WELL HEALTH-SAFETY RATING FOR FACILITY OPERATIONS & MANAGEMENT

INTERNATIONAL WELL BUILDING INSTITUTE™
WELL
HEALTH-SAFETY RATED
2020

WELL HEALTH-SAFETY RATING, Q2 2025

INTRODUCTION

The WELL Health-Safety Rating is a roadmap to help organizations put the necessary plans and protocols in place for resilience and response.

The rating is designed to empower workplace leaders, owners and operators across large and small businesses alike to prioritize the health and safety of their employees, staff, visitors and other stakeholders. The WELL Health-Safety seal is a visible mark of your organization's commitment to making health and safety a best practice at your locations.

The rating is comprised of a subset of strategies from the WELL Building Standard (WELL Standard) addressing safety and acute health issues within buildings, primarily through operations and management policies. The rating has proven applications for any business seeking to proactively plan for the future and to support the long-term health and safety needs of their people.

WELL Health-Safety Rating scope

The rating includes more than 20 features across five action areas. To earn the rating, projects must achieve 15 points across multiple themes below:

- Cleaning and Sanitization Procedures
- Emergency Preparedness Programs
- Health Service Resources
- Air and Water Quality Management
- Stakeholder Engagement and Communication

Projects can also earn up to five innovation points and there are several pathways to do so, including by working with a WELL AP on their project or implementing design-based features from the broader WELL Standard that address their unique health and safety needs. Projects may also apply novel health and safety interventions not otherwise covered in the WELL Standard.

An annual renewal process validates projects' ongoing operations and maintenance practices to confirm they are consistently meeting a high standard for health and safety. The result of the annual renewal process results in an updated WELL Health-Safety seal.

For program details regarding base building applicability, space types, occupant types and the WELL project boundary, please refer to the Overview of WELL v2.

About the International WELL Building Institute

The International WELL Building Institute (IWBI) is the leading authority for transforming health and well-being in buildings, organizations and communities. IWBI's mission is to lead the global movement for putting people first in organizational decision-making and culture. IWBI sets the global standard for health through the WELL Standard, a library of holistic, evidence-based strategies that, when implemented, can improve the health and well-being of people. Developed over 10 years and backed by the latest scientific research, the WELL Standard contains over 500 strategies dispersed amongst more than 100 features, all of which is organized into 10 categories called concepts. The WELL program (WELL) reflects the application of the WELL Standard; IWBI allows organizations to implement the WELL Standard in a flexible and customizable way to meet specific health and well-being goals and drive outcomes for their business.

Developing the WELL Health-Safety Rating

The genesis of the WELL Health-Safety Rating was informed by feedback from IWBI's Task Force on COVID-19 and Other Respiratory Infections, which was established in March 2020 to support IWBI's response to the coronavirus disease (COVID-19) pandemic. Collectively, nearly 600 public health experts, virologists, government officials, academics, business leaders, architects, designers, building scientists and real estate professionals, expressed the need for a roadmap that would help guide workplace leaders, owners and operators through the pandemic and beyond.

Inspired by this call to action, IWBI identified a subset of operational and policy-based features in the WELL Standard that addressed the theme of health and safety. Feature selection focused on strategies that would help organizations respond to acute health and safety risks, including but not limited to COVID-19, and proactively plan for a more resilient future.

During the development process of the rating, IWBI sought information from a number of stakeholders, including the Task Force of COVID-19, World Health Organization (WHO), U.S. Centers for Disease Control and Prevention (CDC), global disease control and prevention centers and emergency management agencies, as well as recognized standard-making bodies such as ASTM International and ASHRAE, and leading academic and research institutions. Industry experts and researchers convened by IWBI as part of the WELL Concept Advisories, the WELL Research Advisory, the WELL Advisory for Sports and Entertainment Venues, the WELL Advisory for Hotels and Resorts and the WELL Airport Advisory also provided extensive insights for the WELL Health-Safety Rating.

Learning from the COVID-19 pandemic to prepare for a more resilient future

The COVID-19 pandemic highlighted the critical role that buildings play in supporting people's health, safety and well-being. Transmission of infectious diseases largely occurs in indoor and enclosed environments, where people spend approximately 90% of their time. While longer-term design strategies are important in reducing the risks of infectious disease spread and protecting occupants from acute threats in buildings, the urgent need to meet high health and safety standards prompted this rating to focus on strategies that can be implemented immediately within the scope of policy and operational strategies.

Because initial feature selection focused on helping organizations respond to a broader set of risks, including but not limited to COVID-19, the WELL Health-Safety Rating offers a roadmap for businesses to put health and safety at the center of their business strategy now and in the longterm. Proactive planning is critical to addressing emergencies and health and safety issues that may face in the future, such as those that arise from the common flu, seasonal wildfires or acts of terrorism.

The WELL Health-Safety Rating addresses a range of health and safety topics through a diverse set of evidence-based strategies that can be customized to an organization's specific concerns and goals in the short and the long term. The WELL Health-Safety Rating includes operational strategies that aim to reduce the risk of transmission of contagious and infectious diseases (e.g., flu, Legionnaires' disease), mitigate mold, and deliver high-quality air and water. It also focuses on emergency planning and operations, as well as occupant communication and engagement to ensure awareness and participation in creating a healthy, safe environment. Finally, the rating includes strategies to support occupant and employee health and resilience, with a focus on mental health during crises, sick leave policies and community immunity.

A seamless entry to WELL

The WELL Health-Safety Rating is comprised of a subset of features available in the foundational WELL Standard, which addresses a more comprehensive set of topics related to human health and well-being. Adapted to focus specifically on health and safety, the WELL Health-Safety Rating provides an accessible entry point to a comprehensive set of achievements that can be earned by engaging with the WELL program more broadly. Project teams can pursue the WELL Health-Safety Rating for any location independently, use the

rating as a stepping stone to achieve WELL Certification or integrate the rating as a milestone within their WELL at scale journey.

Disclaimer

None of the parties involved in the development or creation of the WELL Health-Safety Rating™ (and versions thereof and materials related thereto) including IWBI, its affiliates, and its and their respective owners, officers, directors, employees, agents, representatives, or contractors, assume any liability or responsibility to the user or any third parties for the accuracy, completeness, or use of or reliance on any information contained in the WELL Health-Safety Rating, or for any injuries, losses, or damages (including, without limitation, equitable relief) arising from such use or reliance. Although the information contained in the WELL Health-Safety Rating is believed to be reliable and accurate, all materials set forth within are provided without warranties of any kind, either express or implied, including but not limited to warranties of the accuracy or completeness of information or the suitability of the information for any particular purpose. The WELL Health-Safety Rating and versions thereof and materials related thereto are intended to educate and assist organizations, building stakeholders, real estate owners, tenants and other users in their efforts to create healthier spaces, organizations and communities, and nothing in the WELL Health-Safety Rating or versions thereof or materials related thereto should be considered, or used as a substitute for, quality control, safety analysis, legal compliance (including zoning), comprehensive urban planning, or medical advice, diagnosis or treatment. Achievement of the WELL Health-Safety Rating does not in any way guarantee, represent or warrant that the individuals in a space, building or organization will be healthy or healthier, nor does it guarantee that a space will be free from viruses, pathogens, bacteria, allergens or volatile organic compounds. As a condition of use, the user covenants not to sue and agrees to waive and release IWBI, its affiliates, employees, or contractors from any and all claims, demands, and causes of action for any injuries, losses or damages (including, without limitation, equitable relief) that the user may now or hereafter have a right to assert against such parties as a result of the use of, or reliance on, the WELL Health-Safety Rating and versions thereof or materials related thereto.

CLEANING AND SANITIZATION PROCEDURES

COVID-19 and many other infectious diseases are spread primarily through close contact with an infected person via respiratory droplets. However, it is known that coronaviruses and noroviruses, among other pathogens, can survive on surfaces infected by droplets. For instance, research suggests that the SARS-CoV-2 virus can remain airborne for up to three hours and on some surfaces for up to 72 hours.[1] Several outbreak investigations have supported the potential of fomites (i.e., infected surfaces) to cause viral diseases.[2,3] Similarly, pathogenic bacteria such as Salmonella can be transmitted through contaminated surfaces and hands, which may particularly trigger disease in children, as they are more likely to touch surfaces such as toilets.[4] Maintaining good cleaning protocols can support organizational resilience by helping reduce the risk of infection. Similarly, hand washing promotion is an effective way to reduce the spread of infectious diseases and to confer individual resilience.[5] Soap has been found to be more effective than hand sanitizer in community settings.[6]

While sanitization is critical, especially during an infectious disease crisis, commercial cleaning products may contain ingredients suspected to be hazardous to human health and the environment.[7] Cleaning product ingredients may contain vapors or gasses that irritate the nose, eyes, throat and lungs and can cause or trigger asthma attacks.[8] As a result, frequent use of household cleaning sprays is suspected to be a risk factor for adult asthma.[9] Low-hazard cleaning products and cleaning practices reduce impacts in indoor air quality and in the health of those performing these duties, while protecting occupants, as well.[7]

SC01 SUPPORT HANDWASHING | O (MAX: 1 PT)

Intent: Ensure support of hygienic hand washing practices for all individuals.

Summary: This feature requires projects to improve hygiene by offering hygienic soap containers and hand drying support.

Issue: All humans share the critical need to access to bathrooms and proper hand hygiene is key to reduce the incidence of gastrointestinal and respiratory diseases.[5] Soap has been found to be more effective at removing germs than hand sanitizer in non-healthcare settings, as sanitizers' effect is impeded by dirty or greasy hands.[10] Despite hand washing, hands can only become as clean as the surrounding environment. Sinks may harbor pathogenic bacteria that can migrate onto hands during washing.[11] Water splashing from the drain may spread bacteria to surrounding areas.[12–15] Additionally, soap and the inside of liquid soap containers often remain contaminated after use; thus, best practice and research recommends that soap dispensers not be topped off.[13,14] Lastly, once an individual's hands are cleaned, they can more easily become re-infected when wet compared to when dry.[11,16]

Solutions: Bathrooms can be designed and furnished to ease hygiene. Visual cues that promote hand hygiene may improve compliance with established guidelines in certain segments of the population.[17–19]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units & Guest Rooms:

For all sinks where handwashing is expected (e.g., bathrooms, break rooms, food prep and wellness rooms), the following are present within the room:

a. Fragrance-free liquid hand soap dispensed through one of the following:
    1. Sealed dispensers equipped with disposable soap cartridges.
    2. Dispensers with detachable and closed containers for soap refill. Soap containers must be washed and disinfected when emptied, before refilling.
b. One of the following methods for hand drying:
    1. Fabric hand towel rolls with dispensers, with rolls replaced before reaching their end of service.
    2. Paper towels.
    3. Hand dryers equipped with a HEPA filter. Filter replacement and equipment maintenance are carried out per manufacturer's instructions. (NOTE: This method is not available for healthcare projects.)
    4. Washable fabric hand towels accompanied by a used towel container placed nearby. Towels are washed before reuse.
c. Signage displaying steps for proper hand washing.

For Commercial Kitchen Spaces & Commercial Dining Spaces:

The following requirement is met:

a. Clear signage directing toward the nearest handwashing location is present at the entrance to all areas intended for food preparation or consumption.

For messages.Guest Rooms:

The following are provided in each bathroom:

a. Fragrance-free hand soap via one of the following:
    1. Individually wrapped bar soap, replaced during room turnover, and drainable soap bar racks.
    2. Sealed dispensers of liquid soap equipped with disposable soap cartridges.
    3. Liquid soap dispensers with detachable and closed containers for soap refill. Soap containers must be washed and disinfected when emptied, before refilling.
b. One of the following methods for hand drying:

1. Reusable cloth towels, replaced and washed at least during room changeover.
2. Paper towels.
3. Hand dryers equipped with a HEPA filter. Filter replacement and equipment maintenance are carried out per manufacturer's instructions.
4. Fabric hand towel rolls with dispensers, with rolls replaced before reaching their end of service.

SC02 REDUCE SURFACE CONTACT | O (MAX: 1 PT)

Intent: Reduce the amount of hand contact on high-touch surfaces.

Summary: Assess high-touch surfaces throughout the project and implement temporary and/or permanent strategies to reduce frequency or need of hand touch.

Issue: Coronaviruses and noroviruses, among other pathogens, can survive on surfaces infected by droplets. For instance, research suggests that the SARS-CoV-2 virus can remain airborne for up to three hours and on some surfaces for up to 72 hours.[1] Several outbreak investigations have supported the potential of fomites (i.e., infected surfaces) to cause viral diseases.[2,3]

Solutions: Reducing the instances where occupants touch surfaces can help minimize one of the vectors of disease transmission.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units & Guest Rooms:

Project provides the following:

a. An inventory of:
    1. All high-touch surfaces (e.g., doorknobs/handles, telephones, elevator buttons, faucet handles, soap dispensers, security equipment).
    2. All person-person contact points (e.g., security check-points).
b. Potential temporary and/or permanent measures to reduce or eliminate frequency of contact with high-touch surfaces and person-person contact, if possible (e.g., doors opened by an attendant, touch-free faucets, voice-activated elevators, ticketless entry, transparent partitions).
c. Circumstances and/or timeline in which measures will be implemented.

OR

The following requirements are met:

a. Project offers hands-free operation (through foot, voice, sensor or personal electronic device) or implements other design strategies to avoid hand operation for at least three of the following:
    1. Regularly used pedestrian doors to the project, during regularly occupied hours.
    2. Elevators.
    3. All water bottle fillers, water faucets, soap and paper towel dispensers.
    4. Window blinds and indoor lighting switches and/or controllers.
    5. Lids of trash, recycling and reuse bins.
b. Project supports occupants in maintaining hand hygiene near the following high-touch surfaces:
    1. Handrails, handlebars and other structures that support mobility and accessibility.
    2. Surfaces designed to help individuals with physical and/or visual disabilities to fully utilize a space (e.g., push to open door buttons, wheelchair lift controls, tactile maps or signage).
c. Project establishes and communicates rules and expectations for the usage and cleaning of shared tools and devices (e.g., photocopiers, gym equipment, communal kitchen appliances, utensils) for all regular occupants.

SC03 IMPROVE CLEANING PRACTICES | O (MAX: 1 PT)

Intent: Provide effective cleaning by establishing adequate cleaning protocols and practices.

Summary: This feature requires the development of cleaning and disinfection plans that include instructions, training and recordkeeping.

Issue: Cleaning is fundamental for keeping a healthy indoor environment. Microorganisms such as house dust mites – ubiquitously present around the world– are directly related with asthma and allergy development.[20,21] Surfaces may host pathogens released by sick individuals or through contact with another contaminated surface.[3]Cleaning practices may cause additional health concerns. For instance, indiscriminate use of cleaning sprays is suspected to be a risk factor for adult asthma.[9] Similarly, lack of education on the use of gloves during wet cleaning activities may explain the high prevalence of hand dermatitis in the cleaning service industry. [22,23]

Solutions: A thorough plan for cleaning operations that considers the health of occupants and cleaning staff increases the overall efficiency of the process, while reducing environmental damage.[24] The plan should align with advice from public health agencies for disinfection requirements.[25] Along with personal protective equipment (PPE), the implementation of engineering controls (e.g., ventilation) and policies is key to reduce exposure to hazards during cleaning practices.[26]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units:

The project develops and implements a cleaning plan that meets the following requirements:

a. Details the following:
    1. Extent and frequency of cleaning.
    2. Cleaning responsibilities of building occupants (if any) and cleaning staff.
    3. Cleaning supplies and where they can be accessed.
    4. Process to evaluate and document adherence to the cleaning plan.

b. Identifies the following:
    1. Surfaces that require disinfection (e.g., high-touch surfaces).
    2. Frequency and/or other thresholds (e.g., number of hours, number users of a space, results from a swab test) for disinfection.
    3. Applicable governmental registration and directions of use (e.g., contact time and dilution rates) for disinfectants.
    4. Other non-chemical tools used for disinfection, if any.

c. States the following documentation procedures:
    1. Record keeping practices for cleaning and disinfection activities.
    2. The chain of communications with building occupants.
    3. A system to log feedback from occupants and cleaning staff.

d. Specifies the following for cleaning materials and personal protection equipment (PPE):
    1. PPE requirements for general cleaning and specialized tasks (e.g., disinfection or dilution or chemicals).
    2. Color-coding for reusable and disposable cleaning cloths.
    3. Separate cleaning of reusable cleaning materials from other clothing or products.

e. Includes the following precautions for storage of cleaning products:
    1. An identifiable, fit-for-purpose storage space in accordance with the manufacturers' directions; bleach stored away from other products.
    2. Color-coding and labeling of any bleach-based and ammonia-based products, indicating they are

not to be mixed with one another.

f. Specifies the following for cleaning tools and equipment:
    1. HEPA rated filters for vacuum cleaners.
    2. If carpet and woven upholstery are present, the cleaning methodology (based on manufacturer's recommendations), favoring hot water extraction if technically feasible.
    3. Protocols for cleaning, maintenance and handling of waste accumulated in equipment (e.g., used vacuum cleaner bags).
g. Includes the following operational aspects:
    1. Use of cleaning and disinfection products, including dilutions (when needed) and ventilation requirements.
    2. On-site availability of current Safety Data Sheets (SDS) of cleaning and disinfection products, in languages spoken by the cleaning staff.
    3. Precautions to avoid slip hazards during and after floor cleaning.
    4. Safe disposal of waste, including soiled cleaning materials and PPE.
h. Outlines a training program that meets the following:
    1. Training covers cross-contamination prevention via hand hygiene, PPE, cleaning cloth replacement, cloth handling techniques and carrying systems to separate clean tools from dirty ones.
    2. Training is delivered to all relevant personnel including building management, building operators and contracted cleaning staff, on an annual basis.

