleaning and domestic workers, education workers, meat-processing workers, hospitality workers, drivers and transportation workers, public safety workers, construction workers and the people in social service occupations. Workplaces with physical person-to-person contact, inadequate ventilation, common eating areas, shared work accommodations and travel are more likely to report COVID-19 outbreaks. The evidence supports the existing WHO and ILO recommendations for preventative measures for COVID-19, such as remote work directives, restricting worksite entrance to key workers, physical distancing, routine screening, isolation of infected persons, contact tracing and quarantining of contacts, regular worksite disinfection (especially of high touch surfaces), hand hygiene, environmental monitoring and appropriate use of personal protective equipment.

The action points in the policy brief are derived from the existing WHO and ILO recommendations and are aimed at providing national and local governments, employers, workers and their representatives and occupational health services with practical guidance on preventing COVID-19 outbreaks at work by minimizing exposure to and transmission of SARS-CoV-2 among workers. Governments, in line with applicable international labour standards, notably International Labour Organization (ILO) Conventions No. 155 (1) and No.187 (2), should define national policies and measures to protect the health and safety of workers by instituting occupational health surveillance of COVID-19, ensuring paid sick and quarantine policies and enforcing public health and occupational safety and health measures.

National and local authorities need to adapt these action points based on the level of COVID-19 transmission in the community as defined by the WHO guidance on adjusting public health and social measures (3) and in accordance with ILO guidance on occupational safety and health measures to prevent COVID-19 (4). In implementing prevention and mitigation policies at work, governments and employers must balance policy interventions with measures to limit the potential impact on socioeconomic wellbeing, including access to services and loss of income (5). Policies implemented to prevent the spread of COVID-19 in workplaces may come with health and safety risks of their own, such as prolonged use of personal protective equipment (PPE), psychosocial and ergonomic effects of working remotely, risks related to lack of systems maintenance during lockdown, and chemical exposure associated with increased levels of disinfection. These resulting risks also should be acknowledged and mitigated.

Part 1. Overview

1.1 Aim of the document

The aim of this policy brief is to provide practical guidance for national and local authorities and employers and workers' representatives for the implementations of the WHO and ILO recommendations to prevent the transmission of SARS-CoV-2 and manage COVID-19 outbreaks at work in non-healthcare settings.

This document offers an updated literature review and expanded discussion on policies to prevent workplace transmission of SARS-CoV-2, which has at times facilitated the spread of COVID-19 worldwide in employer-provided accommodation, transportation or during routine worker tasks and interactions (4). The unique risk to workers and workplaces continues to have a significant impact on public health, as well as local and global economies. The WHO interim guidance, "Considerations for public health and social measures in the workplace in the context of COVID-19" (6), the WHO FAQs on health and safety in the workplace (7) and the ILO guidance on occupational safety and health measures to prevent COVID-19 (4) provide general guidance for non-healthcare workplaces to ensure worker health and safety.

Health workers are at particular risk of workplace-related SARS-CoV-2 transmission. The WHO interim guidance, "COVID-19: Occupational health and safety for health workers" provides specific guidance for healthcare settings (8). Additional measures related to the labour market in general as outlined in the ILO four policy pillars framework are integral for a holistic approach to protecting and supporting all workers and businesses throughout the pandemic and recovery (9).

Outbreaks at work increase the likelihood of workplace closure and represent a key indicator for safe reopening of commerce. The policy recommendations outlined in this brief are appropriate for all non-healthcare workplaces, including those that have not experienced outbreaks.

1.2 Key questions addressed

This brief addresses the issue of COVID-19 at workplaces outside of healthcare facilities and focuses on addressing the following questions:

- According to available scientific evidence, what characteristics of the workplace and workforce increase the risk of SARS-CoV-2 transmission in the workplace?
- Is there evidence of successful infection prevention and control (IPC) measures in the workplace?
- What is the role of workplaces for containing and mitigating COVID-19 in their workforces?
- What types of policies have been implemented to prevent and mitigate transmission in the workplace?
- What policies will help prevent transmission and mitigate the impact of COVID-19 in the workplace?

Part 2. COVID-19 in the workplace: a review of the literature

2.1 Transmission of SARS-CoV-2

In order to understand how to prevent the transmission of SARS-CoV-2 at work it is important to first review how the virus is spread between people and in the environment. The WHO interim guidance on mask use in the context of COVID-19 provides an overview of SARS-CoV-2 transmission and implications for infection prevention in the community (10). According to current knowledge about transmission, SARS-CoV-2 transmission primarily occurs between people when an infected person is in close contact with another person. The extent to which the virus will transmit between co-workers depends on the amount of viable virus being shed and expelled by a person, the type of contact that person has with others, the setting where exposure occurs and what preventative measures are in place.

