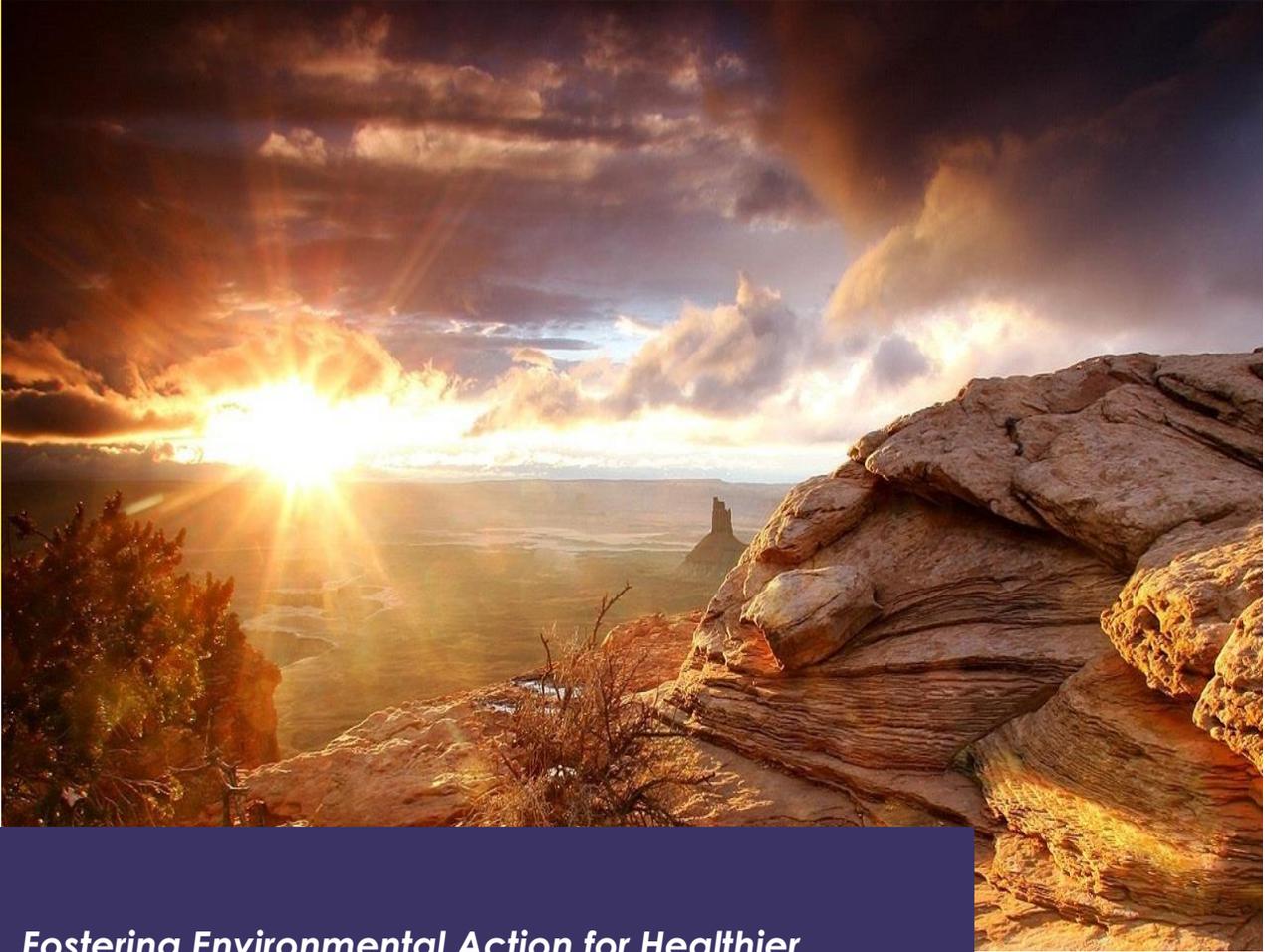


**A Review on How Arizona Businesses Can  
Protect Employee Health from  
Climate-Sensitive Hazards**



*Fostering Environmental Action for Healthier  
Community - Action Team Report*

**Maricopa County Department of Public Health**

Contact Us: [climateandhealth@mail.maricopa.gov](mailto:climateandhealth@mail.maricopa.gov)

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# Abstract

## Purpose

To inform Arizona businesses of sustainable health practices that would be beneficial for the environment, economic, and workers.

