



Going viral in PNG – Exploring routes and circumstances of entry of a rabies-infected dog into Papua New Guinea



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ABSTRACT

In this qualitative study implemented in November 2016, we elicited narratives about fictional rabies incursions from key employees ($n = 16$) of the National Agriculture and Quarantine Inspection Authority in Papua New Guinea (PNG) to explore the potential circumstances and routes of entry of a rabies-infected dog, and direct rabies preparedness. Although PNG is rabies free, proximity to rabies-endemic Indonesia poses a risk of introduction and it is expected that an outbreak in PNG would have devastating human health impacts consistent with other countries with similarly low human development indices and abundant free-roaming dogs. Participants used their local and professional knowledge to create plausible narratives in response to contextual, but fictitious, newspaper stories. An ethnographic content analysis was used to extract themes and interpret the narratives. Themes were assessed in the context of their potential influence on rabies preparedness in PNG against the social and political background of PNG and relevant, published literature. Consistent themes included the ubiquity of trade and the complexity of routes between Indonesia and PNG. Dog ownership seemed pragmatic – actors in the narratives readily and rationally involved dogs in transactions in response to trade, exchange or gifting opportunities. Consequently, dogs changed ownership frequently. The findings of this study have important implications for rabies preparedness in PNG; there is potential for wide geographic dissemination of rabies in dogs before outbreak detection. However, common patterns of travel – trade of dogs via Papuan towns and use of traditional trade routes – do provide opportunity for targeted surveillance and response in the event of an incursion.

1. Introduction

Canine-rabies is a high impact, zoonotic disease that is estimated to cause approximately 50,000 human deaths globally each year (Hampson et al., 2015). The World Health Organization, World Organization for Animal Health, Food and Agriculture Organization of the United Nations and the Global Alliance for Rabies Control recently proposed a framework for elimination of canine-mediated human rabies (WHO and OIE, 2016). Although the focus of this framework is elimination in currently endemic regions, prevention of spread to historically or recently rabies-free regions is also recognised as important to achieve global elimination.

South-east Asia is a region in which rabies spread is ongoing. For example, an outbreak of rabies in dogs and humans was recently reported in Sarawak, Malaysia, on the island of Borneo (ProMED-mail, 2017). This part of Malaysia shares a land border with the rabies-endemic Kalimantan Provinces of Indonesia. Within the past two decades rabies has spread to previously uninfected areas and provinces of

Indonesia (Tenzin and Ward, 2012). Spread is attributed to the movement of rabies-infected dogs facilitated by human activities (Putra et al., 2013; Susetya et al., 2008; Windyaningsih et al., 2004). Papua New Guinea (PNG) also shares a land-border with Indonesia, and although the island of New Guinea is currently rabies-free, the proximity of the rabies-endemic Indonesian provinces of Maluku and North Maluku and the abundance of dog movement across New Guinea island pose a risk of rabies introduction (Brookes et al., 2017).

The human development index (HDI) of PNG is currently 0.516 (hdr.undp.org/en/countries/profiles/PNG, accessed 17.06.2017), ranked 154th globally. This low HDI reflects an under-resourced education and health system, poor infrastructure outside the major urban centres (Port Moresby, Lae and Madang) and low gross per capita income. Nearly 40% of the 7.6 million people in PNG live below the income poverty-line, most (87%) live in rural locations, and the current life-expectancy at birth is 62 years. Hampson et al. (2015) inferred that the probability that a person would receive rabies post-exposure prophylaxis (PEP) was significantly lower in countries with low HDI.

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Consequently, establishment of rabies in the domestic dog population in PNG would likely have a high impact; not only to individuals, but also to the country due to lost productivity and the cost of PEP and control measures. Prevention of a rabies incursion is therefore, a high priority for PNG and improving rabies surveillance and response capacities are a current focus for activities of the National Agriculture Quarantine and Inspection Authority (NAQIA).