OR

The project retains a cleaning provider organization certified under one of the following standards:

a. Green Seal® Standard for Commercial and Institutional Cleaning Services, GS-42, operated by Green Seal Inc.
b. Cleaning Industry Management Standard (CIMS) - GB criteria, operated by ISSA.
c. Nordic Swan Ecolabelling for Cleaning Services criteria, operated by Nordic Ecolabelling.
d. British Institute of Cleaning Science (BISc) accredited training.

SC04 SELECT PREFERRED CLEANING PRODUCTS | O (MAX: 1 PT)

Intent: Minimize potential health effects to occupants by selecting less hazardous products.

Summary: This feature requires the restriction of hazardous or harmful ingredients in cleaning, disinfection and sanitization products.

Issue: Commercial cleaning products may contain ingredients that may degrade the indoor air quality and are suspected to be hazardous to human health.[7] Some products may emit substances that irritate the nose, eyes, throat and lungs and can cause or trigger asthma attacks.[8] Moreover, the interactions between cleaning agents, microbes and public health are diverse and complex, and we are just beginning to better understand them.[27,28]

Solutions: The provision of cleaning products that contain less hazardous ingredients may reduce the risk of respiratory and dermal symptoms.[29]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units:

The project or organization has a cleaning policy that lists all surface cleaning and disinfection products and specifies that they meet the following requirements:

a. Cleaning products as-sold meet one of the following:

    1. Are labeled as 'low-hazard' or 'safer' by an Reference, or by a third-party certification recognized by the local government where the project is located. Hazard criteria must be specific for the product classes within the scope of this feature.
    2. Have ingredients disclosed through a Safety Data Sheet (SDS) that meets EU Regulation 2015/830 (CLP),[15] or through a disclosure document that meets California State Bill No. 258, and there are no ingredients listed in the disclosure document present at 100 ppm (0.01%) or above that are classified with the following codes and hazard statements as defined by the Globally Harmonized System (GHS): H311, H312, H317, H334, H340, H350, H360, H372.
    3. Meet Feature X08 Materials Optimization in WELL v2.

b. Products labeled as disinfectants meet the following:

    1. Have all antimicrobial efficacy claims registered by a governmental office and stated in their label.
    2. Utilize only active ingredients only from the following list: citric acid, hydrogen peroxide, L-lactic acid, ethanol, isopropanol, peroxyacetic acid, sodium bisulfate, chitosan
    3. Section 2 of the SDS does not contain the following GHS codes: H311, H312, H317, H334, H340, H350, H360, H372.

SC05 REDUCE RESPIRATORY PARTICLE EXPOSURE | O (MAX: 1 PT)

Intent: Implement strategies to reduce human contact with respiratory particles.

Summary: This feature requires projects to implement design and policy strategies to minimize some instances of contact with contaminated respiratory particles.

Issue: Many viral diseases, including COVID-19[262] and influenza, [263] are spread by oral or respiratory emissions of liquid particles emitted by an infected person when they cough, sneeze or even exhale.[182] Factors that may affect exposure include the size distribution of the respiratory particles,[263] humidity,[264,265] air flow[265,266] and air treatment.[265,266] While the relative influence of these factors is variable, direct exposure to particles shed by an infected individual may increase a person's odds of acquiring certain diseases.[262,267]

Solutions: Implementing design and policy strategies aimed at reducing exposure to some particles shed by infected individuals, like establishing physical distancing among people[268,269] or providing barriers to prevent respiratory particles,[270] may slow the spread of pathogens.[271]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units:

The following requirements are implemented during periods when higher incidence of respiratory disease is likely:

a. At least one of the following distancing strategies:

1. Queuing marks to increase distance between people while waiting in line (e.g., in elevator lobbies, at check-out counters) and while using moving sidewalks and escalators, as applicable.
2. Screens, protective furnishings or other engineering controls to reduce particle exchange at security check-ins, reception areas, check-out counters and other places with frequent interaction between occupants and a stationary worker.
3. Self-service systems to control ingress or egress to the project (e.g., at reception desks or checkout counters).

b. At least one of the following circulation strategies:

1. One-way hallways and corridors.
2. Separate entry and exit doors at pedestrian building entrances.
3. Separate entry and exit for restrooms except single-user bathrooms.

> **Note:** Interiors projects may count base building elevators, entries and exits towards feature requirements, even if outside of the project boundary.

The following requirements are implemented during periods when higher incidence of respiratory disease is likely:

a. All of the following in any shared spaces (e.g., meeting rooms, workspaces, communal kitchens):

1. Strategies to increase distance among occupants.
2. Expectations and requirements for usage of face coverings or personal protective equipment.
3. Clearly communicated rules for occupancy to reduce respiratory particle exposure and rationale

for their use.

b. The project or organization implements at least one of the follow communication strategies to educate occupants about the practices implemented by the project to reduce respiratory particle exposure:

    1. Monthly communication (e.g., email, webcast) to all regular occupants.
    2. Prominent signage (physical or digital) at all building entrances and in shared spaces.

> **Note:**
> This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

EMERGENCY PREPAREDNESS PROGRAMS

Emergency preparedness and resilience plans are critical to ensuring that organizations are equipped to immediately confront a crisis, as well as to recover successfully from it. Infectious disease epidemics have increased in the 21st century, involving fast global spread due to travel, trade and urbanization.[30,31] For example, the COVID-19 pandemic infected 6 million people and spread to almost every continent within 5 months, impacting the social and economic livelihood of the global population on an incalculable scale.[32,33] In addition, natural disaster emergencies kill around 90,000 people and affect close to 160 million people worldwide every year, with both an immediate and long-term impact on human lives and built spaces.[34] The U.S. Federal Emergency Management Agency estimates about 40-60% of small businesses permanently close following a disaster due to lack of a comprehensive disaster preparedness plan with proper mitigation strategies. [34]Emergency management plans can help organizations be better prepared to handle unforeseen events, minimize occupant confusion and improve coordination and safety during emergency situations.[30,35–39] Robust emergency preparedness and response measures can also slow the spread of infectious disease and minimize secondary mortality.[40]Additionally, creating plans to support business continuity, remote work readiness and project re-entry after extended remote periods helps maintain business resilience and individual well-being during and after longer-lasting emergencies.[41,42]

Finally, providing access to mental health services, such as psychological first aid, crisis counseling and bereavement counseling, is critical to supporting employee short-term recovery and long-term productivity, functioning and well-being.[43–46] Stress is known to weaken the immune system and chronic stress is associated with increased risk of numerous adverse health consequences, such as depression, cardiovascular disease, diabetes and upper respiratory infection.[47,48] Having access to health services, mental health support and restorative programming are important before, during and after any health crisis.

SE01 DEVELOP EMERGENCY PREPAREDNESS PLAN | O (MAX: 1 PT)

Intent: Enable organizations, families and individuals to prepare and respond to diverse emergency situations.

Summary: This feature requires projects to undertake a risk assessment, create an emergency management plan for natural, human-caused, technological and health-related emergencies and educate occupants on the plan to support emergency preparedness and response.

Issue: Natural disasters kill around 90,000 people and affect close to 160 million people worldwide every year, with both an immediate and long-term impact on human lives and built spaces.[49] Older adults, individuals with disabilities, pregnant women and children may have special needs during an emergency and are particularly vulnerable when disaster strikes.[49] The U.S. Federal Emergency Management Agency estimates about 40-60% of small businesses permanently close following a disaster due to lack of a comprehensive disaster preparedness plan with proper mitigation strategies.[50] Beyond natural disasters, infectious disease epidemics have increased in the 21st century, involving fast global spread due to travel, trade and urbanization.[51,52] The COVID-19 pandemic spread to almost every continent and infected more than more than six million people worldwide within five months impacting the social and economic livelihood of the global population on an incalculable scale.[53,54]

Solutions: An effective emergency management plan requires an understanding of local potential hazards, the needs of vulnerable groups, the responsibilities of the emergency response team and building response capabilities.[55] Emergency management plans, including risk assessments, occupant drills and enhanced emergency communications, can help organizations be better prepared to handle unforeseen events, minimize occupant confusion and improve coordination and safety during emergency situations.[51,56–60] Robust emergency preparedness and response measures can also help to slow the spread of infectious disease and minimize secondary mortality.[61]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The following requirements are met:

a. A risk assessment is undertaken to address at minimum the following:
    1. Identify project assets (e.g., employees, facilities).
    2. Establish a process for vulnerable occupants or groups (e.g., older adults, people with disabilities, pregnant women, children) to confidentially identify their specific needs for an emergency.
    3. Evaluate potential impacts of relevant hazards and identify high-risk hazards.
    4. Determine emergency management planning priorities.

b. An emergency management plan is in place outlining response in the case of emergency situations within the building or surrounding community, addressing at minimum the following hazards:
    1. Natural (e.g., flood, tsunami, wildfire, earthquake, heatwave).
    2. Fire.
    3. Health (e.g., acute medical emergency, infectious disease pandemic).
    4. Technological (e.g., power loss, chemical spill, explosion).
    5. Human-caused (e.g., civil unrest, active shooter, terrorism).

c. The emergency management plan meets the following requirements:
    1. Incorporates annual (at minimum) inventory and maintenance of building emergency response resources (e.g., first aid kits, automated external defibrillators (AEDs), emergency notification system, personal protective equipment) and operations capabilities (e.g., backup power, remote management systems).
    2. Includes a list of specialized personnel that is updated annually (at minimum) and includes roles and contact information of the emergency response team.

3. Plan is reviewed and updated (as needed) on an annual basis and is easily accessible to all regular occupants.

d. Regular occupants are provided education and training on emergency preparedness and response, including the following:

1. Communications about the emergency management plan and related resources, including guidance by relevant local-, state-, regional- or global-level emergency response agencies (e.g., WHO, FEMA or equivalent), annually (at minimum), to employees during new employee onboarding and during an emergency event.
2. Practice drills or other operations-based or discussion-based exercises conducted annually (at minimum) for each high-risk hazard identified in the risk assessment, and conducted every two years (at minimum) for other hazards covered under the emergency management plan.

SE02 CREATE BUSINESS CONTINUITY PLAN | O (MAX: 1 PT)

Intent: Prepare organizations to operate, to the extent possible, under disruptive circumstances.

Summary: This feature requires projects to create a business continuity plan to facilitate resilience during and recovery after an emergency.

Issue: Globally, the frequency, size and cost of disasters is increasing due to climate change, population growth and rapid urbanization.[62–64] In 2019, the global economic losses from disasters amounted to $232 billion, and the 2020 COVID-19 pandemic caused the largest global recession in history.[62,65] Small businesses may be particularly vulnerable as research shows that about 90% of smaller companies fail after emergencies unless they can resume business operations within five days.[66,67] Emergencies such as biological events or active shooters may necessitate sheltering in the workplace, while longer-term emergencies may lead to extended workplace shutdowns.[68–75] The latter can result in extensive layoffs, while employees who continue working may be forced to work in high-risk conditions or remotely in spaces not equipped to support productivity.[71–75] Most individuals who go through emergencies experience psychological distress, resulting in depression, anxiety, feelings of hopelessness, fatigue, irritability or anger.[76,77] These impacts can be exacerbated by added stressors during emergencies such as social isolation, domestic abuse, economic hardship or loss of loved ones.[76,77]

Solutions: Business continuity planning is critical to help manage business disruption, restore business operations, minimize risk to employees and mitigate financial loss when emergencies occur.[59,60,78,79] Establishing organizational remote work readiness can help operations run smoothly and support employee well-being and productivity when an emergency makes remote work imperative.[78,80]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

Projects implement a business continuity plan (BCP) that addresses at minimum the following:

a. Determines critical business functions, processes, supporting resources and dependencies (e.g., email, internet connectivity, third-party suppliers or service providers, interdependent departments).

b. Includes a list of the roles and responsibilities of the business continuity team and convenes the team annually (at minimum) to review, test and update (as needed) the plan.

c. Implements a business impact analysis to evaluate the likely effects resulting from disruption of normal business functioning due to a disaster and identifies which critical business functions should be prioritized for recovery.

d. Conducts a remote work readiness assessment, including at minimum the following:

    1. Evaluates which employees and/or positions (if any) are able to work remotely.
    2. Evaluates which employees and/or positions (if any) have the necessary support infrastructure to work productively in a remote situation.
    3. Evaluates whether organizational technology (e.g., company laptops, virtual private network (VPN)) is set up to support enterprise-wide remote work.
    4. Implements the strategies necessary to support remote work readiness as determined by the evaluation, including (as applicable) methods of communication to employees during remote work and provision for alternate work locations.

e. Outlines strategies to support short- and long-term continuity in various disasters (e.g., blizzard, pandemic), restore and maintain business operations following disruption and re-mobilize to address recurring disasters.

> **Note:** This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

SE03 PLAN FOR HEALTHY RE-ENTRY | O (MAX: 1 PT)

Intent: Ready spaces for re-occupancy following situations requiring them to be vacant, taking into account necessary adjustments to policies, operations and protocols to support safer and healthier re-entry.

Summary: This feature requires projects to create and implement a re-entry plan that includes re-evaluation of existing policies, protocols and programs, risk inspections of building systems, frequent occupant communications, and flexible re-entry options to meet occupant needs.

Issue: In the U.S., the most frequent causes of evacuations each year are fires and floods; however, a wide range of other emergencies, from earthquakes and tornadoes to infectious disease outbreaks and explosions, can lead to mass evacuation and often may not allow for immediate re-entry.[81–83] During the COVID-19 pandemic, many businesses worldwide were forced to close by government mandates; 82% of Chinese, 69% of UK and 62% of U.S. employees were forced to work remotely during the crisis.[74,84–86] Extended closures post-emergency closures can lead to significant economic losses: business shutdowns from COVID-19 led to global recessions, increased the U.S. unemployment rate in the U.S. to 14.7%, and an anticipated 5.2% loss in global GDP in 2020.[71,73,87,88] However, reopening and re-entry after a natural disaster can pose safety risks given potential aftershocks or recurrences and infrastructural and systems damage.[82,89,90] In particular, re-entry during or after infectious disease pandemics can significantly increase risk of exposure; studies of the 1918 flu pandemic found cities that lifted closures, quarantine rules and distancing measures too quickly saw more deaths and slower economic recovery.[91] During the COVID-19 pandemic, in many countries lifting stay-at-home orders and reopening businesses led to surges in COVID-19 infections and deaths.[92–95]

Solutions: Careful consideration of re-entry timing and strategies is critical to supporting occupant health and safety in the aftermath of an emergency.[96–105] Consulting with occupants on their re-entry needs and concerns, clearly communicating new roles, policies and protocols and offering flexible re-entry options will help mitigate occupant anxiety and support the inclusion, well-being and productivity of occupants.[100,106,107] Assessing critical infrastructure systems and taking necessary actions to ensure those systems are functional after damage or extended shutdown is also crucial to facilitate safer and smoother re-entry.[100,102,104] Finally, re-evaluating existing facilities management operations and workplace wellness policies to adapt to altered conditions post-emergency, and frequently communicating those changes to occupants, will help facilitate safer re-entry and create a healthier environment after re-entry.[96–105]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

Projects establish a plan for re-entry into the project after or during an emergency (e.g., natural disaster, public health emergency) addressing at minimum the following:

a. Consultation with regular occupants before and after re-entry to understand their needs and concerns related to re-entry.

b. Safety, compliance and risk inspections of water, mechanical, electrical, ventilation and life safety systems, including necessary actions to restart building and facility systems after prolonged shutdown and approval or clearance for safe re-entry, as applicable.

c. A list of roles for those who will be responsible for overseeing the re-entry plan. While roles and contact information should be made available to an organization's personnel, it is not necessary to include this information in the plan submitted for purposes of verifying this feature.

d. Re-evaluation and adjustment (as needed) of human resources, workplace wellness and employee support policies and amenities (e.g., use of common areas and shared spaces like wellness rooms, food provision, physical activity programs) to support a safer and healthier re-entry.

e. Policy to support phased re-entry (as needed) offering part-time options, work from home flexibility and/or flexible schedules for all employees (as feasible), particularly for parents and caregivers who may have specific dependencies (e.g., due to childcare closures or a sick family member) and vulnerable groups (e.g., people with disabilities or who may be particularly vulnerable to infectious disease).

f. Re-evaluation and adjustment of facilities management policies and organizational protocols to support

a safer and healthier re-entry, including but not limited to:

1. Crowd management and spacing and physical distancing of individuals.
2. Heightened security measures (e.g., screening, security personnel).
3. Access to personal protective equipment (PPE).
4. Additional sanitization supplies and other cleaning or maintenance protocols.

g. Contingency planning and re-closure measures should the same hazard that forced initial closure re-occur.

h. Frequent communications through multiple methods (e.g., emails, signage, trainings) to all relevant stakeholders, including (as applicable) employees, occupants, residents, facilities management team, contractors and community members, on: the re-entry plan; new or altered policies; operations and procedures; relevant local-, state-, national- or global-level re-entry guidelines and how the project will address occupant health and safety concerns.

i. Evaluation and incorporation of re-entry guidelines (as available) provided by a relevant local-, regional- or global-level emergency response agency (e.g., WHO, government emergency management agency or equivalent) into the plan, and adherence to instructions provided by that agency during re-entry.

> **Note:** This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

SE04 PROMOTE EMERGENCY RESOURCES | O (MAX: 1 PT)

Intent: Provide resources, personnel and training to help organizations, families and individuals respond to diverse emergency situations.

Summary: This feature requires projects to offer resources like first aid kits and AEDs, coordinate with emergency response teams and provide emergency preparedness and response trainings.

