Relevant research article summaries

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1. Lipcsei, L.E. et al., 2019. *Foodborne Illness Outbreaks at Retail Establishments – National Environmental Assessment Reporting System, 16 State and Local Health Departments, 2014–2016*, MMWR, 68(1): 1–14.

Four-hundred and four foodborne outbreaks reported to CDC from 2014 to 2016 were analyzed. Most of the outbreaks with a suspected or confirmed agent were caused by norovirus (61.1%). The majority of outbreaks with identified contributing factors had at least one factor associated with food contamination by a worker who was ill or infectious (58.6%). Almost half (47.4%) of establishments with outbreaks had a written policy excluding ill workers from handling food or working. These findings are consistent with findings from other national outbreak data sets and highlighted the role of workers in foodborne illness outbreaks.

2. Ronca, S. et al., 2019. *Cumulative Incidence of West Nile Virus Infection, Continental US, 1999–2016*, Emerging Infectious Diseases, 25(2): 325–327.

Using reported case data from ArboNET, researchers conservatively estimated that approximately 7 million persons in the United States have been infected with West Nile Virus since its introduction in 1999.

3. Kormondi, S. et al., 2019. *Human Pasteurellosis Health Risk for Elderly Persons Living with Companion Animals*, Emerging Infectious Diseases, 25(2): 229–235.

Pasteurella spp. infection is becoming more noteworthy because of increasing numbers of pets in households and changes in pet-keeping habits. Most infections are associated with cat or dog bites, licks, and scratches. This study from Hungary found the rate of human pasteurellosis over a 13-year period increased from year-to-year with advanced age, possibly related to elderly patients owning companion animals to combat loneliness.

4. Raffetti, E. et al., 2019. *Cement Plant Emissions and Health Effects in the General Population: A Systematic Review*, Chemoshpere, 218: 211–222.

A systematic review of 1491 articles found a positive association between cement plant exposure and respiratory diseases and symptoms. An excess risk of cancer incidence and mortality in both children and adults mainly concerning respiratory tract cancer was also reported in some studies. Higher values of heavy metals and of a biomarker of renal toxicity were found in the exposed populations compared with unexposed populations.

5. Westrick, J.A. and Szlag, D., 2018. *A Cyanotoxin Primer for Drinking Water Professionals*, JAWWA, 110(8): E1–E16.

To efficiently produce potable water from a source impacted by a toxic cyanobacterial bloom, drinking water practitioners need to take a multidisciplinary approach. Bloom dynamics (biology), surrogate and analytical methods (chemistry), inactivation/removal of intra- and extracellular toxins and multi-barrier treatment (engineering), and risk management (public health) must all be part of a comprehensive management strategy. In a healthy bloom, three of the four cyanotoxin groups (MC, ANA, and STX) maintain toxins within the cell. Removing the cell therefore removes the cyanotoxin. Physical removal by conventional treatment of intact cells is a very effective treatment strategy and can remove upward of 99% of the intracellular cyanotoxins. Activated carbon (powder-activated carbon PAC and GAC) adsorption removes extracellular cyanotoxins. Ozone is very effective for ANA, CYN, and MC but not effective for STX. Chlorine is very effective for MC, CYN, and STX but not for ANA. Chloramine is not effective at inactivating cyanotoxins.

6. Lelieveld, J. et al., 2019. *Cardiovascular Disease Burden from Ambient Air Pollution in Europe Reassessed using Novel Hazard Ratio Functions*, European Heart Journal, 40(20): 1590–1596. doi: 10.1093/eurheartj/ehz135

Hazard ratio functions were used in combination with ambient air pollution exposure data to estimate the impacts in Europe and the 28 countries of the EU (EU-28). The annual excess mortality rate from ambient air pollution in Europe is 790,000 and 659,000 in the EU-28. Between 40% and 80% are due to cardiovascular events, which dominated health outcomes. These estimates exceed recent analyses by more than a factor of two. Researchers estimated that air pollution reduced the mean life expectancy in Europe by about 2.2 years with an annual, attributable per capita mortality rate in Europe of 133/100,000 per year.

7. Hardy, M.C. et al., 2019. *Environmental Investigation of a Multistate Salmonellosis Outbreak Linked to Live Backyard Poultry from a Mail-Order Hatchery – Michigan, 2018*, MMWR 67(51&52): 1430–1431.

An investigation was conducted to examine risk factors for *Salmonella* infection linked to live backyard poultry originating at a mail-order hatchery in Michigan. This hatchery supplies young poultry (poults) to backyard flocks through direct sale to

flock owners and via feed stores. Nine percent of swab samples were positive for *Salmonella*. Three isolates collected from the same building were identified as *Salmonella enterica* serotype *Typhimurium*. The investigation confirmed the presence of the outbreak strain at hatchery.

8. Pedati, C. et al., 2019. *Campylobacteriosis Outbreak Associated with Contaminated Municipal Water Supply – Nebraska, 2017*, MMWR 68(7): 169–173.

An investigation implicated *Campylobacter jejuni* as the cause of a waterborne outbreak in Nebraska, most likely from a municipal water system contaminated by wastewater runoff from an adjacent concentrated animal feeding operation. Although laboratory testing of the water did not yield any positive results, samples were not taken until long after the contamination event. These findings also suggested that routine coliform testing might not be a good indicator of the presence of *Campylobacter* species. Further, it is possible that *Campylobacter* might be viable but not necessarily detectable by culture in water systems.

