Seroprevalence and risk factors for *Coxiella burnetii* (Q fever) infection in humans in Bura irrigation scheme, Tana River County, Kenya

Mwololo D.K.[1, 2], Kitala P.M.[1], Wanyoike S.K.[3] and Bett B.[2]

1. Department of Public Health, Pharmacology and Toxicology, University of Nairobi, P. O. Box 29053-00625, Nairobi;
2. International Livestock Research Institute, P. O. Box 30709-00100, Nairobi
3. Veterinary Epidemiology and Economics Unit, Central Veterinary and Investigation Laboratories, Kabete, Nairobi

Introduction

Q fever is a zoonotic disease caused by the bacterium *Coxiella burnetii* which is an obligate intracellular organism and ruminants are considered to be the primary source of infection to humans (Van den Brom et al. 2013). Humans become infected through inhalation of aerosols from infected ruminants such as cattle, sheep and goats and through exposure to animal products such as unpasteurized dairy products (Whitney et al. 2009). In humans, the disease syndrome can be divided into acute and chronic forms with the acute form manifesting as a relatively mild self-limiting febrile illness while the chronic form is a more severe disease characterized by hepatitis, pneumonia and chronic fatigue (Dorko et al. 2008). The disease is likely to impact negatively on humans because of its public health importance. Q fever is considered an occupational disease among farmers, abattoir workers and veterinarians, although community outbreaks around farms with infected ruminants, especially during the kidding season, have also been reported (Maurin and Raoult 1999). The objectives of this study were to determine the seroprevalence and risk factors for Q fever infection in humans in Bura irrigation scheme Tana River County, Kenya.

Methods

- Questionnaires were administered to 85 randomly selected households where a maximum of five individuals per household were randomly sampled for Q fever screening.
- A commercial ELISA antibody test kit (SERION ELISA classic *C. burnetii* Phase 1 IgG) was used for the detection of human antibodies in serum directed against *C. burnetii* Phase 1.
- Logistic regression was used to model for potential risk factors on univariate and multivariate analyses using R software version 3.1.1.

Results

All respondents reported having never heard of Q fever before.

Table 1 shows the seroprevalence of *Coxiella burnetii* in different groups of people.

Table 1: Seroprevalence of *C. burnetii* in different groups of people

Category	Seroprevalence (95%CI)
All tested	26.8% (18.1-35.5%)
Adults	34.2% (24.9-43.5%)
Adolescents	23.2% (14.9-31.5%)
Children	26.8% (18.1-43.5%)
Males	28% (19.2-36.8%)
Females	26% (17.4-34.6%)

Differences in the seroprevalence between different occupations as outlined in Figure 1.