The SARS-CoV-2 virus can spread from the mouth or nose of an infectious person when the person coughs, sneezes, sings, breathes heavily or talks. Close contact with an infected person can result in inhalation of, or inoculation with, the virus through the mouth, nose or eyes. There is limited evidence of transmission through fomites (objects or materials that may be contaminated with viable virus, such as work equipment or surfaces) in the immediate environment around the infected person. Such transmission may occur through touching the fomites followed by touching the mouth, nose or eyes. Transmission occurs in settings outside of medical facilities, most often in indoor, crowded, and inadequately ventilated spaces, where infected persons spend long periods of time with others. This suggests SARS-CoV-2 transmission is particularly effective in crowded, confined indoor spaces where there is poor or no ventilation (10).

2.2 Factors influencing the spread of COVID-19 in the workplace

2.2.1 Occupational factors

According to the scientific literature, healthcare workers have the highest risk occupations due to the nature of their work, but outbreaks have been described in several non-health care work settings. Workplaces with physical person-to-person contact, inadequate ventilation and shared work accommodations, travel or eating areas have reported higher rates of COVID-19. Outbreaks have been identified among retail workers (11) (12) (13) (14) (15), cleaning and domestic workers (13), food production workers (16)(17), restaurant and hospitality workers (12), drivers and transportation workers (12) (13) (14) (15) (18), education workers (18) (19) (29), public safety workers (12) (13) (19) (20), construction workers (11) (14) (19) (21) (22), agricultural workers (16) (23) and among individuals in social service occupations including social workers and counsellors (11) (13) (19). Occupations that allowed for remote work and work with minimal interaction with the public or clients have shown lower risks of infection (11). The list provided above is not exhaustive and does not exclude possible problems in other occupations and sectors.

2.2.2 Socio-demographic factors

Socio-demographic factors associated with higher risk of occupational exposure to SARS-CoV-2 include low-income bracket (13) (24) (25), female gender (24) (26) (27), immigrant status (27), increasing age (11) and being a "visible minority" (28). "Non-white" non-essential workers[1] had higher COVID-19 risk when compared to "white" essential workers, with "non-white" essential workers having the highest risk of transmission (29). Two studies on how occupational segregation according to race and ethnicity impact the risk of COVID-19 demonstrated that Black workers in the United States of America are more likely to be employed in essential occupations (30) and occupations with close proximity with customers and the public (28). Outbreaks in meat processing facilities in the United States of America have had a disproportionate impact on Hispanic and other minority worker populations (17) (31). High density worksites and shared accommodation and transportation have caused exceptionally high rates of COVID-19 among migrant workers (32). Workers with a post-secondary school education (Bachelor's degree and higher) have less occupational risk of exposure to SARS-CoV-2 (27).

2.2.3 Work environments

Outbreaks have been identified in a number of different work environments: office environment, meat-processing facilities, other factories, migrant work camps (32), fitness centres (33), ships (34) (35) (36), other service-related occupations (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) and transportation (49) (50). The published literature illustrates a small portion of the total number of outbreaks in the work environment but demonstrates a preclusion towards outbreaks in specific environments. Four studies report outbreaks in office settings, with primary facilitators being in close proximity to an infected person (51) (52) (53) (54). A number of studies describe outbreaks in meat processing facilities where prolonged close contact with co-workers, poor ventilation and crowded accommodation were identified as key factors (55) (56) (57) (58) (59) (60). Symptomatic cases of COVID-19 have been more prevalent among workers in "public spaces" and the tourism industry when compared to non-working populations (61).

In addition to the above studies, risk assessment studies report that workplaces with attributes of high customer density and visit time are associated with an increase in cumulative weekly cases of COVID-19 (62). Risk mapping for COVID-19 outbreaks using mobility data found that workplace specific factors such as shared workspace increased risk of SARS-CoV-2 exposure (63).

2.2.4 Para occupational factors

Shared accommodations involve extended time spent indoors in close proximity. Multiple studies have demonstrated outbreaks arising from shared employer-provided accommodations. Attack rates described in some of the studies were exceedingly high; one study of workers residing on a fishery vessel reported an attack rate of 85.2% (35). Of all confirmed COVID-19 cases in Singapore from April 2020, 86% were linked to dormitories for migrant workers (64). Seroprevalence was highest (88.7%) among individuals living in worker accommodation (65). However, one study (66) reported that all participants living in employer-provided accommodations tested negative for antibodies. A study of

[1] For effects of this brief, the term « essential worker » is not to be used as a synonym of worker in essential services, or in any way that would entail the deprivation or restrictions to the right to organize according to the ILO Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87).

migrant workers in Singapore reported 88% of all nationally confirmed cases were workers housed in worksite dormitories; one dormitory reported nearly 20% of workers being seropositive (14). Other worksites reporting accommodation-related transmission are meat processing facilities in the United States (56) (57), an overnight camp (45) and marine vessels (34) (35) (36).

Commuting and work-related travel. Four published studies describe outbreaks related to commuting. Two publications reported shared transportation to work and an outbreak of 264 workers at meat processing facilities in the United States (56) (57). One study found no transmission among co-workers from a single index case despite 150 exposures and shared transportation (54). When compared to non-infected controls, COVID-19 cases were 3.2 times more likely to have taken public transit to work (25). Four additional studies report outbreaks associated with work-related travel (52) (53) (67) (68).

