

The Relevance of Formal and Informal Institutions in Local Chicken Genetic Resource Conservation: A Case of Igunga District, Tanzania

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Abstract

Understanding the relevance of institutions for local chicken (LC) genetic resource conservation forms the basis for the management of Animal Genetic Resource (AnGR). A qualitative study was conducted to assess the relevance of formal and informal institutions on LC genetic resource conservation in rural and peri-urban areas in Tanzania using Igunga district as a case study due to its substantial number of crossbred LC with exotic breeds. Primary data were collected through in-depth interviews with fourteen key informants, ten focus group discussions (FGDs) with farmers as well as documentary review of the existing formal institutions. Atlas.ti (version 7.5.7) computer software was used in the content analysis of data solicited from the key informants and FGDs. Findings show that, formal institutions have low relevance because they are inclined to LC and/or AnGR production rather than its conservation. On the other hand, existing informal institutions such as norms, beliefs, traditional healing and sacrifice have a moderate relevance because they may serve as incentives for the conservation of LC genetic resources. The study therefore suggests that, the government should formulate or improve the existing formal institutions for effective management of AnGR.

Keywords: AnGR management, local chicken conservation, regulatory frameworks, Igunga

Introduction

In many developing countries Tanzania included, local chicken (LC) play an important role to rural livelihoods and they contribute significantly to social cultural, food security and income of smallholder farmers (Padhi, 2016; Singh *et al.*, 2018). More importantly, the scavenging behaviour, disease resistance and ability to thrive under harsh environment are considered as potential genetic attributes of LC (Okeno *et al.*, 2013; Ngeno *et al.*, 2015; Gebremariam *et al.*, 2017). However, the growing chicken demand coupled with limited knowledge on chicken husbandry has led farmers to perceive LC as non-productive and relatively inferior to the high yielding breeds (Biscarini *et al.*, 2015; Zidane *et al.*, 2018). Consequently, this has accelerated the problem of indiscriminate crossbreeding. According to Scherf (2000), out of the 7,000 livestock breeds

including chicken registered in the FAO global database, more than a third are susceptible to extinction.

This study uses the term LC genetic resource conservation interchangeably with AnGR conservation to refer to all human activities including strategies, plans, policies and actions undertaken to ensure that the diversity of LC are maintained to contribute to food production (FAO, 2007b). Globally, two AnGR conservation methods are broadly grouped as; in-situ, in which animals are maintained within the environment where they have conventionally been raised and ex-situ, in which animals are maintained away from their environment where they were raised (Oldenbroek, 1999; Rege and Gibson, 2003).

The Interlaken Declaration (FAO, 2007a), where a Global Plan of Action (GPA) for AnGR was internationally agreed upon spells out the

needs for improved productivity and drawing of long term and sustainable breeding programmes; which are currently mostly non-existent for the local livestock breeds. The GPA identifies four strategic priority areas: i) characterization, inventory, monitoring of trends and associated risks ii) sustainable use and development iii) conservation and iv) policies, institutions and capacity building. The latter emphasizes the strengthening of all institutions involved in AnGR management (Zonabend *et al.*, 2013). In developing countries where sub-Saharan Africa falls, AnGR are a very crucial constituent of biodiversity (FAO, 2003); as such effort to improve food security in these countries lies in wise use of AnGR (Philipsson, 2011). Nonetheless, literature shows that, limited resources and infrastructure are some of the obstacles hindering governments to formulate policies for AnGR conservation (Boettcher and Atkin, 2010). For example, in Tanzania existing animal breeding infrastructures such as the National Artificial Insemination Centre (NAIC) and Tanzania Livestock Multiplication Units (TLMUs) mainly concentrate on breeding and conservation of large animal species such as the Mpwapwa cattle rather than LC (Njombe, 2013). On the other hand, specific studies on LC conducted in Tanzania have concentrated on characterization of the chickens in terms of their physical, production and genetic attributes (Msoffe *et al.*, 2005; Guni and Katule, 2013; Lyimo *et al.*, 2013; Pius and Mbagha, 2018; Mwambene *et al.*, 2019). However, these studies have not shown how the characterized LC can be conserved in wake of existing formal and informal institutions. The knowledge on how the institutions relate to management of AnGR is a key entry point for farmers, decision makers and policy makers to learn on how LC genetic resources can be conserved. Therefore, the study on which the paper is based aimed to uncover the relevance of both formal and informal institutions towards LC genetic resource conservation in Igunga district and Tanzania at large.

Institutions are defined differently by different scholars based on the perspective in which they are inferred: as organizations (Stinchcombe, 1997), as rule of the game

(North, 1990; Nootboom, 1996), as set of rules by a set of individuals to manage repeated actions whose consequence not only affect those individuals but also others (Ostrom, 1992), as shared values and rules and actions focused at enforcing those values (Peters, 2019). These definitions are different but, have one collective insight, that institutions impact individuals. The paper is guided by the definition of institutions by Helmke and Levitsky (2004), that is, institutions are rules and processes (both formal and informal) which configure social relations by restraining and permitting actors' behaviour. By contrast, informal institutions as defined by Mahonge (2010) as unwritten rules, customs, conventions and norms that govern resource use practices and relevant social relations among the resource users. Mahonge's definition is adopted by the paper to refer to community based norms and customs serving the purpose to govern relationships among specific LC users and forms the basis for their actions towards LC genetic resource conservation. Therefore, it can be said that effective AnGR conservation depends on the relevance of formal and informal institutions and how its operationalization is perceived by stakeholders (farmers and regulators). Therefore, the paper aims to unveil relevance of existing institutions towards LC genetic resource conservation. The following questions are answered: (i) what formal institutions are relevant for governing LC genetic resource conservation? (ii) What informal institutions are relevant for LC genetic resource conservation at practice level? (iii) To what extent are the existing institutions relevant to LC genetic resource conservation?