## Methods

Articles were identified using electronic searches through the Google Scholar database.

## Results

The occupational climate hazards most prevalent to Arizona businesses are extreme heat, extreme weather, air quality, and risk of infectious disease. These pose a risk to businesses and the health of workers, especially to those businesses who may be smaller and do not have the same financial backing as larger companies. To mitigate these negative outcomes, businesses can pick from the list of interventions provided that are linked with local resources. This allows businesses to choose which practices to implement since size and financial performance must be considered.

## Type

Literature Review.

# INTRODUCTION

Arizonans face unique extreme weather challenges from extreme heat, flooding, drought, dust storms, wildfires, and winter storms. These extreme weather events are expected to become more frequent and severe ([CDC](#)). Temperatures are expected to increase, for example in Maricopa County, the City of Phoenix currently experiences about 106 days over 100 degrees and by 2050 is expected to have 122 days over 100 degrees ([ADHS](#)). Many parts of Arizona such as: La Paz, Maricopa, Pima, Pinal, and Yuma Counties already experience more than three months of days over 100 °F per year. The projected increase in temperature will expand the season for many environmental hazards. Continued exposure to environmental hazards such as extreme heat can have a detrimental impact on physical, mental, and social health. As health deteriorates, people are less likely to show up for work or use their time productively. This creates a unique opportunity for public health professionals to work with businesses to change health behaviors at the workplace (Harris, 2014).

However, this thought poses a challenge because when businesses think about environmental problems and hazards, literature is more focused on environmental impacts such as waste management, recycling, and emissions rather than health or employee behavior. The few businesses that do look at the health impacts sometimes run into problems with program planning as employee behavior depends on many factors and different motivations (Rae, 2015). As increased temperature projections continue to cause further problems for both productivity and health, more businesses may need to take a more proactive role to maintain a positive financial performance (Andrews, 1999).

It is common for employee health to be overlooked when more and more companies are being pressured to conform to environmental regulations that don't focus on employees outside of their health insurance status (Ginemez, 2012; Okanga, 2017). Many of the regulations businesses follow suggest making changes through organizational models such as sustainable development to improve upon three aspects: people, planet, and profit (FIE, n.d.; Gallagher, 2017). Yet, the concept of sustainability often lacks the 'people' aspect, a challenge for workplaces to invest more in the health of employees (Gallagher, 2017). Similar challenges for businesses to

change the attitudes of employees may be the demographic, for example, male dominated industries may have a dismissive, almost negative, attitude toward illness and health prevention (Singh, 2013).

To address such challenges, it may be more beneficial for businesses to focus more on the direct impacts on human health rather than focusing on treatment and healthcare. Employees are stakeholders in their own workplace environment, since the actions taken to mitigate human effect on the environment, and vice versa, benefit them (Gallagher, 2017). Focusing more on health behaviors shifts the focus from sustainable development to a different organizational model, sustainable health (WHO). For the purpose of this document, sustainable health is defined as the intersection between economic growth, environmental protection, and impacts on and of human health as seen in Figure 1. The following section addresses the link between how sustainable health is linked to climate and health.