Social gathering of co-workers. Social gatherings of co-workers outside of the workplace facilitates the introduction of community acquired cases into the workplace and conversely exposing the community to workplace originating cases. In these studies one group socialized in a bar (47) while another at a dinner party that involved singing in an enclosed space (48). In all reported scenarios, the infections acquired through social gatherings of co-workers resulted in additional infections in the workplace.

2.2.5 The effectiveness of workplace interventions

Studies assessing the efficacy of workplace interventions are especially important in designing recommendations to workplaces and national policies on preventing SARS-CoV-2 transmission at work. Studies on risk reduction strategies in the workplace tested a wide range of interventions including regular worksite disinfection, work from home directives, restricting worksite entrance to key workers, physical distancing guidelines, routine screening, contact tracing, environmental monitoring and personal protective equipment. The majority of published studies are based on predictive models, which may be prone to biased assumptions in the model. Only a few studies measured disease prevalence among workers.

Policies that encourage ill workers to self-isolate through income support programs, furlough and quarantine policies were found to be effective in preventing workplace outbreaks (69) (70) (71). Interventions that limit workplace social interaction and reduce workplace density were effective in decreasing infection rates (51) (72) (73) (74) (75). The number of workplace outbreaks increased 5-fold following a loosening of physical distancing measures (76). Personal protective equipment (PPE) use among workers was found to significantly reduce transmission rate among co-workers (72). Company policies and guidelines on PPE use improved worker PPE compliance (77). Regular environmental testing (78), face mask use by both workers and customers (79) and worker screening (80) were effective in mitigating outbreaks at workplaces. High-circulation HVAC systems with HEPA filters were shown to significantly reduce virus concentrations indoors (81).

Research has also shown that consultation and involvement of workers' representatives to address occupational safety and health (OSH) issues at the workplace are associated with a decrease in work-related injuries and accidents (82). A nursing home study in the United States noted that health worker unions were associated with a 1.29-percentage-point reduction in mortality related to COVID-19 (83).

Part 3. Policies directed at preventing transmission in the workplace

The WHO Public Health and Social Measures (PHSM) database (84) brings together multiple large datasets tracking public health measures for the COVID-19 pandemic using a common taxonomy and structure, into a single, open-content dataset for public use. As of 20 April 2021, the PHSM database lists 89 574 public health and social measures policies initiated since the start of the pandemic. Of those, 11 138 are specific to workplaces. Below is an overview of policies directed at mitigating transmission in the workplace.

3.1 Remote work

Encouraging remote work through a range of interventions has been a cornerstone of occupational health policy in the context of COVID-19. Approximately one third of all workplace policies listed in the WHO PHSM database are directed at remote work. Some governments have required remote work of all non-essential government workers, while others have mandated compulsory remote work for all non-essential workers. Quota systems have also been put in place to require remote work for at least 70% of all workers. When not mandated, incentives, national guidance and capacity building of remote work has been used to encourage remote work.

Targeted policies requiring employers to provide remote work for high-risk workers with co-morbidities have been instituted; some countries have required employers to provide remote work for all workers over the age of 60 years and those affected by public transit and day-care closures. Policies that prohibit employers from requiring non-essential workers from leaving their houses have been instituted.

3.2 Workplace measures

Mandated work shifts and spacing of workstations have been instituted to decrease workplace density. Quotas of office space occupancy have been established to limit density and physical contact. Restrictions limiting social activities and all in-person functions have been instituted for non-essential business. Staggered meal breaks and shift work schedules have been recommended. Physical barriers and adaptation of workspaces to minimize physical contact have been required by some governments as a condition to reopen following workplace closures. Mask use and safe physical distance guidelines have been widely recommended and at times made compulsory.

3.3 Reopening of workplaces

Premature and poorly planned re-opening of workplaces is likely to increase the risk of outbreaks at work (85). Additionally, premature return to the workplace without proper inspection and preparation can lead to significant safety hazards and has resulted in death and injury of workers. In simulation models, a staged approach to return to work has suggested reduced likelihood of a secondary outbreak (86). Multiple variables have been considered when planning a phased reopening, including worker age, immunity and prevalence of COVID-19 in the geographical area (87). Serology testing has been used among occupational cohorts to guide the selection of individuals to return to work by identifying workers with acquired immunity (88) (89). Staggered return to work plans and government-issued return-to-work permits have been used to prevent high-density work conditions. A staggered workday, with public and private sector workers starting work at different times, has been used to minimize exposure on public transit systems. Return-to-work permits based on worker risk level have been issued to protect high-risk workers. A 5-step return to work policy ranging from "quarantine" to "advanced reopening" has been recommended based on the rate of transmission in defined geographical areas, while other countries have used a "traffic light" system with a yellow grade indicating gradual return to work. When workplace restrictions are lifted, an initial return of key workers has been followed by non-key retail workers, followed by workers in recreational venues. Quotas requiring a limit of the total work force allowed to return to work, ranging from 30% to 66% of workers have been suggested.

