Relevant research article summaries

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1. Self, J.L. et al., 2019. *Multistate Outbreak of Listeriosis Associated with Packaged Leafy Green Salads, United States and Canada, 2015–2016*, Emerging Infectious Diseases, 25(8): 1461–1468.

Outbreaks of listeriosis in the United States have historically been associated with ready-to-eat delicatessen meats and dairy products but have more recently been associated with fresh produce including sprouts, celery, cantaloupe, stone fruit, and caramel apples. This outbreak was detected by whole-genome multilocus sequence typing and was associated with packaged leafy green salads. Nineteen cases were identified in the United States and PHAC investigated 14 cases in Canada.

2. Zheng, X. et al., 2019. *Incompatible and Sterile Insect Techniques Combined Eliminate Mosquitoes*, Nature. doi: 10.1038/s41586-019-1407-9

Researchers combined incompatible and sterile insect techniques (IIT-SIT) to enable near elimination of field populations of the world's most invasive mosquito species, *Aedes albopictus*. Millions of factory-reared adult males with an artificial triple-Wolbachia infection were released, with prior pupal irradiation of the released mosquitoes. The mosquitoes were released in residential areas of two islands in a river in Guangzhou, China. When the infected male *Ae. albopictus* mated with wild females, all the resulting embryos died. Relative to the control site, the average number of viable eggs produced by wild mosquitoes at test sites declined by 94% in 2 years of monitoring. The number of wild adult females collected in traps at the two test sites declined by 83% and 94%. The estimated human-biting rate decreased by as much as 96.6%.

3. Nicole, W., 2019. *Comparing Fluoride Exposures in Pregnant Canadian Women: Fluoridated versus Non-Fluoridated Drinking Water*, Environmental Health Perspectives, 127(7): 074002-1.

Researchers measured urinary fluoride concentrations in 1,566 pregnant women from 10 Canadian cities; seven of the cities add fluoride to public drinking water, whereas three do not. Results showed the mean fluoride concentrations were twice as high in the urine of women living in cities with fluoridated water, compared with the urine of women in cities with nonfluoridated water. Among all the mothers, average fluoride concentrations increased between the first and third trimesters. The increase may be due to increased fluoride uptake by the fetus earlier in pregnancy when bone tissue is forming.

4. Khreis, H. et al., 2019. *Outdoor Air Pollution and the Burden of Childhood Asthma Across Europe*, European Respiratory Journal. doi: 10.1183/13993003.02194-2018

Emerging evidence suggests that air pollution may contribute to childhood asthma development. Researchers estimated the incidence rates of childhood asthma that may be attributable to outdoor NO₂, PM_{2.5}, and black carbon (BC) in Europe. Researchers compared asthma incidence rates with estimations of levels of exposure to pollutants in areas more than 1.5 million km², which are often traffic-related in urban areas. Results showed that compliance with the WHO's NO₂ and PM_{2.5} guidelines was estimated to prevent 2,434 (0.4%) and 66,567 (11%) incidence cases, respectively. Meeting the minimum air pollution levels for NO₂ (1.5 µg/m³), PM_{2.5} (0.4 µg/m³), and BC (0.4 × 10⁻⁵/m³) was estimated to prevent 135,257 (23%), 191,883 (33%), and 89,191 (15%) incident cases, respectively.

5. McDonald, E. et al., 2019. *West Nile Virus and Other Domestic Nationally Notifiable Arboviral Diseases—US, 2018*, MMWR 68(31): 673–678.

In 2018, the United States recorded 2,813 cases of domestic arboviral disease, with 2,647 (94%) being West Nile Virus (WNV) disease cases; 63% of WNV cases were classified as neuroinvasive for a national incidence of 0.51 cases of WNV neuroinvasive disease per 100,000. Other diseases reported included La Crosse virus (86), Jamestown Canyon virus (41), Powassan virus (21), St. Louis encephalitis virus (8), eastern equine encephalitis virus (6), and unspecified California serogroup virus (4).