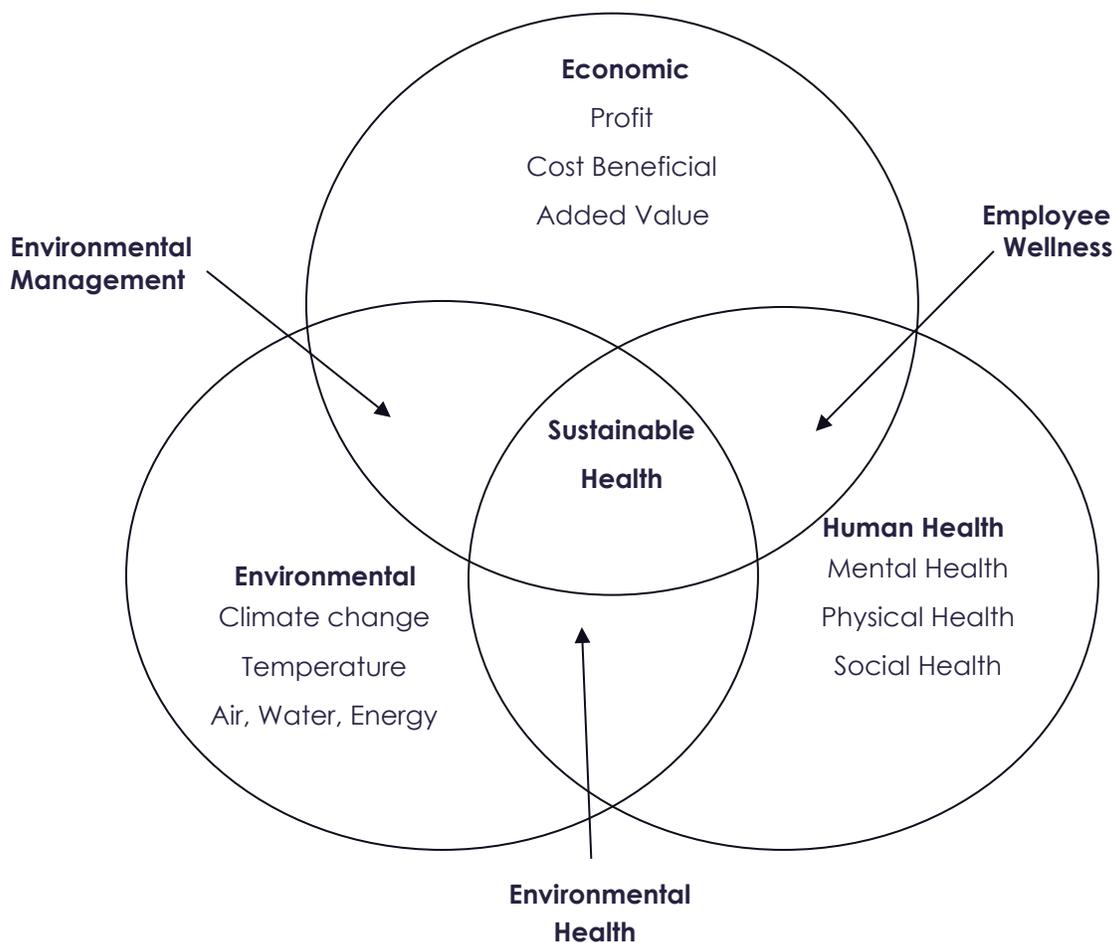


Figure 1: Factors of Sustainable Health

Literature shows that changes in climate have intensified hazards, all which are liable to negatively impact businesses (Schulte, 2016). Such hazards include heat, air pollution, ultraviolet radiation exposure, extreme weather, infectious diseases, and rising sea levels (Adam-Poupart, 2013; Schulte, 2016; Shaw, 2014; Younger, 2008). This document will look more in detail at recommendations for business reactions to heat, air pollution, extreme weather, and infectious diseases, which are climate-sensitive hazards in Arizona. Arizona is a landlocked state which is why sea level rise is not mentioned in this paper.

The impacts of these hazards on human health cause a variety of problems such as increased illness from infectious disease, high mortality from extreme weather disasters, increased risk of respiratory diseases from air pollution, and many negative physical and psychological effects from extreme heat (Shaw, 2014; Patz, 2014; Page, 2017; Agrawala, 2011; Schulte, 2016). All of these problems can disrupt employee well-being, which can affect the financial presence of a company. More employees becoming sick or incapacitated could lead to higher rates of worker absenteeism and less productivity (Schulte, 2016). Climate can also disrupt resource supplies, displace people in the workforce through climate migration, and increase healthcare costs over time (Allen, 2016).