Reopening of workplaces has been made conditional on compliance with occupational safety and health measures including hand sanitation, sufficient ventilation and mask use. Continuation of remote work and virtual meetings following workplace reopening has been encouraged, with some countries allowing workplace reopening only for workers who cannot work remotely.

Part 4. Policy action points: workplace level policies

4.1 Conduct workplace assessment for potential occupational exposures to SARS-CoV-2

Individual risk of SARS-CoV-2 infection is dependent on multiple environmental and organizational variables. By assessing the risk of exposure to SARS-CoV-2 in the workplace, employers will be able to better protect their workforce by implementing specific guidance based on risk profile. Employers in consultation with workers and workers' representatives should regularly update the risk assessment with support of occupational health services, when available. Workers and their representatives should be regularly informed about their risk of exposure to SARS-CoV-2 and what measures will be taken to minimize their risk.

The WHO interim guidance "Considerations for public health and social measures in the workplace in the context of COVID-19" recommends the use of the following risk levels for carrying out a workplace risk assessment for exposure to SARS-CoV-2 and planning for preventive measures in non-healthcare workplaces. In these risk categories, persons referred to as known to be or suspected of being infected with SARS-CoV-2 generally refers to persons who have already had a positive test or diagnosis (6).

- *Low exposure risk*. This category is for jobs or work tasks without frequent, close contact with the general public and other co-workers, visitors, clients or customers or contractors, and that do not require contact with people known to be or suspected of being infected with SARS-CoV-2. Workers in this category have minimal occupational contact with the public and other co-workers.
- *Medium exposure risk*. In areas where COVID-19 cases continue to be reported, this risk level may be applicable to workers who have work-related frequent and close contact with the general public, visitors, or customers in

high-population-density work environments (e.g. food markets, bus stations, public transport, schools and other work activities where safe physical distancing may be difficult to observe); or for work tasks that require close and frequent contact between co-workers.

- *High exposure risk.* Applicable to jobs or work tasks with high potential for close contact with people who are known or suspected of having COVID-19, as well as contact with objects and surfaces possibly contaminated with the virus. Examples of such exposure scenarios outside of healthcare facilities include the transportation of persons known or suspected to have COVID-19 in enclosed vehicles without separation between the driver and the passenger and providing domestic services or home care for people with COVID-19.

Assessing the level of transmission in the community is critical to assessing the risk of SARS-CoV-2 transmission at work. WHO defines seven transmission scenarios to describe the dynamic of the epidemic: no reported cases (including both zero transmission and the absence of detected and reported cases), sporadic cases, clusters of cases and four levels of community transmission from low incidence (CT1) to very high incidence (CT4). Further information on transmission scenarios and definition of these categories can be found in the interim guidance "Considerations for implementing and adjusting public health and social measures in the context of COVID-19" (90).

For more information on workplace risk assessment, refer to "Considerations for public health and social measures in the workplace in the context of COVID-19: Annex to considerations in adjusting. public health and social measures in the context of COVID-19 10 May 2020" (6). The ILO document on "A safe and healthy return to work during the COVID-19 pandemic" provides a practical structure for workplace risk assessment in the context of the COVID-19 pandemic (4). Information on how to effectively assess and manage occupational risks related to COVID-19 is provided by the ILO prevention and Mitigation of COVID-19 at Work Action Checklist (91). The ILO Guidelines on occupational safety and health management systems give further information on occupational risk management in workplaces (92).

4.2 Encourage transition to remote work

The hierarchy of control is a framework for preventing and reducing risk from potential hazards in the workplace. Elimination of potential exposure to SARS-CoV-2 in the workplace is the most effective way of preventing COVID-19 at work. Because of the risk inherent in working in close physical contact or in closed spaces with other co-workers and clients, an unprecedented transition to remote work has taken place worldwide.

Remote work, however, has its own unique health risks including physical ergonomic and mental health impacts (93). Occupation, sector and geographical location influence the likelihood a worker will be afforded a remote work opportunity. Affluent, educated workers from urban areas have greater potential for remote work (94). This calls into question the equity of remote work as a prevention strategy for COVID-19. The following action points should guide employers on transitioning their workers to remote work in a safe, healthy and efficient manner:

- Redesign workflow, protocols and processes to accommodate for maximum number of workers working remotely.
- Assess which individuals with specific positions and job tasks may work remotely and execute remote work policies.
- Provide training on safe and efficient remote work.
    - Ensure that the remote workspace is ergonomically equipped for the required work task.
    - Encourage regular brief stretch breaks every half an hour for seated work.
    - Encourage consistent working hours and breaks.
- Provide social outlets for workers and encourage regular video interactions.
- Educate workers about the mental health impacts of prolonged remote work, including the risk of depression, isolation and anxiety. Discuss work-life balance and setting clear working hours so that workers do not feel the pressure to be constantly connected.
- Encourage workers to support mental health through a regular schedule, exercise and social interactions such as virtual meet ups and social calls. Consider providing access to a worker assistance program for those experiencing mental health symptoms (95).
- Inform workers about healthful lifestyles, with encouragement to adopt them.

