

Roadrunner (Indigenous chickens): The role of chickens in addressing food insecurity in a semi-arid environment of Mukoma village in Mt Darwin District, Zimbabwe

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Abstract: Rearing indigenous chickens have been debatably documented as a promising conduit out of poverty for small-scale rural farmers in sub-Saharan African countries. However, the information about indigenous chickens is scanty and the debate remains inconclusive. This paper explores the impact on indigenous chickens (IC) in alleviating food insecurity among the small-scale farmers of Mukoma village in Mt Darwin a semi-arid region in Zimbabwe. Majority of the community people are food insecure specifically in time of drought and other natural calamities. The study employed the mixed methodology making use of both qualitative and quantitative techniques. Information about the survey was solicited by the management of a well- structured interview guide, observations, and focus group discussions. A questionnaire was also used to gather quantitative information relating to the socio-economic standing of the respondents, production, challenges and marketing of the IC. Analysis of data was done using descriptive statistics and multiple regressions using SPSS version 20. Findings showed that 85% of the smallholders are food insecure. The majority (75%) of the food insecure group is unemployed and keep indigenous chickens ranging from 5-35. The results indicated that the marketing structure was not favorable to the small-scale farmers. The indigenous chickens are barter traded by 45% of the respondents with food items like maize and cooking oil. In addition, the respondents sell the chickens to obtain income used for buying food, paying school fees and other household basics. All respondents acknowledged the importance of the IC as a safety net during times of adverse weather conditions. Despite the outlined importance of IC, the results revealed the following challenges faced by the small-scale farmers as; high morbidity of chickens due to New Castle, shortage of vaccines, lack of feed, unavailability of viable markets, lack of access to credit, high transport costs of markets, theft and lack of knowledge on good practices in raising the chickens. All the mentioned challenges faced by the IC small-scale farmers in of Mukoma village were found to be significant at $P < 0.05$ in raising a substantial quantity of chickens. The paper in light of the challenges suggests the scaling up of services rendered by the government extension and veterinary departments to assist the farmers. Awareness campaigns and prevention of New Castle disease should be the government and non-governmental organization's priority. The paper also recommends the government to ensure road infrastructure is improved to reduce the cost to the markets for the farmers.

Keywords: *Food insecurity, indigenous chickens, morbidity of chickens, smallholder farmers*

Introduction

Food insecurity has affected the world with nearly a billion people facing this challenge. Statistics show that 90 per cent of them are from sub-Saharan African countries. Unexpected changes in the global economy, in consumption patterns and in population and demographics have had their share in impacting negatively on the livelihoods of many people in Africa especially the rural people. Erratic rainfall and high alternating incidence of floods and droughts in most rural spaces of Southern Africa, particularly in semi-arid regions influence the bulk of the poor rural farmers to rely on livestock and other non-farming activities for their livelihoods (Mahabileet *al.*, 2002). Coupled with that, the continuous changes in climatic conditions around the world especially in SSA have

caused a mismatch in food availability and its production. Many rural Africans are living in abject poverty and their efforts are being thwarted by the unfavorable economic and climatic conditions. Zimbabwe is one such country in SSA whose greater populace is struggling to make ends meet. The smallholder rural farming communities' poverty levels still remain high due to a number of challenges (Vedeld *et al.*, 2016).

This has exposed many rural people to vulnerable situations especially those with no coping strategies to food insecurity. The poverty incidence in Zimbabwe, as measured by the Total Consumption Poverty Line (TCPL), increased from 42% in 1995 to 60% in 2010, Poverty Assessment Study Survey (PASS), 2011). However, TCPL of Mashonaland Central province stood at 51% as compared to the nation's 63%, (PASS 11, 2006). Faced with food insecurity households try and adopt coping strategies when experiencing food shortage or food shock. The outcome of adopting food insecurity could lead to improvement of food security (success) or could lead to food insecurity (failure). To analyze vulnerability to food insecurity, one needs to understand risk, sensitivity and resilience. Resilience refers to the ability of an ecological or livelihood system to "bounce back" from stresses or shocks (Tompkinset *et al.*, 2010). Livelihood resilience is defined as the ability of an individual or household to recover from, or to withstand changes in the social or physical environment, and the ability to adapt to changing circumstances and ensure security of their livelihoods (Adger *et al.*, 2009).