Theoretical Review

This study draws insights from two theories; the Institution Theory (IT) by North (1990) and the Perception-In-Action (PIA) Theory by Gibson (2002). The first theory examines the humanly devised constraints that structure human interactions. In consequence, they structure incentives in human exchange whether political, social or economic. The main argument of the theory is that, the processes by which the structures, including schemes, rules, norms and routines become established

as authoritative guidelines for social behaviour. This scenario creates an enforcement mechanism which directly and indirectly influences the motives guiding individual behaviour. This implies that the relevance of formal institutions as established by the government depend on the interaction with the society as being bounded by its informal constraints. Lack of interactive environment is one of the key enforcement obstacles. The theory thus requires the government to strategize the integration of farmers in the effort towards sustainable LC genetic resource conservation. This study applies the theory in assessing the relevance of formal and informal institutions in conservation of LC genetic resources.

On the other hand, Perception-In-Action Theory is based on the fact that human perception and actions are mutually dependent. It asserts that human perception is a necessary property of a living action; and that without perception action would be unguided, and without action perception would serve no purpose. This implies that before an action is undertaken, a series of events must occur. For

example, the perceiver (farmer) has to acquire information based on their ability to see, hear or become aware of the institutions through their senses. Then the perceiver has to process the information in order to gain more insight about it (understand) and lastly take action. Thus, it is assumed that farmers are driven by incentives in order to act towards LC genetic resource conservation. In this study, the term incentive is used to mean the social, cultural or economic values anticipated by farmers in order to keep LC. The study applied the theory in ascertaining whether there are incentives behind the LC genetic resource conservation. Therefore, the two theories complement each other by deriving from the possibilities that coordination between the government and the farmers is vital for enhancing sustainable LC genetic resource conservation.

Conceptual framework

According to the study’s conceptual framework (Fig. 1.), institutions relevant for AnGR conservation have been shown. These include formal institutions such as policies,