Issue: It is estimated that sudden cardiac arrest (SCA) causes between 6.8 – 8.5 million deaths worldwide per year, with a global survival rate of less than 1%; in the United States, where SCA is a leading cause of death, about 10,000 SCA deaths per year occur in the workplace.[108,109] An SCA victim's chances of survival lower by 7-10% with every minute that passes without cardiopulmonary resuscitation (CPR) or defibrillation.[110] Additionally, nearly 16,000 people worldwide die from preventable injuries each day, yet in most European countries, only 5-10% of the population is trained in first aid.[111,112] While natural disasters kill an average of 90,000 people annually, nearly 60% of American adults have not practiced what to do in a disaster.[49,113] Finally, anaphylaxis causes up to 1,500 deaths per year in the U.S., with studies showing a delay in administering epinephrine to be a significant risk factor associated with fatal outcomes from allergen exposure.[114–116]

Solutions: Rapid and effective emergency response requires coordination with local emergency responders and maintenance of emergency resources such as an emergency notification system, first aid kits and automated external defibrillators (AEDs).[55,117] Supplementing those resources with occupant training on CPR, first aid, AED use and individual and family preparedness can increase individual response time and help improve survival rates; CPR and AED training alone can increase victim survival rates by nearly 40%.[110,117] In food allergy emergencies, quick access to and immediate availability of epinephrine is essential.[116,118]

Part 1 Promote Emergency Resources (Max: 1 Pt)

For All Spaces:

Resources are in place that support emergency response, including at least three of the following:

a. At least one first aid kit per floor.

b. AEDs accessible to any occupant within 100 meters and adoption of routine maintenance and testing schedule. The locations of building AEDs are identified through posters, signs or other forms of communication other than on the AED itself.

c. Undesignated epinephrine auto-injectors for food allergy emergencies.

d. Rides for employees subsidized or reimbursed by at least 50% to destination of need for emergency situations (e.g., urgent medical needs, personal or family emergency), including from home to work as needed (e.g., during public transit shutdown).

e. Information indicating emergency procedures (e.g., containment and response strategies for infectious disease outbreaks, evacuation during fire or earthquake, shelter-in-place during active shooter) available to all guests upon entrance to the building.

f. Building emergency notification system with auditory and visual indicators of emergency (e.g., public address systems, flashing lights).

At least two of the following are in place:

a. Emergency response team for medical emergencies, including at least one certified medical professional, first responder or other qualified personnel who has received emergency medical training (e.g., Emergency Medical Technician, paramedic, police, fire service, individuals certified in advanced first aid) present within the building during regular business hours.

b. Security or crisis response team for human-caused disruptions (e.g., civil unrest, active shooter).

c. Annual availability to regular occupants of a certified training course on CPR, first aid and AED usage.

d. Trainings to promote emergency preparedness available to regular occupants that address at least the following topics:

    1. Creating evacuation or sheltering plans.
    2. Building emergency kits, supplies and go-bags.
    3. Planning communications with family or primary contacts in case of emergency.

SE05 BOLSTER EMERGENCY RESILIENCE | O (MAX: 1 PT)

Intent: Better enable individuals and communities to help maintain health and well-being, and organizations to maintain business function, during and after emergencies.

Summary: This feature requires projects to facilitate resilience during and recovery after an emergency.

Issue: The estimated economic loss of natural disasters worldwide in 2019 was $73 billion, while studies show an average of 14 million people worldwide are made homeless per year as a result of natural disasters.[119,120] A wide variety of emergencies, from biological events, winter storms and tornadoes to active shooters or terrorist attacks, may necessitate sheltering in place.[37,121] Alternatively, infectious disease pandemics can cause extended business shutdowns, while employees who continue working may be forced to work in high-risk conditions or in remote spaces not equipped to support productivity.[122–126] Approximately one-third of U.S. adult workers were deemed "essential" during the COVID-19 pandemic and continued working; 31% of those were low-income and one-fourth were or lived with a healthcare worker and thus were at high risk of disease exposure.[126] Moreover, the United Nations Population Fund estimates that COVID-19 stay-at-home orders will lead to 2 million additional instances of intimate partner violence worldwide from 2020-2021.[127] Finally, studies show the capacity of hospital facilities decreases significantly in the aftermath of natural disasters, and the unprecedented spread and severity of the COVID-19 pandemic overwhelmed the capacity of U.S. hospitals, forcing them to ration resources and outsource healthcare workers.[128–130]

Solutions: For emergencies that require sheltering on-site, a shelter-in-place plan is crucial to supporting occupant safety.[68,70,131] Designating space for emergency public use can reduce the burden on medical facilities during critical events such as natural disasters and pandemics and help patients receive immediate care.[132,133] Moreover, employer-funded employee relief assistance can help protect employees from unsafe domestic environments, help lower-income employees meet basic needs, reduce the risk of exposure during pandemics and support employee retention and well-being during and after emergencies.[134–136]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

Projects implement at least one of the following:

a. Designated outdoor or indoor space is made available to emergency responders, relief organizations or other equivalent institutions at no cost for alternative use in case of emergency (e.g., shelter during a natural disaster, treatment area during a pandemic).

b. Funding or other resources (e.g., in partnership with local agencies providing relevant services or resources such as vouchers, shelter, clothing, food, transportation) are provided by the employer for emergency use by employees in at least two of the following critical scenarios:

    1. Sheltering from domestic violence or abuse.
    2. Quarantine due to infectious disease exposure.
    3. Damage to employee housing from a disaster.

c. Shelter-in-place plan for emergencies in which occupants cannot leave the project (e.g., hurricane, chemical spill) that includes the following:

    1. A shelter-in-place kit with resources to help occupants shelter in place within the project for at least 24 hours (e.g., water, food supplies, blankets, flashlights, first aid kit).
    2. A process for occupants or groups who may be more vulnerable (e.g., older adults, people with disabilities, pregnant women, children) to confidentially identify specific needs they may have during a shelter-in-place emergency.
    3. Procedures for communicating to occupants the decision to evacuate or shelter-in-place during an emergency.
    4. A commitment to incorporate shelter-in-place guidelines provided by a relevant local-, regional- or global-level emergency response agency (e.g., WHO, FEMA or equivalent) into the plan, and to

adhere to instructions provided by that agency during a shelter-in-place emergency.

5. Annual (at minimum) occupant trainings on the shelter-in-place plan.

> **Note:** This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

SE06 ESTABLISH HEALTH ENTRY REQUIREMENTS | O (MAX: 1 PT)

Intent: Combat infectious respiratory diseases and support health building entry policies with requirements regarding vaccination, testing disclosure, and/or face covering requirements.

Summary: This feature requires projects to establish vaccination disclosure requirements or testing and masking requirements for occupants to utilize the space.

Issue: Emergency preparedness and resilience plans are critical to ensuring that organizations are equipped to immediately confront a crisis, as well as to recover successfully from it. Infectious disease epidemics have increased in the 21st century, involving fast global spread due to travel, trade and urbanization.[39,40] For example, the COVID-19 pandemic infected 6 million people and spread to almost every continent within 5 months, impacting the social and economic livelihood of the global population on an incalculable scale.[41,42]

Solutions: Re-entry plans after emergencies should consider employee needs, offer employees flexibility, assess critical infrastructure systems, communicate re-entry strategies to key stakeholders and re-evaluate existing policies, operations and protocols to support a healthy, safe and inclusive re-entry.[104–113] In certain types of emergencies, including epidemics and pandemics, re-entry plans may need to consider relevant vaccination, testing, and other requirements (as applicable), including social distancing and use of personal protective equipment in order to help manage risks.[145]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units:

Projects located in a region with heightened risk of infectious respiratory disease transmission defined by a public health authority (e.g., World Health Organization, local public health agency) require at least one of the following for regular occupants to enter the space:

a. Proof of vaccination or documented exemption (e.g., a medical or religious exemption), including necessary boosters as applicable, for the disease of heightened risk.

b. Both of the following:

    1. Proof of negative diagnostic testing for the disease of heightened risk and, for eligible employees (as applicable), access to diagnostic testing at no cost.
    2. Face masks worn indoors by, at minimum, unvaccinated occupants. Face masks are available for all occupants.[104]

> **Note:** This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

HEALTH SERVICE RESOURCES

The COVID-19 pandemic has illustrated how the behaviors of one person can negatively impact others in severe ways. The strategies encompassed within this section focus on ways to foster individual actions that support health and safety for all in a space.

Unvaccinated individuals pose a risk to public health, and seasonal flu causes severe illness and death in high-risk populations, costing the U.S. $10.4 billion in annual healthcare costs; the average hospitalized flu case in Canada costs $11,092. [137–140] Providing free on-site flu vaccines with education on good health habits can increase vaccination rates and reduces flu cases. Implementing support for influenza vaccine may also help support the infrastructure that will be needed when a vaccine is available for SARS-CoV-2, as well as promotes occupant health and reduces strain on community healthcare systems.

Moreover, studies estimate 20 million Americans and 37% of UK employees go to work sick because they lack sick leave or have only one-day sick leave, respectively, infecting colleagues as a result.[141,142] Employees may also go into work when sick if their sick leave does not offer sufficient wage replacement. [141] Providing timely access to health services can relieve both actual and perceived barriers to care. [143,144] Additionally, studies show implementing paid sick leave reduces contagion in the workplace, improves employee productivity and reduces employee turnover.[141,142,145] Overall, enhancing access to essential healthcare and paid sick leave can help improve the physical, social and mental health of individuals and communities.[144,146]

Finally, exposure to tobacco smoke persists to detrimentally affect the health of both smokers and those exposed to secondhand smoke.[147] Secondhand smoke exposes nonsmokers to the same contaminants, increasing the number of people subject to health risks from smoking. The thirdhand smoke (residual chemicals left on indoor surfaces by tobacco smoke) clings to walls, furniture, clothes, bedding, carpets and other surfaces long after smoking has occurred.[148] Smoking can also increase comorbidities for influenza such as chronic obstructive pulmonary disease (COPD) and COVID-19.[149]

SH01 PROVIDE SICK LEAVE | O (MAX: 1 PT)

Intent: Improve recovery from and reduce transmission of diseases by enabling and encouraging employees to stay home when sick.

Summary: This feature requires projects to provide access to paid sick leave.

Issue: Access to basic healthcare services is one of five key pillars that form the social determinants of health.[150] Access includes physical or geographic access, affordability and quality or acceptability of care, and access varies based on race, ethnicity, socioeconomic status, age, sex, disability status, sexual orientation, gender identity and location.[5,154,64,65] While 94% of the world's countries mandate paid sick leave, the U.S. and Korea are the only OECD countries that do not, and 40% of American employees have no sick leave.[155,156] Studies estimate 20 million Americans and 37% of UK employees go to work sick because they lack sick leave or have only one-day sick leave, respectively, potentially infecting colleagues as a result.[157,158] Employees may also go into work when sick if their sick leave does not offer sufficient wage replacement.[157]

Solutions: Studies show implementing paid sick leave reduces contagion in the workplace, improves employee productivity and reduces employee turnover.[157–161] Overall, enhancing access to paid sick leave can help improve the physical, social and mental health of individuals and communities.[151,153]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

A sick leave policy that meets the following requirements is available to all eligible employees:

a. Leave is offered up front or accrued for use during any 12-month period for any health condition and meets one of the following requirements:
    1. Short-term sick leave for all eligible employees, distinct from paid time off and family leave, at least 10 days of which are paid at 50% or higher of the employee's full salary or wages.
    2. At least 20 days of combined paid time off and sick leave which are paid at 50% or higher of the employee's full salary or wages.

b. Statement that discourages employees from coming into work when they feel sick, and from doing work while on sick leave.

c. At least one of the following:
    1. At least 12 weeks of sick leave (which may be unpaid) during any 12-month period for a chronic or serious health condition that involves inpatient care in a hospice or residential healthcare facility (e.g., stroke, infectious disease, surgery) or health condition that requires continuing treatment and/or supervision by a healthcare provider (e.g., diabetes, asthma, cancer).
    2. Part-time options, flexible schedules or permission to work from home when recovering from serious health conditions.

SH02 PROVIDE HEALTH BENEFITS | O (MAX: 1 PT)

Intent: Support the overall health and well-being of individuals and their families by offering comprehensive health benefits, policies and services.

Summary: This features requires projects to provide access to essential and on-demand health services.

Issue: Access to basic healthcare services is one of five key pillars that form the social determinants of health.[162] Access includes physical or geographic access, affordability and quality or acceptability of care, and access varies based on race, ethnicity, socioeconomic status, age, sex, disability status, sexual orientation, gender identity and location.[163]

Solutions: Basic essential healthcare services include medical, dental, vision, mental health, substance use, preventive screenings, disease management and biometric assessments.[144] Providing free on-site flu vaccines with education on good health habits can increase vaccination rates and reduces flu cases.[164] Providing timely access to health services can relieve both actual and perceived barriers to care.[143,144] Studies demonstrate that the overwhelming majority of employees seek one-on-one benefits consultation and flexible coverage options so they can opt into coverage that best meets their individual schedule and health needs.[165]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The following requirements are met:

a. A health benefits plan is available to all eligible employees and their designated dependents (e.g., spouse, domestic partner, child, parent, parent-in-law, grandparent, grandchild, sibling) at no cost or subsidized that includes the following services:

    1. Medical care.
    2. Dental care.
    3. Vision care.
    4. Sexual and reproductive health services, including obstetrics and gynecology (OB-GYN) services and sexually transmitted infection (STI) testing and treatment.
    5. Medication/prescription coverage.
    6. Essential immunizations based on region.
    7. Preventive screenings and biometric assessments.
    8. Tobacco cessation programs.
    9. Infectious disease testing (e.g., tuberculosis, malaria, COVID-19) during a regional or global infectious disease outbreak, epidemic or pandemic as declared by a regional or global public health agency (e.g., WHO, disease control and prevention centers or equivalent institution)

b. Confidential benefits consultations are available with clearly identified and qualified support staff (e.g., benefits counselor, human resources representative).

SH03 SUPPORT MENTAL HEALTH RECOVERY | O (MAX: 1 PT)

Intent: Enable families and individuals to access mental health services and resources that provide support during and after emergencies.

Summary: This feature requires projects to offer supportive resources to facilitate recovery after an emergency.

Issue: Globally, the frequency, size and cost of disasters is increasing due to climate change, population growth and rapid urbanization.[62–64] Most individuals who go through emergencies are likely to experience psychological distress, resulting in depression, anxiety, feelings of hopelessness, fatigue, irritability or anger.[76,77] These impacts can be exacerbated by added stressors during emergencies such as social isolation, domestic abuse, economic hardship or loss of loved ones.[76,77]

Solutions: Providing access to mental health services, such as psychological first aid, crisis counseling and bereavement counseling, is critical to supporting employee short-term recovery and long-term productivity, functioning and well-being.[76,77,99,166]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

Projects offer mental health services to support recovery from a traumatic event, to all employees at no cost or subsidized, either on-site, in-person within 400 m of the project boundary, or virtually, including at least three of the following:

a. Crisis counseling or trauma-focused psychotherapy with qualified mental health professionals.

b. Psychological first aid (PFA) training offered to all employees and/or required for manager-level employees.

c. Bereavement counseling and materials on coping with grief, including resources for returning to work after a loss.

d. Information on benefits coverage and how to access additional mental health services, made conveniently and confidentially accessible to employees.

Note: This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

SH04 SUPPORT COMMUNITY IMMUNITY | O (MAX: 1 PT)

Intent: Reduce incidence of respiratory diseases and promote vaccinations .

Summary: This feature requires projects to provide and encourage immunizations.

Issue: Unvaccinated individuals pose a risk to public health, and seasonal flu causes severe illness and death in high-risk populations, costing the U.S. $10.4 billion in annual healthcare costs; the average hospitalized flu case in Canada costs $11,092.[167–170]

Solutions: Providing free on-site flu vaccines with education on good health habits can increase vaccination rates and reduces flu cases.[164] Flu vaccinations also reduce the quantity and duration of visits to intensive care units,[171] freeing up medical capacity for other needs such as pandemics and natural disasters.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project identifies an immunization relevant to the target population and implements an immunization program which includes the following:

a. Makes the immunization available to regular occupants on at least an annual basis at no cost through either:
    1. An on-site clinic or program.
    2. An off-site clinic or program (e.g., free community clinic, access through health care providers) and, for employees (as applicable), paid time during the workday to receive the immunization.
b. For employees, as applicable, at least one day of paid leave for recovery or sick leave following immunization.
c. A campaign that addresses the following:
    1. Provides regular occupants information on how the project facilitates immunization availability.
    2. Encourages or incentivizes, through monetary or non-monetary methods, regular occupants to receive the immunization.
    3. Educates regular occupants on the health reasons to receive the immunization.

SH05 PROMOTE A SMOKE-FREE ENVIRONMENT | O (MAX: 1 PT)

Intent: Deter smoking, minimize occupant exposure to secondhand smoke and reduce smoke pollution through interventions that prevent the use, sale and advertisement of tobacco products.

Summary: This feature requires projects to ban indoor smoking and ban or restrict outdoor smoking within its boundaries, as well as restrict the sale and marketing of tobacco products.