6. Green, R. et al., 2019. *Association Between Maternal Fluoride Exposure During Pregnancy and IQ Scores in Offspring in Canada*, JAMA Pediatrics. doi: 10.1001/jamapediatrics.2019.1729

The prospective birth cohort study found fluoride exposure during pregnancy was associated with lower IQ scores in children aged 3–4 years. Women living in areas with fluoridated tap water ($n = 141$) compared with nonfluoridated water ($n = 228$) had significantly higher mean (SD) maternal urinary fluoride (MUF_{SG}) concentrations (0.69 mg/L vs. 0.40 mg/L). Children had mean (SD) Full Scale IQ scores of 107.16 (13.26), range 52–143, with girls showing significantly higher mean (SD) scores than boys: 109.56 (11.96) versus 104.61 (14.09). A 1 mg/L increase in MUF_{SG} was associated with a 4.49-point

lower IQ score in boys, but there was no statistically significant association with IQ scores in girls. A 1-mg higher daily intake of fluoride among pregnant women was associated with a 3.66 lower IQ score in boys and girls.

7. Ford, L. et al., 2019. *Cost of Salmonella Infections in Australia, 2015*, Journal of Food Protection, 82(9): 1607–1614.

It was estimated that in Australia, infections with *Salmonella enterica* resulted in 8.8% of people developing irritable bowel syndrome (IBS) and 8.5% of people developed reactive arthritis (ReA). Researchers estimated incidence, hospitalizations, other health care usage, absenteeism, and premature mortality for four age groups. Modelling estimated 90,833 cases, 4,312 hospitalizations, and 19 deaths occurred from salmonellosis in Australia circa 2015 at a direct cost of AUD 23.8 million and a total cost of AUD 124.4 million. When IBS and ReA were included, the estimated direct cost was 35.7 million and the total cost was AUD 146.8 million. Foodborne infections were responsible for AUD 88.9 million from acute salmonellosis and AUD 104.8 million when IBS and ReA were included.

8. Barrett, C.E. et al., 2019. *Impact of Public Health Interventions on Drinking Water Associated Outbreaks of Hepatitis A – US, 1971–2017*, MMWR, 68(35): 766–770.

HAV was the most commonly reported etiology for outbreaks associated with untreated ground water during 1971–2008, and HAV can remain infectious in water for months. From 1971–2017, 32 outbreaks were reported resulting in 857 cases, all before 2010. Untreated groundwater was associated with 72% of outbreaks resulting in 68.3% of cases. Reported outbreaks significantly decreased after the introduction of hepatitis A vaccination recommendations by the Advisory Committee on Immunization Practices and USEPA public groundwater system regulation. Individual water systems that are not required to meet national drinking standards were the only contaminated drinking water systems to cause the last four reported hepatitis A outbreaks during 1995–2009. No waterborne outbreak was reported during 2009–2017.

9. Shin, S. et al., 2019. *Ambient Air Pollution and the Risk of Atrial Fibrillation and Stroke: A Population-Based Cohort Study*, Environmental Health Perspectives. doi: 10.1289/EHP4883

A population-based cohort comprised of 5,071,956 Ontario residents, aged 35–85 were followed from 2001 to 2015. Atrial fibrillation (AF) and stroke cases were evaluated as related to air pollutants, including PM_{2.5}, NO₂, and ozone. Interquartile range increments of PM_{2.5}, NO₂, O₃, and O_x were associated with increases in the incidence of AF: 1.03, 1.02, 1.01, and 1.01 and the incidence of stroke: 1.05, 1.04, 1.05, and 1.05, respectively. Researchers also found a near-linear association for stroke with PM_{2.5}, whereas O_x-stroke, PM_{2.5}- and O_x-AF relationships exhibited sublinear shapes. Researchers concluded that air pollution was associated with stroke and AF onset, even at very low concentrations

10. da Cunha, D.T. et al., 2019. *The Differences Between Observed and Self-Reported Food Safety Practices: A Study with Food Handlers using Structural Equation Modeling*, Food Research International. doi: 10.1016/j.foodres.2019.108637

The two most common methods for evaluating food safety practices, self-assessment, and observation, are generally treated as interchangeable, but they can have different meanings. The objective of this study was to differentiate between the observed and self-reported food safety practices of food handlers. A questionnaire was given to 183 food handlers to evaluate their food safety knowledge, attitudes, self-reported practices, and risk perceptions. For the observed assessment method of evaluating the food handlers' practices (observed practices), a checklist was developed, and food handlers were observed during one workday. In the first model a significant positive effect of knowledge and a negative effect of risk perception on self-reported practices were observed. Food handlers with high risk-perception about their practices reported less adequate practices. Positive food safety attitudes acted as a moderator dampening the positive effect between knowledge and self-reported practices. In the second model there was a significant positive effect of knowledge on observed practices. Attitudes strengthened the positive effect between knowledge and observed practices. On the other hand, a direct effect of attitude on observed practices was not observed. In conclusion, self-reported practices and observed practices are different and should be used and discussed properly.

