

EVIDENCE BRIEF

Reducing health risks associated with backyard chickens



December, 2017

Key Messages

- Backyard chickens can be found in rural and urban residences in Ontario and elsewhere.
- Owners' awareness of risk of illness (e.g., salmonellosis) and biosecurity measures is limited.
- Illnesses and outbreaks are linked to exposure to backyard chickens.
- Owners can reduce their risk of illness through a variety of measures such as:
 - hand washing after handling chickens
 - wearing dedicated clothing and shoes
 - refraining from kissing and snuggling live poultry
 - removing wet manure
 - sanitizing equipment

Issue and Research Question

Chickens kept on residential property are commonly referred to as urban or backyard chickens. Smith et al. defines backyard chickens as domestic gallinaceous birds, excluding exotic pet birds, housed in urban, suburban or rural settings.¹

Keeping backyard chickens in rural or urban residences is not a new concept. Early poultry production in the United States (US) in the 1800s consisted of backyard poultry.² Today, backyard chicken owners may also develop emotional attachments to their flocks, viewing their flock as pets and practicing closer contact with the flocks in some cases.³ A 2013 report from the United States Department of Agriculture (USDA) found a growing interest in ownership of backyard chickens in several US cities.⁴ An issue brief from the University of Minnesota also reported that the number of households keeping chickens in urban backyards in the US appears to be increasing.³

A number of recent media reports have also suggested that backyard chickens are being raised in Ontario.^{5,6} We are aware that Ontario public health units receive complaints and inquiries regarding backyard chickens. Public Health Ontario (PHO) has also received inquiries about human health risks and risk reduction measures related to backyard chickens. If this is indeed a trend, concerns about backyard chickens as sources of zoonotic diseases to humans may also increase.⁷

This Evidence Brief focuses on the following questions:

- Are backyard chicken owners' aware of the risk of infectious disease transmission from their flocks?
- What illnesses and outbreaks are associated with exposure to backyard chickens?
- What are potential risk reduction measures to reduce the risk of human illness and outbreaks?

This Evidence Brief only addresses questions regarding health risks from backyard chickens and means to reduce those risks. We have not included noise, odour and the possible benefits of raising backyard chickens in this brief. However, policy makers may also consider these factors when setting policy.

Methods

A literature search was conducted by PHO Library Services using MEDLINE, Embase, Academic Search Premier, Food Science Source and Scopus databases. The search was limited to literature published in English from 1946 to July 3, 2017. Search terms included: urban chicken, backyard chicken, domestic chicken, transmission, monitoring, infections, illness, outbreak, disease, biosecurity, knowledge, practice, attitude, and risk. The search yielded 1635 citations after duplicate records were removed. Titles and abstracts were screened for relevance. Additional information was identified through cited reference searching of full-text articles and through an external reviewer.

A grey literature search was also performed using Google on July 5, 2017, and the first 100 hits were reviewed. Search terms included backyard chicken OR backyard poultry OR urban chicken OR backyard hen OR neighborhood poultry OR hobby hen OR hobby chickens OR household poultry.

Papers were selected if they identified illnesses or outbreaks associated with exposure to backyard chicken, backyard chicken owners' awareness of health risks and risk reduction measures. A total of 32 records are included in this report.

Main Findings

OWNERS HAVE LIMITED AWARENESS OF THE HUMAN RISK OF INFECTIOUS DISEASE TRANSMISSION FROM BACKYARD CHICKENS

We found a number of papers that examined backyard chicken owners' awareness of infectious disease transmission risk to humans.⁸⁻¹⁴ In general, the studies found limited awareness of association between salmonellosis and live poultry contact and a lack of biosecurity measures* among flock owners. The following highlights provide details:

- A cross-sectional study by the USDA National Animal Health Monitoring System, examined *Salmonella* awareness among backyard chicken owners in Denver, Colorado; Los Angeles, California; and Miami, Florida. Among 385 owners, the study found 64%, 30% and 40% of respondents, respectively, were aware of a connection between salmonellosis and poultry contact. In a multivariable analysis, participants who completed the survey in English (versus Spanish), sold or gave away eggs and cited keeping chickens for educational purposes for their children were more aware of the association.⁹
- A cross-sectional study of Colorado (n=317) backyard chicken owners found minimal biosecurity measures and high human contact with flocks. About 79% of individuals surveyed did not change into separate clothes before contact and about 95% did not report disinfecting or scrubbing their flock shoes before and/or after contact.¹
- A survey of 41 Maryland backyard flock owners' concluded that biosecurity practices were highly variable among flock owners.⁷
- A survey of bird health, animal husbandry and hygiene practices, and knowledge, attitudes and practices relating to *Salmonella* risk in 50 households with backyard chickens in Washington DC and surrounding metropolitan area, showed that owners are aware of the *Salmonella* risk from poultry but do not consistently practice risk reduction measures. In video recordings, touching the face and snuggling with birds were often observed (about two thirds and 51% of participants respectively). Some participants acknowledged high risk behaviours, while some denied but were observed to practice such behaviours.¹³
- Pohjola et al. studied health management procedures and awareness of human illnesses associated with backyard chickens in 181 registered flock owners in Finland in 2012. Biosecurity measures were uncommon among the owners, e.g., 13% reported using different shoes in the poultry premise and 35% said they may wash hands when leaving the premise; opportunity for close contact between wild birds and backyard poultry was common.¹¹
- Analysis of data from a survey study of backyard chicken owners in greater London area identified a lack of avian and zoonotic disease knowledge and low disease prevention measures such as biosecurity. Twenty one out of 30 flock owners surveyed did not know campylobacteriosis could affect human health and six were not aware of the zoonotic impact of salmonellosis and avian influenza.¹²

* A set of preventive measures designed to reduce the risk of transmission of infectious diseases in crops and livestock, quarantined pests, invasive species, and living modified organisms.³²

ILLNESS AND OUTBREAKS ASSOCIATED WITH EXPOSURE TO BACKYARD CHICKENS HAVE BEEN DOCUMENTED

Infectious disease transmission is a known human health risk associated with backyard poultry. Poultry can carry *Salmonella* in their intestines or eggs without symptoms of illness which can be transferred onto feathers and the surrounding environment.³ Salmonellosis and campylobacteriosis are the most frequent infections reported in relation to backyard chicken and live poultry exposure.^{3,13,15,16} Table 1 summarizes *Salmonella* outbreaks we found.

Table 1: Outbreaks and cases of *Salmonellosis* associated with backyard chickens, 1990-2014 (only reports from the US were found in the search)*

Location	Year	Outbreaks (n)	Cases (n)	Details	Reference
US	1996-2012	45	>1581	Resulted in 221 hospitalizations, and five deaths.	Behravesh et al., 2014 ¹⁵
US	1990-2014	45	2057	Literature review of publicly available data sources for human infectious disease outbreaks associated with backyard chicken exposure. Authors recommended manure management, proper slaughter and disposal, veterinary care, permitting and consumer education to reduce the infectious disease risk associated with backyard poultry ownership.	Tobin et al., 2015 ²⁵
US	1990-2014	53	2630	Literature review and search of multiple databases including PulseNet, the National Molecular Subtyping Network for Foodborne Disease Surveillance in the US, CDC's National Outbreak Reporting System, etc. Keeping poultry inside households and kissing birds were some high risk practises reported.	Basler et al., 2016 ⁸

*Studies reported in Table 1 are literature reviews and may include data from the same outbreaks.

A systematic review and meta-analysis examined domestic livestock (poultry, swine, ruminant, goat, sheep and unspecified animals) as risk factors for diarrhea. A significant association between domestic animal husbandry and diarrheal disease in the household was found in 20 out of the 29 studies included in the review. A meta-analysis was possible for poultry studies only (n=6), which found a pooled odds ratio of 2.73 (95% confidence interval 1.90, 3.93) for household *Campylobacter* infection from domestic poultry exposure.¹⁷

In addition to outbreaks and illnesses associated with backyard chickens, a number of studies have demonstrated the presence of human pathogens in backyard chickens:

- *Salmonella* has been identified in backyard chickens. Fecal sampling studies of backyard chicken flocks in Australia show that the prevalence of *Salmonella* species can be as high as 10.4%.¹⁶ A recent study of *Salmonella* and *E. coli* in the intestines of small flock chickens in Ontario identified *Salmonella* in 0.3% and *E. coli* in 99% of 1,025 birds tested. *Salmonella* prevalence in small flocks was significantly lower than in federally inspected commercial flocks in Ontario.¹⁸