9. Mills, D. et al., 2018. *Projecting Age-Stratified Risk of Exposure to Inland Flooding and Wildfire Smoke in the US under Two Climate Scenarios*, Environmental Health Perspectives 126(4): 047007. doi: 10.1289/EHP2594

By integrating climate-driven hazard and population projections, newly created country-level exposure maps identified locations of potential significant future public health risk. Researchers found in both 2050 and 2090, an additional one-third of the US population will be living in areas affected by larger and more frequent inland flooding under one scenario. Nearly 1 million young children and 1.7 million older adults would be exposed to wildfire smoke each year under one scenario.

10. June, S.G. and Dziewulski, D.M., 2018. *Copper and Silver Biocidal Mechanisms, Resistance and Strategies, and Efficacy for Legionella Control*, JAWWA, 110(12): 1–23.

Copper–silver ionization (CSI) is often used to control *Legionella* especially in health care systems. However, recent events have raised questions about CSI's reliability. Recolonization and recurrence of disease had occurred in an acute-care hospital that had been using CSI. Researchers reviewed the literature regarding the biocidal mechanisms of CSI against *Legionella* spp. Data showed that an elevated dissolved oxygen content, the sodium content of the water, combined disinfectants, and higher temperature may provide conditions under which *Legionella* spp. may be more susceptible to metal ions.

11. Lelieveld, J. et al., 2019. *Effects of Fossil Fuel and Total Anthropogenic Emission Removal on Public Health and Climate*, Proceedings of the National Academy of Sciences, 116(15): 7192–7197. doi: 10.1073/pnas.1819989116

Researchers assessed the effects of air pollution and greenhouse gases on public health, climate, and the hydrologic cycle. The study combined a global atmospheric chemistry–climate

model with air pollution exposure functions, based on an unmatched large number of cohort studies in many countries. Data showed fossil-fuel related emissions account for about 65% of the excess mortality rate attributable to air pollution, and 70% of the climate cooling by anthropogenic aerosols. Researchers concluded that to save millions of lives and restore aerosol-perturbed rainfall patterns, while limiting global warming to 2°C, a rapid phaseout of fossil-fuel related emissions and major reductions of other anthropogenic sources are needed.

12. Ryan, S. et al., 2019. *Global Expansion and Redistribution of Aedes-borne Virus Transmission Risk with Climate Change*, PLoS Neglected Tropical Diseases, 13(3): e0007213. doi: 10.1371/journal.pntd.0007213

Researchers applied empirically parametrized model of viral transmission by the vectors *Aedes aegypti* and *Ae. Albopictus*, as a function of temperature, to predict cumulative monthly global transmission risk in current climates and compared with projected risk in 2050 and 2080. Results showed that if mosquito range shifts matched optimal temperature ranges for transmission (21.3–34 °C for *Ae. Aegypti*; 19.9–29.4 °C for *Ae. Albopictus*), one can expect poleward shifts in Aedes-borne virus distributions. More severe climate change scenarios produce larger population exposures to transmission by *Ae. Aegypti* but not by *Ae. Albopictus*. Within the next century, nearly a billion people are threatened with new exposure to virus transmission by both *Aedes* spp. in the worst-case scenario. Diseases such as Zika, chikungunya, and dengue will continue spreading farther north.

13. Hill, J. et al., 2019. *Air-Quality-Related Health Damages of Maize*, Nature Sustainability, 2: 397–403. doi: 10.1038/s41893-019-0261-y

Agriculture is essential for feeding the large and growing world population, but it can also generate pollution that harms ecosystems and human health. Researchers explored the human health effects of air pollution caused by the production of maize, a key agricultural crop that is used for animal feed, ethanol biofuel, and human consumption. Data showed that reduced air quality resulting from maize production is associated with 4300 premature deaths annually in the United States, with US\$39 billion (range: US\$14–64 billion) estimated damages. Increased concentrations of fine particulate matter (PM_{2.5}) were driven by emissions of ammonia, a result from nitrogen fertilizer usage. Average health damages from reduced air quality are equivalent to US\$121/t of harvested maize grain, which is 62% of the US\$195/t decadal average maize grain market price. It was estimated that lifecycle greenhouse gas emissions of maize production resulted in total climate change damages of US\$4.9 billion (range: US\$1.5–7.5 billion) or US\$15/t of maize. Data suggested potential benefits from strategic interventions in maize production, including changing the fertilizer type and application method, improving nitrogen use efficiency, switching to crops requiring less fertilizer, and geographically relocating production.

14. Poulsen, A.H. et al., 2019. *Long-Term Exposure to Wind Turbine Noise and Risk for Myocardial Infarction and Stroke: A Nationwide Cohort Study*, *Environmental Health Perspectives*, 127(3): 37004. doi: 10.1289/EHP3340

Noise from wind turbines (WTs) is reported as more annoying than traffic noise at similar levels, raising concerns as to whether WT noise (WTN) increases risk for cardiovascular disease, as observed for traffic noise. Researchers identified all Danish dwellings within a radius 20 times the height of the closest WT and 25% of the dwellings within 20–40 times the height of the closest WT. The results did not show convincing evidence of associations between WTN and myocardial infarction or stroke.

15. DeFlorio-Barker, S. et al., 2019. *Cardiopulmonary Effects of Fine Particulate Matter Exposure Among Older Adults, During Wildfire and Non-Wildfire Periods, in the US 2008–2010*, *Environmental Health Perspectives*, 127(3): 37006. doi: 10.1289/EHP3860

Researchers examined the cardiopulmonary effects of short-term exposure to PM_{2.5} on smoke days in the United States to evaluate whether health effects are consistent with those during non-smoke days. The results showed the increased risk of PM_{2.5}-related cardiopulmonary hospitalizations was similar on smoke and non-smoke days across multiple lags and exposure metrics, whereas risk for asthma-related hospitalizations was higher during smoke days.