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Perceived benefits of upgrading in pig value chains: A gender perspective of smallholder pig farmers in Uganda

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ABSTRACT
Pig farming is dynamic and a rapidly growing sub-sector involving about two million farmers in Uganda. Smallholder farmers perceive pig farming as a "live bank" for addressing household basic needs as soon as money is needed. However, benefits accruing to men and women involved in smallholder pig farming have not been documented, consequently the nature of benefits and who (by gender) benefits what upon upgrading of pig value chains is not known. This paper explains the socio-demopgraphic characteristics of smallholder farmers and benefits accrued to men and women farmers in relation to number of pigs held. Multistage sampling technique was used to collect data on 179 smallholder pig farmers in Lira and Masaka districts of Uganda. An explanatory factor analysis was conducted to identify suitable items for each benefit construct. Cronbach's alpha was calculated to show construct reliability of income, asset ownership, food and nutrition, social capital and leisure items. Ordinal Least Square was used to analyse benefit factors influencing upgrading. Income is male farmers' most important benefit of upgrading, while food and nutrition and leisure are female farmers' most important benefits derived from upgrading in pig value chains. Failure to understand the perceived benefits by women and men in agricultural value chains would lead to implementation of upgrading interventions that could unintentionally harm rather than benefit women; yet they are the most labour providers in smallholder agricultural production.

Keywords: Gender, benefits, value chains, pig farming

RÉSUMÉ
L'élevage porcin est dynamique et un sous-secteur en croissance rapide impliquant environ deux millions d'éleveurs en Ouganda. Les petits exploitants agricoles perçoivent l'élevage porcin comme une « banque vivante » pour répondre aux besoins de base des ménages dès que l'argent est nécessaire. Cependant, les avantages revenant aux hommes et aux femmes impliqués dans l'élevage porcin à petite échelle n'ont pas été documentés, par conséquent la nature des avantages et qui (par genre) bénéficie de quoi lors de la mise à niveau des chaînes de valeur porcines n'est pas connu. Cet article explique les caractéristiques sociodémographiques des petits exploitants agricoles et les avantages dont bénéficient les agriculteurs et les agricultrices en fonction du nombre de porcs détenus. La technique d'échantillonnage à plusieurs étapes a été utilisée pour collecter des données sur 179 petits éleveurs de porcs dans les districts de

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Lira et Masaka en Ouganda. Une analyse factorielle explicative a été menée pour identifier les éléments appropriés pour chaque concept d'avantage. L'alpha de Cronbach a été calculé pour montrer la fiabilité du construit du revenu, de la possession d'actifs, de l'alimentation et de la nutrition, du capital social et des loisirs. Les moindres carrés ordinaux ont été utilisés pour analyser les facteurs d'avantages influençant la mise à niveau. Le revenu est le principal avantage de la mise à niveau des éleveurs masculins, tandis que l'alimentation, la nutrition et les loisirs sont les avantages les plus importants pour les agricultrices découlant de la mise à niveau des chaînes de valeur porcines. Le fait de ne pas comprendre les avantages perçus par les femmes et les hommes dans les chaînes de valeur agricoles conduirait à la mise en œuvre d'interventions de mise à niveau qui pourraient involontairement nuire plutôt qu'être bénéfiques aux femmes ; pourtant, ce sont eux qui fournissent le plus de main-d'œuvre dans la production agricole des petits exploitants.

Mots-clés: Genre, avantages, chaînes de valeur, élevage porcin

INTRODUCTION

Pig farming is dynamic and rapidly growing as a priority sub-sector in Uganda. Approximately 2 million households are involved in rearing pigs in rural and urban settings of Uganda. Generally pigs are a means to prosperity, by contributing to livelihoods and incomes of the poor to meet their emergency and basic needs at household level (FAO, 2011). In Uganda, pigs are commonly perceived as a "*live bank*"; due to their ability to provide quick and urgently needed cash for meeting basic household needs such as school fees, medical bills, and food (Mangheni, 2014). Upgrading of pig value chains in Uganda has received increased attention as a means to attaining food security and poverty reduction for and by the poor (ILRI, 2014; MAAIF, 2010). However, establishment of market-driven investment and development of the pig value chains requires an understanding of the benefits that accrue to pig farmers and other actors involved in pig farming. Studies (Njuki *et al*., 2013 ; Quisumbing *et al*., 2015) reveal that understanding the gendered benefits accruing from participation in agricultural production is important because gendered use, control, and ownership of assets affect who can participate, and how household members benefit from participation. For instance, when men own the assets, they are likely to capture the majority of benefits, compared to their women counterparts—unless a deliberate effort is made to change the distribution of benefits (Quisumbing *et al*., 2015). Consequently, in pig value chain, this may unintentionally exacerbate gender asset gaps among men and women involved in smallholder pig farming.