11. Pieracci, E.G. et al., 2019. *Vital Signs: Trends in Human Rabies Deaths and Exposures – United States, 1938–2018*, MMWR, 68(23): 524–528.

From 1960 to 2018, 125 human rabies cases were reported in the United States, with 36 (28%) attributed to dog bites during international travel. Among the 89 infections acquired in the United States, 62 (70%) were attributed to bats. In 2018, approximately 55,000 persons sought PEP after contact with a potentially rabid animal.

12. Charlebois, S. et al., 2019. *A Review of Food Recalls in Canada: A Nationwide Survey*, Food Protection Trends, 39(4): 317–325.

This study examined the Canadian food recall system from the consumer perspective through an online survey to determine whether recall fatigue is a problem among consumers. Recall fatigue occurs when consumers are inundated with such an excess of information on food recalls that it causes apathy toward food safety. Optimistic bias, the belief that others are at risk but not one's self, also contributes to recall fatigue, which can lead to public health risks. Results indicated that although consumers generally have some knowledge of food recalls, they do not retain or subsequently internalize information about all food recalls. Results also indicated that Canadians have confidence in the current recall system. However, Canadians across all demographics place the responsibility for food safety on others, namely the federal government. Even though foodborne

illnesses can originate in the home, most Canadians believe they are more likely to occur as a result of actions taken before food reaches their home. The combination of apparent information overload, optimistic bias, and inaccurate risk assessment regarding food recalls puts Canadians at risk of recall fatigue.

13. Benedict, K. et al., 2019. *Surveillance for Coccidioidomycosis- US, 2011–2017*, MMWR Surveillance Summaries, 68(7): 1–17.

Coccidioides spp. lives in soils in warm, arid regions and can cause respiratory illness. During 2011–2017, a total of 95,371 cases from 26 states and DC were reported to CDC. The number of cases decreased from 2011 to 2014, but subsequently increased in 2017; >95% of cases were reported from Arizona and California. The reasons for the changing trends may be due to environmental factors (temperature and precipitation), surveillance artifacts, land use changes, and changes in the population at risk.

14. Evans, S. et al., 2019. *Cumulative Risk Analysis of Carcinogenic Contaminants in the US Drinking Water*, Journal Heliyon, 5(9).

Cumulative risk analysis of contaminant occurrence in US drinking water for the period of 2010–2017 indicated that over 100,000 lifetime cancer cases could be due to carcinogenic chemicals in tap water. Most of this risk is due to the presence of arsenic, disinfection by-products, and radioactive contaminants. Overall, the national attributable risk due to tap water contaminants is approximately 4×10^{-4} , which is two orders of magnitude higher than the *de minimus* cancer risk.

15. Ouhoumane, N. et al., 2019. *Economic Burden of West Nile Virus Disease, Quebec, Canada, 2012–2013*, EID Journal, 25(10): 1843–1850.

Researchers described the direct and indirect costs of (West Nile Virus) WNV infection in Quebec for up to 2 years after onset of signs and symptoms. For 90 people infected with WNV, persons with encephalitis accounted for the largest proportion of total cost: a median cost of \$21,332 per patient compared with \$8,124 for West Nile meningitis and \$192 for West Nile fever. When results were extrapolated to all reported WNV patients, the estimated total cost for 125 symptomatic cases was approximately \$1.7 million for 2012 and for 31 symptomatic cases was \$430,000 for 2013.

16. Hernandez, L.M. et al., 2019. *Plastic Teabags Release Billions of Microparticles and Nanoparticles into Tea*, Environmental Science & Technology. doi: 10.1021/acs.est.9b02540

Researchers showed that steeping a single plastic teabag at brewing temperature (95°C) released approximately 11.6 billion microplastics and 3.1 billion nanoplastics and were compared with original teabags (nylon and polyethylene terephthalate). The levels of particles released from the teabag packaging are several orders of magnitude higher than plastic loads in foods. An initial acute invertebrate toxicity assessment showed that exposure to only the particles released from the teabags caused dose-dependent behavioral and development effects.