



Raw fish consumption in liver fluke endemic areas in rural southern Laos

Vilavanh Xayaseng^{a,b,c}, Khampheng Phongluxa^{a,b,c}, Peter van Eeuwijk^{c,d},
Kongsap Akkhavong^a, Peter Odermatt^{b,c,*}

^a National Institute of Public Health, Ministry of Health, Vientiane, Lao People's Democratic Republic

^b Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel, Switzerland

^c University of Basel, Basel, Switzerland

^d Institute of Social Anthropology, Basel, Switzerland

ARTICLE INFO

Article history:

Received 7 January 2013

Received in revised form 27 March 2013

Accepted 28 March 2013

Available online 6 April 2013

Keywords:

Raw or insufficiently cooked fish dishes

Food preparation

Raw fish consumption

Liver fluke

Laos

Opisthorchiasis

Opisthorchis viverrini

ABSTRACT

Consumption of raw or insufficiently cooked fish is a major public health concern in Southeast Asia, and in Lao People's Democratic Republic (Lao PDR), in particular. We aimed to assess the knowledge, attitudes, perceptions and practices of villagers in liver fluke endemic areas related to raw fish preparation, consumption and its health consequences. In February 2010, eight focus group discussions (FGDs, 35 men and 37 women total) and direct observations were conducted in four randomly selected villages in Saravane District, Saravane Province (Lao PDR). FGDs distilled the knowledge, attitudes, perceptions and practices of adult community members on raw fish preparation, consumption and its consequences for health. Conversations were transcribed from notes and tape-recorders. MaxQDA software was used for content analysis. Knowledge regarding the health effects of raw fish consumption was heterogeneous. Some participants did not associate liver fluke infection with any ill health, while others linked it to digestive problems. Participants also associated vegetables and tree leave consumption with liver fluke infection. The majority of FGD participants considered fish flesh that had been prepared with weaver ant extract to be safe for consumption. Visual appearance, taste, smell and personal preference were given as reasons for consuming raw fish dishes. Moreover, participants considered it a traditional way of food preparation, practiced for generations in Laos. Ten different fish dishes that use raw or fermented fish were identified. All FGD participants reported consuming dishes with raw fish. This study reveals a low degree of knowledge among local people on the health risks related to frequent consumption of raw or insufficiently cooked fish. Fish dishes were considered to be 'well-prepared' (that is, 'cooked') even though the fish had not been heated. In future, successful health education campaigns will have to address the specific knowledge, attitudes, perceptions and practices of the concerned population.

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1. Introduction

Raw and insufficiently cooked food consumption is very common in Southeast Asia (Grundy-Warr et al., 2012). In Lao People's Democratic Republic (Laos, Lao PDR) raw food consumption has deep cultural roots. For instance, in the southern Saravane Province, up to 90% of village populations regularly consume raw or insufficiently cooked fish (Sayasone et al., 2007). Food transmitted parasitic infections are, as a matter of course, very common in Laos. Of major public health concern is infection with the liver

fluke *Opisthorchis viverrini*, a food-borne trematodiasis transmitted through the consumption of raw or insufficiently cooked fish. *O. viverrini* infection may lead to severe hepatobiliary pathologies, depending on the duration and intensity of infection (Mairiang and Mairiang, 2003; Mairiang et al., 2012; Sayasone et al., 2012). A most severe complication is cholangiocarcinoma, a fatal bile duct cancer (Sripa et al., 2011, 2012).

O. viverrini infection is endemic in several countries in Southeast Asia (Sithithaworn et al., 2012) and in all provinces of Laos (Rim et al., 2003). It is highly prevalent in central and southern Laos, reaching infection rates of more than 90% in adult populations (Forrer et al., 2012; Sayasone et al., 2007, 2011). It is estimated that over 2 million Laotians are currently infected with liver flukes (Sithithaworn et al., 2012). Mixed infection (multiparasitism) with food-borne trematodiasis, such as *O. viverrini*, and minute intestinal flukes, such as *Haplorchis taichui* and others, is

* Corresponding author at: Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Socinstrasse 57, P.O. Box, 4002 Basel, Switzerland. Tel.: +41 61 284 82 14.

E-mail address: peter.odermatt@unibas.ch (P. Odermatt).

also very common in Laos PDR (Sato et al., 2010; Sayasone et al., 2009).

To combat the problem, the Ministry of Health employs an intervention strategy of preventive chemotherapy using praziquantel (single dose 40 mg/kg body weight) combined with health education and promotion of latrine use. However, in the presence of widespread and frequent consumption of raw or insufficiently cooked fish dishes, rates of re-infection with *O. viverrini* are rapid and high. Hence, food consumption behaviour change is a prerequisite for sustainable control of liver fluke infection and associated diseases (Ziegler et al., 2011).

To advance our understanding of how best to achieve food consumption behaviour change in this context, we studied villagers' knowledge, attitudes, perceptions and practices related to the consumption of raw and insufficiently cooked fish dishes in rural communities in southern Laos that are highly endemic for liver fluke infections. We conducted a qualitative study using focus group discussions (FGD) and direct observation in four villages in Saravane Province.