These and additional recommendations to address the mental health effects of teleworking are provided by the ILO guide "Managing work-related psychosocial risks during the COVID-19 pandemic" (96).

4.3 Implement safety and health measures to prevent transmission at the workplace

Measures to prevent SARS-CoV-2 transmission in the workplace should be established in consultation with IPC and occupational safety and health professionals and committees, in line with national and local public occupational and

safety health policies. Consultation and dialogue with workers and their representatives should be included during the planning, introduction and monitoring phases of new measures. Policies must adhere to national and local transmission classification in addition to the workplace-specific risk assessment. Further guidance on how to adapt these specific measures based on the workplace-specific risk assessment is described in the WHO interim guidance on COVID-19 at work (6) and the ILO brief on a safe and healthy return to work during the COVID-19 pandemic (4).

The following action points should be provided to all workers in all workplaces to prevent transmission of COVID-19. The action points follow the hierarchy of controls for all situations where the hazard cannot be eliminated and in which engineering controls such as ventilation and physical barriers, and administrative and organizational controls, such as staggered working times, are more effective in reducing transmission than the use of PPE, which should complement other measures as required.

- *Ventilation.* Natural ventilation such as opening windows should be recommended when possible and safe to do so. For mechanical systems, increase the percentage of outdoor air and total airflow supply to occupied spaces. Increase air filtration to as high as possible without significantly diminishing design airflow (97). Before increasing outdoor air percentage, verify compatibility with HVAC system capabilities for both temperature and humidity control as well as compatibility with outdoor/indoor air quality considerations. Consider running the HVAC system at maximum outside airflow for 2 hours before and after spaces are occupied, in accordance with manufactory recommendations (98). Employers must ensure routine maintenance of HVAC systems according to industry standards (99). The WHO ventilation roadmap is an important resource to ensure good indoor ventilation in the context of COVID-19 (100).
- *Physical distancing.* Introduce measures to keep a safe physical distance in accordance with national regulations between all people by regulating entrance to non-workers, discouraging direct physical contact with other persons and social gatherings, enforcing strict control over external access, implementing queue management through marking on the floor, scheduling queuing times, implementing physical barriers and decreasing workspace density (101). Minimize the need for physical meetings by encouraging teleconferences. Stagger workplace entrance and exit times to avoid crowding (102). Shared transportation should be avoided, and alternative forms of transportation such as walking, biking or using a private vehicle should be incentivized.
- *Hand hygiene.* Implement conveniently located hand washing stations or alcohol-based hand sanitizer at all entrances, bathrooms, workstations and dining facilities. Place signage to remind workers of proper hand hygiene, and institute a system to monitor compliance (103).
- *Cleaning and disinfection of environmental surfaces.* High traffic areas and high touch surfaces should be identified for cleaning and disinfection multiple times daily. Surfaces should always be cleaned with soap and water or a detergent to remove organic matter first, followed by disinfection. In non-health care settings, sodium hypochlorite (bleach) may be used at a recommended concentration of 0.1% (1000 ppm). Alternatively, alcohol with 70%-90% concentration may be used for surface disinfection. Disinfection should be applied in a localized and contained fashion. Area spraying of entire rooms, outdoor areas or persons is potentially toxic and should not be conducted. Commonly used disinfectants are potentially toxic. Preparation and application of disinfectants must follow manufacturer's instructions to protect the safety and health of disinfection workers (104). Workers must be provided with regular training on safe chemical handling and appropriate personal protective equipment.
- *Personal protective equipment (PPE).* Employers have a responsibility to provide at no cost suitable and sufficient PPE, conduct training and monitor safe use among its workers. Non-medical (fabric) masks should be used by all workers working indoors or in close proximity to clients and co-workers. Individuals with higher risk of severe complications from COVID-19 are advised to use a medical mask. Employers should retrain staff on proper use of protective equipment on a monthly basis. WHO guidance on when and how to use masks, and the composition of non-medical fabric masks, is an important resource for workers (105) (10).

All workplaces should make COVID-19 information from relevant health agencies readily available to their workforce. Development of preparedness and business contingency plans in the advent of outbreaks at work should be prioritized. Additionally, continual risk communication dialogue with workers and their representatives should be conducted to ensure managers receive feedback from workers and monitor the introduction of preventative measures. Managers and supervisors set the safety culture in the workplace, and it is therefore crucial that they follow all safety and health measures implemented in the workplace.