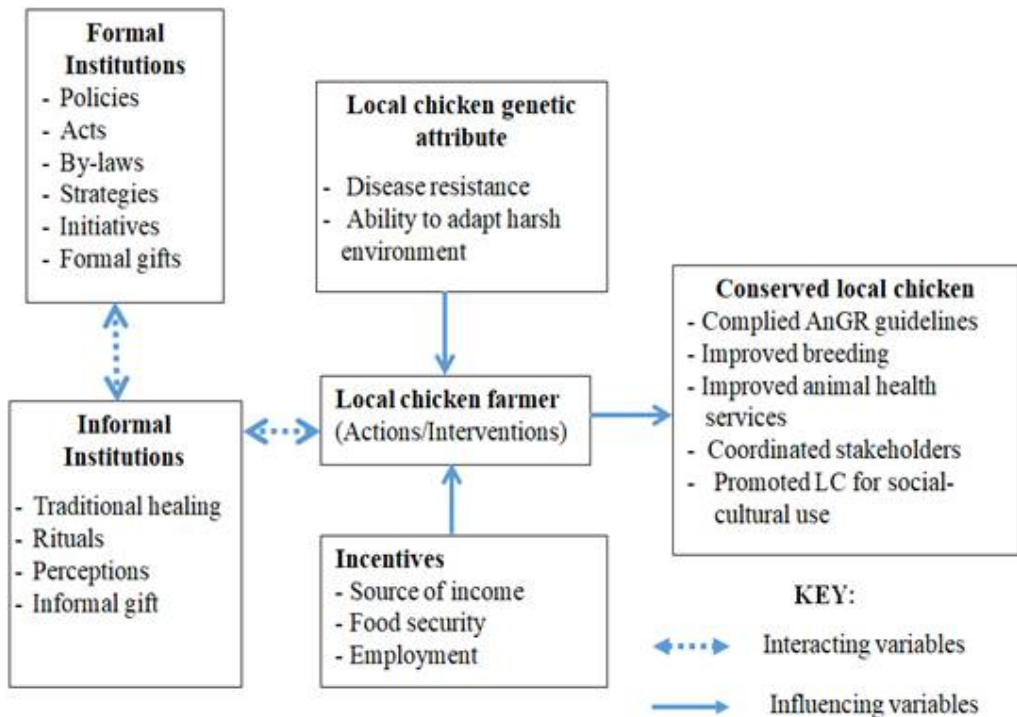


Figure 1: Conceptual framework for the study

acts, initiatives and strategies whereas informal institutions include gifts, beliefs, traditional healing and sacrifice. Specifically, this study conceptualizes that formal institutions can directly influence LC genetic resource conservation. As such, well organized and assenting formal institutions should be focused on governing LC genetic resources. However, there should be recognition, determination or willingness by the responsible government officials, agencies or actors, to prioritize and make formal institutions operational. On the other hand, the study assumes that LC farmers also have their own institutions (informal) which challenge, influence and interact with the formal institutions. In consequence, both formal and informal institutions may interact with farmer's perceptions and actions (interventions) relevant for LC genetic resources conservation. As such, the interaction may motivate (incentivize) or de-motivate farmers to conserve LC genetic resources depending on its contribution to their livelihoods in terms of income, food security, employment and cultural issues. Equally, this study further assumes that, farmer's willingness to conserve LC genetic resources can be influenced by genetic reasons such as ability to thrive under harsh environment, disease resistance and the low input use. The attributes signifies the relevance of conserving LC genetic resources in favour of resource poor farmers residing in rural areas where it is mostly kept. In this study, the conserved LC genetic resources is an outcome for variables such as controlled breeding, access to animal health services, improved LC management practices, stakeholder's coordination and promoted LC use for social-cultural reasons. These outcomes are measured based on two levels prescribed as follows; i) Low relevance when the institutions focused on LC production rather than conservation and ii) Moderate relevance when the institutions advocated for LC production but with some key aspects on its conservation.

Methodology

Description of the study area

The study was conducted in Igunga district, Tanzania. The scope of application of formal institutions that were reviewed was based at

both the local and national levels; whereas actual practice was investigated in Igunga district, Tabora Region, Tanzania. The district lies between latitude 3°51' and 4°48' to the South of Equator and longitude 33°22' and 34°8' East of Greenwich. Igunga district was used as a case study because it has a history of implementing institutions (by-laws and Chicken Passing on the Gift rule) which has influence on LC genetic resource conservation. From the district, two wards (Igunga and Mbutu wards) wherein ten villages (5 villages in each ward) which were impacted by the four years chicken-based interventions (2015 to 2019) were purposively selected. The rationale for selecting the villages was twofold. First, the interventions donated chickens (one exotic cock and four LC hens per farmer) for crossbreeding purpose; together with training on good chicken husbandry practices. Second, the interventions (HITz, 2019), introduced a formal institution referred to as chicken pass on the gift (POG) which is based on the rule that, each livestock assisted farmer or family helps another farmer in obtaining the same benefits as received from the donor (Windig *et al.*, 2012). In this situation, the POG was applied to produced crossbred chicks which were distributed amongst the farmers (each farmer received one cock and four hens) within the study villages.

Study population and data collection

A qualitative multi-methods research approach was employed whereby primary data were collected through key informant interviews (KIIs) and focus group discussions (FGDs) that were guided by checklist of questions and FGD guide respectively. An audio recorder was used where consent from the study's participants was sought before interviewing and tape-recording their responses. The KIIs and FGDs were conducted in Kiswahili, the language that all participants were familiar with for easy communication. The transcription of the audio records was done in Kiswahili and later translated into English for analysis. Primary data were also sought through reviewing of formal institution documents such as Acts, policies, by-laws, strategies, plans and initiatives concerning AnGR conservation. The review was conducted

by showing the types, roles, responsibilities and the operationalization of the institutional documents in relation to LC genetic resource conservation.

Key informant interviews

The researcher shared introductory letter which highlighted the research objectives to the livestock practitioners in the relevant offices including the livestock research and training institutes. The selection of key informants (KI) based on their animal breeding skills and experience, which are relevant for AnGR conservation as stipulated by FAO guidelines (2007). The aim was to get participants with experience on chicken breeding and conservation. Key informant profiles were established for the purpose of identifying their capability and/or skills relevant to the subject matter under investigation. The study involved fourteen KIs categorized into three groups as follows; eight representatives were sought from the local government, government research and training institutions, four representatives from the private and livestock development partners, and two representatives from traditional healers (one from each ward). The study combined the diverse categories of KIs in order to gather insight on the relevance of institutions from various actors on LC genetic resource conservation. Key informant interviews explored views about the operationalization of formal and informal institutions relevant to LC genetic resource conservation in the study area. Existing opportunities and constraints were also included during the interview.

Focus group discussions

A total of ten focus group discussions (FGDs) were conducted with farmers in ten villages (one FGD in each village). Each FGD involved 7 – 10 participants. The ten FGDs were conducted as insights on the relevance of institutions varied with geographical location of farmers (rural/peri-urban). In order to capture various opinions from farmers about the relevance of institutions for LC genetic resource conservation, farmers for FGD were selected based on: i) sex because the relevance of institutions for LC genetic resource conservation varied due to gender

roles on chicken rearing responsibilities; ii) type of chicken breed kept by farmers because it determines the influence of institutions in governing LC genetic resources; iii) type of chicken management adopted by farmers because relevance of institutions especially for in-situ LC genetic resource conservation depend on good chicken husbandry practices. The participation of farmers in the study was voluntary; therefore prior consent was sought before one could participate in the study. Focus group discussions with farmers explored both formal and informal institutions in relation to the findings from the literature as well as government officials' views on the practices of AnGR/LC genetic resource conservation. A trained research assistant facilitated all the FGDs and the researcher probed and asked follow up questions while recording and taking notes.

