Foodborne hazards in the scientific literature: Results of a systematic literature review in East African countries

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Introduction

- The study gathered information available in the published and grey literature on safety of:
  - dairy products and zoonoses from cattle in Tanzania
  - pork and zoonoses from pigs in Uganda
- Areas covered: prevalence, risk factors, control and impacts of a list of hazards in each value chain

Questions

- What is the prevalence and relative importance of each of the selected hazards in people, pigs, pork, dairy cattle, dairy products and wildlife?

- What type of impacts do each of the selected hazards have with respect to (i) economic burden/cost, (ii) DALYs,
  (iii) health, (iv) social and (v) environment?

- What are risk factors for each of the selected hazards in each of the selected populations?

- What are the available control strategies for each of the selected hazards and their effectiveness?

Methodology

- Four online databases were used: PubMed, CAB Direct, Web of Science and African Journals Online
- Hazards studied:

Food borne non-zoonotic	Food-borne zoonoses	Food borne and direct zoonoses
Salmonella typhi	*Campylobacter* spp	Leptospirosis
Mycotoxins	(Toxigenic) *E. coli*	Tuberculosis
Antibiotic residues	*Salmonella* spp	Brucellosis
	Staphylococcus spp	Rabies
	Clostridium perfringens	Anthrax
	Bacillus cereus	Rift Valley fever
	Cryptosporidium spp	Q fever (*Coxiella burnetti*)
	Toxoplasma spp	Trypanosomiasis

Methodology

- PRISMA 2009 flow diagram used to document the process
- Database prepared using Mendeley Desktop reference manager

Results

- Foodborne hazards are under-represented in published literature
- Most papers cover prevalence and risk factor studies, very few cover control options and impact
- Diverse research methods used and reporting is inconsistent; this makes it difficult to combine results
- For the dairy value chain, most studies done at the farm and retailer levels; very few involve consumers
- For the pork value chain, porcine cysticercosis is the most frequently studied foodborne hazard
- Studies on humans, with respect to pig zoonoses, focus on *Toxoplasma gondii*, but its relation to pork consumption has not been investigated

Results – dairy value chain

Campylobacter spp.	*C. jejunum* commonly isolated in meat samples, 5.6% in animals in Morogoro
Escherichia coli	6.3% of milk samples at retailers in Dar es Salaam were found to have *E. coli*
Staphylococcus aureus	Commonly isolated in milk samples in Morogoro; reported prevalence range 17–26%
Bacillus cereus	Found in 6.3% of milk samples collected from milk retailers in Dare salaam

Results – dairy value chain

Cryptosporidium spp.	A study in Tanga area found 50% and 63% of positive farms Another study in Tanga and Iringa estimated 20% and 21%, respectively, animal level prevalences much lower
Leptospira spp.	8.4% of patients with fever in Moshi were found to be suspected or confirmed cases of leptospirosis
	An abattoir survey conducted in Tanga found 26 out of 51 sampled animals (51%) to be positive to MAT for *Leptospira*

Results – dairy value chain

Bacillus cereus	29 out of 1450 milk samples sent to a lab in Dar es Salaam over 30 years positive
Toxoplasma spp.	In periurban areas, the farm level prevalence among smallholder dairy farmers was 4.8%, while the farm level prevalence among pastoralists in rural areas reached 48%
Tuberculosis	10% of blood samples from cattle tested at an abattoir in Tanga were found positive for tuberculin test
Q fever	A cross-sectional survey on seroprevalence of *C. burnetii* in different healthy hosts in periurban areas of Dar es Salaam found 3.9% prevalence among healthy humans The prevalence among cattle ranged from 18.8 to 27.2%; and 13.6 and 17.7% in goats and sheep, respectively

Results – pork value chain

Trypanosomosis	Pigs play a major role as reservoirs for *T. brucei rhodesiense*
Tuberculosis	*M. bovis* isolated from 2% of pigs in Mubende District, Uganda
	M. avium, M. terrae and *M. asiaticum* also isolated in the same area
Leptospirosis	4.43% in Morogoro Municipality
Campylobacteriosis	Thermophilic campylobacteria in 66.7% pigs and 10% in dressed carcasses

Results – pork value chain

Porcine cysticercosis	High prevalence in Kenya, Uganda and Tanzania
Echinococcosis	*Taenia hydatigena* up to 4% from abattoir surveys in Uganda

Inferences

- For now, difficult to draw firm conclusions but the results show the range of pathogens present in the value chains studied
- Systematic surveys required for comparative assessments

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