In the rural areas of Zimbabwe residents use many ways of countering the effect of food insecurity. *Ziziphus mauritania* for example is widely used by rural households in the Dande area to counter food insecurity through selling the fruit, brewing traditional beer and eating the fruit or exchanging it with food items. Indigenous chickens (IC) production is documented to be common in rural spaces for poor households in many developing countries (Padhi, 2016). IC are documented as the most common poultry globally regardless of culture and space (Mohammed, 2018). Indigenous chickens are one of the cheap poultry animals to raise in rural communities even by the poorest households (Chalchisa and Deressa, 2016). IC are also viewed by Padhi, (2016) as a remarkable tool to answer rapidly to country poverty gaps. They are found dotted in almost every household in the rural areas. Subsistence farmers keep them for household production (meat and eggs) and/or to supplement their income (Bwalya and Kalinda, 2014). There is a notable change in the demand for indigenous chickens by Zimbabweans. People now seem to favour indigenous chicken meat as compared to broiler chickens because of the good taste of the meat and for health reasons (Hailu *et al.*, 2014). In food outlets and restaurants a dish with indigenous chicken meat command more price than a similar dish with broiler chicken. IC is lean, with an organic basis and fetches a best price in the markets (Ayieko *et al.*, 2015).

According to (Padhi, 2016) the price of indigenous chicken meat is 13% and 27% higher in market and supermarket compared to prices of meat from commercial chickens. This trend is still continuing even today. Quality chicken meat is believed to come from indigenous chicken breeds, which are generally slow growing with poor feed conversion (Mohammed, 2018; Padhi, 2016). Urbanisation has also been raised as a factor linked with the high demand for IC in urban and peri-urban areas (Asmelash *et al.*, 2018). Indigenous chickens have the ability to scavenge for food, where they eat kitchen waste, leftover cereal like rice, wheat, pulses, green grass and vegetables insects, and other available feedstuff to produce a good quality, cheap source of animal protein (Magothe *et al.*, 2012). Indigenous chickens play an important role in the livelihoods of rural people. Acquiring IC is easier when compared to other livestock (Kitalyi, 2012). However, the rural producers of IC are faced with various production, and marketing challenges. These diverse challenges prevent the IC producers from fully contributing in the IC high-value markets. This paper would like to address the following: determine the socio-economic benefits of indigenous chickens to the respondents, establish the challenges that are encountered by smallholder farmers in the production of indigenous chickens in the Mukoma village of Mt Darwin District.

Literature Review

Chickens are documented to be the most popular poultry worldwide irrespective of culture and region (Dube *et al.*, 2016; Mohammed, 2018). In the rural communities indigenous chickens are found in most households with the only variation being the type and number of the chickens each household owns (Dutta *et al.*, 2013). According to (Fisseha *et al.*, 2010) most rural and peri-urban families in developing countries keep a small flock of free range chicken. Indigenous chickens have diverse use and benefits to households especially in the livelihoods of people in the developing countries (Asmelash *et al.*, 2018). Indigenous chickens and their use vary from region to region and from community to community within a region. According to Padhi, (2016) in the tropics small landholders keep chickens for their socio-religious functions. Ramdas, (2009) noted that IC contributes to food security among households in the developing countries through generating income, food provision and organic fertilizer

FAO, (2015) defined food security as occurring given a scenario whereby all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. This is however difficult to achieve especially in most rural communities in developing countries. Apart from ensuring food security (Harun *et al.*, 2004) added that IC assist in poverty alleviation and mitigate the adverse economic impacts of HIV/AIDS for rural people and the urban poor. According to Aboki *et al.*, (2013) smallholder farming families, the landless and those living below the poverty line are able to raise IC using low inputs and obtain eggs and meat to augment their protein needs. Chickens are also exchanged for goats when a household has accumulated enough birds to move to a higher-value domestic animal. Household wares and food items are also exchanged for the indigenous chicken.