Documentary/Desk Review

Secondary data were obtained from various reports related to AnGR conservation. The reports were collected from Igunga district, livestock department office; while the AnGR conservation guideline was sourced from the internet (FAO, 2007b). The researcher read all the collected reports whereby identified sections or statements relevant to AnGR conservation were highlighted for analysis. The main reports were from the chicken – based intervention's reports (EPOG and Igunga-Eco village) which evidenced the extent to which institutions for LC genetic resources are relevant at practice level. A report on the State of the World's AnGR (SoW-AnGR) for food and agriculture by FAO (2007b), was used as a global guideline for gauging the relevance of existing institutions for LC genetic resource conservation.

Data analysis

Content analysis method was used in data analysis. First phase involved institutional analysis, a qualitative approach which was done by highlighting the parts (written rules or formal institutions) related to AnGR conservation including aspects such as compliance with global AnGR guidelines, genetic improvement with LC flocks, access to animal health services,

socio-cultural use and stakeholder coordination. The highlighted parts were drawn out of the documents to form the basis for discussion on their relevance towards LC genetic resource conservation. Findings were supported by quotes drawn from the selected section of the formal institutions such as policies, Acts, by-laws, initiatives and strategies in relation to their relevance on LC genetic resource conservation.

The unwritten rules (informal institutions) were analyzed in the second analytical phase which involved qualitative data from KIs and FGDs recorded in the field notes and recorded audio conversations. The data were transcribed, categorized, coded and thereafter grouped into themes with reference to study objectives. The Atlas.ti (version 7.5.7) computer software facilitated the data analysis solicited from KIs and FGDs. The findings are presented basing on two main themes including the institutional operationalization (governance) and social-cultural use of AnGR for LC genetic resource conservation. The themes were supported in the quotes from the statements made by the key informants and consensus made by farmers during the FGDs.

Results and discussion

Investigations on the relevance of formal and informal institutions in LC genetic resource conservation in the study area and Tanzania at large identified five main themes including three for the formal and one for the informal institutions respectively. The themes identified were compliance with formal institutions to global guidelines, LC crossbreeding, animal health services, stakeholder participation and socio-cultural uses. The latter theme represents informal institutions within which four sub-themes including traditional healing, rituals, perceived tastes and preferences, and informal gift are discussed.

Compliance with guidelines

According to FAO (2007a), conservation of LC genetic resources is required to meet the Global Plan of Action (GPA) guidelines for conservation of AnGR. Documentary review finding identifies four GPA's strategic priority areas entailing; i) characterization,

inventory, monitoring of trends and associated risks on conservation ii) sustainable use and development iii) conservation and iv) policies, institutions and capacity building. Tanzania government is cognizant of the priority areas as pointed out on section 2.4 of the National Compact Strategies and Action Plan (NCSAP) (URT, 2019). Furthermore, section 2.3.1 of the NCSAP clearly points out weaknesses under which, the lack of animal breeding act creates unfavourable enforcement environment to the pointed out activities under each of the NCSAP priority areas. Also, under challenges, the NCSAP mentions "long term investment to realize genetic improvement, unreliable sources of improved genetic materials, occurrence of endemic and epidemic diseases, seasonal supply of feed resources, low number of specialized professionals, weak implementation of mitigation to climate change, low levels of involvement in breeding programme by the private sector and indiscriminate crossbreeding". In general, this section highlights both finance and non-finance as obstacles causing failure of the government to comply with the GPA guidelines. Based on the literature, Hoffmann and Scherf (2010) urge that, development of the action plan is the first step in the implementation of the GPA. However, Hoffmann (2009) further emphasizes that; implementation of GPA guidelines requires substantial financial resources whereby countries should make effort to provide support in order to effectively manage AnGR. Thus, conservation of LC genetic resources in Tanzania will primarily need to address the obstacles so as to operationalize the existing action plan and meet the GPA guidelines. Commenting on the weaknesses in relation to LC genetic resource conservation, one key informant declared that: "...monitoring activities on LC breeding practices do not occur mainly due to dwindling financial support and lack of focus on LC genetic resource conservation" (National AnGR coordinator, MoLFD key informant, July 2020). In regards to monitoring of chicken breeding and hatchery activities by the government, another key informant explained that:

"On average I sell about 300 hatched chicks per month. The chick breeds are not from the same parents because the eggs are

locally sourced from various farmers who keep different types of chicken breeds. Interestingly, I have never seen government officials visiting my business for monitoring or regulation purpose” (Entrepreneur, Igunga village, key informant, July, 2020).

A further institution finding review revealed that, the Tanzania Livestock Research Institute Act (TALIRIA) (URT, 2012) is authorized to conduct research activities on AnGR. In regulatory perspectives, only section 38 (2d) mentions that “regulating the utilization by specific institutions engaged in livestock research or livestock industry...in livestock conservation, or in the management, collection or use of livestock or livestock products”. This section indicates weakness of the government since the regulation activity is research based. Thus, it does not address regulatory activities to other actors such as farmers and/or hatchery operators. Similarly, section 63 (1j) of the Animal Welfare Act (AWA) number 19 of 2008 (URT, 2008) regarding the power of the minister mentions making regulations “for the breeding of an animal including the method of breeding and the species of animals to be used”. This assertion implies that the AWA, as the name indicates, is principally highlighting welfare issues related to productivity rather than local AnGR conservation issues. Therefore, this rule of the game does not comply with local AnGR conservation guidelines as an animal welfare issue.