Cooperation between employers and workers is critical for successfully protecting the health and safety of workers. According to ILO Recommendation No. 164, measures to facilitate cooperation may include the appointment of workers' safety delegates, workers' safety and health committees, and/or joint safety and health committees with equal representation with employers' representatives, according to national law and practice. All such committees or, as appropriate, other workers' representatives should, among other rights:

- be given adequate information on safety and health matters, enabled to examine factors affecting safety and health and encouraged to propose measures on the subject
- be consulted when major new safety and health measures are envisaged and before they are carried out
- be consulted in planning alterations of work processes, work content or organization of work, which may have safety or health implications for the workers
- be given protection from dismissal and other measures prejudicial to them while exercising their functions in the field of occupational safety and health as workers' representatives or as members of safety and health committees
- have access to all parts of the workplace and be able to communicate with workers on safety and health matters during working hours
- be able to contribute to negotiations in the undertaking on occupational safety and health matters
- have reasonable time during paid working hours to exercise their safety and health functions and to receive training related to these functions
- have recourse to specialists to advise on particular safety and health problems.

4.4 Routine screening of at-risk workers

Mitigation of workplace outbreaks depends on their rapid identification through screening and contact tracing. All workers should be informed about how to identify clinical signs and symptoms of concern. Workers should be regularly reminded to stay home if feeling unwell and to self-quarantine after contact with a COVID-19 patient.

- A system must be in place at each workplace to screen workers for suspected symptoms, and laboratory testing should be readily accessible. This must be done in a confidential and secure manner. Intensity of screening protocols should reflect the case rate in the community (106).
- Establish clear and consistent policies for workers displaying symptoms or with a known COVID-19 contact.
- Consider screening of workers with high exposure risk using point of care rapid antigen testing in accordance with WHO guidance (107).
- Workers who report recently developed symptoms consistent with COVID-19 should be required to stay home.
- Local health authorities should be notified when a COVID-19 case is suspected to be work related, and according to national law, employers may be required to report it to the competent labour inspectorate.
- Co-workers who had maintained close physical contact with known cases should remain quarantined for 14 days, consistent with WHO guidelines (108).

4.5 Plan for a gradual and safe workplace reopening

Reopening of workplaces must be undertaken in a gradual staged process under clear guidance from local authorities. The ILO guidance on Safe Return to Work: Ten Action Points (109), provides succinct guidance to employers, workers and their representatives on preventative measures for a safe return to work. WHO infographics are useful educational resources for reopening workplaces (110). ILO's Occupational Safety and Health Convention No. 155 provides a clear framework of employers and workers rights and responsibilities to ensure a safe workplace.

- Transition to remote work and digital commerce as much as possible; only consider physically reopening operations that cannot take place remotely.
- Take stock of supplies needed for a safe reopening (masks, hand hygiene supplies, physical barriers, educational materials). Ensure supply chain and inventory management before reopening.
- Ensure facilities are able to provide for universal precautions before reopening and have the required resources, including safety and health expertise.
- Re-conduct worker specific risk assessment before reopening (see 4.1). This assessment should cover all elements of work and consider in particular potential impact of lack of routine maintenance and availability of first aid and emergency cover.
- Allow partial reopening initially with selected key workers who have minimal personal risk factors and low exposure risk.
- Remotely train all workers about reopening protocols before reopening.
- Conduct a symptom survey of workers before reopening.
- Institute shift or rotational schedules to decrease workplace density and isolate cases if an outbreak occurs.

Overall workplace conditions should be inspected for potential hazards. Consultation with workers' representatives is of particular relevance because they are in a unique position to ensure a practical understanding of processes and problems to be considered for protection of life and health.

Part 5. Policy action points: government level policies

5.1. National policies and programmes for prevention and mitigation of COVID-19 in workplaces

National policies on COVID-19 at the workplace should be informed by a people-centred approach giving priority to life and health and the anticipation and mitigation of risks. These policies should be developed in consultation with the most representative organizations of employers and workers and informed by the ILO Occupational Safety and Health Convention, 1981 (No. 155), the Occupational Health Services Convention, 1985 (No. 161), and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187). These international standards provide a legal framework that establishes a clear system of workplace rights and responsibilities, recognizes social dialogue at national and workplace level as critical to ensuring effective policy design and intervention and give guidance to countries on how to establish an effective occupational safety and health system for adequate responses to COVID-19. More specifically these normative instruments include the following definitions:

- workplace arrangements for cooperation between employers, workers and their representatives and the necessity for workers and their representatives to be consulted by employers on all aspects of OSH associated with their work
- the overarching principle according to which employers must ensure that, in so far as is reasonably practicable, workplaces under their control are safe and without risk to health and that workers should follow established OSH procedures
- the right of workers to remove themselves from any situation they have reasonable justification to believe presents an imminent and serious danger to their life or health, according to national law and practice.

National policies should be applicable to all workers and workplaces and address in particular the specificities of medium, small and micro-sized companies and individuals working in the informal economy. For more information consult ILO Brief on COVID-19 crisis and the informal economy: Immediate responses and policy challenges (111) and ILO Prevention and Mitigation of COVID-19 at work for small and medium-sized enterprises Action Checklist (112).

5.2 Government oversight and enforcement of safety and health measures during the COVID-19 pandemic

The implementation of public health and safety measures in the workplace aimed at preventing the transmission of SARS-CoV-2 should involve oversight by public health authorities and labour inspectorates according to their respective mandates (113) (114).

