International Livestock Research Institute

Incorporating equity in agricultural research: Social science capacity building for veterinary students

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Summary

Poverty is a problem in Malawi and agriculture has the potential to contribute to the country's national economy. Incorporating an equity dimension in agricultural research and delivery can highlight where the gaps are and define who in the society is affected more (by factors such as gender, age or location). This evidence can then be used as a basis for resource allocation and prioritization of interventions.

Five undergraduate students pursuing degrees in veterinary medicine at Lilongwe University of Agriculture and Natural Resources were supported to incorporate equity in their final year thesis work. A few inequities were observed in their studies. In the poultry value chain, women were found to have no power to make decisions on procuring of Newcastle disease vaccines and this likely impacted on disease control. In the pig value chain, women did more work in caring for the animals than men and youth. The helminth study found that families living near wildlife reserves were exposed to zoonotic strongyloidiasis and the risk of exposure was high among pregnant women and children. Although men dominate in catfish production, women do most of the processing work.

This relatively small project gave the first veterinary medicine graduates of Malawi an opportunity to gain skills related to equity which can improve their ability to work with communities, academicians, donors and development agents. More work is needed to build on the students' findings.

Background

Malawi is a landlocked country with an area of 94,522 square kilometres and a population of 17,563,749 people (Kanyuka 2019). It is still one of the poorest countries in Africa (Kemp et al. 2003) despite economic and structural reforms (World Bank 2019). The agriculture sector is the main source of livelihood, supporting 86% of the population that belong to farming families and contributing over 30% of total Gross Domestic Product (IMF 2017; Mussa 2017).

Around 56% of the population keep livestock. Commonly kept livestock are chicken (50% of households), goats (25%), pigs (10%) and cattle (5%). Households with livestock are richer and more food secure. However, very few buy inputs for livestock which are mostly reared in a low-input system.

Some goods and services are necessities and should be distributed according to the level of need (Jones 2009). The need to address inequality in Malawi is highlighted in Vision 2020 but this is yet to be acted upon (Mussa 2017). Various forms of inequities persist in the country. Zere et al. (2007) conducted a study to assess equity in Malawi and found publicly provided services to have benefited the rich more than the poor. Poverty rates are higher in rural than in urban areas (World Bank 2007; Mussa 2017). Public health facilities are unable to deliver basic services (Kemp et al. 2003). About 60% of primary school students entering Class 1 reach Class 5 and about 39% reach Class 8 (World Bank 2007). Illiteracy is high among rural women and gender balance is a problem at higher levels of education (FAO 2011). Men have opportunities to diversify their economic activities (FAO 2011) thus women are disadvantaged when income from agriculture is limited.

Considering equity in agricultural research can help highlight the needs of particular groups in society (gender, age, religion or area). It ensures that individuals have access to the same opportunities (e.g. access to inputs). Such can influence decision-making processes, help inform allocation of scarce resources and contribute to economic growth. Sensitizing students early in their career is one way of promoting the concept and ensuring this is considered in future research. Inequity can constrain delivery of essential services and impact on the health and economic wellbeing of communities. We provide a summary of equity findings from research projects implemented by students enrolled at Lilongwe University of Agriculture and Natural Resources.

Participatory epidemiology, ecohealth and One Health are appropriate approaches for helping veterinary researchers reach poor livestock keepers. Key principles are interdisciplinarity (different disciplines working together) and transdisciplinarity (communities, researchers and policymakers working together). All these approaches assume that the health of people, animals and the environment are interdependent.

Approach

Lilongwe University of Agriculture and Natural Resources was created in 2010 after the merger of Bunda College of Agriculture and the Natural Resources College. Bachelor of Veterinary Science is the university's youngest degree program and the veterinary school is the youngest in Africa. Previously, Malawi's veterinarians were trained outside the country which was very expensive and limited the number of veterinarians entering the profession. In 2019, the university graduated Malawi's first 12 'home-grown' veterinarians.

A two-day training program on equity was designed for and delivered to students pursuing degrees in Bachelor of Veterinary Medicine at Lilongwe University of Agriculture and Natural Resources. The degree is offered by the Department of Veterinary Biomedical Sciences. The focus of the training was on equity and how it can be integrated into veterinary work (Waithanji and Roesel 2018). Following the training, the CGIAR Research Program on Agriculture for Nutrition and Health and the International Livestock Research Institute (ILRI) funded five students to include equity in their research projects. The training also included participatory epidemiology as an approach to data collection (Figure 1). It was assumed the students would use this to collect data on equity. It is a university requirement that all final-year veterinary students design research projects and collect data and use these to prepare thesis reports before graduating.

Figure 1: Participatory data collection (photo credit: Lawrence Banda).

Findings

Background on topics supported

Researchers from ILRI were invited to attend a session where 12 final year students were to present their proposals. The plan was to listen to the presentations and identify those in which gender and equity could easily be incorporated in the projects. Newcastle disease in poultry, milk safety, pork cysticercosis, strongyloidiasis (in vervet monkeys) and catfish were the topics selected for funding.