Despite the deliberate effort by the government in developing the CNSAP, TALIRIA, and AWA, findings from the KIIs with the government officials suggests non-compliance of national AnGR conservation with global guidelines. Lack of financial resources is one of the obstacles attributed to this non-compliance resulting into lack of LC genetic resource conservation measures. Since the national government has limited financial resources, government agencies such as TALIRI, responsible for undertaking livestock research activities, are equally affected. This implies that the regulatory authority can be affected by factors beyond its control. Based on this, their technical capacity can be utilized effectively if they get support from the national government

and/or development partners. Research findings by Mahonge (2012) and Zonabend *et al.* (2013) indicate that laws enforcement may become unsuccessful due to the lack of capacity of enforcers. Thus, the financial incapability can lead to unsuccessful LC genetic resource conservation. On the contrary, an in-depth interview with the hatchery entrepreneur has revealed the lack of government control on chicken breeding and hatchery operations resulting into indiscriminate LC crossbreeding. In developing countries like Tanzania where breeding services are not well developed and/or managed indiscriminate crossbreeding of local AnGR with exotic breed is a common practice (Olaniyan, 2015). As such, there is no clear evidence whether the existing LC in a study area evolved from their natural habitats. The introduction of exotic LC breed without meeting breeding guidelines is one of the sources that can cause genetic erosion on existing LC.

Genetic improvement

Indiscriminate crossbreeding involving LC with exotic breed was reported during the FGD with farmers in the study areas. FGD finding in Mwabakima village showed that;

...the use of exotic chicken to crossbreed with LC is a threat to the existing LC diversity... as a result the produced chicken flocks in the community are becoming less resilient to harsh environment and diseases...this may be largely attributed to indiscriminate crossbreeding. (FGD1, Mwabakima village, June. 2020).

Complementing the observation from the FGD, Section 7c of the village by-laws in Igunga district (IDC, 2017) also emphasizes enforcement on donation of various resources including crossbred chicks. Although the POG enforcement promotes chicken rearing activities among farmers, it does not consider indiscriminate crossbreeding as a problem to farmers. Similarly, the Tanzania Livestock Modernization Initiative (TLMI) (URT, 2015) seeks to promote sustained genetic gains in Tanzania livestock breeds (local AnGR). For example, in the section on improving the Tanzania poultry industry, priority action area mentions on the “identification of key dual-purpose breeds (egg and meat) suitable for

Tanzania free range conditions". This priority action area promotes LC because of the dual-purpose nature and their ability to thrive under free range (harsh) environment. However, it does not clearly point out strategies on how to conserve the LC breeds. Also, the National Livestock Policy (NALIPO) (URT, 2006a); section 1.3 states that "low genetic potential of the indigenous livestock coupled with limited supply of improved livestock has led to poor production and productivity of the livestock industry". This section suggests that local AnGR have lower genetic value which is contradicted by TLMI on the basis of suitability of LC thrive on harsh environment. The findings indicate limited recognition on the extent to which LC can perform better in their local context. When commenting on LC genetic performance as compared to other breeds, FGD participants argued:

Local chicken are rich in genetic diversity, we are able to select stocks and/or develop new breeds in response to changing conditions including climate change or disease outbreak... this is something we have not experienced in exotic or crossbred chickens (FGD 2, Mwabakima village, June. 2020).

Furthermore, section 3.1.3 (i) of the National Livestock Policy (NALIPO) states that "poultry industry is divided into traditional and commercial production system. Traditional system is the largest contributing over 70% of the flock, consisting of LC breeds (*Gallus domesticus*) such as Kuchi, Kishingo, Sukuma, Kinyafuzi, and Kiduchu". This section signifies LC recognition and population dominance but conservation measures are not effective due to the extensive nature of production system. This also suggests that breeding practices cannot be easily controlled. Commenting on the traditional production system in relation to LC genetic improvement, the FGD pointed out that:

Since the LC are mainly reared extensively there is no control in chicken breeding; this may result into genetic erosion/dilution due to indiscriminate crossbreeding practices (FGD 3, Mgongoro village, June. 2020).

Further investigation on institutions revealed that, the Livestock Identification, Registration and Traceability (LIRTA) Act

number 12 of 2010 (URT, 2010b), recognizes the treasure of livestock on the basis of "appropriate identification, registration and traceability for the purpose of controlling animal diseases and livestock theft, enhancing food safety assurance, to regulate movement of livestock, improve livestock products and production of AnGRs".

Nonetheless, in this rule of the game, the aspect of local AnGR conservation is not addressed indicating that the value of LC genetic resource conservation is underestimated. In view of the concern, a study by Hoffmann (2009) connotes that in-situ conservation of poultry genetic resources is not necessarily dependent on high technological approaches or facilities but, mainly on skills and recording. Farmer's views on their ability to keep LC performance records indicated that:

The majority of us especially in rural areas do not know how to read and write, this situation impedes the effort towards LC genetic resource conservation (FGD 4, Ibutamisuzi village, June, 2020).

On the contrary, observations from the in-depth interviews with government officials especially those from the national AnGR advisory committee indicated uncertainty on the efficiency of documentation of LC genetic resources to the level that the information can be used to conserve LC genetic resources. For example one of the government official interviewed said:

"...the current information of LC is inadequate to justify conservation initiatives... it is imperative to undertake characterization of the environment and LC genetic resources in the country to determine their physical and genetic diversity and uniqueness in such breed-types...the gathered information may serve as a benchmark towards effective LC genetic resource conservation measures" (National AnGR coordinator, MoLFD key informant, July 2020).