- Labour and public health authorities should collaborate on providing joint guidance to workplaces and ensuring that those guidances are followed. This includes the provision of technical information on how to comply with mandatory safety and health measures and enforcement of these measures by labour inspectors. In this context, labour inspection could be considered as an essential service.
- Governments in consultation with employers and community partners need to provide clear and consistent indices of when workplaces can safely reopen.
- Governments should engage the business community to ensure they are updated on community transmission and changes in workplace directives and made aware of their responsibility to provide a safe working environment for their workers during the pandemic.

5.3 Institute paid sick leave policies

Paid sick leave maintains income, thereby ensuring socioeconomic stability, and mitigates SARS-CoV-2 transmission by incentivizing isolation of infected workers and self-quarantine of contacts of confirmed cases. Paid sick leave has been shown to significantly reduce work attendance among ill workers (115). Policies encouraging paid sick leave have resulted in decreased transmission of influenza (116). Emergency sick leave provisions in the United States of America has been associated with decreased cases of COVID-19 (69). Currently, however, 27% of 193 United Nations Member States do not require paid sick leave from the first day of illness. Only 34% of countries guarantee sick leave for part-time workers, and 58% of countries do not have provisions for self-employed workers (117).

According to the ILO Medical Care and Sickness Benefits Recommendation, 1969 (No. 134), workers who are absent from work for the purpose of quarantine or for undergoing preventive or curative medical care and whose salary is

suspended should be granted a (sickness) cash benefit. Appropriate provisions should also be made to help protect a person who is economically active but has to care for a sick dependent. The following action points are important in instituting an effective and equitable sick leave policy.

- Employment protections should be enacted to ensure workers are not subject to unfair dismissal, loss of income or punitive measures for taking sick leave when feeling ill or quarantining after close contact in the community or at work.
- Paid sick leave should be provided to all workers starting from the first day of illness. Sick leave should be extended to people isolating because of vulnerability and who cannot work remotely and for contacts of confirmed cases.
- All workers, including those working in small business, contract workers and part-time workers should be provided with adequate sick leave protections.

5.4 Institute occupational health surveillance for COVID-19

An occupational surveillance system for COVID-19 enables public health officials and employers to evaluate the efficacy of workplace interventions and is crucial to understanding the true impact of the pandemic on the world of work. Such systems are essential to ensuring adherence to national workers' compensation laws. They also assist countries with understanding which worker populations are at risk and which work activities are most associated with contracting COVID-19.

Passive surveillance through already established methods of data collection is the most efficient method. Italy has estimated that 19.4% of COVID-19 cases were acquired through work by tracking claims submitted to the Italian Worker's Compensation Authority (118). Workers' compensation data, however, can be limiting because the definition of work causality is variable and often disputed. Adding occupational information to laboratory testing or physician reporting can provide useful sources of information for active surveillance of the working population. Mandated active surveillance by employers, however, raises potential concerns about patient privacy and the employer's ability to determine whether a COVID-19 case is work-related. The United States Occupational Safety and Health Administration revised previous guidance (119), which required employers to determine whether workers contracted COVID-19 in the workplace, due to concerns of privacy and technical limitations. The updated guidance states that employers "should not be expected to undertake extensive medical inquiries, given worker privacy concerns and most employers' lack of experience in this area." (120). The following policy action points guide the establishment of occupational health surveillance for COVID-19.

- Local public health agencies involved in contact tracing should be supported by occupational health services and practitioners in determining work-relatedness. Work information should be collected during interviews of positive cases.
- Criteria for determining work-relatedness should consider known cases at the workplace, known contact with such cases, temporal association (work contact preceding symptoms and diagnoses), clustering of cases among co-workers and lack of a competing source such as a family member.
- Cases suspected of being work-related should be recorded in a central confidential reporting system. Aggregated data and trends should be made public and disseminated to employers and workers.
- Employers should report to labour inspectorates COVID-19 cases characterized as a work injury or occupational disease, in accordance with national law (121).

5.5 Policies directed at protecting vulnerable workers

Vulnerable workers such as migrant workers, workers of the informal economy and ethnic and racial minorities are at increased risk for workplace hazards, income insecurity and job loss. They face added mental and physical health impacts associated with limited access to healthcare, language and cultural barriers, lack of formal labour contracts, limited legal protection and lack of social support networks (17) (31) (122). WHO Member States must ensure "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" including immigration status (123). The following actions are strongly recommended to protect the rights and health of vulnerable workers.

- Policies and protective measures outlined in this document must be provided to all workers regardless of immigration status, employment status, gender, and ethnic and racial identity; including paid sick leave, quarantine leave and protection from unfair dismissal.
- Ensure access to testing and healthcare services for vulnerable workers.
- Provide translated and culturally sensitive public health guidance and updates to all workers.

- Ensure living and transportation accommodations are compliant with public health measures, including safe physical distancing.
- Include vulnerable workers in national occupational COVID-19 surveillance systems.
- Public health authorities should have specially trained units to conduct contact tracing and testing among vulnerable workers in a culturally sensitive and linguistically appropriate manner.