Newcastle disease is an important disease in rural poultry systems (Guèye 2005) and vaccination is key to addressing it. Smallholder poultry production constitutes about 90% of Malawi's total production (Chintsanya et al. 2004), supplies 13–40% of urban requirements for meat and eggs and meets 100% of the rural demand (Government of Malawi 2013). Chickens are easily managed by women and children and there are fewer restrictions to their consumption by different religions, ethnicities and genders (Government of Malawi 2013). Guèye (2000), in a review of backyard poultry in Africa, states that women generally own and care for poultry. In Malawi, chickens are housed in the same dwellings where people live, in median flock sizes of 12 (Gondwe and Wollny 2005).

Smallholder dairy farmers own one or two cows each (Anon 2016) and are mainly located in Blantyre, Lilongwe and Mzuzu (Revoredo-Giha and Toma 2016). The farmers are organized into milk bulking groups which collect milk from farms, store it in cooling tanks and sell it to processors (Gift 2012). About 19% of the milk is retained on farm and the rest is sold to milk bulking groups (Anon 2016). Milk from local zebu cattle is consumed at home or informally traded (Gift 2012). There are about 10,000 dairy and 1.2 million zebu cows (Anon 2016). Cold-chain handling of milk is a challenge for milk bulking groups (Baur et al. 2016) and this is made worse by frequent power failures (Gift 2012). Although generators may be available, they may not achieve sufficient power rating for effective cooling of the milk (Gift 2012). Milk is tested for adulteration and acidity (Revoredo-Giha and Toma 2016). About 17% of milk is rejected by processors and some of the rejected milk ends up in the informal market (Anon 2016). Bacterial contamination has been reported at farms and bulking centres (Gift 2012). Urban consumers prefer to consume safer pasteurized or ultra-pasteurized milk (Akaichi et al. 2016).

Pig-keeping has been considered an entry point to wealth creation in Malawi (Phiri 2012). A 2018 article (www.pigprogress.net) indicated that free-range pigs contribute about 50% of the pork consumed in the country. Allowing pigs to roam freely is an important risk factor for *Taenia solium* but there is scanty information on the occurrence of the disease in the country. Pigs get infected when they eat faeces from infected human carriers or consume feed contaminated with the parasite eggs. Humans are infected when they consume pork with viable *T. solium* cysts. Humans can ingest *T. solium* eggs (through accidental auto-infection) or eat food that is contaminated with the parasite eggs resulting in neurocysticercosis. Neurocysticercosis is an important cause of epilepsy in developing countries (Moyano et al. 2014). Housing and animal welfare concerns were observed (Figure 2).


Figure 2: Pig management in Malawi (photo credit: Lawrence Banda).

Strongyloidiasis is a problem in areas without latrines, where hygiene is poor and where people walk barefoot; children and HIV/AIDS patients are at higher risk of infection (Varatharajalu and Rao 2016). *Strongyloides fuelleborni* is zoonotic and has monkeys and apes as the definitive hosts. Eggs are released in faeces and hatch into rhabditiform larvae which can develop either into infective filariform larvae (which penetrate the skin of the definitive host) or into free-living adults (which mate to produce eggs and release rhabditiform larvae). The filariform larvae migrate to the small intestines where they grow to become adults. The females produce eggs which are passed in faeces (CDC 2019).

In Malawi, fish play an important role in combating food and nutrition insecurity as they are a significant source of protein, vitamins, minerals and micronutrients. Fish are also important in the diets of children (Mlauzi and Mzengereza 2017). Consumption of fish increases as household income rises (Nankwenya et al. 2017). Reducing the costs incurred by value chain actors can reduce inequalities in the sector (where retailers earn more) (Phiri et al. 2013).

Description of findings

Project 1: Comparative efficacy of Newcastle disease vaccines derived from chicken, duck and quail eggs

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The study sought to investigate who within the household had the power to monitor chicken health and make decisions on when vaccines or drugs are purchased. Data were collected using participatory approaches. It was found that poultry belonged to the family but women were primarily responsible for their management. Newcastle disease was rated the most important disease in the study areas. Women had less power to make decisions especially those involving the release of money to buy Newcastle disease vaccines. As a result, vaccination was delayed, losses were incurred and livelihood and nutrition support were threatened. Women had to seek consent from men before selling livestock whereas men were able to sell livestock without consulting the family. This need for women to seek permission may delay the purchase of essential household items which women are mostly concerned about. Access to loans and utilization of other resources in the community was limited. The study also reported unavailability of markets and unfair use of the proceeds from flock sales. Veterinary drugs and vaccines were available although timely access was a challenge.