Issue: Tobacco is responsible for an estimated six million deaths per year globally among direct users, and serves as the cause of death for up to half of its users.[172,173] In addition to those deaths caused by direct use, an estimated 890,000 annual deaths can be attributed to non-user exposure to second-hand smoke.[172] Exposure to tobacco smoke persists to detrimentally affect the health of both smokers and those exposed to secondhand smoke. Ingredients in cigarettes form over 7,000 compounds when burned, of which at least 69 are known to be carcinogenic.[174] As a result, the average life expectancy of a smoker is 10 years less than that of a nonsmoker.[175] Furthermore, secondhand smoke exposes nonsmokers to the same contaminants, increasing the number of people subject to health risks from smoking. The thirdhand smoke (residual chemicals left on indoor surfaces by tobacco smoke) clings to walls, furniture, clothes, bedding, carpets and other surfaces long after smoking has occurred. Emerging evidence suggests that there are serious health consequences associated with exposure to thirdhand tobacco smoke,[176] secondhand marijuana smoke and emissions from e-cigarettes.[177,178] Health issues associated with tobacco smoke include asthma attacks, respiratory infections, coronary heart disease, stroke, lung cancer and sudden infant death syndrome.[179] Smoking can also increase comorbidities for influenza such as chronic obstructive pulmonary disease (COPD) and COVID-19.[149] Despite such severe influences on health, 80% of the global population lives in countries not protected by 100% smoke-free regulations.[180]

Solutions: There is no safe and acceptable level of cigarette smoke exposure.[181] Therefore, the only way to protect people from secondhand and thirdhand smoke is to implement a 100% smoke-free environment.[181–183] In order to prevent intrusion of cigarette smoke from the outdoors, projects must also take steps to ensure that smoking is not allowed in the vicinity of building entrances, operable windows and building air intakes.[184] Another influencing factor on tobacco use is an individual's proximity to outlets where it is sold.[185] Restricting the sale of tobacco on-site is a key strategy for preventing or curbing use of tobacco products as well as providing support to those trying to quit.[185,186]

Part 1 Prohibit Indoor Smoking (Max: 1 Pt)

For All Spaces:

The following requirement is met:

a. Smoking and the use of e-cigarettes is prohibited in interior spaces within the project boundary.[12]

Part 2 Prohibit Outdoor Smoking (Max: 0 Pt)

For All Spaces:

The following requirements are met:

a. Clear and visible permanent signage prohibiting smoking and vaping is located within 10 ft of all functional building entrances, operable windows and building air intakes that open to any occupiable outdoor area.

b. Clear and visible permanent signage describing the hazards of smoking is located in all outdoor areas designated for smoking and vaping.

Part 3 Limit Tobacco Availability (Max: 0 Pt)

For Retail Spaces:

The following requirements are met for projects where retail products are sold on a daily basis:

a. Sale of tobacco products (including e-cigarettes) is prohibited.[11]

b. Tobacco products (including e-cigarettes) are not marketed or promoted.[12]

AIR AND WATER QUALITY MANAGEMENT

People spend approximately 90% of their time in enclosed spaces[187]– in homes, offices, schools or other building environments. Depending on their specific properties, pathogens can enter our system through breaks in the skin or through our body's natural openings, such as our mouth, nose, and eyes.[188] Some pathogens can enter our bodies through our mouth and nose via the air we breathe, the food we ingest and the water we drink.

Air stagnation may concentrate airborne viruses. Research has shown that increased ventilation in a building can reduce the chance of influenza; a study published in 2019 found that providing even minimum levels of outdoor air ventilation reduced influenza transmission as much as having 50-60% of the people in a building vaccinated.[189] Some pathogens can also attach themselves onto smaller particles in the air such as dust. These small particles can stay in the air longer and travel farther distances than droplets, potentially affecting people within a wider spatial range.[190]

Without proper maintenance and filtration, heating, ventilation and air conditioning systems can build up mold and particulates that can propagate respiratory diseases, especially after periods of inactivity.[191,192] Inhalation exposure to indoor air pollutants can lead to a variety of negative short- and long-term health and well-being outcomes that can range in severity. Less severe symptoms of exposure can include headaches, dry throat, eye irritation or runny nose, while more severe health effects can include asthma attacks and carbon monoxide poisoning.[193–195] Mold developed on cooling coils may shed particles into the building's indoor air and trigger asthma, headaches, allergies and other respiratory system disorders.[196–199] In the U.S. alone, indoor pollution contributes to thousands of cancer deaths and hundreds of thousands of respiratory health issues annually.[200] In addition to public health concerns, estimates by the U.S. EPA suggest that net avoidable costs associated with indoor air pollution amount to well over $100 billion annually with 45% of those costs attributable to avoidable deaths from radon and environmental tobacco smoke, about 45% from lost productivity, and about 10% from avoidable respiratory diseases.[200]

Exposure to a range of contaminants in water can result in negative health impacts including the spread of infectious disease.[201] Water is typically treated with chlorine to keep it free of pathogens. However, if left stagnant after a period of vacancy, chlorine is likely to lose its disinfection power, creating opportunity for pathogens to contaminate the water. Additionally, Legionella bacteria is naturally present in waters at low concentrations, but it may colonize recirculated water systems such as hot water loops and cooling towers, especially where the water temperature is within 25 and 45 degrees C.[202] and can cause lung disease and even death if contaminated water aerosols are inhaled. Legionnaire's disease especially affects the immunocompromised, smokers and those over 50.[202]

Air and water quality monitoring, paired with operational strategies to improve the ventilation and filtration in a space, is critical to identifying and mitigating risks for occupants.

SA01 ASSESS VENTILATION | O (MAX: 1 PT)

Intent: Minimize indoor air quality issues through the provision of adequate ventilation.

Summary: This feature requires projects to assess their ability to bring in fresh air from the outside through mechanical and/or natural means in order to dilute human- and product-generated air pollutants.

Issue: Poorly ventilated spaces contribute to symptoms — such as headache, fatigue, dizziness, nausea, cough, sneezing, shortness of breath and eye, nose, throat and skin irritation — collectively called sick building syndrome (SBS).[203,204] Poor ventilation is also linked to increased rates of absences in employees, higher operational costs for businesses and decreased productivity in students.[205,206] One U.S.-based study reported that the sick leave attributable to insufficient provision of fresh air in buildings is estimated to be 35% of total absenteeism.[207] Therefore, the economic costs of SBS in under-ventilated buildings are significant and far exceed the energy-related cost savings.[208–210]

Solutions: Many indoor and outdoor sources of air pollution emit particulate matter and volatile organic compounds (VOCs) that can cause discomfort and trigger asthma and eye, nose and throat irritation. In order to maintain healthy indoor environments for building users, it is necessary to provide sufficient ventilation required to maintain acceptable air quality.[211,212] Increasing ventilation rates is also a recommended strategy to mitigate the transmission of COVID-19 and other airborne contagious diseases.[213,214] In addition to proper HVAC system design, mechanically ventilated projects need to perform regular system maintenance as inadequate maintenance is associated with reduced ventilation performance and poorer indoor air quality and thermal conditions.[215]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

A qualified engineer provides the project with an assessment of the following:

a. The extent to which the current mechanical system can operate without recirculating air

b. How and if any of the potential HVAC system modifications would affect the following:

    1. Energy consumption.
    2. The ability to manage thermal comfort conditions (e.g., higher ventilation leading to draft, recirculation elimination straining conditioning capacity).
    3. Maintenance processes.

c. The highest supply rate of outdoor air the current mechanical system can provide.

d. Potential modifications to system controls to increase supply of outdoor air (e.g., ventilating for longer hours, changing the setpoint for demand-controlled ventilation systems).

SA02 ASSESS AND MAINTAIN AIR TREATMENT SYSTEMS | O (MAX: 1 PT)

Intent: Mitigate risks from indoor contamination and pollution sources such as infectious disease particles and volatile organic compounds (VOCs).

Summary: This feature requires the projects to inventory air filters and other treatment devices to ensure proper maintenance.

Issue: Building materials, furnishings (e.g., carpets and furniture finishes), fabrics, cleaning products, personal care products, adhesives, solvents and air fresheners can all emit VOCs or semi-volatile organic compounds (SVOCs) into the indoor environment.[216,217] VOCs include benzene, formaldehyde and other chemical compounds, which at high concentrations can lead to irritation of the nose and pharynx and have been associated with leukemia and Nasopharyngeal cancer.[218,219] Health effects can also include damage to the liver, kidneys and central nervous system.[220] Additionally, particles exhaled by infected individuals that contain air airborne diseases such as COVID-19 can remain suspended several hours or longer and be recirculated to through the ducts of the building.[214,221,222]

Solutions: Air can be treated to remove contaminants. Carbon filters remove VOCs and ozone from the passing air.[223,224] HEPA or near-HEPA filters can help remove virus particles, since the virus often travels as part of larger particles.[213,225] UVGI systems can also be effective, both when irradiating the upper portion of the room or when placed in the air ducts, so long as they are powerful and/or the air speed is slow enough to provide sufficient UV dose.[213,226] For optimal performance, air filtration systems need to be maintained according to the manufacturer's instructions.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

Project provides an inventory of all filters and UVGI equipment currently used to treat the air in the following locations (if any):

a. Ducts and air handling units.

b. Fan coil units.

c. Standalone air cleaning devices.

The following requirements are met:

a. A qualified engineer provides the project with an assessment of at least one of the following for occupiable areas.

    1. The highest efficiency of media or other particle filters (particularly for recirculated air, if any) that can be installed with the current mechanical system.
    2. The capacity of the current mechanical system to utilize UVGI equipment.
    3. The quantity of standalone air purifiers required to serve the space.

b. Project provides one of the following:

    1. Conditions under which project will install at least one of the types of treatment systems assessed.
    2. A timeline for the installation of at least one of the types of treatment systems assessed.

For devices identified in the System Inventory, the following requirement is met:

a. Evidence that the filters and/or UV lamps have been replaced according to the manufacturer's recommendation is submitted annually through the WELL digital platform.

SA03 DEVELOP LEGIONELLA MANAGEMENT PLAN | O (MAX: 1 PT)

Intent: Implement protocols to reduce risk of *Legionella* colonization.

Summary: This feature requires projects to manage recirculating hot water systems against Legionella colonization.

Issue:
All water systems require some degree of validation to ensure that health targets are met under the operational conditions, for which sampling is an effective verification tool.[227] Legionella bacteria is naturally present in waters at low concentrations, but it may colonize recirculated water systems and can cause lung disease and even death if contaminated water aerosols are inhaled.[228] Legionnaire's disease affects especially the immunocompromised, smokers and those over age 50.[228] Assets commonly vulnerable to Legionella infestation include domestic potable and hot water systems, cooling towers, humidifiers, misters, decorative fountains, spas and hot tubs.[228]

Solutions: Minimizing the risk of Legionella requires a thorough and quantitative risk assessment of buildings' water assets, identifying locations where control is required, and a well-documented maintenance and operations program.[213] Implementing a proper Legionella management plan should reduce the risk of exposure to pathogenic bacteria.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project provides a Legionella management plan that meets the following requirements:

a. Addresses hot water systems, cooling towers, decorative fountains and any other devices or spaces under control of the project where water is recirculated and aerosolized.

b. Includes the items listed below:

   1. Determination of roles for Legionella management in the building, distinguishing those under project control from those that may be the responsibility of building management or other parties.
   2. Water system inventory and process flow diagrams of systems within the project boundary.
   3. Hazard analysis of water assets within the project boundary. If the project does not operate the building hot water supply system (e.g., boilers, heaters, pumps or hot water risers), then an explanation of the building-wide Legionella management policies (if any) and how they influence risk is included.
   4. A list of monitoring actions for relevant variables (e.g., temperature or residual chlorine), performance limits associated with these variables and corrective actions when variables exceed such limits.
   5. A list of critical control points (locations where actions to maintain relevant variables listed in (4) within performance limits are applied) within the project boundary.
   6. Verification and validation procedures for evaluating the suitability and proper implementation of the management plan. A Legionella sampling schedule is included if projects have operational control over cooling towers and spas.
   7. Protocols for documenting results of monitoring activities and corrective actions. If sampling for Legionella is planned, results are included.

The following requirement is met:

a. Documentation of monitoring results, corrective actions and Legionella sample results as stated in the Legionella management plan are submitted annually through the WELL digital platform.

SA04 MONITOR AIR AND WATER QUALITY | O (MAX: 1 PT)

Intent: Assess indoor air quality and water quality, which contribute to the health and well-being of building users.

Summary: This feature requires projects to monitor air quality and water quality levels at least once per year.

Issue: Exposure to air pollutants such as Volatile Organic Compounds (VOCs), ozone, particulate matter, carbon monoxide and others has been shown to increase the risk of respiratory and cardiovascular diseases in addition to causing thousands of cancer deaths annually.[229] Inhaling pollutants present symptoms ranging from headaches, dry throat, eye irritation and runny nose that may later develop into extreme health outcomes such as asthma attacks and cancer.[194,230,231] In addition, radon exposure is the second cause of lung cancer, after tobacco use.[232] Therefore, it is important to define indoor air quality levels that minimize risk to human health. All water systems require some degree of validation to ensure that health targets are met under their operational conditions, for which sampling is an effective verification tool.[227]

Solutions: The World Health Organization (WHO) and other regulatory bodies such as the U.S. Environmental Protection Agency (EPA) identify a list of "criteria" air pollutants and have established permissible levels for such criteria pollutants based on epidemiological studies that show the relationships between concentrations of these pollutants, duration of exposure and health risks. Achieving the goal of clean indoor air as defined by permissible levels requires the joined efforts of both professionals and building users in the implementation of adequate approaches. Indoor air quality can be properly managed through different features listed in the WELL Air concept, including source control strategies, passive and active building design and operation strategies and human behavior interventions.[233,234] Basic management for water quality ensures that the water sourcing, treatment and delivery operates as designed. Turbidity, residual chlorine and pH monitoring help control basic chemical and microbiological water characteristics and, if trends are detected, may inform that actions may be needed to protect the quality of the water, such as changing a filter, checking the building's pipes for leaks or inquiring with local relevant governmental authorities.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces except Dwelling Units:

The following pollutants are monitored in occupiable spaces (with a quantity and location of sampling points complying with the requirements outlined in the Performance Verification Guidebook) at intervals no longer than once per year, and results are submitted annually through the WELL digital platform:

a. Ozone.

b. Carbon Monoxide.

c. $PM_{2.5}$ and/or PM_{10}.

d. Total VOCs and/or Formaldehyde.

The following requirements are met:

a. The following parameters are sampled at drinking water dispensers in occupiable spaces at intervals of no less than once per year:

   1. Turbidity.
   2. pH.
   3. Residual (free) chlorine.
   4. Total coliforms, only if residual chlorine is below detection limits.

b. Tests are required at 5% of drinking water dispensers, up to a maximum of four tests.

c. The water quality results are submitted annually through the WELL digital platform.

SA05 MANAGE MOLD AND MOISTURE | O (MAX: 1 PT)

Intent: Limit the potential for bacteria and mold growth within buildings from water infiltration, condensation and internal leaks.

Summary: This feature requires projects to manage mold and moisture through inspections.

Issue: Excess moisture and dampness is a common problem in buildings, affecting about 20% of buildings in Europe, Canada and the U.S.[235] When improperly managed, moisture creates conditions conducive to the growth of mold and other biological pests, which can increase the risk of developing respiratory infections and asthma for those within the building.[235] It is estimated that one fifth of asthma cases in the U.S. are caused by excess moisture and dampness in buildings.[236] Furthermore, moisture can damage the building itself by creating an environment hospitable to insects and other destructive pests, corroding metal components and degrading wood and porous building materials.[237] These problems can arise when water unintentionally penetrates the building envelope or leaks from indoor uses of water, or when moisture-heavy air condenses on building materials.

Solutions: Inspections are needed to both verify that design and operations properly safeguards against mold growth, as well as informs the need for preventative maintenance.[238]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project implements a moisture management plan for building operations that contains the following:

a. A system for occupants and tenants to notify building management about mold or water damage.

b. A schedule of periodic inspections for signs and potential sources of water damage or pooling, discoloration and mold on ceilings, walls, floors and HVAC equipment.

c. A system or inspection protocol to periodically assess water pipe leaks.

The following requirement is met:

a. Results of inspections for mold and leaks (including any mold test results) are submitted annually through the WELL digital platform.

SA06 B PROVIDE CLEAN AIRFLOW RATES FOR CONTROL OF INFECTIOUS AEROSOLS | O (MAX: 2 PT)

Intent: Minimize the exposure risk to respirable infectious agents.

Summary: This WELL feature requires projects to provide sufficient clean airflow rates to reduce the risk of airborne disease transmission.

Issue: When humans exhale, they can release pathogens, such as COVID-19 or Influenza particles, which can remain suspended in the air for several hours or longer. These pathogens can be recirculated through ducts and HVAC systems of buildings, increasing the risk of transmission of disease indoors.

Solutions: The simplest way to avoid recirculating contaminated air is to not recirculate it by supplying spaces with 100% outdoor air. Unfortunately, in certain climates this can result in high energy usage, although this can be mitigated through the use of heat recovery systems.[9] In buildings where recirculated air is utilized, it can be treated to remove contaminants. Carbon is capable of filtering VOCs and ozone from the air that passes through[10,11]. HEPA or near-HEPA filters can help remove virus particles, since the virus often travels as an attachment to a larger particle.[12,13] UVGI systems can also be effective, both when irradiating the upper portion of the room or when installed in the air ducts, so long as they are powerful and/or the air speed is slow enough to provide a sufficient UV dose.[13,14] Other technologies exist, but should be evaluated carefully. For example, more novel devices that release oxidants into rooms have less robust evidence for safety and efficacy outside of laboratory conditions.[15,16] Finally, in-room air purifiers can be beneficial because the clean air is often provided within the breathing zone. For optimal performance, air filtration systems need to be maintained according to the manufacturer's instructions.

Part 1 Part 1 (Max: 2 Pt)

For All Spaces:

The mechanical system provides all regularly occupied spaces with clean airflow rates for infection risk management as set in one of the following guidelines:

a.