However, raising of IC has got some challenges. Dutta *et al.*, (2013) noted that there is high mortality rate in the production of IC ranging from as high as 80–90% within the first few weeks after hatching, due to diseases and predation. Ahmed (2018) noted that Newcastle disease (NCD) is highly infectious and causes more losses than any other diseases in the tropics in IC. According to Ayieko *et al.*, (2015) the disease spreads rapidly through the flock and mortality could reach up to 100%. A study by Dana *et al.*, (2010) in Ethiopia revealed that, the high mortality of village chicken in the central highlands of Ethiopia is due to diseases, parasites, predation, lack of feed, poor housing and insufficient water. Despite diseases being the main cause of death among IC, Baarendse *et al.*, (2006) found out that exposure to unfavorable environmental conditions also causes high mortality to the IC. Padhi (2016) cited poor extension services and inadequate credit facilities, availability of few or limited research activities, lack of organized marketing system, seasonal fluctuation of price and lack of processing facilities as some challenges in the production of IC. Mohammed (2018) cited poor management practices as a contributing factor affecting the production of IC. Magothe *et al.*, (2012) cited poor market infrastructure, price variability, limited marketing support services, market information, lack of access to markets and credit services to traders as impeding profitability of livestock. In agreement Mahabile *et al.*, (2002) asserted that road infrastructure has a bearing on the marketing of IC. The rural smallholder farmers are located far away from markets. Coupled with distance to formal markets, most roads in rural areas in SSA countries are in a poor state (Musemwa *et al.*, 2008). With regards to poor roadwork network Mohammed (2018) suggested that an improvement on road infrastructure enhances accessibility to market opportunities. In Ethiopia Sara (2010) found out that smallholder pastoralist resorted to selling a limited number of animals as a result of high transport costs charged by transporters due to the bad state of the roads. Makhura (2001) and Sara (2010) noted that despite the fact that farmers stay in areas with good road infrastructure, the long distances to and from the markets affect the transport costs and eventually their return.

Methodology and study materials

Description of the Study Area

The study was carried out in Mukoma village of ward 32, Dande valley in Mt Darwin District see Figure 1. Mukoma village is located in the low-lying areas to the north of Zimbabwe, characterized by severe dry spells during the rainy season and frequent seasonal droughts. Mt Darwin district shares a border with Mozambique at Mukumbura border post. Rainfall in Dande valley ranges between 400-600mm per annum as it is found in region v. Dande valley area is hot with temperatures going as high as 40°C in the summer season. Main crops grown include; the drought-tolerant crops like cotton, sorghum, rapoko, cowpeas as well as maize. There are self-tilting red soils and also black clay soils in some areas. Livestock kept include; cattle, goats, sheep and the indigenous chickens.

Sampling and data collection

Purposive sampling was used to choose Mukoma ward 32 in the Dande valley of Mt Darwin District. Random sampling was used to select four villages in the ward. Stratified sampling was done within the villages then random sampling was done to come up with a sample of 80 respondents. Focus group discussions, key informant interviews, and a household questionnaire were used in soliciting information from the respondents

Data analysis

Analysis of the qualitative and quantitative gathered data sets was employed using the Statistical Package for Social Sciences (SPSS Version 20). The qualitative data was transcribed using verbatim and analyses using the NVIVO software. Ensuring accuracy and reusability meant the data analysis relied on the questionnaire. The data was then coded, sorted, cleaned and stored as simple Microsoft Excel spreadsheets.