These three fields overlap to allow businesses to view sustainability more holistically. While this document focuses a lot on the behaviors that affect the direct impacts of the environment on health, financial performance is still a component that many businesses must consider when creating new programs. The cost of interventions may be hard for smaller businesses who struggle with high turnover rates and lack of resources, both human and financial. (Harris, 2014). To compete with larger firms, small businesses may need to partner and work with outside contractors who are subject matter experts to make up for the lack of experience if they are unable to allocate resources towards a 'wellness coach' or wellness committee' (Harris, 2014; Torugsa, 2013).

Using the sustainable health model, businesses may be able to more positively engage their employees and encourage healthier lifestyles. One of the most engaging programs that businesses use are wellness programs. These can range from a variety of activities such as using different forms of active transportation,

carpooling, and trainings (Shaw, 2014; Page, 2017; Schulte, 2016). These activities can be low cost with co-benefits for both the environment and human health. By using different forms of active transportation such as walking or biking to work, employees can decrease their risk of chronic diseases like obesity, diabetes, cardiovascular disease, and hypertension (Patz, 2014). Other transportation such as carpooling or using public transportation can decrease the carbon emissions, which also benefits employees by lowering risks of respiratory illnesses (Page, 2017; Patz, 2014; Younger, 2008). By training and educating employees about risks and management of environmental hazards, programs can protect employees and their financial performance by reducing potential healthcare costs (Patz, 2014; Shaw, 2014; Singh, 2015).

These co-benefits can be positively beneficial for companies, since they can save on investment, increase productivity, and reduce worker absenteeism (Shukla, 2016). To promote such benefits, this paper explores nation-wide recommendations and practices that businesses of all sizes can use to protect their employees from the impacts of climate. The results are listed alongside local sources that can be used as a tool in implementing the practice.

## **Method**

### **Inclusion and Exclusion Criteria for Literature Review**

The literature review was focused on identifying relevant articles for businesses. Articles that were included in the synthesis were peer reviewed journal articles, both primary and secondary sources. International sources were included unless there was no proper English translation available. Grey literature such as articles produced for Occupational Health and Safety Association and the National Oceanic and Atmospheric Administration were also used as resources and sources for recommendations.

### **Search Strategy**

Terms were categorized into three different topics: Economical, Environmental, & Health. Terms related to these three dimensions were used as follows:

- Economical: financial performance, cost beneficial

- Environmental: adaptation, resilience, climate change, environmental strategy, sustainable development, environmental management, protection from climate change, climate hazards, heat safety trainings
- Health: employee wellness, employee health, sustainable health, occupational safety, wellness program, active commuting

## Data Collection

Google Scholar was the main database used as it included international articles and gave a broader amount of articles to look at.