ASHRAE 241-2023 Table 5-1 Equivalent Clean Airflow Rates (Section 6 - Clean Airflow Rate Equation or Appendix C - In-place Modeling Method).[17]

b. 5 Equivalent Air Changes per hour (5 e/ACH) calculated in accordance with Appendix SA1.[18]

OR

The following requirements are met:

a. The mechanical system is capable of providing all regularly occupied spaces with clean airflow rates for infection risk management as set in one of the following guidelines:
    1. ASHRAE 241-2023 Table 5-1 Equivalent Clean Airflow Rates (Section 6 - Clean Airflow Rate Equation or Appendix C - In-place Modeling Method).[17]
    2. 5 Equivalent Air Changes per hour (5 e/ACH) calculated in accordance with Appendix SA1.[18]
b. The project has an operational plan for Infection Risk Management Mode (IRMM) that includes the following:[17]
    1. The conditions under which the IRMM will be activated.
    2. The engineering controls (e.g., changes in ventilation or air treatment) and non-engineering controls (e.g., changes in occupancy) that will be utilized to achieve the target clean airflow rates.
    3. The operational and maintenance procedures in place to implement target clean airflow rates within 48-hours of the decision to activate IRMM.
    4. An inventory of HVAC system consumables (e.g., filters, adsorption media, UV bulbs) that is updated when significant equipment modifications have been implemented or after replacement consumables have been utilized.

5. A requirement that there is at least one set of replacement consumables available to install during IRMM.

APPENDIX SA1:

eACH = Q / [room volume][18]

Where Q = A + B + C + D (total clean volumetric air flow rate)

To determine the total clean volumetric air flow rate (Q) for a room, sum the air flow rates for individual systems (as applicable to the HVAC system) per the calculations below.

A: Ventilation Systems[18]

The greater of:

The full mechanical HVAC outdoor air supply rate

The full mechanical HVAC system's exhaust rate, provided the transfer air is from non-regularly occupied spaces or outdoors

B: CADR-rated Media Filters (Standalone Systems)[17,18]

One of the following:

The full m-CADR rate (AHAM Certified per ANSI/AHAM Standard AC-5) or, if unavailable,

The full smoke-CADR rate (AHAM Certified per ANSI/AHAM Standard AC-1)

C: In-duct or non CADR-rated Media Filters[18]

Multiply the air supply rate (e.g., mechanical HVAC fan, blower fan) by the weighted clean air below:

MERV-A (ASHRAE 52.2)	ePM2.5 (ISO 16890)	Weighted Clean Air Factor (MERV E2 [1-3 um] minimum arrestance efficiency)
< 13	≤ 79	0
13	80	85
14-15	85	90
16	90	95
17-19 (HEPA	99	99

D: In-duct UVGI[17]

Multiply the air supply rate by the infectious aerosol reduction efficiency determined in accordance with ANSI/ASHRAE 185.1 with MS2 challenge organism.

STAKEHOLDER ENGAGEMENT AND COMMUNICATION

During emergencies, stakeholder engagement and communication is critical to instilling confidence, improving coordination and supporting actions that can help protect safety. Regular, clear communication about the emergency preparedness and response strategies being utilized by an owner or operator of a space to support people's health and safety, as well as how stakeholders can build awareness of what to do during an emergency event, provides critical information that supports the health and well-being of all occupants.

Through providing such communication, organizations can support occupant health literacy, which refers to a person's cognitive and social ability to access, interpret and understand basic health information, as well as the ability to act on that understanding to maintain health.[239–242] Low health literacy is linked to lower use of preventive care (e.g., flu shots), poor management of chronic conditions (e.g., high blood pressure) and lower self-reported mental and physical health.[243,244] Studies estimate that low health literacy costs the U.S. economy anywhere between $70-240 billion each year.[243,245]

Based on the effects of previous SARS outbreaks, COVID-19 is predicted to have lasting physical and mental health impacts.[246] Providing individuals with access to health-promotion strategies, education and resources can help them to cultivate healthy habits and resilience in response to physical and mental health stressors.

Multi-modal programming, educational materials and communications can help promote health literacy and increase positive health outcomes.[247,248] By supporting awareness of health and wellness programs and policies, projects can promote health literacy and encourage engagement with health resources, leading to both individual benefits - like increased participation in healthy behaviors and use of health services - and also employer benefits, providing an estimated 4:1 return on investment.[243,249]

SS01 PROMOTE HEALTH AND WELL-BEING | O (MAX: 1 PT)

Intent: Promote adherence to collective well-being and sustainability goals and a deeper occupant understanding of the features pursued by the project and of how building operations and policies impact health and well-being.

Summary: This feature requires project teams to establish a health-oriented project mission and to provide a guide to occupants that highlights the features pursued by the project, the relationship between health and buildings and available health resources and programs.

Issue: Health literacy refers to a person's cognitive and social ability to access, interpret and understand basic health information, as well as the ability to act on that understanding to maintain health.[242,250–252] Health literacy is influenced by sociocultural factors such as age, socioeconomic status, mental health, cultural background, language and communication abilities, prior health experiences and how healthcare delivery and education systems deliver care, health information and health education.[250] Low health literacy is linked to lower use of preventive care (e.g., flu shots), poor management of chronic conditions (e.g., high blood pressure) and lower self-reported mental and physical health.[253,254] Studies estimate that low health literacy costs the U.S. economy anywhere between $70-240 billion each year.[245,253]

Solutions: Establishing a health-centered mission and orienting stakeholders to how the project will adhere to that mission through features can help individuals remain engaged in the space and empower them to utilize all available health and wellness programs and policies.[255] Multi-modal programming, educational materials and communications can help promote health literacy and increase positive health outcomes.[256,257] By supporting awareness of health and wellness programs and policies, projects can promote health literacy and encourage engagement with health resources, leading to both individual benefits - like increased participation in healthy behaviors and use of health services - and also employer benefits, providing an estimated 4:1 return on investment.[253,258]

Part 1 Promote Health-Oriented Mission (Max: 1 Pt)

For All Spaces:

The project or organization establishes a health-oriented mission that meets the following requirements:

a. Connects supporting and improving occupant health to the organizational objectives or mission statement.

b. Outlines the project's or organization's objectives for health promotion.

Part 2 Provide Feature Guide and Occupant Communication (Max: 0 Pt)

For All Spaces:

A physical or digital WELL feature guide, such as the WELL report, will be prominently displayed and/or made widely available to all occupants upon certification achievement or completion of a review cycle, meeting the following requirements:

a. Describes the WELL features achieved by the project or organization.

The following requirement is met:

a. Quarterly communications (e.g., emails, modules, trainings) are sent to regular occupants, and onboarding communications are given to new employees (as applicable), about health resources, programs, amenities and policies available to them addressed by the WELL features achieved by the project or organization.

SS02 SHARE FOOD INSPECTION INFORMATION | O (MAX: 1 PT)

Intent: Mitigate foodborne illness and increase consumer knowledge of food inspection results.

Summary: This feature requires restaurants and other food service areas to display letter grades or sanitary inspection reports.

Issue: Food quality is a public health necessity, with 68% of reported foodborne illness outbreaks in the U.S. originating from a food service setting.[259]

Solutions: Restaurant grading and public posting programs have been implemented in some communities, resulting in increased public awareness of restaurant cleanliness and quality, as well as incentivizing food establishments to uphold and maintain sanitary measures and hygiene practices. In New York City, for example, 88% of surveyed residents reported considering Health Department ratings in their dining decisions, underscoring the value of the rating systems in reassuring patrons regarding foods consumed away from home.[260] Most importantly, implementation of a restaurant grading system has been shown to reduce the overall risk of foodborne disease. The Los Angeles restaurant hygiene grading and posting system, for example, was associated with an approximate 13% decrease in the number of foodborne-disease hospitalizations, further reinforcing the potential public health benefit of this intervention.[261]

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

All food service establishments within project boundary have at least one of the following prominently displayed on-premises and clearly visible to customers entering the establishment:

a. Publicly available food hygiene or sanitary inspection report by the local health department or other third-party inspection agency.

b. Scoring or letter grading system issued by the local health department or other third-party inspection agency.

Note:
This feature is a beta strategy and has an additional documentation requirement (beta feature feedback form). The feedback form supports IWBI in developing new features that are effective and applicable to projects around the world.

INNOVATION

Innovation features address a novel concept or strategy aimed at addressing acute health and safety issues that are not already included within the WELL Health-Safety features.

The Innovation features provide guidelines on the requirements that must be met in order for an Innovation to be considered for approval. Projects should use Option 1 to submit new Innovation proposals. Options II-IV represent additional Innovation strategies pre-approved by IWBI.

SI01 INNOVATION I | O (MAX: 1 PT)

Intent: Promote excellence in project design and continuous evolution of the WELL Health-Safety Rating.

Summary: This feature provides projects several options to go beyond features of the WELL Health-Safety rating, including a pathway to propose new interventions that address health and well-being in novel ways and achieving relevant design-based features from the WELL Building Standard.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project submits a proposal that meets the following requirements:

a. Positively impacts project occupants by relating to acute health and safety in a novel way that is not covered in the WELL Health-Safety Rating.
b. Substantiated by existing scientific, medical and/or industry research.
c. Consistent with applicable laws and regulations and leading practices in building design and operations.

OR

At least one member of the project team:

a. Has achieved the Reference.
b. Maintains accreditation until project's initial rating is achieved.

OR

Project completes the requirements listed in any one of the following features, and submits the corresponding verification method document(s):

a. One of the following Air features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference – 2 points	OR	Reference - 2 points
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference		-
Reference	OR	Reference

b. One of the following Water features:

WELL v2 feature		WELL v2 pilot feature
Reference and Reference	OR	Reference and Reference (must do both to achieve 1 Innovation)
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference

c. One of the following Movement features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference	OR	Reference

d. The following Thermal Comfort feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

e. The following Community feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

OR

One of the following requirements are met:

a. The project is WELL Precertified. This strategy may be used for one Innovation feature.

b. The project is WELL Certified. This strategy may be used for three Innovation features.

c. The project has achieved a WELL Rating. This strategy may be used for one Innovation feature.

SI02 INNOVATION II | O (MAX: 1 PT)

Intent: Promote excellence in project design and continuous evolution of the WELL Health-Safety Rating.

Summary: This feature provides projects several options to go beyond features of the WELL Health-Safety rating, including a pathway to propose new interventions that address health and well-being in novel ways and achieving relevant design-based features from the WELL Building Standard.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project submits a proposal that meets the following requirements:

a. Positively impacts project occupants by relating to acute health and safety in a novel way that is not covered in the WELL Health-Safety Rating.
b. Substantiated by existing scientific, medical and/or industry research.
c. Consistent with applicable laws and regulations and leading practices in building design and operations.

OR

At least one member of the project team:

a. Has achieved the Reference.
b. Maintains accreditation until project's initial rating is achieved.

OR

Project completes the requirements listed in any one of the following features, and submits the corresponding verification method document(s):

a. One of the following Air features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference – 2 points	OR	Reference - 2 points
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference		-
Reference	OR	Reference

b. One of the following Water features:

WELL v2 feature		WELL v2 pilot feature
Reference and Reference	OR	Reference and Reference (must do both to achieve 1 Innovation)
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference

c. One of the following Movement features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference	OR	Reference

d. The following Thermal Comfort feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

e. The following Community feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

OR

One of the following requirements are met:

a. The project is WELL Precertified. This strategy may be used for one Innovation feature.

b. The project is WELL Certified. This strategy may be used for three Innovation features.

c. The project has achieved a WELL Rating. This strategy may be used for one Innovation feature.

SI03 INNOVATION III | O (MAX: 1 PT)

Intent: Promote excellence in project design and continuous evolution of the WELL Health-Safety Rating.

Summary: This feature provides projects several options to go beyond features of the WELL Health-Safety rating, including a pathway to propose new interventions that address health and well-being in novel ways and achieving relevant design-based features from the WELL Building Standard.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project submits a proposal that meets the following requirements:

a. Positively impacts project occupants by relating to acute health and safety in a novel way that is not covered in the WELL Health-Safety Rating.

b. Substantiated by existing scientific, medical and/or industry research.

c. Consistent with applicable laws and regulations and leading practices in building design and operations.

OR

At least one member of the project team:

a. Has achieved the Reference.

b. Maintains accreditation until project's initial rating is achieved.

OR

Project completes the requirements listed in any one of the following features, and submits the corresponding verification method document(s):

a. One of the following Air features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference – 2 points	OR	Reference - 2 points
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference		-
Reference	OR	Reference

b. One of the following Water features:

WELL v2 feature		WELL v2 pilot feature
Reference and Reference	OR	Reference and Reference (must do both to achieve 1 Innovation)
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference

c. One of the following Movement features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference	OR	Reference

d. The following Thermal Comfort feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

e. The following Community feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

OR

One of the following requirements are met:

a. The project is WELL Precertified. This strategy may be used for one Innovation feature.

b. The project is WELL Certified. This strategy may be used for three Innovation features.

c. The project has achieved a WELL Rating. This strategy may be used for one Innovation feature.

SI04 INNOVATION IV | O (MAX: 1 PT)

Intent: Promote excellence in project design and continuous evolution of the WELL Health-Safety Rating.

Summary: This feature provides projects several options to go beyond features of the WELL Health-Safety rating, including a pathway to propose new interventions that address health and well-being in novel ways and achieving relevant design-based features from the WELL Building Standard.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project submits a proposal that meets the following requirements:

a. Positively impacts project occupants by relating to acute health and safety in a novel way that is not covered in the WELL Health-Safety Rating.

b. Substantiated by existing scientific, medical and/or industry research.

c. Consistent with applicable laws and regulations and leading practices in building design and operations.

OR

At least one member of the project team:

a.

Has achieved the Reference.

b. Maintains accreditation until project's initial rating is achieved.

OR

Project completes the requirements listed in any one of the following features, and submits the corresponding verification method document(s):

a. One of the following Air features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference – 2 points	OR	Reference - 2 points
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference		-

Reference	OR	Reference

b. One of the following Water features:

WELL v2 feature		WELL v2 pilot feature
Reference and Reference	OR	Reference and Reference (must do both to achieve 1 Innovation)
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference

c. One of the following Movement features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference	OR	Reference

d. The following Thermal Comfort feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

e. The following Community feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

OR

One of the following requirements are met:

a. The project is WELL Precertified. This strategy may be used for one Innovation feature.

b. The project is WELL Certified. This strategy may be used for three Innovation features.

c. The project has achieved a WELL Rating. This strategy may be used for one Innovation feature.

SI05 INNOVATION V | O (MAX: 1 PT)

Intent: Promote excellence in project design and continuous evolution of the WELL Health-Safety Rating.

Summary: This feature provides projects several options to go beyond features of the WELL Health-Safety rating, including a pathway to propose new interventions that address health and well-being in novel ways and achieving relevant design-based features from the WELL Building Standard.

Part 1 Part 1 (Max: 1 Pt)

For All Spaces:

The project submits a proposal that meets the following requirements:

a. Positively impacts project occupants by relating to acute health and safety in a novel way that is not covered in the WELL Health-Safety Rating.

b. Substantiated by existing scientific, medical and/or industry research.

c. Consistent with applicable laws and regulations and leading practices in building design and operations.

OR

At least one member of the project team:

a.

Has achieved the Reference.

b.

Maintains accreditation until project's initial rating is achieved.

OR

Project completes the requirements listed in any one of the following features, and submits the corresponding verification method document(s):

a. One of the following Air features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference – 2 points	OR	Reference - 2 points
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference - 2 points
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference

Reference	-	
Reference	OR	Reference

b. One of the following Water features:

WELL v2 feature		WELL v2 pilot feature
Reference and Reference	OR	Reference and Reference (must do both to achieve 1 Innovation)
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference
Reference	OR	Reference

c. One of the following Movement features:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference
Reference	OR	Reference

d. The following Thermal Comfort feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

e. The following Community feature:

WELL v2 feature		WELL v2 pilot feature
Reference	OR	Reference

OR

One of the following requirements are met:

a. The project is WELL Precertified. This strategy may be used for one Innovation feature.

b. The project is WELL Certified. This strategy may be used for three Innovation features.

c. The project has achieved a WELL Rating. This strategy may be used for one Innovation feature.

SI06 GATEWAYS TO HEALTH-SAFETY | O (MAX: 5 PT)

Intent: Recognize projects that have taken meaningful steps toward deeper commitments to health and safety in building operation and management.

Summary: WELL aligns with leading rating systems and programs that support health and safety in the spaces where we live, learn, work and play. Various independent programs support similar and aligned goals of maintaining the health, safety and well-being of individuals and communities. IWBI awards credit for these programs in an effort to recognize projects which demonstrate leadership in this area and deepen their commitment to these issues.

Part 1 Part 1 (Max: 5 Pt)

For All Spaces:

The following requirement is met:

a. The project is certified in a third-party rating system approved by IWBI for the WELL Health-Safety Rating and listed on IWBI's website (Reference).

APPENDIX - REFERENCES:

1. Van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med. 2020;382(16):1564-1567. doi:10.1056/NEJMc2004973

2. Charles P. Gerba P, Sonia L.M. Fankem MMP, Stephanie A. Boone MP, Marlene Gaither MMR. Outbreak of Norovirus Illness in a College Summer Camp: Impact of Cleaning on Occurrence of Norovirus on Fomites | National Environmental Health Association: NEHA. J Environ Health. 2014;76.8:20-26.