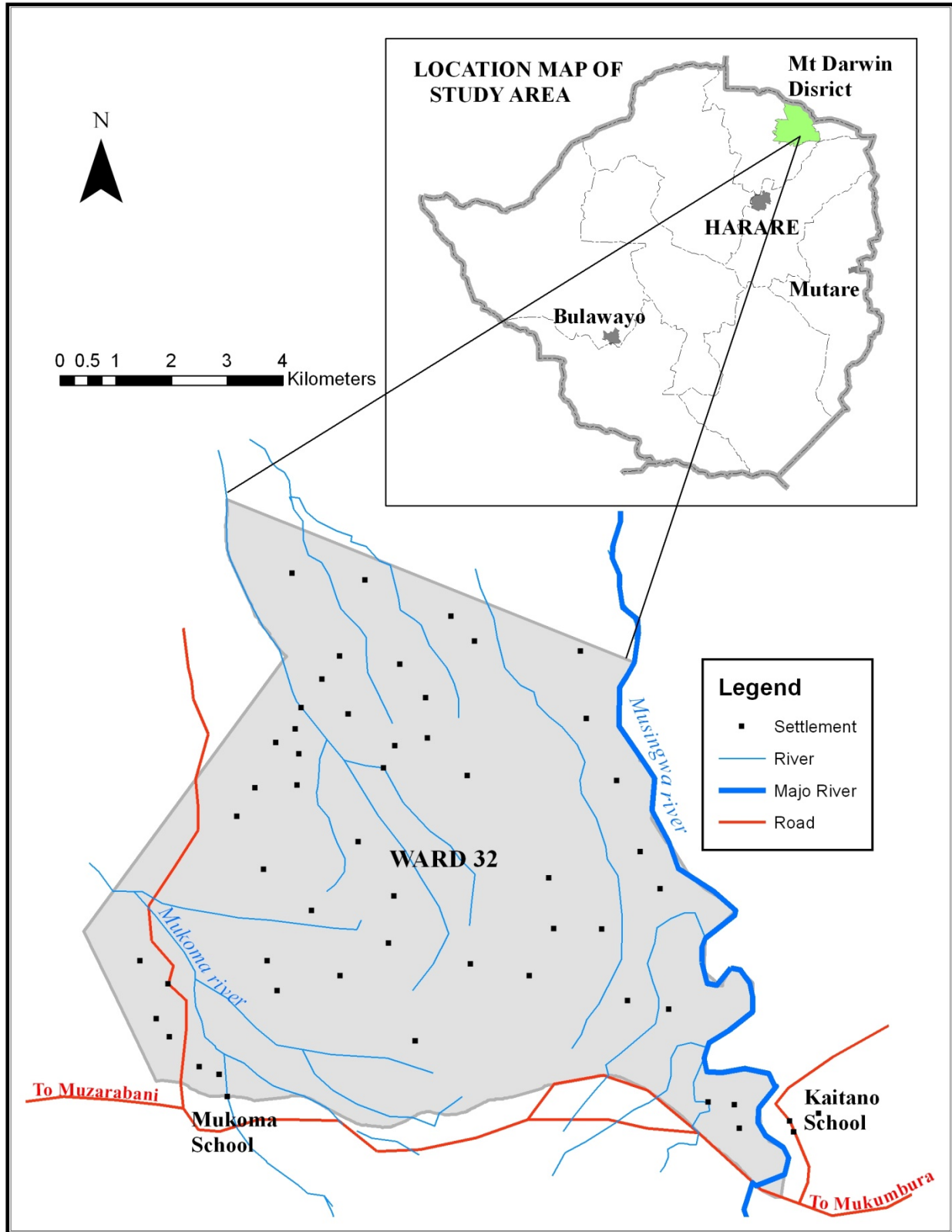


Figure 1: Mukoma village Ward 32

To minimize data entry error the double entry system was used. To ascertain the factors affecting IC production, a simple multi-linear regression model was used. The function is stated implicitly as:

$$Y_1 = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, \dots, X_n)$$

Where:

Y = IC production defined as the total number of IC produced by the farmer per year

X₁ = Mortality of IC whether caused by diseases or any other factor

X₂ = Vaccination availability of vaccines to prevent New Castle Disease

X₃ = MKTAVL being the availability of markets for the IC

X₄ = CREDITACC this looks at how accessible the farmers are to credit to boost their IC production

X₅ = TRNSPT being the availability of transport to and from markets

X₆ = EXTCONT this refers to whether the IC farmers are getting any services from the agricultural extension officers in the production of IC.