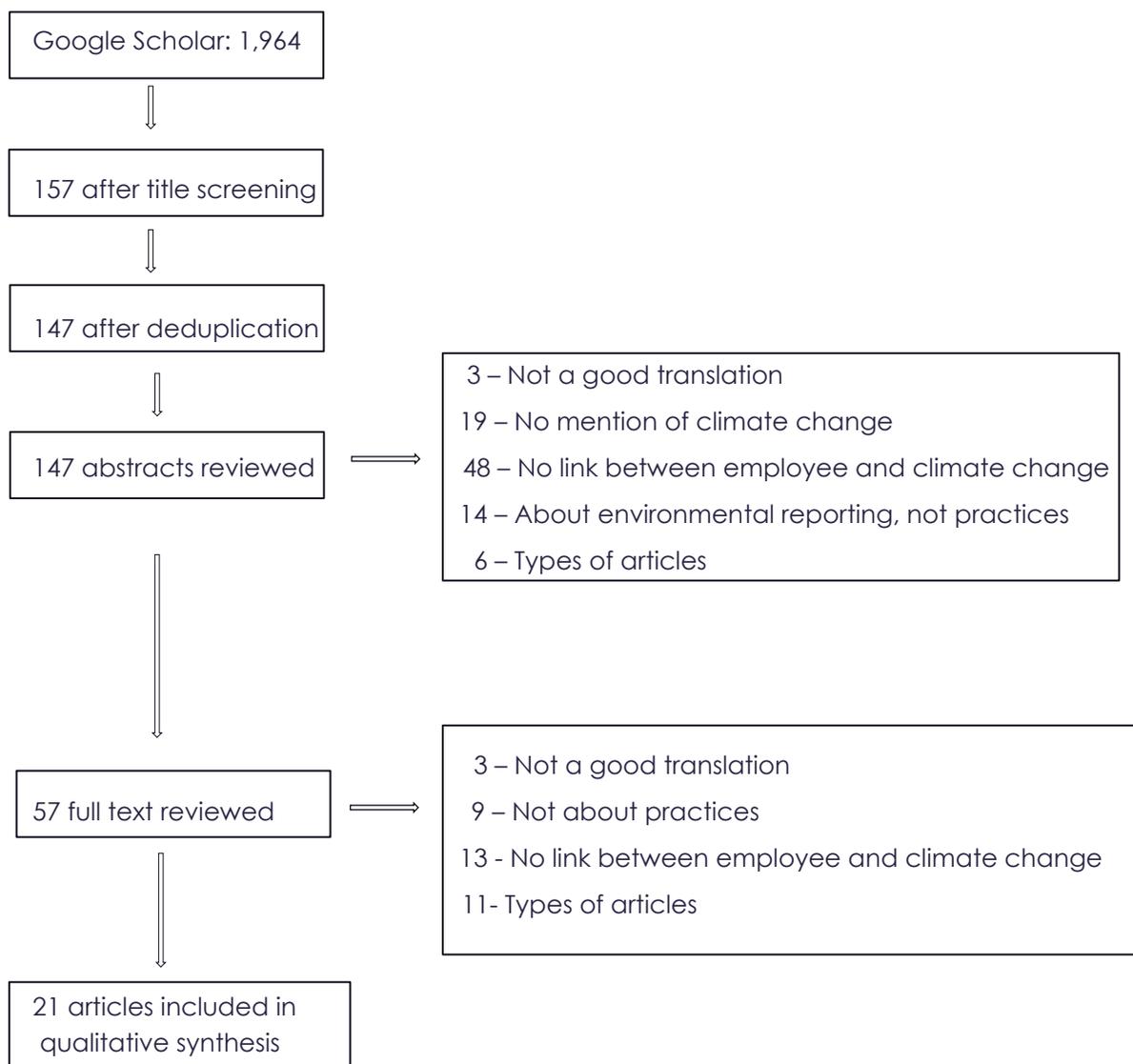


Figure 2: Search Strategy

## RESULTS

These recommendations in Table 1 also come with links to various organizations, companies, and stakeholders who may be helpful resources for implementation of a program or practice. The third column is the source from where the recommendation or practice came from.

<b>Overall Climate Sensitive Hazards</b>		
Location of Company <ul style="list-style-type: none"> <li>• Before moving or even starting a business, it may be helpful to look at the population and environmental demographic of the state to find the best location for a certain price</li> </ul>	<a href="http://arizonapro prospector.com">Location Mapping for Businesses (arizonapro prospector.com)</a>	Allen, 2016
Stakeholder Integration <ul style="list-style-type: none"> <li>• Bring in third party consultants to help with things like risk assessment, technical/economic analysis, climate adaptation solutions, and GIS Mapping/modeling</li> <li>• May give competitive advantage in lowering future healthcare costs</li> </ul>	<a href="http://epa.gov">EPA Public Involvement Tools (epa.gov)</a>	Sharma, 1998 Agrawala, 2011
<b>Extreme Heat</b>		
Heat Trainings <ul style="list-style-type: none"> <li>• Address worker dismissiveness towards personal safety</li> </ul>	<a href="#">OSHA trainings</a>	Singh, 2015 OSHA
Heat First Aid Program <ul style="list-style-type: none"> <li>• Identify symptoms of heat illness and know how to treat them</li> </ul>	<a href="#">OSHA trainings</a>	Singh, 2015

