

## Risk Factors for Taeniasis Prevalence in Rural Sichuan Province, China

**Background:** *Taenia solium* taeniasis is a foodborne illness caused by the consumption of pork that has been infected with juvenile tapeworms. While taeniasis is contained to the small intestine and often presents asymptotically, it is the necessary precursor to cysticercosis: a debilitating disease of the muscles, eyes and brain. By breaking the taeniasis lifecycle, both taeniasis and cysticercosis can be controlled. As such, the present study aims to investigate taeniasis transmission routes in order to elucidate risk factors for infection that could serve as future areas of intervention.

**Methods:** The study followed a two-stage sampling design. Seven villages in rural Sichuan Province, China, were selected by student cysticercosis prevalence level (high or low), as determined by a preceding school-based study. Fieldworkers surveyed an average of 90 adults per village about social and demographic factors, animal ownership and symptoms of disease. These data were used to describe the distribution of exposures in villages with high and low Associated Student Cysticercosis Levels (ASCL), estimate taeniasis and cysticercosis prevalences, and build causal models of taeniasis transmission using logistic regression.

**Results:** 630 households from seven villages consented to participate. Across the villages, taeniasis prevalence ranged from 4.6% (95% confidence interval [CI]: 1.3, 11.4) to 24.3% (95% CI: 14.8, 36.0) and cysticercosis prevalence ranged from 2.3% (95% CI: 0.3, 8.0) to 8.7 (95% CI: 3.8, 16.4). In adjusted analyses, consumption of undercooked pork was associated with a 2.30 times higher taeniasis prevalence (95% CI: 1.01, 5.25;  $p=0.058$ ) and use of commercial pig feed was associated with 81% lower taeniasis prevalence (95% CI: 53%, 93% reduction,  $p<0.001$ ).

**Conclusions:** Consumption of undercooked pork may increase taeniasis prevalence while the use of commercial pig feed may decrease it. Future research should endeavour to employ more sensitive diagnostic tools and attempt to establish dose-response effects. Overall, future interventions may be successful in controlling taeniasis transmission, and the resulting spread of cysticercosis, if they focus on improving pork preparation and pig feeding practices.

## **Small places, big problems: Understanding environmental health in smaller African urban centres**

### **The case of Karonga Town, Malawi 2016-2017**

Africa is simultaneously the world's least urbanised and second most rapidly urbanising continent following Asia. Most of Africa's future urban growth is expected to occur south of the Sahara Desert, where as much as 40% of the urban population is estimated to live in small towns and cities with fewer than 500,000 inhabitants. These smaller urban centres are also expected to accommodate a growing share of future urban growth with urbanisation. But many suffer from a lack of capacity to plan and manage urban growth, provide basic infrastructure and services, and adapt to emerging environmental hazards (including disasters and climate change). Levels of poverty also tend to be high in smaller urban centres, with levels of health care often similar to rural areas.

Environmental health may therefore not only be especially poor in smaller African urban centres, it may also be worsening. Yet virtually all research on urban environmental hazards comes from the largest cities. Consequently, very little remains known in smaller urban centres about what the most serious environmental hazards are, even less about whose health is most at risk and why, or how urban planning and public health can effectively respond.

At the same time, existing knowledge on the relationship between urban planning and public health remains overwhelmingly based on research in Europe and North America. There are serious concerns as to whether this knowledge is appropriate in the global South, where the assumptions of urban planning do not necessarily apply. In this context, this study addressed the disconnection between (a) existing evidence on environmental health problems in the largest cities versus smaller urban centres, and (b) existing knowledge on urban planning and public health in the global North versus the global South. In doing so, it drew on a detailed case study of Karonga Town, one such smaller urban centre in Malawi, to contemplate the prospects for reconnecting these two fields in these increasingly important contexts.

## **What do men in the Samburu tribe think about family planning programs that relate family size to the environment?**

### **Introduction**

Men have been identified as a barrier to the uptake of family planning services in Sub-Saharan Africa. This study investigated the thoughts of men from the pastoral Samburu tribe in Kenya on the Community Health Africa Trusts' (CHAT) PHE programme, focusing on their views about the relationship between family size and the environment.

### **Methods**

I carried out three focus group discussions and nine semi-structured interviews with a total of 27 Samburu men equally divided into the age groups 18-30, 30-45 and 45+. Following translation and transcription of the qualitative data collected, I conducted a thematic analysis.