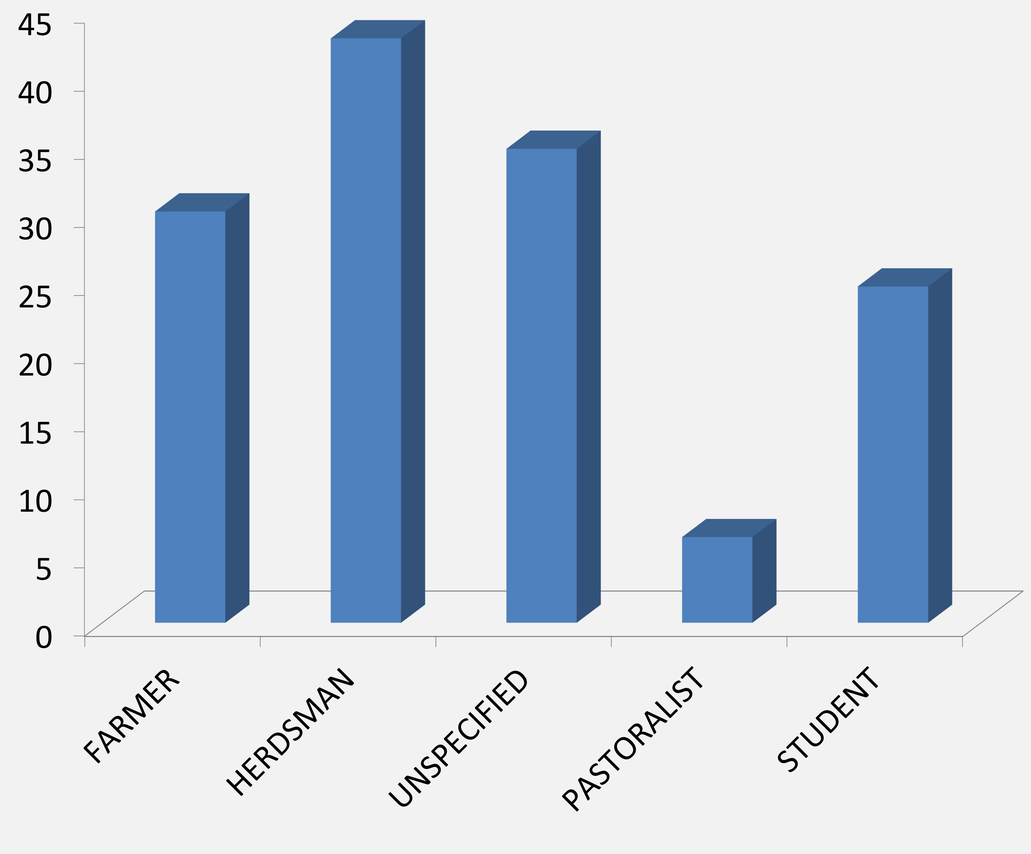

Figure 1: Comparison of seroprevalence of *C. burnetii* antibodies among different occupation groups.

- Risk factors associated (P<0.05) with individual and household seropositivity on univariate analysis were occupation and irrigation status (Table 2)
- Compared to farmers, pastoralists had a lower risk of Q fever infection.

Table 2: Results of a univariate logistic regression model showing significant risk factors

Variable	Levels	Estimate	95% CI	P value
Occupation	Farmers	Ref	-	-
	Herdsmen	0.55	-1.12 - 2.12	0.4872
	Pastoralists	-1.87	-3.73 - 0.59	0.0139
	Students	-0.28	-0.94 - 0.37	0.4064
	Other	0.21	-0.54 - 0.94	0.5759
Irrigation status	Irrigated	Ref	-	-
	Non-irrigated	-0.79	-1.55 -0.11	0.0292

Discussion

- ❑ The community in Bura irrigation scheme does not know about Q fever yet the reported seroprevalence is high.
- ❑ A study in western Kenya by Knobel et al. (2013) also reported a seroprevalence closely similar to our finding.
- ❑ Studies in different sub-Saharan countries on apparently healthy people have shown the seroprevalence to range between 1% and 37% (Kobbe et al. 2008)
- ❑ In the univariate analysis, people living in non-irrigated areas were at lower risk of Q fever infection compared to people within the irrigation scheme.
- ❑ Most farmers in the scheme house their livestock within the living houses and this poses a higher risk of inhalation of infected aerosols from sick animals.

Conclusion: There is a need to create awareness on Q fever in the community at Bura irrigation scheme in Tana River County. The capacity of the hospitals in this area should also be developed to properly diagnose and manage the disease.

References

Dorko E., Kalinová Z., Tatiana Weissová T., Pilipčinec E.,(2008), Ann Agric Environ Med 15, 119–124

Knobel D et al.(2013). American Journal of Tropical Medicine and Hygiene 88, 513–518

Maurin M. and Raoult D. (1999), Q fever. Clinical Microbiology Rev 12, 518–553

Van den Brom R., Schimmer B., Schneeberger P.M., Swart W.A., van der Hoek W ., (2013) PLoS ONE 8 (1), e54021

Whitney A. S., Massung R. F., Candee A. J., Ailes E. C., Myer L. M., Patterson N. E., Berkelman R. L., (2009) Clinical Infectious Diseases 48, 550-557.

Acknowledgements

This work falls under the project 'Dynamic Drivers of Disease in Africa: Ecosystems, livestock/wildlife, health and wellbeing: REF:NE/J001422/1" partly funded with support from the Ecosystem Services for Poverty Alleviation Programme (ESPA). The ESPA program is funded by the Department for International Development (DFID), the Economic and Social Research Council (ESRC) and the Natural Environment Research Council (NERC).