2. Methodology

2.1. Study design and area

This research was part of a larger project in Saravane District, Saravane Province, on "Rolling out preventive chemotherapy to achieve rapid and sustained impact on opisthorchiasis and soil-transmitted helminthiasis in Lao PDR: an intervention study in Saravane District", which was launched in January 2010. We used direct observation and FGDs (Dawson et al., 1993; Silverman, 2007) to collect qualitative information on the knowledge, attitudes, perceptions and practices related to liver fluke infection and raw and insufficiently cooked fish consumption.

The study was carried out in February 2010 in four randomly selected villages in Saravane District, namely in Hangphounoy, Napheng-Gnai, Songkhon and Nongboua-Gnai. Saravane District is located in the low plain of Saravane Province (in the southern part of Lao PDR) and has a total population of 94,965 people (48,636 women) living in 179 villages and 13,239 households; the average income is 762 USD/person/year; 674 families are categorised as poor (4.8%); and the annual fertility rate is 2.4%. Saravane District is located around the provincial capital Saravane, where a provincial hospital with 70 beds is located. This district has 9 health centres, 19 pharmacies, 91 villages with drug kits and 67 health workers (unpublished report of Saravane District Health Office, 2009). In 2007, exceedingly high *O. viverrini* infection prevalence rates of 80.0% per village were observed in Saravane District, latrines were barely available and knowledge of liver fluke infection was scarce. Most people harboured two worm species (Sayasone et al., 2007).

2.2. Characteristics of study population

FGD participants were adults aged 16–59 years from randomly selected households in four study villages. They had lived in the village for at least one year. Each FGD included 8–10 local participants. Two FGDs were conducted in each of the four villages: one with men and the other with women.

2.3. Data collection

Direct observation was carried out during visits to the four villages and results were noted. Observations focused on the cleanliness of houses, the type of water supply available, the distribution of information, education and communication campaigns (e.g., poster), and food preparation and consumption practices. FGDs

were held at the Buddhist temple or at another appropriate protected public space. FGDs were led by a moderator and an assistant who took notes. All FGDs were conducted in Lao language and recorded by a digital tape recorder. Four FGDs with 35 men and four FGDs with 37 women were carried out.

A moderator led the discussion, using a discussion guide. An explanation of the parasite and its transmission was not provided to FGD participants beforehand. Using open-ended questions, participants were asked about their knowledge of liver fluke infection and associated health problems. The main questions posed in this discussion were: (i) describe "san tap" or "pha yat bai mai nai tap" (liver fluke – opisthorchiasis); (ii) how is it transmitted to humans and what diseases and symptoms does it cause?; (iii) what other worms do you know, how are they transmitted to humans and what diseases and symptoms do they cause?; and (iv) explain how worms cause health problems in your community. Discussions about the participants' attitudes and perceptions focused on judgements and experiences regarding raw or insufficiently cooked fish preparation and consumption. Discussions about related practices centred on the mode of preparation of fish dishes and their consumption. For these two discussions, the main questions asked were: (i) tell us about the kind of food you eat most often; (ii) where do you find your food? (iii) describe how you prepare beef and pork?; (iv) explain how you cook fish; (v) give details of your raw fish consumption; what type of dish do you eat most often? When and on which occasions do you eat raw fish? Why do you eat dishes made of raw fish?; (vi) tell us about raw fish consumption in your family.

2.4. Data management and analysis

Notes and tape-recorded discussions were transcribed into Lao the day after the discussion. Subsequently, the transcripts were translated into English and imported into MaxQDA (version 10, VERBI Software). The statements were coded in different groups and categories; all coded data were retrieved and exported to Excel form for frequency analysis and content exploration.

2.5. Ethical considerations

Province, district and village authorities were informed about the study and their approval was obtained. The objectives and procedures of the study were explained in detail to FGD participants. It was made clear that discussions would be tape-recorded. All participants gave their written informed consent prior to enrolment. Ethical clearance was obtained from the Ethical Board of WHO and the National Ethics Committee for Health Research (NECHR), Ministry of Health, Vientiane, Lao PDR (Reference No. 169/NECHR, 1 April 2008).

3. Results

3.1. Observations

On several occasions, we observed villagers eating raw fish dishes. For instance, during our field visit to Napheng-Gnai, we observed people preparing and consuming a sticky raw fish dish, which was also served with Lao alcohol ("lao lao" made of rice). The villagers, irrespective of their ethnic group or age, commonly consumed papaya salad with raw fermented fish sauce. The fish species used for these dishes were tracked and photographed in the Saravane market (Fig. 2b).

We looked at health education posters on the walls of village authorities' houses and health centres. Posters were distributed by the Saravane District Health Office. They displayed information on bird flu prevention, hand washing with soap and latrine use, impregnated mosquito bed net use and rapid diagnostic

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