Project 2: Preliminary investigation of *Taenia solium* cysticercosis in pigs in Malawi

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Equity data were collected through focus group discussions in three Extension Planning Areas of Blantyre. Pigs were ranked either as the most important or second most important species in the community. They are kept in low numbers as farmers cannot afford to buy feeds. Most households had latrines but several of these had been destroyed by rains, making it easy for roaming pigs to come into contact with human faeces and likely increase the risk of *T. solium* spread. Knowledge about cysticercosis was low in the community. African swine fever was also said to be a problem. Pig houses were poorly designed with little consideration of animal welfare. Women were not given as many opportunities as men, despite being more involved in pig production and care than men and youth. However, men were more involved than youth in caring for pigs. There was varied distribution of labour between men and women but not much variation was observed across villages.

Project 3: *Strongyloides* infestation in wild vervet monkeys in Kuti Wildlife Reserve and opportunities for zoonotic transmission

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The study was conducted in the vicinity of a wildlife reserve in Salima, central Malawi. Although the reserve is fenced, it is not electrified so people easily enter it to cut down trees and poach wildlife. Animals can also easily move out of the park, particularly in the month of February. Participatory approaches were used to assess the risk of human exposure to strongyloidiasis from vervet monkeys. Data were collected through 12 focus group discussions. Monkeys invaded the crop fields in farms around the wildlife reserve and contaminated the environment when they defecated. Household hygiene was poor and the risk of strongyloidiasis infestation was low. Exposure was through weeding and walking barefoot and through consumption of contaminated vegetables and fruits. Women used their wrapper cloths to wipe fruits while men used their shirts. Geophagy (eating soil) was popular mostly among children and pregnant women, presenting a risk of exposure in these groups. In some areas, water contaminated with faeces from the monkeys was used to wash babies' diapers. Water was also contaminated with the babies' faecal matter. Children also defecated in the water while bathing. Open defaecation was common in the community. Only a small percentage of women regularly washed their hands after changing babies' diapers. Diarrhoea was a common problem. Hygiene and health interventions (deworming and training) should be considered in addressing the problem. There is need to investigate the observed soil-eating behaviour and, if possible, address nutritional deficiencies in the populations at risk.

Project 4: Safety and economics of milk along the value chain in central Malawi

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In Malawi, there are formal and informal milk value chains. The formal value chain aims to maintain a cold chain from production to processing, packaging and retail. Safety is assured through quality tests, supervision by the regulatory authority at various stages and pasteurization (Revoredo-Giha and Toma 2016). Conversely, the informal value chain lacks cold chain capability, no formal quality tests are conducted and products are not packaged or pasteurized. A cross-sectional study was conducted in rural and peri-urban areas in five districts in Malawi, involving different actors along the dairy value chain: farmers, milk collection centres, transporters, processors, retailers and consumers. The Government of Malawi prohibits the sale of raw milk to consumers because it is not tested for quality and there is no evidence of cow health certification. However, the study found that raw milk was sold and 68% of consumers preferred to buy raw milk because it was cheaper than processed milk and thought to be more nutritious.

Project 5: Sperm preservation method, egg quality and environmental factors affecting brood development in *Clarias gariepinus*

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Catfish production is greatly constrained by lack of seedstock supply in some seasons. There is need for constant supply of gametes for fry production as well as research. The scarcity of seedstock has led to the development of artificial spawning processes. A participatory study was done to establish the current production status of African catfish and the major actors participating in and benefiting from production of African catfish. Men dominated in catfish production while women were mostly involved in fish processing. Increasing the participation of women and youth in African catfish fry production could contribute towards increased availability of seedstock.

Discussion

There is a long-standing concern that veterinary education in Africa is not well suited to development needs. Many veterinary schools were established during the colonial era with an assumption that veterinary graduates would be employed by the government and mainly involved in disease control. However, in recent years, the government has only employed a small proportion of veterinary graduates. Veterinary education has tended to be closely modelled on approaches used in high-income countries where most graduates go on to private practice, mostly looking after companion animals. In low- and middle-income countries, the situation is different as there are very few opportunities in private practice. Yet veterinarians may lack the skills to work in areas where there are many opportunities for professional growth and development, including the rapidly growing livestock industries and development programs.

This relatively small project gave the first veterinary graduates of Malawi an opportunity to gain skills related to equity which can improve their ability to work with communities, academicians, donors and development agents. The research projects funded by the CGIAR Research Program on Agriculture for Nutrition and Health generated useful information and, more importantly, introduced Malawi's first cohort of veterinary graduates to interdisciplinary and transdisciplinary ways of working.

There are plans to support more students in the future. For the 2019/2020 final year class, seven topics have been selected and will be supported. ILRI researchers working on the topics have reviewed the proposals and provided inputs that the students can use to improve on the design. It is expected that the scientists will be involved in reviewing of draft papers after the students have collected their data. Materials on focus group methodology and questions to guide collection of data on equity have been shared with the department for use by students in the field.

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