The FGD findings indicate factors that cause erosion of LC genetic resources. Such factors include development partner's pressure (depicted from the chicken-based interventions) to improve LC performance, prevailing extensive production system and inability of farmers to document LC genetic performance.

The presented FGD findings are in agreement with findings by Magothe *et al.* (2015) that LC upgrading programs implemented in Kenya between 1976 and 1996 resulted into loss of important LC genetic traits for generations. Also, the findings from the present study are in line with findings by Mahoro *et al.* (2017) that LC mate freely due to extensive (scavenging) nature of LC production systems. By contrast, the in-depth interviews showed that lack of information on LC necessitates characterization, documentation and inventory of LC genetic resources. A study conducted in southern and eastern Africa on infrastructure for sustainable use of AnGR showed that there is little documentation on AnGR and such information are mainly research based stations (Hoffmann *et al.*, 2013). The state of the World's Animal Genetic Resources for Food and Agriculture (SoW-AnGR) highlights that inventory, characterization and monitoring should include the identification, quantitative and qualitative description, documentation of breed populations and the natural habitat and production systems in which they are embedded (FAO, 2007a). Therefore, the uncertainties by the key informant from the national AnGR advisory committee are genuine due to the existing limited LC genetic resource information.

Animal health services

Conservation of LC genetic resources is a function of appropriate animal health management systems (Asmara, 2014). Limited access to veterinary extension services addressing animal health services was identified by the study as the cause of LC losses. An FGD with farmers affirmed this:

Limited access to animal health services is an obstacle...if the access was readily available, chicken losses due to disease outbreak such as ubaba (Newcastle Disease) would have decreased; in that way LC genetic resources could have been conserved. (FGD 5, Mbutu village, June. 2020).

The observation from the FGD clearly shows that farmers have limited access to extension services in mitigating chicken health challenges. By contrast, the Livestock Sector Development Strategy (LSDS) of 2010

(URT, 2010a) as per section 2.1.4 regarding animal disease control under the productivity of poultry illustrates that "Introduction of heat stable vaccine against Newcastle Disease (NCD) and improved housing and feeding through the PADEP and DADPs programmes in some regions (for example Lindi and Mtwara) has reduced mortalities to 4%". Tanzania government is committed towards improving the animal health by imposing animal disease control measures to prevent LC losses; if scaled up, it can contribute significantly towards LC genetic resource conservation. A study conducted in rural areas of Lindi and Mtwara in southern Tanzania on NCD outbreaks indicated that NCD control using locally produced heat stable NCD-I2 vaccine protected 73.3% of the LC sampled in the region (Komba *et al.*, 2012). Other than animal health (vaccination) interventions, the Animal Disease Act (ADA) number 17 of 2003 (URT, 2003) is cautious on restricted animal movements as a bio-security intervention. Section 43 (b) of the ADA states that: "no person shall move an animal on foot or by the use of a vehicle outside the inspector's area of jurisdiction without a permit". This implies that ADA is at the forefront in preventing spread of chicken diseases through movement restriction which also results into reduction of LC losses.

Stakeholder coordination

Successful conservation of AnGR observed in this study requires involvement of all stakeholders particularly farmers, public, private and development actors. Findings from key informants, who are the government officials, indicated that the existing institutions have mentioned LC genetic resource conservation without clearly pointing out coordination of stakeholders in the poultry sub sector. For example, two of the key informants remarked:

"National livestock policy has mentioned the contribution of LC in the poultry sub-sector but it has not clearly pointed out coordination of stakeholders in regards to LC genetic resource conservation initiatives" (LITA Dar es Salaam, July 2020).

Another key informant added:

“...the Tanzania Livestock Research Institute Act (2012) mentions TALIRI as a government agency responsible for coordinating all livestock related research matters including AnGR conservation... .. if the agency is supported well, it can enhance LC genetic resource conservation strategies.... . it has also mentioned the issue of ensuring property right of newly discovered animal breed but the Act did not cover clear guidelines on conservation of existing AnGR (such as LC) under threat for genetic erosion...” (TALIRI Naliendele Key informant, July 2020).

According to the Tanzania Livestock Research Institute Act (TALIRIA), the government does not recognize stakeholders especially farmers on matters related to AnGR. For example, Section 25 (1) states that, “where as a result of any research carried out by or on behalf of the institute anything is discovered, the discovery shall become the property of the institute; (2) the institute may, for the purpose of commercial exploitation of any discovery which the institute considers important for the improvement of animal production, arrange with any person to buy, sell, take or grant patent rights in the discovery, subjects to such terms and conditions as the board may determine”. The section has not addressed the role of farmers as individuals, associations and/or cooperatives on aspects such as breed discovery as well as participation in research as a means towards conservation and utilization of AnGR in their natural habitat (in-situ conservation).