Occupational Heat Monitoring <ul style="list-style-type: none"> <li>• Temperatures should be monitored so supervisors and managers know when is safe to plan outdoor work activities</li> </ul>	<a href="#">OSHA-NIOSH heat safety tool app</a>	OSHA
LEED Certification <ul style="list-style-type: none"> <li>• May prevent future utility costs for air conditioning to keep employees cool</li> </ul>	<a href="#">LEED Certification Guide</a>	Allen, 2016 & Younger, 2008
<b>Extreme Weather</b>		
Preparation Guidelines <ul style="list-style-type: none"> <li>• Have a plan prepared to minimize mortality in an emergency</li> </ul>	<a href="#">National Disaster Preparedness Planning for Your Business</a>	Schulte, 2016
Find current, historical, and future projected temperatures <ul style="list-style-type: none"> <li>• Local-level heat and health data</li> </ul>	<a href="#">Heat and Health Tracker</a>	CDC, 2020
Risk Assessments <ul style="list-style-type: none"> <li>• Collaborate with forecast networks to help with monitoring</li> </ul>	<a href="#">Weather Ready Nation Ambassadors</a>	Schulte, 2016
Agricultural and Farmer Education <ul style="list-style-type: none"> <li>• Contractors and organizations can help educate farmers on using resources wisely</li> <li>• Local workshops and programs can be created</li> </ul>	<a href="#">USDA Extension Risk Management Education Program</a>  <a href="#">USDA Sustainable Agricultural Systems program</a>	Agrawala, 2011
<b>Air Quality</b>		
Source Locally <ul style="list-style-type: none"> <li>• Cut down on air pollution</li> <li>• Cut down on transportation costs</li> <li>• Benefit health of transportation workers</li> </ul>	<a href="#">Local First Arizona</a> : online database to help businesses find local resources	Shukla, 2016

<p>Active Transportation</p> <ul style="list-style-type: none"> <li>• Encourage walking or biking to work</li> <li>• Cut down on air pollution</li> <li>• Lower risk of chronic diseases</li> </ul>	<p>Infographics at <a href="http://CleanAirMakeMore.com">CleanAirMakeMore.com</a></p>	<p>Page, 2017 Patz, 2014</p>
<p>Carpool</p> <ul style="list-style-type: none"> <li>• Lower air pollution</li> <li>• Increase social cohesion in the workplace</li> </ul>	<p>Infographics at <a href="http://CleanAirMakeMore.com">CleanAirMakeMore.com</a></p>	<p>Shaw, 2014</p>
<p>Public Transit</p> <ul style="list-style-type: none"> <li>• Lower air pollution</li> <li>• Walking to bus stops encourages physical activity</li> </ul>	<p>Infographics at <a href="http://CleanAirMakeMore.com">CleanAirMakeMore.com</a></p> <p>Healthy Tips when using <a href="#">public transportation</a></p>	<p>Gallagher, 2018  CDC, 2020</p>
<p>Teleworking</p> <ul style="list-style-type: none"> <li>• Encourage teleworking where appropriate and logistical support</li> </ul>	<p><a href="#">Gaining the air quality and climate benefit from telework</a></p> <p><a href="#">Telework: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters</a></p>	<p>Irwin, 2004  EPA, 2005</p>
<p><b>Infectious Disease</b></p>		
<p>Monitor Disease</p> <ul style="list-style-type: none"> <li>• Educate employees and employers on benefits of sick days</li> <li>• Don't want to spread disease in the workplace</li> </ul>	<p><a href="#">American Public Health Association Support for Sick Leave</a></p>	<p>Schulte, 2016</p>
<p>Improved Infrastructure</p> <ul style="list-style-type: none"> <li>• Lower amount of stagnant water that could encourage mosquito nesting</li> <li>• Drain large amounts of standing water to lower risk of waterborne disease</li> </ul>	<p>There are not many resources pertaining to architecture, but the Arizona Department of Health does have <a href="#">trainings</a> to educate employees on risks of infectious diseases</p>	<p>Patz, 2014</p>