3. Boone SA, Gerba CP. Significance of fomites in the spread of respiratory and enteric viral disease. Appl Environ Microbiol. 2007;73(6):1687-1696. doi:10.1128/AEM.02051-06

4. Barker J, Bloomfield SF. Survival of Salmonella in bathrooms and toilets in domestic homes following salmonellosis. J Appl Microbiol. 2000;89(1):137-144. doi:10.1046/j.1365-2672.2000.01091.x

5. Aiello AE, Coulborn RM, Perez V, Larson EL. Effect of hand hygiene on infectious disease risk in the community setting: A meta-analysis. Am J Public Health. 2008;98(8):1372-1381. doi:10.2105/AJPH.2007.124610

6. Show Me the Science – When & How to Use Hand Sanitizer in Community Settings | Handwashing | CDC.

7. Garza JL, Cavallari JM, Wakai S, et al. Traditional and environmentally preferable cleaning product exposure and health symptoms in custodians. Am J Ind Med. 2015;58(9):988-995. doi:10.1002/ajim.22484

8. Occupational Safety and Health Administration and the National Institute for Occupational Safety and Health. Protecting Workers Who Use Cleaning Chemicals. 2012.

9. Zock JP, Plana E, Jarvis D, et al. The use of household cleaning sprays and adult asthma: An international longitudinal study. Am J Respir Crit Care Med. 2007;176(8):735-741. doi:10.1164/rccm.200612-1793OC

10. Centers for Disease Control and Prevention. Show Me the Science – When & How to Use Hand Sanitizer in Community Settings | Handwashing.

11. Jumaa PA. Hand hygiene: Simple and complex. Int J Infect Dis. 2005;9(1):3-14. doi:10.1016/j.ijid.2004.05.005

12. Parkes LO, Hota SS. Sink-Related Outbreaks and Mitigation Strategies in Healthcare Facilities. Curr Infect Dis Rep. 2018;20(10). doi:10.1007/s11908-018-0648-3

13. Chattman M, Maxwell SL, Gerba CP. Occurrence of heterotrophic and coliform bacteria in liquid hand soaps from bulk refillable dispensers in public facilities. J Environ Health. 2011;73(7):26-29.

14. Schaffner DW, Jensen D, Gerba CP, Shumaker D, Arbogast JW. Influence of Soap Characteristics and Food Service Facility Type on the Degree of Bacterial Contamination of Open, Refillable Bulk Soaps. J Food Prot. 2018;81(2):218-225. doi:10.4315/0362-028X.JFP-17-251

15. Kotay SM, Donlan RM, Ganim C, Barry K, Christensen BE, Mathers AJ. Droplet- Rather than Aerosol-Mediated Dispersion Is the Primary Mechanism of Bacterial Transmission from Contaminated Hand-Washing Sink Traps. Appl Environ Microbiol. 2019;85(2). doi:10.1128/AEM.01997-18

16. Huang C, Ma W, Stack S. The hygienic efficacy of different hand-drying methods: A review of the evidence. Mayo Clin Proc. 2012;87(8):791-798. doi:10.1016/j.mayocp.2012.02.019

17. Lawson A, Vaganay-Miller M. The effectiveness of a poster intervention on hand hygiene practice and compliance when using public restrooms in a university setting. Int J Environ Res Public Health. 2019;16(24). doi:10.3390/ijerph16245036

18. Ford EW, Boyer BT, Menachemi N, Huerta TR. Increasing hand washing compliance with a simple visual cue. Am J Public Health. 2014;104(10):1851-1856. doi:10.2105/AJPH.2013.301477

19. Pellegrino R, Crandall PG, O'Bryan CA, Seo HS. A review of motivational models for improving hand hygiene among an increasingly diverse food service workforce. Food Control. 2015;50:446-456.

doi:10.1016/j.foodcont.2014.09.015

20. Wu F, Takaro TK. Childhood asthma and environmental interventions. Environ Health Perspect. 2007;115(6):971-975. doi:10.1289/ehp.8989

21. Calderón MA, Linneberg A, Kleine-Tebbe J, et al. Respiratory allergy caused by house dust mites: What do we really know? J Allergy Clin Immunol. 2015;136(1):38-48. doi:10.1016/j.jaci.2014.10.012

22. Velazquez S, Griffiths W, Dietz L, et al. Protecting Workers Who Use Cleaning Chemicals. Contact Dermatitis. 2007;5(1):175-180. doi:10.1111/j.0105-1873.2004.00421.x

23. Behroozy A, Keegel TG. Wet-work exposure: A main risk factor for occupational hand dermatitis. Saf Health Work. 2014;5(4):175-180. doi:10.1016/j.shaw.2014.08.001

24. ASTM E1971-19. Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings. West Conshohocken, PA; 2019.

25. World Health Organization. Cleaning and Disinfection of Environmental Surfaces in the Context of COVID-19.; 2020.

26. Gorman T, Dropkin J, Kamen J, et al. Controlling health hazards to hospital workers: A reference guide. New Solut. 2014;23(1_suppl):1-167. doi:10.2190/ns.23.suppl

27. Velazquez S, Griffiths W, Dietz L, et al. From one species to another: A review on the interaction between chemistry and microbiology in relation to cleaning in the built environment. Indoor Air. 2019;29(6):880-894. doi:10.1111/ina.12596

28. Zhong L, Su FC, Batterman S. Volatile organic compounds (VOCs) in conventional and high performance school buildings in the U.S. Int J Environ Res Public Health. 2017;14(1). doi:10.3390/ijerph14010100

29. Zock J-P, Plana E, Jarvis D, et al. The use of household cleaning sprays and adult asthma: an international longitudinal study. Am J Respir Crit Care Med. 2007;176(8):735-741. doi:10.1164/rccm.200612-1793OC

30. World Health Organization. Managing Epidemics.; 2018.

31. World Health Organization. WHO's Emergencies: Work in Prepare, Prevent, Detect and Respond. World Health Organization; 2018.

32. World Health Organization. WHO Timeline - COVID-19. WHO Timeline - COVID-19. https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19. Published 2020.

33. World Health Organization. Coronavirus Disease (COVID-19) Situation Report - 134.; 2020.

34. World Health Organization. Environmental health in emergencies : Vulnerable groups. Public Health Management of Chemical Incidents.

35. Lockwood NR. Crisis Management in Today's Business Environment: HR's Strategic Role.; 2005.

36. Skryabina E, Reedy G, Amlôt R, Jaye P, Riley P. What is the value of health emergency preparedness exercises? A scoping review study. Int J Disaster Risk Reduct. 2017;21:274-283. doi:10.1016/j.ijdrr.2016.12.010

37. Occupational Safety and Health Administration. Evacuation Plans and Procedures eTool | Emergency Action Plan - Develop & Implement an Emergency Action Plan (EAP).

38. American Red Cross Ready Rating. SMB Prepared Playbook. 2015.

39. U.S. Small Business Administration. Disaster Preparedness and Recovery Plan.; 2019.

40. World Health Organization. COVID-19 Strategy Update - 14 April 2020.; 2020.

41. Business Continuity Plan | Ready.gov.

42. Goldman SB. PANDEMIC MANUAL Planning and Responding to a Global Health Crisis for Facility Management Professionals.; 2020.

43. Benedek DM, Fullerton C, Ursano RJ. First Responders: Mental Health Consequences of Natural and

Human-Made Disasters for Public Health and Public Safety Workers. Annu Rev Public Health. 2007;28(1):55-68. doi:10.1146/annurev.publhealth.28.021406.144037

44. United Nations. COVID-19 and the Need for Action on Mental Health.; 2020.

45. World Health Organization. Mental health in emergencies. WHO Fact Sheets.

46. Society of Occupational Medicine. Returning to the Workplace after the COVID-19 Lockdown.; 2020.

47. Mental health: strengthening our response.

48. Stress Weakens the Immune System.

49. WHO. Environmental health in emergencies : Vulnerable groups. Public Health Management of Chemical Incidents.

50. Mike S. Make Your Business Resilient.

51. World Health Organization. Managing Epidemics.; 2018. https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf. Accessed June 3, 2020.

52. World Health Organization. WHO's Work in Emergencies: Prepare, Prevent, Detect and Respond - Annual Report 2018. World Health Organization; 2018. https://www.who.int/emergencies/who-work-in-emergencies/en/. Accessed June 3, 2020.

53. WHO Timeline - COVID-19. https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19. Published 2020. Accessed June 3, 2020.

54. World Health Organization. Coronavirus Disease (COVID-19) Situation Report - 134.; 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200602-covid-19-sitrep-134.pdf?sfvrsn=cc95e5d5_2. Accessed June 3, 2020.

55. Occupational Health and Safety Administration. How to Plan for Workplace Emergencies and Evacuations. 2001.

56. Lockwood NR. Crisis Management in Today's Business Environment: HR's Strategic Role.; 2005. https://www.shrm.org/hr-today/news/hr-magazine/Documents/1205RQuartpdf.pdf. Accessed October 21, 2019.

57. Skryabina E, Reedy G, Amlôt R, Jaye P, Riley P. What is the value of health emergency preparedness exercises? A scoping review study. Int J Disaster Risk Reduct. 2017;21:274-283. doi:10.1016/j.ijdrr.2016.12.010

58. Occupational Safety and Health Administration. Evacuation Plans and Procedures eTool | Emergency Action Plan - Develop & Implement an Emergency Action Plan (EAP). https://www.osha.gov/SLTC/etools/evacuation/implementation.html. Accessed June 3, 2020.

59. American Red Cross Ready Rating. SMB Prepared Playbook. 2015. https://www.readyrating.org/Resource-Center/All-Resources/smb-prepared-playbook. Accessed June 4, 2020.

60. U.S. Small Business Administration. Disaster Preparedness and Recovery Plan.; 2019. https://www.sba.gov/sites/default/files/2019-08/2019 DPRP 3-2b-FINAL.pdf. Accessed June 4, 2020.

61. World Health Organization. COVID-19 Strategy Update - 14 April 2020.; 2020. https://www.who.int/publications-detail/covid-19-strategy-update---14-april-2020. Accessed June 3, 2020.

62. Weather, Climate & Catastrophe Insight.; 2019. http://catastropheinsight.aon.com. Accessed June 4, 2020.

63. Coronese M, Lamperti F, Keller K, Chiaromonte F, Roventini A. Evidence for sharp increase in the economic damages of extreme natural disasters. Proc Natl Acad Sci U S A. 2019;116(43):21450-21455. doi:10.1073/pnas.1907826116

64. Global Increase in Climate-Related Disasters.; 2015. https://www.adb.org/publications/global-increase-climate-related-disasters. Accessed June 4, 2020.

65. International Monetary Fund. World Economic Outlook, April 2020: The Great Lockdown.; 2020.

https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/weo-april-2020. Accessed June 4, 2020.

66. Business Continuity Plan | Ready.gov. https://www.ready.gov/business-continuity-plan. Accessed June 4, 2020.

67. FEMA. Make Your Business Resilient.; 2015. https://www.fema.gov/media-library-data/1441212988001-1aa7fa978c5f999ed088dcaa815cb8cd/3a_BusinessInfographic-1.pdf.

68. Evacuation Plans and Procedures eTool | Emergency Action Plan - Shelter-in-Place | Occupational Safety and Health Administration. https://www.osha.gov/SLTC/etools/evacuation/shelterinplace.html. Accessed June 4, 2020.

69. CDC Emergency Preparedness and You | Learn How to Shelter in Place. https://emergency.cdc.gov/shelterinplace.asp. Accessed June 3, 2020.

70. Build A Kit | Ready.gov. https://www.ready.gov/kit. Accessed June 3, 2020.

71. Coronavirus Makes Work from Home the New Normal. https://www.shrm.org/hr-today/news/all-things-work/pages/remote-work-has-become-the-new-normal.aspx. Accessed June 4, 2020.

72. COVID-19: Making remote work productive and secure: PwC. https://www.pwc.com/us/en/library/covid-19/making-remote-work-productive-secure.html. Accessed June 4, 2020.

73. Kluch S, Hickman A. 4 Workplace Adjustments to Help Parents Working From Home.; 2020. https://www.gallup.com/workplace/300662/workplace-adjustments-help-parents-working-home.aspx. Accessed June 4, 2020.

74. Willis Towers Watson. North American companies take steps to protect employees from coronavirus epidemic. 2020. https://www.willistowerswatson.com/en-US/News/2020/03/north-american-companies-take-steps-to-protect-employees-from-coronavirus-epidemic. Accessed June 4, 2020.

75. KFF. Taking Stock of Essential Workers | KFF. https://www.kff.org/coronavirus-policy-watch/taking-stock-of-essential-workers/. Published 2020. Accessed June 4, 2020.

76. World Health Organization. Mental health in emergencies. WHO Fact Sheets. https://www.who.int/news-room/fact-sheets/detail/mental-health-in-emergencies. Published 2019. Accessed June 3, 2020.

77. United Nations. COVID-19 and the Need for Action on Mental Health.; 2020. https://www.un.org/sites/un2.un.org/files/un_policy_brief-covid_and_mental_health_final.pdf. Accessed May 28, 2020.

78. Business Continuity Plan | Ready.gov. https://www.ready.gov/business-continuity-plan. Published 2020. Accessed May 29, 2020.

79. Emergency Management Agency F. Continuity Guidance Circular - February 2018.; 2018.

80. Goldman SB. PANDEMIC MANUAL Planning and Responding to a Global Health Crisis for Facility Management Professionals.; 2020. www.ifmafoundation.org. Accessed June 4, 2020.

81. Emergency Preparedness and Response | Getting Started - Evacuation & Shelter-in-Place. https://www.osha.gov/SLTC/emergencypreparedness/gettingstarted_evacuation.html. Accessed June 26, 2020.

82. Planning Considerations: Evacuation and Shelter-in-Place - Guidance for State, Local, Tribal and Territorial Partners.; 2019.

83. U.S. Fire Administration. Operational Lessons Learned in Disaster Response.; 2015.

84. Ciena. 68% of British Adults Will Work Remotely More Often After COVID-19. https://www.ciena.com/about/newsroom/press-releases/68-percent-of-british-adults-will-work-remotely-more-often-after-covid-19.html. Accessed June 26, 2020.

85. U.S. Workers Discovering Affinity for Remote Work. https://news.gallup.com/poll/306695/workers-discovering-affinity-remote-work.aspx. Accessed June 26, 2020.

86. Policy Responses to COVID-19. International Monetary Fund. https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#U. Accessed June 26, 2020.

87. U.S. economy loses 20.5 million jobs, unemployment rate rises to 14.7% - Marketplace. https://www.marketplace.org/2020/05/08/u-s-economy-loses-20-5-million-jobs-unemployment-rate-rises-to-14-7/. Accessed June 26, 2020.

88. Global Economic Prospects.; 2020. https://www.worldbank.org/en/publication/global-economic-prospects. Accessed June 26, 2020.

89. Aftershock Forecast Overview. U.S. Geological Survey. https://earthquake.usgs.gov/data/oaf/overview.php. Accessed June 26, 2020.

90. Ferris E, Petz D, Stark C. The Year of Recurring Disasters: A Review of Natural Disasters in 2012.; 2013. https://www.brookings.edu/research/the-year-of-recurring-disasters-a-review-of-natural-disasters-in-2012/. Accessed June 26, 2020.

91. Markel H, Lipman HB, Navarro JA, et al. Nonpharmaceutical interventions implemented by US cities during the 1918-1919 influenza pandemic. J Am Med Assoc. 2007;298(6):644-654. doi:10.1001/jama.298.6.644

92. Live: WHO reports largest 24-hour increase in coronavirus cases | News | Al Jazeera. https://www.aljazeera.com/news/2020/06/brazil-coronavirus-death-toll-nears-50000-live-updates-200620230549593.html. Accessed June 26, 2020.

93. Wilson S. In the nation's biggest states, a spike in coronavirus comes with the economic reopening - The Washington Post. The Washington Post. https://www.washingtonpost.com/national/in-the-nations-biggest-states-a-spike-in-coronavirus-comes-with-the-economic-reopening/2020/06/21/e08457e4-af4f-11ea-b1e7-33e88fa24c71_story.html. Published June 21, 2020. Accessed June 26, 2020.

94. Chappell B, Stein R. U.S. Hits 2 Million Coronavirus Cases As Many States See A Surge Of Patients : Coronavirus Live Updates : NPR. NPR. https://www.npr.org/sections/coronavirus-live-updates/2020/06/10/873473805/u-s-hits-2-million-coronavirus-cases-as-many-states-see-a-surge-of-patients. Published June 10, 2020. Accessed June 26, 2020.

95. Bosman J, Smith M. Coronavirus Cases Spike Across Sun Belt as Economy Lurches into Motion - The New York Times. The New York Times. https://www.nytimes.com/2020/06/14/us/coronavirus-united-states.html. Published June 14, 2020. Accessed June 26, 2020.

96. CDC. COVID-19 Guidance: Businesses and Employers | CDC. https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fspecific-groups%2Fguidance-business-response.html. Published 2020. Accessed June 8, 2020.

97. HMG. Our Plan to Rebuild: The UK Government's COVID-19 Recovery Strategy.; 2020.

98. PricewaterhouseCoopers. Returning to the workplace after COVID-19: What boards should be thinking about: PwC. https://www.pwc.com/us/en/services/governance-insights-center/library/covid-19-returning-workplace-boards.html. Published 2020. Accessed June 4, 2020.

99. Society of Occupational Medicine. Returning to the Workplace after the COVID-19 Lockdown.; 2020. https://www.som.org.uk/Returning_to_the_workplace_COVID-19_toolkit_FINAL.pdf. Accessed June 3, 2020.

100. Recovery Readiness: A How-to Guide for Reopening Your Workplace | Cushman & Wakefield.; 2020. https://www.cushmanwakefield.com/en/insights/covid-19/recovery-readiness-a-how-to-guide-for-reopening-your-workplace. Accessed June 9, 2020.

101. GUIDANCE FOR CLEANING AND DISINFECTING.; 2020. https://www.cdc.gov/coronavirus/2019-ncov/community/pdf/Reopening_America_Guidance.pdf. Accessed June 9, 2020.