In-depth interviews and the reviewed institutions have clearly indicated that there is lack of stakeholder coordination on AnGR management implying that, existing institutions for AnGR/LC genetic resource conservation are focused on the government actions. They do not spell out the roles and responsibilities of other stakeholders along the LC value chain other than the government in relation to local AnGR conservation. Since stakeholders such as farmers, development practitioners and animal breeding societies are not regulators, they lack control for managing LC genetic resources. Based on that, some scholars have urged policy makers to consider integrating farmers’ concerns

into development policies agenda as a way to mitigate livestock issues such as LC genetic resource conservation (Elias and Abdi, 2010). A study conducted in Indonesia regarding in-situ conservation of LC (Sentul chicken) indicated that other stakeholders, besides the government, are important in conservation programs; such stakeholders include research institutions, universities, private companies and farmer groups (Asmara, 2017). Therefore, the holistic approach regarding stakeholder engagement is vital for conservation of LC genetic resources.

Socio-cultural uses of local chickens

In general, LC crossbreeding using exotic chicken was not supported by farmers interviewed during FGDs. There were of the view that existing informal institutions could be appropriate for conservation of LC genetic resources. The farmers were not in favour of the high producing chicken breed because the existing LC were associated with their social cultural landscapes basing on four sub-themes comprising; traditional healing, traditional sacrifice, LC tastes and preference and informal gift. These sub-themes are presented along with the farmers’ views on LC genetic resource conservation.

Traditional healing

The use of LC in traditional healing is a common social-cultural practice in the study areas. Since farmers are exposed to the breeding technology using exotic chicken, the population of LC is under threat due to uncontrolled breeding. Commenting on the status of LC availability for use in traditional healing, FGD participants said:

“...When compared to exotic or crossbred chicken...LC is important for social-cultural obligation...as such it may involve travelling to distant villages in search for specific LC type to cater for traditional healing. (FGD 6, Makomero village, June. 2020).

Also, from another focus group discussion it was said:

A successful traditional healing must involve local chicken... apart from that, the healing is considered ineffective. (FGD 7, Ibutamisuzi village, June. 2020).

The FGD finding demonstrates that, traditional healing incentivizes farmers in a study area to keep and conserve LC. The finding is in agreement with that reported in Indonesia by Asmara (2014) in a study that looked at the social-cultural values of LC. The study indicated that stronger social cultural values such as traditional healing supported the existence of Pelung and Kedu LC breeds.

Rituals

In a study area there is a ritual locally termed as *Maholelo* or *Ndagu* in Sukuma vernacular which literary means a kind of pact made with the help of a local specialist (divine-healer or traditional healer) in divination and healing in which someone promises something that is precious for him or her to the witches or ancestors, like his/her own body part or even one's child in return for the success in their business or other line of work. In practice, divine-healers prefer blood collected from a red, black or white LC in making the pact. A key informant from one of the traditional healers in the study area said:

"...in our community, I use a black, red or white local chickens to cleanse ritual misfortunes, and or to condemn or curse social offenders in order to ensure that my clients are successful in their businesses or at workplaces" (A traditional healer key informant, June, 2020).

The key informant finding indicates that as long as certain plumage colours are preferred for sacrificial reasons, the pointed out LC with black, red or white plumage colours are likely to undergo conservation. Although exotic chicken may have same plumage colours, they are not used for rituals because they are considered foreign and are believed to lack ancestral connection. These findings are in agreement with that reported by Guèye (2007) who indicated that in Africa, a black LC cock is sacrificed to obtain protection from evils such as diseases and war, while white cock is used when community members want to thank God. Also, in agreement with those reported by Mugittu (2016) who indicated that the preference for plumage colour reinforces the interest to keep LC where colour variation is possible.

Perceived tastes and preferences

During the FGDS, it was pointed out that consumer's preference on LC taste and organic nature were key aspect considered to influence LC genetic resource conservation. Although some farmers had crossbred stocks, their expression on breed preference was inclined towards LC. This is because consumers think that the crossbred or exotic chicken are genetically modified and or are fed on veterinary drugs to increase their performance. Talking on this account, focus group discussion with farmers who are no longer keeping crossbred chickens said:

"Crossbred or exotic chickens are mostly not preferred by customers because they are perceived as inorganic and tasteless" (FGD 8, Mwan'halanga village, June, 2020).

A further discussion with farmers on price factor revealed that:

"Farmers are interested with rearing LC because they can be sold at a premium price... as such the value of one LC can be equivalent to selling three exotic/crossbred chickens" (FGD 9, Isugilo village, June, 2020).

Both FGDs and KIIs findings, show that factors such as taste, organic and price are the key factors appealing farmers to keep and conserve LC. The findings are in agreement with Kyarisiima *et al* (2011) in a study that looked at perceived tastes and preferences of chicken meat in Uganda. The study observed that customers believed that crossbred/exotic chicken are fed on growth promoters. The finding implies health risk to consumers and hence promotes LC to premium market price. Gary (1996) found that even though the price may alter consumers' preferences, the choice of food by consumers greatly depends on childhood, social interactions and social influences. Therefore, the arguments enhance conservation of LC genetic resources.

Informal gift

During the FGDs, gifts offered in a study area were examined. In relation to LC genetic resource conservation, an informal gift, commonly referred to as *kubebhya* in Sukuma vernacular which means "give a chicken gift" was identified. It is a norm whereby one farmer voluntarily donates a chicken upon request

from another farmer or neighbour within the community. The request is put forward based on trait preferences such as egg and weight performance, taste and mothering ability. Thus, the given LC is used to crossbreed with other chickens aimed at acquiring similar traits. However, this form of institution (kubebhya) has evolved over time hence; its impact on preserving LC has also changed with time. This change has been contributed by the chicken based interventions which enforced the beneficiary farmers to donate crossbred chicks (Chicken POG) to other farmers within the community. Unlike kubebhya, the POG practice contradicts LC conservation effort because breeding practices involves exotic breed and yet, are not controlled. Thus, comparing kubebhya in the past with the POG practice, focus group discussion with farmers revealed that:

“...Passing on crossbred chicken as a gift is disruptive to the existing LC diversity, it also promotes the perception that LC are unproductive...however, LC may still perform better if chicken management practices (e.g. housing, feed, vaccination) are improved” (FGD 9, Bukama village, June. 2020).