Employees Wellness		
Evidence-based healthy workplaces <ul style="list-style-type: none"> <li>Statewide program that provides Arizona employers with training, technical assistance, tools, and resources to design, implement, and evaluate worksite wellness initiatives</li> </ul>	<a href="#">Healthy Arizona Worksite Program</a>	HAWP, 2020

Table 1: List of Best Practices and Links to Resources

## Discussion

While these programs are meant to change habits in the workplace, implementation may be challenged by the location and employee accessibility (Agrawala, 2011). Office spaces and industrial work sites may be easier locations to host and promote a workshop or program; however, for industries like agriculture, it may be more beneficial to have a separate facility where multiple farmers and workers can come together which saves time and money for the program hosts. (Agrawala, 2011). Teleworking may also be an option for employers/employees to minimize air quality issues related to commuting (EPA, 2005).

The promotion of these programs and getting employee engagement may depend upon the size of the business (cal OSHA). In order to target a certain audience, it is recommended that supervisors and managers identify vulnerable populations of their employees, such as educating immigrants or seasonal outdoor workers who may work more in hot weather because they fear their paycheck may be affected (Schulte, 2016). While direct messaging and announcements can encourage participation, infographics are also a useful marketing tool in promoting a program.

## Challenges

Occupational health and safety literature articles environmental reporting and recycling rather than climate mitigation or climate and health related strategies. The regulations for reporting usually require a section about employee health, but narrows in more on the healthcare aspect rather than personal health. Ethics and accountability were the focus of many papers as well, but did not focus on the links between climate and human health which is why they were not used. While there are other programs outside of wellness programs like lunch and learn, these search terms did not yield a lot of information about benefits or return on investment. Other challenges arose when trying to find resources about updating building design. There are not many resources to help businesses recognize risks or consult them in how to address the problems.

## Conclusion

This document offers insight into different actions Arizona businesses can take to adapt to the health problems their employees face from current and future climate-sensitive hazards in Arizona. As temperatures rise, there will be higher risks and loss of productivity from a variety of work-related public health issues. To protect employee health and wellness, the literature suggests a variety of different proactive programs that can be implemented with co-benefits that improve both human health and environmental concerns. These practices are dependent upon business size and financial performance, so future research may consider looking at smaller businesses since they are more likely to need more resources. Other future considerations may be looking at practices that protect and promote employee health outside of healthcare or insurance. More research in these areas may create a more holistic view on employee health and allow small businesses to better address the health of their employees and overall communities.

## **Acknowledgements**

This document was supported by the Centers for Disease Control and Prevention cooperative agreements CDC-RFA-EH16-1602: Enhancing Community Resilience by Implementing Health Adaptations (Award 5 NUE1EH001318). The contents of this document do not reflect the official views of the U.S. Department of Health and Human Services or the U.S. Centers for Disease Control and Prevention.

This document was completed with help from the Arizona Department of Health Services in collaboration with the Maricopa Department of Health Services. Helpful input and feedback was received from Matthew Roach, LT Sally Anne Iverson, and Brenna Garrett.

## **Conflicts of Interest**

The author has no conflict of interest

## WORKS CITED

- Adam-Poupart, A., Labreche, F., Smargiassi, A., Duguay, P., Busque, M. A., Gagne, C., ... & Zayed, J. (2013). Climate change and occupational health and safety in a temperate climate: potential impacts and research priorities in Quebec, Canada. *Industrial health*, 51(1), 68-78.
- Agrawala, S., Carraro, M., Kingsmill, N., Lanzi, E., Mullan, M., & Prudent-Richard, G. (2011). Private sector engagement in adaptation to climate change: approaches to managing climate risks.
- Al Nasour, J., Najm, D. P. N. A., & Yousif, A. H. Sustainability and Its Role in Organizational Performance in The Jordanian Pharmaceutical Industry. *The 15th Scientific Annual*, 17.
- Allen, M. (2016). Legitimacy, stakeholders, and strategic communication efforts. In *Strategic Communication for Sustainable Organizations* (pp. 61-104). Springer, Cham.
- Andrews, R. N., Darnall, N., & Gallagher, D. R. (1999, November). Environmental management systems: a sustainable strategy for a sustainable world. In *Eighth International Conference of the Greening of Industry Network, "Sustainability: ways of knowing, ways of acting"*. (Ed. S Hart) (University of North Carolina: Chapel Hill, NC).
- FIE, M. S. N. *Shifting Paradigms of Environmental Management*.