102. Getting Back to Work: Preparing Buildings for Re-Entry Amid COVID-19.; 2020. https://boma.informz.net/BOMA/data/images/Getting Back To Work Preparing Buildings for Re Entry.pdf. Accessed June 9, 2020.

103. Getting Your Workplace Ready for COVID-19.; 2020. www.WHO.int. Accessed June 9, 2020.

104. Re-Occupancy Assessment Tool V2.0.; 2020. http://content.aia.org/sites/default/files/2020-06/STN20_ 344901_ReOccupancyAssessmentTool-V02_sm_v09.pdf. Accessed June 9, 2020.

105. Guidance on Preparing Workplaces for COVID-19.; 2020. https://www.osha.gov/Publications/OSHA3990.pdf. Accessed June 9, 2020.

106. JLL. COVID-19: Top 10 focus areas for workplace re-entry checklist. https://www.us.jll.com/en/views/covid19-top-10-focus-areas-for-workplace-re-entry. Published 2020. Accessed June 9, 2020.

107. Society of Occupational Medicine. Returning to the Workplace after the COVID-19 Lockdown A Toolkit In Association With.; 2020. https://www.som.org.uk/Returning_to_the_workplace_COVID-19_toolkit_FINAL.pdf. Accessed June 3, 2020.

108. Mehra R. Global public health problem of sudden cardiac death. J Electrocardiol. 2007;40(6 SUPPL. 1). doi:10.1016/j.jelectrocard.2007.06.023

109. Saving Sudden Cardiac Arrest Victims in the Workplace. https://www.osha.gov/Publications/3185.html. Accessed June 16, 2020.

110. Konig M. Every Second Counts - AED Fact Sheet 2013 - Final.; 2013. www.heart.org/policyfactsheets. Accessed June 16, 2020.

111. Krug EG, Sharma GK, Lozano R. The Global Burden of Injuries. Am J Public Health. 2000;90(4). https://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.90.4.523. Accessed June 16, 2020.

112. First Aid for a Safer Future - Focus on Europe.; 2009.

113. Sixty Percent of Americans Not Practicing for Disaster: FEMA urges everyone to prepare by participating in National PrepareAthon! Day on April 30 | FEMA.gov. https://www.fema.gov/news-release/2015/04/28/sixty-percent-americans-not-practicing-disaster-fema-urges-everyone-prepare. Accessed June 16, 2020.

114. Hsieh F. Anaphylaxis. Cleveland Clinic Center for Continuing Education - Disease Management. http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/allergy/anaphylaxis/. Published December 2013. Accessed June 16, 2020.

115. Turner PJ, Jerschow E, Umasunthar T, Lin R, Campbell DE, Boyle RJ. Fatal Anaphylaxis: Mortality Rate and Risk Factors. J Allergy Clin Immunol Pract. 2017;5(5):1169-1178. doi:10.1016/j.jaip.2017.06.031

116. Boyce JA, Assa'ad A, Burks AW, et al. Guidelines for the diagnosis and management of food allergy in the United States: Report of the NIAID-sponsored expert panel. J Allergy Clin Immunol. 2010;126(6 SUPPL.):S1. doi:10.1016/j.jaci.2010.10.007

117. Berryman P, Lukes E, Mancini ME, Cazzell M, Kardong-Edgren S, Cason CL. Improving Workplace Safety Training Using a Self-Directed CPR-AED Learning Program. AAOHN J. 2009;57(4):159-167. doi:10.3928/08910162-20090401-02

118. Access to Epinephrine | Food Allergy Research & Education.

119. Cost of natural disaster losses worldwide 2000-2019 | Statista. https://www.statista.com/statistics/612561/natural-disaster-losses-cost-worldwide-by-type-of-loss/. Accessed June 25, 2020.

120. Anzellini V, Desai B, Fung V, et al. Global Disaster Displacement Risk - A Baseline for Future Work | IDMC.; 2017. https://www.internal-displacement.org/publications/global-disaster-displacement-risk-a-baseline-for-future-work. Accessed June 25, 2020.

121. CDC Emergency Preparedness and You | Learn How to Shelter in Place.

122. Coronavirus Makes Work from Home the New Normal.

123. COVID-19: Making remote work productive and secure: PwC.

124. Kluch S, Hickman A. 4 Workplace Adjustments to Help Parents Working From Home.; 2020.

125. Willis Towers Watson. North American companies take steps to protect employees from coronavirus epidemic. 2020.

126. KFF. Taking Stock of Essential Workers | KFF.

127. Interim Technical Note Impact of the COVID-19 Pandemic on Family Planning and Ending Gender-Based Violence, Female Genital Mutilation and Child Marriage.; 2020.

128. Mulyasari F, Inoue S, Prashar S, et al. Disaster Preparedness: Looking through the Lens of Hospitals in Japan. Int J Disaster Risk Sci. 2013;1375(2):89-100. doi:10.1007/s13753-013-0010-1

129. Lewnard JA, Liu VX, Jackson ML, et al. Incidence, clinical outcomes, and transmission dynamics of severe coronavirus disease 2019 in California and Washington: Prospective cohort study. BMJ. 2020;369(9). doi:10.1136/bmj.m1923

130. Khera R, Jain S, Lin Z, Ross JS, Krumholz H. Evaluation of the Anticipated Burden of COVID-19 on Hospital-Based Healthcare Services Across the United States. Cold Spring Harbor Laboratory Press; 2020. doi:10.1101/2020.04.01.20050492

131. Centers for Disease Control and Prevention (CDC). (2015). Planning for an emergency: Strategies for identifying and engaging at-risk groups. A guidance document for emergency managers. https://www.cdc.gov/nceh/hsb/disaster/atriskguidance.pdf.

132. America Society of Civil Engineers. Alternate Care Sites Retrofitting Guidance. https://www.usace.army.mil/Coronavirus/Alternate-Care-Sites/. Published 2020. Accessed June 4, 2020.

133. CDC. Considerations for Alternate Care Sites | CDC. https://www.cdc.gov/coronavirus/2019-ncov/hcp/alternative-care-sites.html. Published 2020. Accessed June 4, 2020.

134. Emergency Relief Funds Throw Employees a Lifeline During Pandemic. https://www.shrm.org/resourcesandtools/hr-topics/benefits/pages/emergency-relief-funds-throw-employees-lifeline-during-pandemic.aspx. Accessed June 4, 2020.

135. Employer-Assisted Housing: The Basics | National Housing Conference. https://www.nhc.org/policy-guide/employer-assisted-housing-the-basics/. Accessed June 4, 2020.

136. Stockham D, Clontz B. Emergency Assistance Funds (EAFs) for Employee Hardship and Disaster Relief: Legal, Tax and Design Considerations. 2015. https://www.pgdc.com/pgdc/emergency-assistance-funds-eafs-employee-hardship-and-disaster-relief-legal-tax-and-design-cons. Accessed June 9, 2020.

137. World Health Organization. Influenza (Seasonal).

138. Duncan IG, Taitel MS, Zhang J, Kirkham HS. Planning influenza vaccination programs: a cost benefit model. Cost Eff Resour Alloc. 2012;10(1):10. doi:10.1186/1478-7547-10-10

139. McKibbin WJ, Sidorenko AA. The Global Costs of an Influenza Pandemic. Milken Inst Rev. 2007:18-27.

140. Centers for Disease Control and Prevention. Make It Your Business To Fight The Flu: A Toolkit for Employers.

141. Scheil-Adlung X, Sandner L. The Case for Paid Sick Leave.; 2010.

142. Heymann J, Rho HJ, Schmitt J, Earle A. Contagion Nation: A Comparison of Paid Sick Day Policies in 22 Countries.; 2009. http://www.issuelab.org/permalink/resource/2939.

143. Jacobs B, Ir P, Bigdeli M, Annear PL, Van Damme W. Addressing access barriers to health services: An analytical framework for selectingappropriate interventions in low-income Asian countries. Health Policy and Planning. doi:10.1093/heapol/czr038

144. U.S. Department of Health and Human Services. Access to Health Services | Healthy People 2020.

145. Estimating the Distributional Impacts of Alternative Policies to Provide Paid Sick Days in the United States Issue Brief-Worker Leave Analysis and Simulation Series 1.; 2017.

146. Braveman P, Gottlieb L. The social determinants of health: It's time to consider the causes of the causes. Public Health Rep. 2014;129(SUPPL. 2):19-31. doi:10.1177/00333549141291s206

147. National Cancer Institute. Harms of Cigarette Smoking and Health Benefits of Quitting.

148. Matt GE, Quintana PJE, Destaillats H, et al. Thirdhand tobacco smoke: Emerging evidence and arguments for a multidisciplinary research agenda. Environ Health Perspect. 2011;119(9):1218-1226. doi:10.1289/ehp.1103500

149. Jha P, Ramasundarahettige C, Landsman V, et al. 21st-century hazards of smoking and benefits of cessation in the United States. N Engl J Med. 2013;368(4):341-350. doi:10.1056/NEJMsa1211128

150. U.S. Department of Health and Human Services. Healthy People 2020: Social Determinants of Health. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health. Accessed February 7, 2018.

151. Braveman P, Gottlieb L. The Social determinents of Health: It's Time to Consider the Causes of the Causes. 2014;129:19-31. doi:10.1177/00333549141291S206

152. Weissman J, Stern R, Fielding S, Epstein A. Delayed Access to Health Care: Risk Factors, Reasons, and Consequences. Ann Intern Med. 1991;114(4):325-331.

153. U.S. Department of Health and Human Services. Access to Health Services | Healthy People 2020. https://www.healthypeople.gov/2020/topics-objectives/topic/Access-to-Health-Services. Accessed February 4, 2018.

154. Gulliford M, Figueroa-Munoz J, Morgan M, et al. What does "access to health care" mean? J Heal Serv Res Policy. 2002;7(3):186-188. doi:10.1258/135581902760082517

155. Raub A, Chung P, Batra P, et al. Paid Leave for Personal Illness: A Detailed Look at Approaches Across OECD Countries.; 2018.

156. Expanding Access to Paid Sick Leave.; 2010.

157. Scheil-Adlung X, Sandner L. The Case for Paid Sick Leave.; 2010. https://www.who.int/healthsystems/topics/financing/healthreport/SickleaveNo9FINAL.pdf. Accessed June 5, 2020.

158. Heymann J, Rho HJ, Schmitt J, Earle A. Contagion Nation: A Comparison of Paid Sick Day Policies in 22 Countries.; 2009. www.cepr.net. Accessed June 5, 2020.

159. Estimating the Distributional Impacts of Alternative Policies to Provide Paid Sick Days in the United States Issue Brief-Worker Leave Analysis and Simulation Series 1.; 2017. https://www.dol.gov/asp/evaluation. Accessed June 5, 2020.

160. Scheil-Adlung X, Sandner L. Evidence on paid sick leave: Observations in times of crisis. Intereconomics. 2010;45(5):313-321. doi:10.1007/s10272-010-0351-6

161. Heymann J, Earle A, Hayes J. The Work, Family, and Equity Index How Does the United States Measure Up? About the Project on Global Working Families. www.mcgill.ca/ihsp. Accessed June 10, 2020.

162. U.S. Department of Health and Human Services. Healthy People 2020: Social Determinants of Health.

163. Gulliford M, Figueroa-Munoz J, Morgan M, et al. What does "access to health care" mean? J Heal Serv Res Policy. 2002;7(3):186-188. doi:10.1258/135581902760082517

164. Greenbaum E, Meinert E. Vaccinating Against the Flu: A Business Case. 2010;(September).

165. MetLife. Work Redefined: A New Age of Benefits. 2017. https://benefittrends.metlife.com/us-perspectives/work-redefined-a-new-age-of-benefits/.

166. Benedek DM, Fullerton C, Ursano RJ. First Responders: Mental Health Consequences of Natural and Human-Made Disasters for Public Health and Public Safety Workers. Annu Rev Public Health. 2007;28(1):55-68. doi:10.1146/annurev.publhealth.28.021406.144037

167. World Health Organization. Influenza (Seasonal). http://www.who.int/mediacentre/factsheets/fs211/en/. Published 2018. Accessed February 4, 2018.

168. Duncan IG, Taitel MS, Zhang J, Kirkham HS. Planning influenza vaccination programs: a cost benefit model. Cost Eff Resour Alloc. 2012;10(1):10. doi:10.1186/1478-7547-10-10

169. McKibbin WJ, Sidorenko AA. The Global Costs of an Influenza Pandemic. Milken Inst Rev. 2007.

170. Centers for Disease Control and Prevention. Make It Your Business To Fight The Flu: A Toolkit for Employers. https://www.cdc.gov/flu/pdf/business/toolkit_seasonal_flu_for_businesses_and_employers.pdf.

171. Arriola C, Garg S, Anderson EJ, et al. Influenza vaccination modifies disease severity among community-dwelling adults hospitalized with influenza. Clin Infect Dis. 2017;65(8):1289-1297. doi:10.1093/cid/cix468

172. World Health Organization. Tobacco. http://www.who.int/mediacentre/factsheets/fs339/en/. Published 2017. Accessed January 9, 2018.

173. World Health Organization. WHO global report on trends in prevalence of tobacco smoking 2015. WHO Mag. 2015:1-359. doi:978 92 4 156492 2

174. National Cancer Institute. Harms of Cigarette Smoking and Health Benefits of Quitting. https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco/cessation-fact-sheet.

175. Jha P, Ramasundarahettige C, Landsman V, et al. 21st-Century Hazards of Smoking and Benefits of Cessation in the United States. N Engl J Med. 2013;368(4):341-350. doi:10.1056/NEJMsa1211128

176. Matt GE, Quintana PJE, Destaillats H, et al. Thirdhand tobacco smoke: Emerging evidence and arguments for a multidisciplinary research agenda. Environ Health Perspect. 2011;119(9):1218-1226. doi:10.1289/ehp.1103500

177. Wang X, Derakhshandeh R, Liu J, et al. One Minute of Marijuana Secondhand Smoke Exposure Substantially. J Am Heart Assoc. 2016;5(8):1-11. doi:10.1161/JAHA.116.003858

178. Mello S, Bigman CA, Sanders-Jackson A, Tan ASL. Perceived harm of secondhand electronic cigarette vapors and policy support to restrict public vaping: Results from a national survey of US adults. Nicotine Tob Res. 2016;18(5):686-693. doi:10.1093/ntr/ntv232

179. U.S. Department of Health and Human Services. The Health Consequences of Smoking: 50 Years of Progress: A Report of the Surgeon General. Rockville, MD; 2014. https://www.ncbi.nlm.nih.gov/books/NBK179276/pdf/Bookshelf_NBK179276.pdf.

180. World Health Organization. WHO Report on the Global Tobacco Epidemic, 2017 - Monitoring Tobacco Use and Prevention Policies. Geneva, Switzerland; 2017. http://apps.who.int/iris/bitstream/handle/10665/255874/9789241512824-eng.pdf?sequence=1%0Ahttps://www.world-heart-federation.org/wp-content/uploads/2017/07/WHO-Report-on-the-global-tobacco-epidemic-2017-EMBARGOED.pdf%0Ahttp://apps.who.int/iris/bitstream/1.

181. International Agency for Research on Cancer. Evaluating the Effectiveness of Smoke-Free Policies. Geneva, Switzerland; 2009. https://www.iarc.fr/wp-content/uploads/2018/07/handbook13.pdf.

182. Gan Q, Hammond SK, Jiang Y, Yang Y, Hu TW. Effectiveness of a smoke-free policy in lowering secondhand smoke concentrations in offices in China. J Occup Environ Med. 2008;50(5):570-575. doi:10.1097/JOM.0b013e3181638640

183. MacNaughton P, Adamkiewicz G, Arku RE, Vallarino J, Levy DE. The impact of a smoke-free policy on environmental tobacco smoke exposure in public housing developments. Sci Total Environ. 2016;557-558:676-680. doi:10.1016/j.scitotenv.2016.03.110

184. Kaufman P, Zhang B, Bondy SJ, Klepeis N, Ferrence R. Not just “a few wisps”: Real-time measurement of tobacco smoke at entrances to office buildings. Tob Control. 2011;20(3):212-218. doi:10.1136/tc.2010.041277

185. Reitzel LR, Cromley EK, Li Y, et al. The Effect of Tobacco Outlet Density and Proximity on Smoking Cessation. Am J Public Health. 2011;101(2):315-320. doi:10.2105/AJPH.2010.191676

186. Polinski J, Howell B, Gagnon M, Kymes S, Brennan T, Shrank W. Impact of CVS Pharmacy’s Discontinuance of Tobacco Sales on Cigarette Purchasing (2012-2014). Am J Public Health. 2017;107(4):556-562. doi:10.2105/AJPH.2016.303612

187. Klepeis NE, Nelson WC, Ott WR, et al. The National Human Activity Pattern Survey (NHAPS): A resource for assessing exposure to environmental pollutants. J Expo Anal Environ Epidemiol. 2001;11(3):231-252.

doi:10.1038/sj.jea.7500165

188. The National Academies. How Infection Works, Entering the Human Host — The National Academies.

189. Smieszek T, Lazzari G, Salathé M. Assessing the Dynamics and Control of Droplet- and Aerosol-Transmitted Influenza Using an Indoor Positioning System. Sci Rep. 2019;9(1):2185-2185. doi:10.1038/s41598-019-38825-y

190. Centers for Disease Control and Prevention. Lesson 1: Introduction to Epidemiology. In Principles of Epidemiology in Public Health Practice: An Introduction to Applied Epidemiology and Biostatistics.; 2019.