According to the study findings, farmers view POG as an enforced practice; but that is a chicken-based intervention trying to ensure that many farmers benefit from it. However, one would argue why could farmers not devise a mechanism such as changing the existing by-law (IDC, 2017) whereby they themselves would promote pass-on-gift using local chicken instead of exotic chicken. Meanwhile, they seem to accept it, on the one hand, and lament, on the other hand. Consequently, the finding is in agreement with that reported by Okeno *et al* (2012) in a study that looked at LC breeding. The study indicated that LC breeding programmes (schemes) involving chicken exchanges/gifts should focus on improvement within LC breed families, in so doing it will help maintain the LC attributes which are preferred by farmers and avoid genetic erosion and dilution and contribute to their conservation. Vincent (2014) further added that, the choice of local breeds should meet the requirements of the livestock production typologies and community preferences, these features are important for

community engagement in LC genetic resource conservation (in-situ conservation).

According to the findings, formal institutions at national level have low relevance because they are more aligned towards improving LC production rather than conservation. On the other hand, relevance of informal institutions is prescribed as moderate because the studied social-cultural obligations of the community members regarding the use of LC are somehow in favour of its conservation at the practice level.

Policy implications

From the study findings, existing institutions are generalized with limited focus on AnGR conservation. The relevance of existing institutions is categorized into low (formal institutions and moderate (informal institutions). In general, the institutions reviewed regard LC as one of the potential livestock resources in attaining the national development objectives pointed out in the Tanzania Development Vision 2025 (2010c). This is mainly because LC is the driver for the growth of the poultry sub-sector; therefore, its conservation requires deliberate efforts. Since most of the farmers especially in rural areas are involved with LC rearing, it is natural for them to have vested interest on specific types of LC breed kept within their local environment. This underscores the fact that their participation in LC genetic resource conservation is vital; because LC is an integral part of the farmer's livelihoods. Therefore, if LC genetic resources are conserved, it can contribute to food and income security, as well as creating youth and women employment opportunities. However, lack of appropriate policies impacts farmers, especially in rural areas where it is mostly kept. The unregulated LC crossbreeding practices with high yielding breed underestimates the global AnGR conservation efforts. This indicates that Tanzania is falling behind in the formulation of appropriate institution that can regulate the practices.

Furthermore, the spelled out GPA guidelines underscores policies, institutions and capacity building (FAO, 2007), as key strategies for governing AnGR conservation. Since policies are the basic principles by

which the government is guided, this study suggests that the existing formal and informal institutions can be effective; only if a policy tailored to animal breeding is available and meets stakeholder's objectives. Therefore, this study has provided supplementary information on existing institutions which is important for policy makers on whether to formulate a new policy or amend the existing ones so that LC genetic resources can be formally recognized, their breeding practices regulated and hence conserved.

Theoretical implications

The study was guided by Institution Theory (IT) and Perception-In-Action (PIA) Theory. According to IT theory, the main argument of the theory is an argument that institutions both formal and informal constitute constraints that human beings devise to shape human interaction but also becomes relevant if there is an enforcement mechanism. The study findings have shown that, institutions do not have enforcement mechanism to enhance LC genetic resource conservation. The study have also shown that there is a lack of interaction between the government as a designer of the written rules and the farmer as the implementer who is also bounded by its informal constraints. Based on the findings, this study confirms the IT based on the argument that institutions are irrelevant when they are not interactive and enforced.

Further study findings have indicated farmers keep LC not only for economic reasons but also for social-cultural reasons. Besides the resilience nature of LC to harsh environment and diseases attributes makes it possible for them to implement actions (interventions) relevant for its conservation. Therefore, this study confirms PIA Theory because the moderate relevance of the informal institutions suggests mutual dependence between farmer's actions and perceptions which enhances LC genetic resource conservation.

Conclusions and recommendations

The study findings conclude that there is low and moderate level of formal and informal institutions. Further findings indicate that the low relevance is concentrated at focusing LC

genetic resource productivity rather than its conservation. On the other hand, moderate conservation is based on socio-cultural values including traditional healing, rituals, perceived tastes and preferences as well as informal gift; which are inclined towards LC genetic resources conservation. It is also concluded that the knowledge generated through this study provides insights that can be used for improving existing formal institutions and/or formulation of appropriate AnGR management institution such as the Animal Breeding Act (ABA). From this end, potential opportunities may arise from the interactions between the appropriate formal and the informal institutions to effectively govern LC genetic resource conservation in the study area and in other areas in Tanzania with similar conditions. Based on the conclusions, it is also recommended that there is a need for co-management arrangements between the government (livestock sector), non-governmental organization (development sector) and the community (farmers) for sustainable conservation of LC genetic resources. In this way, the institutions will become more relevant for effective LC genetic resource conservation.

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