- Two studies examined the possibility of transmission of avian influenza from wild birds to backyard chickens, concluding that transmission could occur.^{19,20} In addition, a human risk of contracting avian influenza A(H7N9) from exposure to live poultry in poultry markets in China has been identified.^{21,22} However, live poultry markets are very different from backyard chicken environments. One study did report that backyard poultry has not been associated with increased risk of avian influenza infection in humans.²¹
- An outbreak of listeriosis in backyard poultry flocks has been reported in Washington state.²³
- A prevalence survey of ectoparasites on backyard chicken flocks in California found that 80% of birds surveyed had a variety of ectoparasites that can affect humans. Parasites identified included lice, fleas and mites. The parasite diversity and prevalence in backyard chicken flocks exceeded what is observed in commercial chicken flocks. Authors concluded that the findings highlight a need for increased biosecurity.²⁴

The above studies on human illnesses and outbreaks also noted that human behaviour can increase the risk of infectious diseases and outbreaks. High risk behaviours cited include keeping poultry inside the house and having close contact such as holding or kissing the poultry.^{3,8,20,25}

RISK REDUCTION MEASURES MAY REDUCE THE RISK OF ZONOTIC INFECTIONS

The following risk reduction strategies implemented by owners may reduce human infectious disease risk related to backyard chickens:

- Hand washing after handling birds.^{8,20}
- Wearing dedicated shoes, gloves and clothes for cleaning.^{8,12,20}
- Appropriate housing for the flock: easy to clean, secure from predators and other animals, adequate space per bird, and adequate ventilation.²⁶
- Regular removal of manure, bedding and feed to reduce bacterial growth and flies.^{3,25}
- Seeking veterinary help in case of illness in the birds and reporting clusters of bird deaths.^{12,25}
- Storing poultry feed in rodent-proof containers.
- Not bringing poultry inside the house.^{3,8,25}
- Proper composting of poultry manure prior to use as a fertilizer.^{3,25}
- Prompt disposal of dead birds and not slaughtering poultry in the home.^{3,25}
- Regular cleaning and sanitization of equipment.^{3,8}
- Refraining from kissing and snuggling live poultry, and not touching one's mouth, eating, or drinking around chickens.⁸

Additional system-level interventions to reduce human disease risk may include:

- Educating flock owners on improved quarantine and hygiene procedures to help reduce the risk of introducing new diseases into backyard flocks.^{20,25}
- Following multiple outbreaks related to live poultry in 2012, the CDC also recommended that health-related information be provided to potential purchasers of poultry birds before the point of sale.²⁷⁻²⁹
- Registration of households with poultry to enable communication in the event of outbreaks.²⁵

The Ontario Ministry of Agriculture and Rural Affairs provides “Keeping Your Birds Healthy Resource Kits” for backyard chicken owners. It provides information on biosecurity, feed and water management, cleaning and disinfection, managing sick birds and disposal of sick birds.³⁰ In addition, [Family Food Program](#) at Chicken Farmers of Ontario (CFO) provides information for members on promotion of bird health and disease management.

Discussion and Conclusions

Close contact with backyard chickens may contribute to infectious disease transmission from birds to humans, even in the absence of illness in poultry.^{8,9,12,19,20} Avoiding close contact and practicing good hygiene may be effective in reducing risk of transmission.^{8-14,31}

Biosecurity measures are intended to limit or prevent the introduction and spread of infectious agents.³² Examples of biosecurity measures for backyard chickens include wearing dedicated protective gear (e.g., shoes and gloves) and washing hands after handling birds. Proper disposal of dead birds, refraining from kissing and snuggling live poultry, not bringing live poultry inside the house, and appropriate cleaning of equipment and facilities are other risk reduction measures.

Owner awareness of the potential human disease risk and potential biosecurity measures may help facilitate behaviour change and reduce the risk of illness.

Implications for Practice

Backyard chickens can be found in urban and rural residences in Ontario. Human illness has been associated with backyard poultry and biosecurity measures implemented by owners may reduce the risk.

Public health staff may be asked to provide information regarding illness risk and measures to reduce the risks. In addition to risk of infection, authorities may consider noise, odour, community preferences and the possible benefits of backyard chickens when making policy.

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Specifications and Limitations of Evidence Brief

The purpose of this Evidence Brief is to investigate a research question in a timely manner to help inform decision making. The Evidence Brief presents key findings, based on a systematic search of the best available evidence near the time of publication, as well as systematic screening and extraction of the data from that evidence. It does not report the same level of detail as a full systematic review. Every attempt has been made to incorporate the highest level of evidence on the topic. There may be relevant individual studies that are not included; however, it is important to consider at the time of use of this brief whether individual studies would alter the conclusions drawn from the document.

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