A previous study in which employees from NAQIA in PNG participated in an expert-elicitation workshop, identified potential routes of entry of a rabies-infected dog to PNG (Brookes and Ward, 2017). The structured methods used in this workshop allowed prioritisation of routes for detailed risk assessment and subsequently, the comparative risk of three land and two sea routes throughout coastal and border provinces in PNG were investigated (Brookes et al., 2017). Overall, dog movement across the Papua Province – PNG land-border was estimated to pose the greatest risk, especially those associated with hunting and traditional border crossers (TBCs) in the South Fly District of Western Province, and associated with TBCs in the Vanimo-Green River District in West Sepik Province. Due to the structured nature of the methods used in the expert-elicitation workshop, only routes for which participants could make quantitative estimates – for example, the annual number of commercial fishing boats arriving in PNG – could be prioritised. During the workshop, participants also discussed aspects of land-border travel. For example, they stated that ‘trans-migrants’ (foreign nationals who enter PNG illegally for permanent residency) could also bring a rabies-infected dog to PNG, especially via the land-border, and described how changes in industry such as increased oil palm plantations and development of commercial fishing along the north coast attracted workers from Indonesia.

Given the length of the land-border (> 700 km), the limited control of immigration between Papua Province and PNG and the estimated, comparatively high risk posed by land-routes relative to sea routes, we considered that further investigation of the entry of dogs to PNG via the land-border was warranted. Therefore, the objective of this study was to investigate the routes and circumstances of dog entry to PNG from rabies-endemic Indonesian islands. We used qualitative methods involving fictional newspaper reports of rabies incursions for participants to respond to in order to elicit a set of outbreak narratives. We believe that the use of fictional reports to elicit outbreak narratives is novel, and present this as an extension of established methods in which outbreak narratives are used identify and describe the contexts and consequences of disease epidemics (Leach and Scoones, 2013; Herring, 2010). In this body of scholarship, the focus is on how the discourses surrounding a disease outbreak are: ‘constructed, mobilized and interact, [to]

selectively justify pathways of intervention and response’ (Leach and Tadros, 2014, 240).’ Rather than critically examine existing discourses, in the current study, we have supplied participants with a series of simple descriptive narratives. Drawing on their located knowledges, understandings and practices, participants were asked to construct the underlying mobilities, exchanges and entanglements they believe most likely to lead to specific outbreak outcomes.

Based on participants’ local knowledge and professional experiences as NAQIA officers, each outbreak narrative describes a potential transmission route and set of circumstances that they believed could lead to a rabies outbreak in specific locations in PNG. Consistent with the tenets of ethnographic content analysis (ECA), we then interpreted the resulting narratives within the social and political context of their production (Altheide, 1987). Drawing on both numerical and narrative data, the ECA allowed us to elucidate patterns and develop detailed comparisons of participants’ causal interpretations of the events described in each newspaper report (Hsieh and Shannon, 2005). This approach to narrative analysis is novel in the context of biosecurity research, and builds on recent participatory work in One Health (Coffin et al., 2015; Scoones et al., 2017). The information and hypotheses about mobility, connectedness and practices of exchange generated from this study will complement quantitative risk assessments to direct canine-rabies prevention, surveillance and incursion response strategies associated with rabies-infected dog entry via the Papua Province – PNG land-border.

2. Materials and methods

2.1. Survey

Participants were purposively selected from employees at NAQIA in PNG, based on their region of work and years of experience in animal biosecurity. A questionnaire was designed to investigate routes of rabies incursions between Indonesia and PNG, via the Papuan – PNG land border (details below). The questionnaire was designed in SurveyMonkey™ and implemented between 3/11/2015–17/11/2015. Ethics approval was granted for this study by the University of Sydney Human Research Ethics Committee (2015/781).

2.1.1. Questionnaire design

PNG is canine-rabies free, and the questionnaire presented three fictitious rabies-incursion scenarios at Madang town, Tabubil (Sisimamak) and South Fly District. Locations for the incursions were chosen to maximise variation between scenarios. Scenario locations are



Fig. 1. Map showing locations of fictitious rabies-incursion scenarios in a study to identify routes and circumstances of potential entry of a rabies-infected dog into Papua New Guinea from rabies-endemic islands in Indonesia.

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