X₇ = Price being the price at which the farmer sell his or her IC whether it is favorable or not

X₈ = MKTAVAIL being availability of markets for their IC.

X₉ = Theft referring to whether they face threat from thieves who steal their IC

X₁₀ = MGT shows management of IC by the farmers in the production of the chickens

X₁₁ = Advertising refers to whether IC farmers advertise their chickens to increase their production

X₁₂ = Knowledge this refers to how knowledgeable the IC farmers are in the production of the chickens.

Results and discussion

Food security

Respondents were asked on the issue of food security and the table 1 shows their response

Table 1: Position on food security of the respondents

Response	Frequency	Percentage
Food Secure	8	10%
Food insecure	68	85%
Sometimes	4	5%
Total 80	100	

Findings in the Table 1 show that 85% of the respondents are food insecure, only 10% indicated that they are food secure. Food insecurity is high especially in the developing countries with the marginal areas being the most affected. The results showed that there is food insecurity among the respondents in Mukoma village, ward 32, in the Dande area of Zimbabwe. People in marginal areas face a lot of challenges especially with the fact that rainfall is inconsistent and temperatures are high hindering crop production and thus rendering them food insecure.

Table 2: Reasons for keeping Indigenous chickens

Reason	Frequency	Percentage
Income	32	40%
Food	36	45%
Traditional ceremonies	12	15%
Total	80	100%

Findings on the reasons why the smallholder farmers keep indigenous chickens are shown in table 2. About 45% indicated that they raise chickens to raise income, 40% and 15% indicated that they keep the chickens for food and for traditional purposes respectively. Results indicated that chickens are kept for raising income and for food. The proceeds from selling chickens are used for various uses in the household. These include; paying fees for children, buying basics for the household including food and for transport. The results are consistent with findings by Padhi (2016) who noted that indigenous chickens are a source of high-quality animal protein and emergency cash income.

Number of chickens kept

The following table shows the response of smallholder farmers' on the number of chickens they keep.

Table 3: Number of chickens kept by the respondents

Range of indigenous chickens kept	Frequency	Percentage
0-5	15	19
6-10	13	16
11-15	15	19
16-20	13	16
21-25	9	11
26-30	8	10
31-35	7	9
Total	80	100

Most of the smallholder (70%) farmers keep between 5-20 chickens. Those who keep 21-35 chickens are less, 24(30%). The numbers of chickens kept by the smallholder farmers are few. They are not targeting commercial production but to meet some basic household need. The low production could be as a result of inadequate resources to boost production. Most rural farmers are resource constrained such that keeping large numbers of the IC would not be feasible. Although the IC is free to look for feed on their own, the feed and space will not be enough to enable them to raise large numbers. There are also high chances of the IC being preyed upon if they are not well looked after when they are released to freely feed. Resources like material to construct large fowl runs are limiting among the rural farmers let one enough food for them.

The study also established that the indigenous chickens are exchanged for other items by the smallholder in order to make ends meet as shown in Figure 1 below:

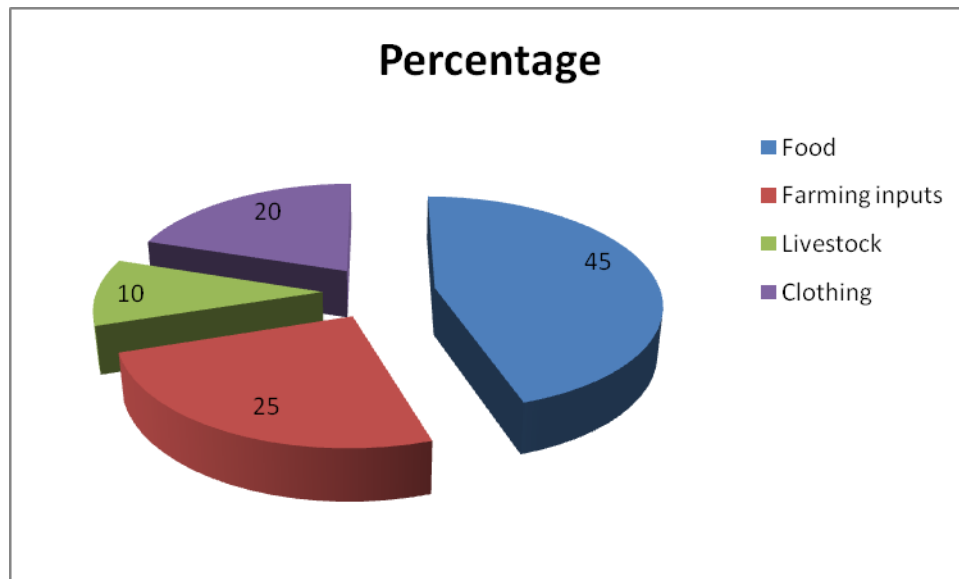


Figure 2: Goods that Indigenous chickens are exchanged for

Barter trading has and is still being practised in rural communities. This is because cash is hard to come by in these areas. The IC farmers are no exception to barter trade. In order to meet some household needs particularly food, 45% of the farmers were found to be exchanging their IC for food items while 25% exchange them with farming inputs, a move to ensure food security.

Table 4: Regression analysis output depicting factors affecting production of IC in the Dande valley, Zimbabwe

	Unstandardized Coefficients		Standardized Coefficients	
	β	Std. Error	Betat	Sig.
Constant.	307	.182	1.687	.096
Mortality	.088	.028	.1153.137	.003*
Vaccine -.043	.022	-.051	-1.944	.054
MktAvl .062	.030	.084	2.048	.045*
Creditaccount	-.192	.034	-.1675.604	.000*
Transport	.065	.038	.0692.717	.009*
Roadnetwork	.081	.038	.0892.231	.029*
Extension	.041	.095	.045	.428.670 ^{NS}
Theft	-.102	.045	-.102-2.251	.028*
Mgt	.475	.090	.5315.30	4.000*
Price	.048	.089	.049	.538.592 ^{NS}
Advertising	.090	.097	.100	.926.358 ^{NS}
BreedKnow	.353	.104	.3473.393	.001*

a. Dependent Variable: IC production

***denotes significance at $p < 0.05$, NS – not significant; β_0 - the intercept of the regression line**

Twelve variables were entered into SPSS version 20 for analyses and out of these, nine variables were found to be significant at $p < 0.05$. These were chicken mortality especially due to New Castle, lack of vaccines, lack of markets, access to credit, transport problems, road network challenges, theft of chickens, poor management of chickens and knowledge of breeds.

The high mortality rate of IC was found to be a significant factor causing low production in the study area. The most common cause of high mortality among the chickens was New Castle disease which at times can wipe the whole flock. This is a serious concern among the smallholder IC producers as this disease leaves them with very few birds if they are lucky but at times nothing is left. This poses a great challenge for the farmers in terms of food security as from the findings, they barter trade these chickens with food stocks and other household items to improve food availability and their livelihood. The findings of this study on high mortality rate concur with Fisseha Moges, (2010) in Ethiopia who found out that high mortality of village chicken in the central highlands of Ethiopia was due to diseases. Lack of vaccines was also found to be significant at $p < 0.05$. Most rural smallholder farmers are resource poor and cannot afford to buy vaccines to prevent diseases attacking their chickens. As a result, most IC die because they are not vaccinated. It was found that all except one chicken keeper provide ND vaccination to their chicken. A

study by Alfred *et al.*, (2012) in Morogoro, Tanzania revealed that only one IC keeper could afford to vaccinate his chickens against ND. Access to credit was found to be significantly affecting IC production. Lack of credit hinders success in the production of IC as these need vaccines and supplementary feeding apart from scavenging. Smallholder farmers in rural areas are often disadvantaged when it comes to credit access as they are classified as lacking collateral security. Unvaccinated chickens against ND can be totally wiped out by the disease as it can spread quickly (Nwanta *et al.*, 2008).