### **Results**

Men universally supported the environmental education that CHAT's FP programme delivers, highlighting their dependency on natural resources, and how it is difficult to provide for a large family and maintain livestock during prolonged drought. Having many children and large herds of livestock were said to lead to exhaustion of natural resources, environmental degradation and wildlife dispersal. Key economic and educational benefits to the community from environmental and wildlife conservation were highlighted, along with the start up of businesses by women and increased education of children leading to future employment. Large family size and traditional livestock practices were understood as incompatible with wildlife conservation. Despite understanding the benefits of FP, not all men intended to use contraception in their own homes. Men encouraged CHAT's programme to visit communities that continued to live with large families and livestock, describing them as responsible for a resource exhaustion-migration cycle that caused environmental degradation in the region.

### **Conclusions**

Relating family size to the environment is a compelling strategy to improve support for FP among Samburu men. This is largely due to the demonstrated economic and livelihood benefits that reductions in family size, and the resulting improvements in natural resource availability and wildlife conservation bring to the community. CHAT should continue to provide its PHE FP programme in the region, expanding where possible to include hard-to-reach communities. Kenyan FP policy should consider integrating community-based PHE strategies among underserved pastoral groups living in fragile ecosystems.

## **Active Living in Glasgow's Neighbourhoods: a qualitative investigation into the role of physical and social environments in physical activity**

Recent research shows a physically active lifestyle can significantly reduce mortality, independent of overweight and obesity. However, population levels of physical activity are extremely low. As with other aspects of health, there is a social gradient to physical activity, with low socioeconomic status groups achieving less activity than others.

Socio-ecological models of physical activity hypothesise that the physical environment, social/cultural environment and individual characteristics exert independent and interactive influences on activity. Previous research has demonstrated that features of the physical environment such as street lighting, maintenance, green space and aesthetics are related to physical activity. Likewise, aspects of social capital such as social cohesion, feelings of belonging and trust between neighbours have been shown to be associated with increased physical activity levels. However, while there is a push to create physical environments with more opportunities for physical activity such as walking, there is little research exploring how active environments may be affected by levels of social capital. It could be hypothesised that an active physical environment will only be successful in increasing residents' physical activity when it is supported by social capital, or vice versa.

A recent publication using data from a sample of adults living in socially-rented housing in Glasgow presented significant independent relationships between neighbourhood walking and self-reported aspects of the physical environment and social capital. In order to provide further insight to these associations, this project collected new qualitative data in two GoWell study areas: Drumchapel and Govan. The project used photovoice methodology to explore features of the physical environment that are related to social capital (e.g. communal space, indicators of vandalism or poor upkeep, opportunities for natural surveillance) and how residents believed they relate to their propensity to be physically active (engaging in walking, light, moderate and vigorous activity).

A total of 23 participants residing in social-rented accommodation provided neighbourhood photographs and participated in a semi-structured interview lasting 45-90 minutes. Of these participants, 20 also completed a questionnaire including items on socio-demographics, physical activity behaviour, social capital and perceptions of the local physical environment. Participants were relatively evenly distributed across neighbourhoods (Govan=12, Drumchapel=11), sex (male=10, female=13) and age (16-24 years=5, 25-39 years=6, 40-60 years=5, >60 years=4, didn't answer=3). Both physical and social environments were viewed as important in creating active environments and regularly interacted with each other. Further thematic analysis of interview transcripts is currently being conducted in NVivo 10.

## **Design and user management characteristics of latrines associated with fly and larval densities in the Kilombero district of Tanzania**

### **Background**

Latrines provide a favorable environment for certain flies to breed and or feed. These flies can carry excreted pathogens to human food and fomites. There is very little known on why some latrines attract large numbers of flies while other latrines nearly fly-free. This project seeks to describe which characteristics of latrines are associated with high fly densities to inform evidence-based latrine design to ultimately lessen this mode of diarrhoea transmission.

### **Methods**

This study was a cross-sectional survey nested within the longitudinal pit latrine study currently taking place in the Kilombero valley. Forty-two latrines were studied in the villages of Sululu, Signali and the town of Ifakara. The longitudinal study gathered the data on the design and user management features of latrines using questionnaires. Adult flies were collected using 24-hour exit traps that were placed over the latrine drop-hole. Larvae samples were collected by dipping a ladle into the pit contents; only 24 latrines were suitable for larva dipping.