For more information on protection of migrants in the context of COVID-19, please refer to the WHO interim guidance on preparedness, prevention and control of COVID-19 for refugees and migrants (124), and the ILO policy brief on protecting migrant workers during the COVID-19 pandemic (125).

Part 6. Conclusion

This policy brief offers an updated literature review and expanded discussion on policies to prevent workplace transmission of SARS-CoV-2. Specific risk factors at work for SARS-CoV-2 transmission and preventative measures on both the workplace and governmental levels have been discussed. Provision of a safe and healthy workplace is fundamental to decent work; the WHO and ILO policies presented in this brief are intended to help ensure safety and health for workers worldwide.

The rollout of vaccines will play a crucial part in protecting workers and populations overall. It is crucial that vaccine distribution be equitable, with preference given to workers at higher risk of developing severe COVID-19 illness and workers at elevated risk of SARS-CoV-2 exposure.

The WHO and ILO will continue to work together to advance the health and safety of workers in the recovery from the COVID-19 pandemic.

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WHO and ILO continues to monitor the situation closely for any changes that may affect this policy brief. Should any factors change, WHO and ILO will issue a further update. Otherwise, this policy brief document will expire 2 years after the date of publication.

Annex: Methods

Review of the scientific literature.

The purpose of the literature review is to define the scope of the public health impact COVID-19 has at work. The review of the literature is based on a rapid review conducted by the Emerging Science Group of Public Health Agency of Canada (126); it is not a systematic review intended to formulate evidence-based guidelines. Searches to retrieve relevant COVID-19 literature were conducted in PubMed, Scopus, BioRxiv, MedRxiv, ArXiv, SSRN and Research Square. The search results were cross-referenced with the literature on the World Health Organization (WHO) COVID literature list and COVID-19 information centres run by the Lancet, BMJ, Elsevier and Wiley. Additional articles, government and public health institution reports were added to the database. The search terms included in this review were "workplace", "work", "occupation", "colleague", "manufacturing", "factory", "office", "employee", "gathering", "transmission", "cluster" and "super spread". There were no language restrictions in the search query. Research published up until October 29, 2020 was included. Each potentially relevant reference was reviewed to confirm its relevance to the policy brief. Conflict of interest was assessed for all articles included. No articles included in the literature review was authored by researchers with perceived conflict of interest (employed or funded by private industry) or was research directly funded by industry with a perceived financial conflict of interest.

Quality of the scientific literature

The quality of the scientific evidence regarding COVID-19 clusters at work is limited. The majority of studies are small cross-sectional studies or ecological studies prone to selection bias and misclassification. A limited number of studies reviewed (8%) are prospective cohort studies. The geographical representation of studies is limited, with less than 15% of studies being from Asia or Africa and no studies from low-income countries, minimizing the external validity of the literature in addressing risks in many economies. Approximately 20% of studies reviewed are preprints and have not undergone a peer-review process. Long-term follow up of occupational cohorts from multiple different work settings are needed to adequately assess the relationship between occupational characteristics and risk of COVID-19 infection.

Review of workplace policies

A separate focused review of specific occupational health policy recommendations in the context of COVID-19 was conducted. Policies were abstracted from the global database of public health and social measures applied during the COVID-19 pandemic. The dataset is an open-content collaboration between WHO, the London School of Hygiene and Tropical Medicine, ACAPS, the University of Oxford, the Global Public Health Intelligence Network, the United States Centers for Disease Control and Prevention and the Complexity Science Hub Vienna (84). The database is not a comprehensive or exhaustive list of all occupational health policies globally. Policy categories reviewed include environmental/social measures, workplace closure and remote work and sick leave policies. Information was abstracted to identify worker population, date of implementation and policy details.

Development of policy action points

The policy brief was developed based on a rapid review of the relevant literature, a review of the relevant policy interventions collected in the PHSM database and a review of all relevant technical guidance published by the WHO and ILO. Key findings and relevant recommendations from these reports and studies were extracted, collated and reviewed in consultation with a panel of experts, including WHO staff from IPC, epidemiology, occupational health, ventilation, Epi-WIN at WHO HQ; occupational health focal persons in WHO regional offices; ILO staff from the Labour Administration, Labour Inspection and Occupational Safety and Health Branch in consultation with other departments and the ILO Bureaux for workers' and employers' activities; and internationally recognized external experts from the field of occupational health and safety. This panel met on two different occasions (remotely) to agree upon recommended policy action points as supported by previously published WHO and ILO guidance. The ILO Bureaux of Employers and Workers are part of the Secretariat of ILO (ILO regular staff members) and were consulted according to the practice established by ILO Cabinet for clearance of any ILO publications. Therefore, ILO staff who participated in the development of this manuscript did not undergo conflict of interest attestation. External reviewers were asked to disclose any circumstances that could represent a potential conflict of interest (i.e., any interest that may affect, or may reasonably be perceived to affect, the expert's objectivity and independence) and to sign a declaration of interest.

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