

Research and capacity building activities on zoonotic viruses in Lao PDR



Sample collection at the slaughterhouse in collaboration with the Faculty of Agriculture, Vientiane Capital

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Background

In rural Lao PDR, the population mainly consists of subsistence farmers. Due to the growing demand in food production, livestock productions is expanding which results in a closer interaction between domestic animals, wildlife and humans. This increases considerably the risk of cross-species disease transmission. Backyard rearing of different animal species together further increases the risk for cross-species and zoonotic transmission of pathogens. 60% of the emerging infectious diseases (EID) are zoonoses, which “are diseases

or infections naturally transmitted between vertebrates and humans'' (World Health Organization).

Although birds are the main host of H5N1 strains of influenza virus, sporadic cases of "bird flu" also occur in humans with a mortality rate of about 60%. Pigs are susceptible for influenza A viruses from different hosts (e.g. humans and birds). When pigs are co-infected with viral strains from different species, reassortant viruses with pandemic potential can emerge. Pigs are also main reservoir of hepatitis E viruses (HEV) and the risk for zoonotic transmission of HEV is highest when people are in direct contact with pigs or when people consume raw pork products.

In addition, indirect transmission of zoonotic pathogens via contaminated water and environment occurs in regions with insufficient hygiene practices and limited sanitation access. Although most HEV infections are asymptomatic or self-limiting, HEV is considered a major cause of acute viral hepatitis. In particular, pregnant women and individuals with pre-existing chronic liver disease may develop fulminant hepatitis upon infection. Furthermore, immunocompromised patients are at high risk for chronic HEV infections. It is known that several zoonotic viruses circulate in Lao PDR, however pathogen occurrence is under-reported across the country due to the insufficient capacity to implement national disease surveillance and vaccination campaigns.

For combating and controlling the emergence and outbreaks of infectious diseases, disease surveillance is essential. Our studies aim at providing baseline data on virus circulation among the animal and human population in rural Lao PDR. By actively involving the local collaboration partners in the sample collection, processing and laboratory analyses, we aim at increasing the capacity for disease surveillance in Lao PDR. The results of the studies are regularly reported to the collaboration partners and to the affected population to raise awareness on infectious diseases and on possible prevention

measures.

High circulation of HEV among slaughter pigs and humans occupationally exposed to pigs in Vientiane Capital

Hepatitis E virus (HEV) occurs worldwide, but with different epidemiological characteristics: while zoonotic infections play a major role in developed countries, waterborne infections are common in developing countries. This cross-sectional study from Lao People's Democratic Republic (Lao PDR) aimed at determining the seroprevalence of HEV in slaughter pigs, the general population and in people occupationally exposed to pigs. In addition, risk factors for HEV infection and awareness about HEV were evaluated. Anti-HEV IgG seroprevalence was assessed in a risk cohort (i.e. slaughterhouse workers and pig farmers), a control cohort and in slaughter pigs by ELISA. In addition, we aimed at identifying statistically significant associations between anti-HEV positivity and behavioural and demographic variables obtained by questionnaire from the risk cohort. Our data suggest that direct and indirect pig-to-human transmission of HEV contributes to the high endemicity in Lao PDR. Increasing the awareness of the health benefits of basic biosecurity measures would decrease the risk of HEV infection.

Influenza viruses in pigs and poultry

Although a National Avian Influenza Control and Pandemic Preparedness Plan ensures a timely and coordinated response in the case of an eventual influenza pandemic in in Lao PDR, knowledge about influenza circulation among its principal animal reservoirs remains underinvestigated. In this cross-sectional study, we assessed by RT-PCR and by ELISA kit, influenza A virus circulation among pigs and poultry from different provinces and at different time points. We find evidence for reverse zoonosis events. However, it remains

unclear whether pH1N1 is endemically circulating in pigs or whether repeated reverse zoonotic transmission occurred.



Sample collection at backyard farms in collaboration with the Faculty of Agriculture, Vientiane Capital

Ruminants as potential reservoirs of zoonotic Hepatitis E virus in rural Lao PDR

Zoonotic Hepatitis E virus (HEV) occurs worldwide and apart from pigs, ruminants are susceptible to HEV strains with zoonotic potential. We presumed that zoonotic transmission of HEV is likely in regions where humans and ruminants closely interact, such as rural Lao PDR. In this cross-sectional study, HEV prevalence was estimated using commercial ELISAs, and risk factors for HEV infection were statistically assessed. We show that HEV circulates endemically in ruminants from rural Lao PDR and provide first evidence that ruminants play a significant role as reservoir of zoonotic HEV. The gained knowledge on HEV epidemiology and on local risk habits should be taken into account when conceiving locally adapted biosafety measures.



Sample collection in the villages
in collaboration with the Faculty
of Agriculture and Veterinarians
without Borders-Canada