

ONE HEALTH

01

Review of biological and chemical health risks associated with pork consumption in Vietnam: major pathogens and hazards

Cook M.¹, Phuc P.-D.¹

¹Hanoi University of Public Health, Center for Public Health and Ecosystem Research, Ha Noi, Viet Nam

Introduction

The global burden of foodborne illness undermines the safety and development of people and nations, particularly in low- and middle-income countries [1, 2]. In Vietnam, local food systems are experiencing a period of rapid change [3], and government efforts to regulate the food sector have had limited impact [4-6]. Socioeconomic development has also driven increased demand for meat, with pork becoming increasingly prominent in Vietnamese diets [5, 6]. Available public health data suggests that biological hazards represent the largest source of foodborne illness nationally, though chemical hazards are also present in food [5]. Thus, there is an urgent need to develop context-appropriate, effective, and low-cost solutions to food safety challenges in Vietnam [1, 5, 7]. In reviewing the scope and burden of different pork-borne health risks in the literature, this paper looks to identify high-value targets for future food safety objectives, highlighting relevant pathogens and hazards, as well as gaps in the current research.

Material and Methods

A search for suitable literature was undertaken using the PubMed database with articles published between 2008 and 2018 considered as relevant for inclusion. Due to limited levels of research specific to Vietnam, studies from comparable contexts in wider Southeast Asia were included. Included literature demonstrated a direct health risk to humans through pork consumption as a result of the conditions in which pigs were raised and/or slaughtered. Articles discussing pathogens that can be contracted directly from pork consumption were excluded if consumption of pork meat was not explored as a potential route of infection.

Results and Discussion

A variety of risks to the health of Vietnamese pork consumers were identified through the literature. Biological risks to consumers that were detailed in the literature included *Salmonella* spp., *Streptococcus suis* bacteria, as well as *Taenia solium* and *Trichinella* spp. parasites. However,

these organisms do not represent the full scope of known pathogens associated with pork consumption. The omission of other appropriate pathogens is a result of gaps in the available research specific to Vietnam and comparable countries of Southeast Asia. Chemical hazards detailed in the literature included antibiotic residues, particularly sulfamethazine, and heavy metal contaminants.

Pork-associated pathogens detailed in the literature illustrate the presence and impacts of gradients of development in Vietnam. For instance, disease as a result of parasitic infection is more frequently documented in regional areas of Vietnam, particularly the northwest mountainous regions. Here, populations have lower relative levels of sanitation infrastructure, reduced access to healthcare, and livestock may be permitted to roam in order to graze.

A multitude of studies included in this review implicated raw pork consumption as a prominent risk factor in the development of disease from biological pathogens. However, epidemiological trends indicate that raw or undercooked pork dishes are part of prominent sociocultural events such as celebrations and funerals.

The epidemiological data explored across the foodborne pathogens included in this study reflected relatively consistent patient demographics. Various studies have reported that males are affected by pork-related foodborne illness at a significantly higher rate than females across Southeast Asia. Age was also positively associated with infection and disease following pork consumption in some studies. However, trends in the gender and age of patients may be a reflection of other underlying risk factors, such as lifestyle behaviours, health comorbidities, or age-associated immunodeficiency.

References

1. Havelaar, A.H., et al., World Health Organization global estimates and regional comparisons of the burden of foodborne disease in 2010. 2015. 12(12): p. e1001923.
2. WHO, WHO estimates of the global burden of foodborne diseases. 2015.
3. World Bank, Vietnam food safety risks management: challenges and opportunities - policy note (English). 2017, World Bank Group: Washington, D.C.

4. Hoang, H.G., Farmers' responses to VietGAP: a case study of a policy mechanism for transforming the traditional agri-food system in Vietnam: a dissertation presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in Agricultural Systems and Environment at Massey University, Palmerston North, New Zealand. 2018, Massey University.
5. Nguyen-Viet, H., et al., Food safety in Vietnam: where we are at and what we can learn from international experiences. 2017. 6(1): p. 39.
6. Rich, K.M., et al., Quantitative value chain approaches for animal health and food safety. 2018. 75: p. 103-113.
7. Wertheim-Heck, S.C.O., S. Vellema, and G. Spaargaren, Food safety and urban food markets in Vietnam: The need for flexible and customized retail modernization policies. *Food Policy*, 2015. 54: p. 95-106.