Gallagher, V. C., Hrivnak, M. W., Valcea, S., Mahoney, C. B., & LaWong, D. (2018).

A comprehensive three-dimensional sustainability measure: The 'missing P' of 'people'—a vital stakeholder in sustainable development. *Corporate Social Responsibility and Environmental Management*, 25(5), 772-787.

Gimenez, C., Sierra, V., & Rodon, J. (2012). Sustainable operations: Their impact on the triple bottom line. *International Journal of Production Economics*, 140(1), 149-159.

Harris, J. R., Hannon, P. A., Beresford, S. A., Linnan, L. A., & McLellan, D. L. (2014).

Health promotion in smaller workplaces in the United States. *Annual review of public health*, 35, 327-342.

IPCC, 2018: Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.

Irwin, F. (2004). Gaining the air quality and climate benefit from telework. Retrieved July 27, 2020, from <http://pdf.wri.org/teleworkguide.pdf>.

- Okanga, B., & Groenewald, D. (2017). Leveraging effects of triple bottom lines business model on the building and construction small and medium-sized enterprises' market performance. *Acta Commercii*, 17(1), 1-14.
- Page, N. C., & Nilsson, V. O. (2017). Active commuting: workplace health promotion for improved employee well-being and organizational behavior. *Frontiers in psychology*, 7, 1994.
- Patz, J. A., Frumkin, H., Holloway, T., Vimont, D. J., & Haines, A. (2014). Climate change: challenges and opportunities for global health. *Jama*, 312(15), 1565-1580.
- Rae, K., Sands, J., & Gadenne, D. L. (2015). Associations between organisations' motivated workforce and environmental performance. *Journal of Accounting & Organizational Change*, 11(3), 384-405.
- P.A. Schulte, A. Bhattacharya, C.R. Butler, H.K. Chun, B. Jacklitsch, T. Jacobs, M. Kiefer, J. Lincoln, S. Pendergrass, J. Shire, J. Watson & G.R. Wagner (2016) Advancing the framework for considering the effects of climate change on worker safety and health, *Journal of Occupational and Environmental Hygiene*, 13:11, 847-865, DOI: 10.1080/15459624.2016.1179388
- Sharma, S., & Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic management journal*, 19(8), 729-753.
- Shaw, C., Hales, S., Howden-Chapman, P., & Edwards, R. (2014). Health co-benefits of climate change mitigation policies in the transport sector. *Nature Climate Change*, 4(6), 427.

- Singh, S., Hanna, E. G., & Kjellstrom, T. (2013). Working in Australia's heat: Health promotion concerns for health and productivity. *Health promotion international, 30*(2), 239-250.
- Torugsa, N. A., O'Donohue, W., & Hecker, R. (2013). Proactive CSR: An empirical analysis of the role of its economic, social and environmental dimensions on the association between capabilities and performance. *Journal of Business Ethics, 115*(2), 383-402.
- United States Environmental Protection Agency. (2005). Telework: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters. Retrieved July 27, 2020, from [https://www.bestworkplaces.org/wp-content/uploads/2010/10/telecommute\\_benefit\\_brief.pdf](https://www.bestworkplaces.org/wp-content/uploads/2010/10/telecommute_benefit_brief.pdf)
- Von Bruun-Riegels, L. S. (2011). Organizational Support for Bicycle Commuting in Finnish Companies—A Low-Hanging Fruit to Be Picked up on the Way to Sustainable Development (Available on Internet) (Master's thesis, Svenska handelshögskolan).
- Younger, M., Morrow-Almeida, H. R., Vindigni, S. M., & Dannenberg, A. L. (2008). The built environment, climate change, and health: opportunities for co-benefits. *American journal of preventive medicine, 35*(5), 517-526.