191. Mendell MJ, Mirer AG, Cheung K, Tong M, Douwes J. Respiratory and allergic health effects of dampness, mold, and dampness-related agents: A review of the epidemiologic evidence. Environ Health Perspect. 2011;119(6):748-756. doi:10.1289/ehp.1002410

192. Bekö G, Clausen G, Weschler CJ. Is the use of particle air filtration justified? Costs and benefits of filtration with regard to health effects, building cleaning and occupant productivity. Build Environ. 2008;43(10):1647-1657. doi:10.1016/j.buildenv.2007.10.006

193. Joshi S. The sick building syndrome. Indian J Occup Environ Med. 2008;12(2):61-64. doi:10.4103/0019-5278.43262

194. Selgrade MK, Plopper CG, Gilmour MI, Conolly RB, Foos BSP. Assessing the health effects and risks associated with children's inhalation exposures - Asthma and allergy. J Toxicol Environ Heal - Part A Curr Issues. 2008;71(3):196-207. doi:10.1080/15287390701597897

195. U.S. Environmental Protection Agency. Indoor Air Pollution: An Introduction for Health Professionals.

196. Zock J-P, Jarvis D, Luczynska C, Sunyer J, Burney P, European Community Respiratory Health Survey. Housing characteristics, reported mold exposure, and asthma in the European Community Respiratory Health Survey. J Allergy Clin Immunol. 2002;110(2):285-292. https://www.jacionline.org/article/S0091-6749(02)00092-1/pdf.

197. Mendell MJ, Mirer AG, Cheung K, Tong M, Douwes J. Respiratory and allergic health effects of dampness, mold, and dampness-related agents: A review of the epidemiologic evidence. Environ Health Perspect. 2011;119(6):748-756. doi:10.1289/ehp.1002410

198. Fisk WJ, Eliseeva EA, Mendell MJ. Association of residential dampness and mold with respiratory tract infections and bronchitis: A meta-analysis. Environ Heal A Glob Access Sci Source. 2010;9(1):72. doi:10.1186/1476-069X-9-72

199. Jones R, Recer GM, Hwang SA, Lin S. Association between indoor mold and asthma among children in Buffalo, New York. Indoor Air. 2011;21(2):156-164. doi:10.1111/j.1600-0668.2010.00692.x

200. Jacobs DE, Kelly T, Sobolewski J. Linking public health, housing, and indoor environmental policy: Successes and challenges at local and federal agencies in the United States. Environ Health Perspect. 2007;115(6):976-982. doi:10.1289/ehp.8990

201. Nieuwenhuijsen MJ, Martinez D, Grellier J, et al. Chlorination disinfection by-products in drinking water and congenital anomalies: Review and meta-analyses. Environ Health Perspect. 2009;117(10):1486-1493. doi:10.1289/ehp.0900677

202. Centers for Disease Control and Prevention. Legionnaires Disease and Pontiac Fever | Legionella. US Centers for Disease Control & Prevention.

203. Wargocki P, Wyon DP, Sundell J, Clausen G, Fanger PO. The effects of outdoor air supply rate in an office on perceived air quality, sick building syndrome (SBS) symptoms and productivity. Indoor Air. 2000;10(4):222-236. https://onlinelibrary.wiley.com/doi/epdf/10.1034/j.1600-0668.2000.010004222.x.

204. Daisey JM, Angell WJ, Apte MG. Indoor air quality, ventilation and health symptoms in schools: An analysis of existing information. Indoor Air. 2003;13(1):53-64. doi:10.1034/j.1600-0668.2003.00153.x

205. Haverinen-Shaughnessy U, Moschandreas DJ, Shaughnessy RJ. Association between substandard classroom ventilation rates and students' academic achievement. Indoor Air. 2011;21(2):121-131. doi:10.1111/j.1600-0668.2010.00686.x

206. Chan WR, Parthasarathy S, Fisk WJ, Mckone TE. Estimated effect of ventilation and filtration on chronic health risks in U.S. offices, schools, and retail stores. Indoor Air. 2016;26(2):331-343. doi:10.1111/ina.12189

207. Milton DK, Glencross PM, Walters MD. Risk of sick leave associated with outdoor air supply rate, humidification, and occupant complaints. Indoor Air. 2000;10(4):212-221. https://buildequinox.com/files/iaq/milton_vent_sick_rates.pdf.

208. Redlich CA, Sparer J, Cullen MR. Sick-building syndrome. Lancet (London, England). 1997;349(9057):1013-1016. https://www.ncbi.nlm.nih.gov/pubmed/9100639.

209. Fisk WJ. Estimates of improved productivity and health from better indoor environments. Indoor Air. 1997;7(3):158-172. doi:10.1111/j.1600-0668.1997.t01-1-00002.x

210. Fisk WJ. How IEQ affects health, productivity. ASHRAE. 2002;44(5).

211. Sundell J, Levin H, Nazaroff WW, et al. Ventilation rates and health: Multidisciplinary review of the scientific literature. Indoor Air. 2011;21(3):191-204. doi:10.1111/j.1600-0668.2010.00703.x

212. Carrer P, Wargocki P, Fanetti A, et al. What does the scientific literature tell us about the ventilation-health relationship in public and residential buildings? Build Environ. 2015;94(P1):273-286. doi:10.1016/j.buildenv.2015.08.011

213. The American Society of Heating Refrigerating and Air-Conditioning Engineers. ASHRAE Position Document on Infectious Aerosols. 2020.

214. Federation of European Heating Ventilation and Air-Conditioning Associations. How to operate and use building services in order to prevent the spread of the coronavirus disease (COVID-19) virus (SARS-CoV-2) in workplaces. 2020.

215. Hanssen SO. HVAC - The importance of clean intake section and dry air filter in cold climate. Indoor Air, Suppl. 2004;14(SUPPL. 7):195-201. doi:10.1111/j.1600-0668.2004.00288.x

216. Salthammer T. Emissions of Volatile Organic Compounds from Products and Materials in Indoor Environments. Handb Environ Chem. 2004;4:37-71. doi:10.1007/b94830

217. Wallace LA, Pellizzari E, Leaderer B, Zelon H, Sheldon L. Emissions of volatile organic compounds from building materials and consumer products. Atmos Environ. 1987;21(2):385-393. doi:10.1016/0004-6981(87)90017-5

218. Nurmatov UB, Tagiyeva N, Semple S, Devereux G, Sheikh A. Volatile organic compounds and risk of asthma and allergy: A systematic review. Eur Respir Rev. 2015;24(135):92-101. doi:10.1183/09059180.00000714

219. Nielsen GD, Larsen ST, Wolkoff P. Re-evaluation of the WHO (2010) formaldehyde indoor air quality guideline for cancer risk assessment. Arch Toxicol. 2017;91(1):35-61. doi:10.1007/s00204-016-1733-8

220. U.S. Environmental Protection Agency. Volatile Organic Compounds' Impact on Indoor Air Quality. https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality.

221. Stariolo DA. COVID-19 in Air Suspensions.; 2020. https://arxiv.org/abs/2004.05699. Accessed June 15, 2020.

222. Dietz L, Horve PF, Coil DA, Fretz M, Eisen JA, Van Den Wymelenberg K. 2019 Novel Coronavirus (COVID-19) Pandemic: Built Environment Considerations To Reduce Transmission. Gilbert JA, ed. mSystems. 2020;5(2):e00245-20. doi:10.1128/mSystems.00245-20

223. Fisk WJ, Spears M, Sullivan DP, Mendell M. Ozone Removal by Filters Containing Activated Carbon: A Pilot Study.; 2009. https://www.osti.gov/scitech/servlets/purl/1050670/.

224. Sekine Y, Fukuda M, Takao Y, Ozano T, Sakuramoto H, Wang KW. Simultaneous removal of formaldehyde and benzene in indoor air with a combination of sorption- and decomposition-type air filters. Environ Technol. 2011;33(15-16):1983-1989. doi:10.1080/09593330.2011.562924

225. Liu Y, Ning Z, Chen Y, et al. Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals. Nature. 2020. doi:10.1038/s41586-020-2271-3

226. Yang Y, Zhang H, Nunayon SS, Chan V, Lai AC. Disinfection efficacy of ultraviolet germicidal irradiation on airborne bacteria in ventilation ducts. Indoor Air. 2018;28(6):806-817. doi:10.1111/ina.12504

227. World Health Organization. Guidelines for Drinking-Water Quality. Geneva, Swizerland: WHO Press; 1996. http://www.who.int/water_sanitation_health/publications/2011/dwq_guidelines/en/.

228. Legionnaires Disease and Pontiac Fever | Legionella | CDC. US Centers for Disease Control & Prevention.

229. Franklin BA, Brook R, Arden Pope C. Air pollution and cardiovascular disease. Curr Probl Cardiol. 2015;40(5):207-238. doi:10.1016/j.cpcardiol.2015.01.003

230. Joshi S. The sick building syndrome. Indian J Occup Environ Med. 2008;12(2):61. doi:10.4103/0019-5278.43262

231. U.S. Environmental Protection Agency. Indoor Air Pollution: An Introduction for Health Professionals. https://www.epa.gov/indoor-air-quality-iaq/indoor-air-pollution-introduction-health-professionals.

232. World Health Organization. WHO Handbook on Indoor Radon: A Public Health Perspective. Presented at the: 2009. https://www.who.int/ionizing_radiation/env/9789241547673/en/.

233. Yang S, Goyette Pernot J, Hager Jörin C, Niculita-Hirzel H, Perret V, Licina D. Radon Investigation in 650 Energy Efficient Dwellings in Western Switzerland: Impact of Energy Renovation and Building Characteristics. Atmosphere (Basel). 2019;10(12):777. doi:10.3390/atmos10120777

234. Hadlich DE, Grimsrud DT. Radon in Institutional Buildings : The Impacts of Conservation Strategies. Radon Institutional Build Impacts. 1991;(1990).

235. Institute of Medicine (US) Committee on Damp Indoor Spaces and Health. Damp Indoor Spaces and Health - 5, Human Health Effects Associated with Damp Indoor Environments. Heal San Fr. 2004;(2):355. doi:10.17226/11011

236. Mudarri D, Fisk WJ. Public health and economic impact of dampness and mold. Indoor Air. 2007;17(3):226-235. doi:10.1111/j.1600-0668.2007.00474.x

237. U.S. Environmental Protection Agency. Moisture Control Guidance for Building Design, Construction and Maintenance. Washington, DC; 2013.

238. Hänninen OO. WHO Guidelines for Indoor Air Quality: Dampness and Mold. Copenhagen; 2011. doi:10.3920/978-90-8686-722-6_10

239. Sundhedsstyrelsen. Health Literacy: A Perscription to End Confusion. Washington, D.C.: National Academies Press; 2009. doi:10.17226/10883

240. Nutbeam D. The evolving concept of health literacy. Soc Sci Med. 2008;67(12):2072-2078. doi:10.1016/j.socscimed.2008.09.050

241. Peerson A, Saunders M. Health literacy revisited: What do we mean and why does it matter? Health Promot Int. 2009;24(3):285-296. doi:10.1093/heapro/dap014

242. Poureslami I, Nimmon L, Rootman I, Fitzgerald MJ. Priorities for Action: Recommendations from an international roundtable on health literacy and chronic disease management. Health Promot Int. 2017;32(4):743-754. doi:10.1093/heapro/daw003

243. World Health Organization. Health literacy: The solid facts. 2013.

244. National Institutes of Health. Improving Health Literacy Surgeon General's Workshop on Improving Health Literacy. 2006.

245. Vernon JA, Trujillo A, Rosenbaum S, Debuono B. Low Health Literacy: Implications for National Health Policy.

246. Shah K, Kamrai D, Mekala H, Mann B, Desai K, Patel RS. Focus on Mental Health During the Coronavirus (COVID-19) Pandemic: Applying Learnings from the Past Outbreaks. Cureus. 2020;12(3). doi:10.7759/cureus.7405

247. Schaller A, Dejonghe L, Alayli-Goebbels A, Biallas B, Froboese I. Promoting physical activity and health

literacy: Study protocol for a longitudinal, mixed methods evaluation of a cross-provider workplace-related intervention in Germany (The AtRisk study). BMC Public Health. 2016;16(1):626. doi:10.1186/s12889-016-3284-6

248. Das S, Mia MN, Hanifi SMA, Hoque S, Bhuiya A. Health literacy in a community with low levels of education: findings from Chakaria, a rural area of Bangladesh. BMC Public Health. 2017;17(1):203. doi:10.1186/s12889-017-4097-y

249. Cho YI, Lee SYD, Arozullah AM, Crittenden KS. Effects of health literacy on health status and health service utilization amongst the elderly. Soc Sci Med. 2008;66(8):1809-1816. doi:10.1016/j.socscimed.2008.01.003

250. Sundhedsstyrelsen. Health Literacy: A Perscription to End Confusion. Washington, D.C.: National Academies Press; 2009. doi:10.17226/10883

251. Nutbeam D. The evolving concept of health literacy. Off Provost. 2008. doi:10.1016/j.socscimed.2008.09.050

252. Peerson A, Saunders M. Health literacy revisited: what do we mean and why does it matter? Health Promot Int. 2009;24(3):285-296. doi:10.1093/heapro/dap014

253. World Health Organization. Health literacy: The solid facts. 2013. http://www.euro.who.int/__data/assets/pdf_file/0008/190655/e96854.pdf.

254. National Institutes of Health. Improving Health Literacy Surgeon General's Workshop on Improving Health Literacy. 2006. https://www.ncbi.nlm.nih.gov/books/NBK44257/pdf/Bookshelf_NBK44257.pdf.

255. Centers for Disease Control and Prevention. The CDC Worksite Health ScoreCard: An Assessment Tool for Employers to Prevent Heart Disease, Stroke, and Related Health Conditions. Atlanta; 2014.

256. Schaller A, Dejonghe L, Alayli-Goebbels A, Biallas B, Froboese I. Promoting physical activity and health literacy: study protocol for a longitudinal, mixed methods evaluation of a cross-provider workplace-related intervention in Germany (The AtRisk study). BMC Public Health. 2016;16:626. doi:10.1186/s12889-016-3284-6

257. Das S, Mia MN, Hanifi SMA, Hoque S, Bhuiya A. Health literacy in a community with low levels of education: findings from Chakaria, a rural area of Bangladesh. BMC Public Health. 2017;17(1):203. doi:10.1186/s12889-017-4097-y

258. Cho YI, Lee S-YD, Arozullah AM, Crittenden KS. Effects of health literacy on health status and health service utilization amongst the elderly. Soc Sci Med. 2008;66(8):1809-1816. doi:10.1016/J.SOCSCIMED.2008.01.003

259. McKelvey W, Wong MR, Matis B. Letter Grading and Transparency Promote Restaurant Food Safety in New York City. J Env Heal. 2015;78(2):46-48. https://www.ncbi.nlm.nih.gov/pubmed/26502567.

260. Wong MR, McKelvey W, Ito K, Schiff C, Jacobson JB, Kass D. Impact of a letter-grade program on restaurant sanitary conditions and diner behavior in New York City. Am J Public Heal. 2015;105(3):e81-7. doi:10.2105/AJPH.2014.302404

261. Simon PA, Leslie P, Run G, et al. Impact of restaurant hygiene grade cards on foodborne-disease hospitalizations in Los Angeles County. J Env Heal. 2005;67(7):32-36, 56; quiz 59-60. https://www.ncbi.nlm.nih.gov/pubmed/15794461.

262. Chu DK, Akl EA, Duda S, et al. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. Lancet. 2020;395(10242):1973-1987. doi:10.1016/S0140-6736(20)31142-9

263. Kutter JS, Spronken MI, Fraaij PL, Fouchier RA, Herfst S. Transmission routes of respiratory viruses among humans. Curr Opin Virol. 2018;28:142-151. doi:10.1016/j.coviro.2018.01.001

264. Yang W, Elankumaran S, Marr LC. Relationship between Humidity and Influenza A Viability in Droplets and Implications for Influenza's Seasonality. Park M-S, ed. PLoS One. 2012;7(10):e46789.

doi:10.1371/journal.pone.0046789

265. Microbiomes of the Built Environment: A Research Agenda for Indoor Microbiology, Human Health, and Buildings | The National Academies Press. National Academies of Sciences, engineering, and Medicine. https://www.nap.edu/catalog/23647/microbiomes-of-the-built-environment-a-research-agenda-for-indoor. Published 2017. Accessed August 27, 2020.

266. Dai D, Prussin AJ, Marr LC, Vikesland PJ, Edwards MA, Pruden A. Factors Shaping the Human Exposome in the Built Environment: Opportunities for Engineering Control. Environ Sci Technol. 2017;51(14):7759-7774. doi:10.1021/acs.est.7b01097

267. van Beek J, de Graaf M, Al-Hello H, et al. Molecular surveillance of norovirus, 2005–16: an epidemiological analysis of data collected from the NoroNet network. Lancet Infect Dis. 2018;18(5):545-553. doi:10.1016/S1473-3099(18)30059-8

268. Valdez LD, MacRi PA, Braunstein LA. Intermittent social distancing strategy for epidemic control. Phys Rev E - Stat Nonlinear, Soft Matter Phys. 2012;85(3). doi:10.1103/PhysRevE.85.036108

269. Chaudhuri S, Basu S, Kabi P, Unni VR, Saha A. Modeling the role of respiratory droplets in Covid-19 type pandemics. Phys Fluids. 2020;32(6):63309. doi:10.1063/5.0015984

270. Verma S, Dhanak M, Frankenfield J. Visualizing the effectiveness of face masks in obstructing respiratory jets. Phys Fluids. 2020;32(6):061708. doi:10.1063/5.0016018

271. Ahmed F, Zviedrite N, Uzicanin A. Effectiveness of workplace social distancing measures in reducing influenza transmission: A systematic review. BMC Public Health. 2018;18(1). doi:10.1186/s12889-018-5446-1