### **Results**

A total of 3,539 flies were caught, ranging from 0 to 951 per trap. Four traps caught zero flies. The mean number of flies per trap was 84 (95% CI: 32-139). The dominating families in traps were Psychodidae and Calliphoridae, making up 99% of the total catch. The presence of a roof was found to have the strongest association with mean total fly numbers. Latrines with roofs had an average of 41 flies (95% CI: 12-70) compared to an average of 242 flies (95% CI: 23-461) in latrines without roofs. There is strong evidence that the difference in mean fly numbers was not due to chance ( $p=0.0008$ ).

### **Conclusions**

This study suggests that the mean number of flies emerging from latrines may be associated with the presence or absence of a roof. Whether this is due to the amount of light entering the latrine, the temperature or the ease of access for the flies is unknown. This knowledge provides a foundation for future studies on the characteristics of latrines associated with high and low fly densities. Building a roof should be explored as a simple, low-cost modification for fly control.

## **An evaluation of pay for performance incentives for community health workers**

### **Background**

Designing effective incentive systems for community health workers (CHWs) represents a longstanding policy issue with substantial impact on the success and sustainability of CHW programs. Using pay-for-performance (P4P) incentives for CHWs represents a novel approach worthy of testing and evaluation. This report evaluates the use of P4P incentives for CHWs in Kisoro, Uganda.

### **Methods**

Surveys were conducted of CHWs (n=30) and programme supervisors (n=7) to assess system acceptability and feasibility. Interviews were conducted with all 8 programme supervisors and with 6 purposively selected CHWs to gain further depth on issues raised in the surveys. Programme budget records were used to assess the costs of the programme. Detailed payment records were used to examine overall programme outputs (i.e., patients identified, sanitation facilities built, community talks delivered, follow-up visits to families with high-risk issues, etc.), the impact of CHW and village characteristics on success under the P4P system, and changes in payments over time.

### **Results**

In surveys and interviews, supervisors expressed high satisfaction with the pay-for-performance system. CHWs perceived the system as generally fair, but complained that they were underpaid for their work. The annual total programme cost was \$18,000 for 34 CHWs (including training, supervision, administration and stipends); \$516 per CHW, and \$1.12 per individual served by the program. CHWs covering more households tended to earn more. There was no evidence that male gender, greater education, or closer proximity to the hospital were associated with higher earnings. Payment amounts declined over the course of the year; however, payment amounts were essentially equal in the rainy and dry seasons.

### **Conclusion**

Pay-for-performance incentives require close supervision of CHWs and detailed record-keeping. In settings where this is possible, performance-based incentives can aid in the development of highfunctioning, data-driven CHW programs.

## **Piloting a sanitation related risk assessment methodology using innovative data collection and processing techniques in Maputo, Mozambique**

Public health issues due to a lack of proper sanitation are a serious concern throughout the developing world, where incidence of faecal-oral transmitted disease is significantly higher than in the developed world. Every 20 seconds a child dies as a result of poor sanitation (UN Water, 2013). One of the principal reasons cited for sanitation health risk is the mismanagement and lack of understanding of municipal sanitation infrastructure (WHO, 2007).

This study aimed to demonstrate the effectiveness of innovative data collection and processing methods in order to survey the condition of critical sanitation infrastructure elements and estimate the risk to human health arising from sanitation system malfunctions in a given urban area. The goal was to demonstrate the validity of a rapid and practical methodology suitable for use in a development context which would enable decision makers to understand the scale of the problem and maximize cost-effectiveness of infrastructure interventions.

This report documents the piloting of a proposed methodology in Maputo, Mozambique. It combines participatory research methods, sanitary surveying and risk assessment techniques. The results of this research project are two-fold:

- The results of the methodology application describe the sanitation problems that Maputo is facing and were analysed to explore different infrastructure intervention options.
- The practical application of this experimental methodology provided insight into the validity of the techniques used. The challenges and benefits of using this innovative approach were discussed and options for further refinement and validation of the methodology were given consideration.

The application of the methodology revealed that the sanitation system that presents the greatest risk to human health in Maputo is the sewer system. The low hanging fruit in terms of infrastructure interventions to reduce risk to human health is refurbishment of the waste stabilisation ponds which are severely mis-managed and in disrepair.

In the context of methodology development, integrating participatory research, sanitary surveying and risk assessment techniques proved suitable for data collection in the development context. Steps to ensure their efficacy in this type of application were uncovered as were many possible sources of error. Due to a lack of information in the literature the accuracy of the methodology could not be definitively confirmed. Necessary steps for refining the methodology and confirming its validity were identified.