Predators such as reptiles particularly snakes, dogs, and rodents evidently added to the loss of IC in Mukoma village. The same view was reported by Chisango, (2017) who revealed that snakes, dogs and other predators stood a serious barrier to IC production in developing countries. Similar reports elsewhere have been made from studies in Zambia (Bwalya and Kalinda, 2014) and India (Padhi, 2016). The problems created by predators are exacerbated by poor fencing of IC production functioning spaces and lack of repellents. External support to the small scale farmers with proper fencing of the fowl run might offset the problem of predation. One female IC farmer aged forty two had this to say:

There are many challenges we face as small scale IC farmers, top on the list is predators. Snakes and dogs are a serious problem especially during drought periods when they attack our chickens from different points. Fencing and use of repellents would help us control these predators; however, we lack capital to purchase the repellents or the fence. (Interviewee A, personal interview, 14 March 2018)

Besides dogs and snakes wild birds particularly the vultures (locally known as “Karukodzi”) were identified as one of the most IC life-threatening wild bird types of predators (62.2%) affecting village birds. The wild birds' attack on young IC was very serious accounting for 78.2% of the chicks' mortality. The Karukodzi was, in particular, an annual threat to the chicks unlike other predators found only in summer when grass and vegetation surrounding home spaces was dense. The vulnerability of young indigenous chicks calls for well-thought protection measure to the study site. The study revealed that few IC farmers 33% had at one point received suitable agricultural extension service training related to IC production such as; production advisory service, preparations, input and credit facilities.

A ready market is a necessity for any product on sale. There is no ready market for the IC in the Mukoma village or the entire Mt. Darwin District area. The village is remote area and customers from other areas cannot easily travel to Dande area to buy chickens because of distances and road networks. This was supported by a thirty-five-year-old man who said;

We are very far from major markets, our road networks are very bad and some bridges have been washed away by floods. In some instances this area is isolated by the rest because the soils in some parts of the road are poorly drained, resulting in some vehicles getting stuck.(Interviewee B, personal interview, 16 March 2018)

Transport and the road networks were significant factors in affecting production and hence food security. Musemwa *et al.*, (2008) noted that apart from the distance to markets, the poor state of roads in rural areas affects the ability of livestock producers to attract many buyers in their areas since bad road network is associated with very high transport costs. The roads in most rural Zimbabwe are in a bad state hence increasing inaccessibility, especially in the remote areas. This leaves the IC farmers with mostly the local customers who sometimes cannot afford to buy using cash due to the economic situation in the country where cash is hard to come by. Thus barter trading was shown by the study as the main activity.

Theft of chickens was also found to be significant in affecting the production of IC at $P < 0.05$. The practice was regarded as a bad practice by respondents. According to a female respondent aged 55;

There are locals who steal and sale the IC to other people for monetary gain. Others steal because they want to augment their meat protein needs. Surely this is a very unfair practice since all people in this village are poor and cannot afford to lose a single bird. (Interviewee C, personal interview, 16 March 2018)

The unsocial practice identified need to be stemmed out because it disadvantages the IC farmers who are trying to balance their food security by selling the chickens and exchanging them with other food items. FAO (2015) found out that poultry keepers lose many birds as a result of diseases, exposure to predators and thieves. Resultantly the IC production is reduced and greatly impact on the resource-poor farmers. Management was also found to significantly affecting IC at $P < 0.05$. Poor management of the IC production was suggested by respondents as being caused by

lack of training in the management and a sustainable way of IC production. As a result, the smallholder farmers will continue using the old ways of raising the IC which do not match with the current environmental changes and they will lose more chickens. In addition to the other factors will continue lowering the production of the IC and not improve food security for most of the Mt District.

Recommendations

The paper in view of the challenges suggests the improvement of services offered by the government agencies such as; extension and veterinary departments to assist IC rural farmers. This should encompass technology development and rural IC farmers' training. Rural farmers who live in abject poverty could benefit from IC through improvement in nutrition, health and housing facilities by NGOs and government aid. The government and non-governmental organisations should prioritize awareness campaigns and prevention of New Castle disease. The paper also recommends the government to ensure road infrastructure is improved to reduce the cost to the markets for the farmers. In addition, IC rural farmers need assistance in finding an alternative competitive market.

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