Women are mostly involved in pig farming in Uganda, with most of them keeping pigs on small-scale, by rearing about 2-5 animals or less in the backyard with the help of children (Tatwangire, 2013; Muhangi *et al*., 2015). Women are mostly involved in cleaning of pig sties, feeding pigs, fetching water, and watering pigs (Ouma *et al*., 2013); while men are mostly involved in pig marketing and pork processing (ILRI, 2011; Mangheni, 2014). The dynamic and rapidly growing pig farming sub-sector in Uganda, implies that disparities in division of labour along with unequal access and control of benefits are likely to increase among women and men involved in doing work within pig value chains. More so, studies reveal that as value chains develop, women become increasingly disadvantaged in access to, control over, and ownership of; resources, incomes, benefits, and key inputs required for successful participation (Jaleta *et al*., 2010; Farnworth, 2011). Such gender inequalities particularly affect women's abilities to participate in and benefit from market activities as value chains develop (Kasente, 2012; Quisumbing *et al*., 2015). This is because gender relations are a primary component of the social and economic contexts that shape value chain functioning at all levels of work within the value chain (FAO, 2016). In such situations, Bolwig *et al*. (2011) suggests that it's necessary to incorporate awareness of gendered labour issues

into value chain development by highlighting a breakdown of potential benefits that accrue to men and women involved in doing work within the value chain.

Value chains exist and operate within a social context that affects the distribution of resources, benefits and opportunities (KIT, Agri-ProFocus and IIRR, 2012). In agricultural value chains, primary actors perform a selection of (primary) functions, which typically include input supply, production, processing, storage, wholesale (including export), retail and consumption (FAO, 2016). Actors who perform similar functions are regarded as occupying the same functional '*node'*, referred to as; input supply, production, marketing, distribution and retail (Mutua *et al.*, 2010). The Food and Agriculture Organisation of United Nations suggests that pig farmers are considered to occupy the same function of pig production in the pig value chain (FAO, 2011). Recent studies however, indicate that little attention is given to analyzing benefits derived by women involved in the production function of pig value chains. Yet evidence reveals that overlooking gendered dynamics of benefit access in smallholder agricultural production may jeoperdise the benefits derived by men and women or and even spur negative effects on intended women beneficiaries across the agricultural value chain (FAO, 2016). This paper, therefore, applies a gender analysis of pig value chains to highlight the benefits accrued to men and women that participate in smallholder pig farming and to understand future implications for upgrading of pig value chains.

Gender analysis of agricultural value chains has received increased attention for interventions aimed at value chain upgrading in developing countries. Gender is considered as "*socially constructed roles of women and men, girls and boy due to their relationships in society*" (Mutua *et al.*, 2010). Upgrading is perceived as "*moving up the value chain*"; by either shifting to more rewarding functional positions, or making products with more value-added invested in them, and/or providing better returns (Riisgaard *et al.*, 2010). Gender analysis in agricultural value chains explores and highlights the relationships of women and men in society, and the inequalities involved, by questioning; "w*ho does what?*" "*who benefits what*?" and "*who loses what?*" in the value chains (Farnworth, 2011; Madrigal and Torero, 2014). Evidence reveals that women in rural households play a key role in agriculture and are instrumental in upgrading; yet gendered patterns in generating, allocating, controlling, and spending household income make it difficult for them to accumulate lump sums required for upgrading (Sebstad and Manfre, 2011). Despite such stunning observation, no analysis has been done to highlight gendered patterns in benefits (including income), derived from upgrading in smallholder pig value chains. Specifically, in Uganda's context, the benefits accrued to men and women involved in smallholder pig farming have not been documented; consequently the nature of benefits and who (*by gender-disaggregation*) would benefit what upon upgrading in pig value chains is not known. This paper therefore, analyses the characteristics of smallholder pig farmers and the benefits accrued to individual men and women pig farmers involved in upgrading within pig value chains.

This paper applies a gender perspective to examine the benefits perceived to accrue from upgrading and how perceived access to the benefits would affect the pig stock held by women and men, in context of smallholder pig farming in Uganda. Specifically, the paper provides an analysis of; i) demographic characteristics of the smallholder pig farmers, ii) list of benefits perceived, iii) how access to the benefit affects the pig stock held by women and men, and iv) the possible implications for women's future participation in upgrading. Key results of the analysis have inference for strategic improvements of gendered participation in upgrading of pig value chains. Generally, insights from this study are relevant for development of gender-sensitive agricultural value chains in various Sub-Saharan Africa and developing countries elsewhere.

The paper is organized as follows; section one provides the introduction, section 2 describes the research approach-indicating the study area, sampling and sample size, data collection procedure, measures of variables, and analytical menthods. Section 3 provides the results obtained, section 4 provides the discusion of results, then conclusion is provided in section 5 , and lastly the acknowledgement of individuals and institutions that supported the study.

RESEARCH APPROACH

Study area. Field data was collected in Masaka and Lira Districts of Uganda. Two rural sub-counties and one urban division were selected in each district.

Sampling and sample size. Participants of this study were randomly selected in Masaka and Lira Districts of Uganda. The samples were drawn from complete lists of pig farmers prepared by local council authorities from the 2 rural sub-counties and 2 urban municipalities of each district, with supervision of the District Veterinary Officer and District Production Officer. A total of 179 respondents were interviewed, comprising of 111 female and 68 male pig farmers.

Data collection procedure. Survey tools were developed to capture information on demographic characteristics and perception on benefits expected by pig farmers upon upgrading in the pig farming enterprise. Demographic characteristics that were captured included; sex of respondent, age, marital status, relationship to head of household, religious affiliation, education level, experience/years in pig farming, banking status, current value of assets for pig farming, most important source of income, and other work done in the pig value chain. Benefit items recorded were in the dimensions of income, asset ownership, food and nutrition, social capital and leisure. The survey tools were administered by qualified and trained enumerators using Computer Aided Personal Interview (CAPI) tool. The interviews were conducted in local language commonly used in each of the two districts. Luganda language was used in Masaka while

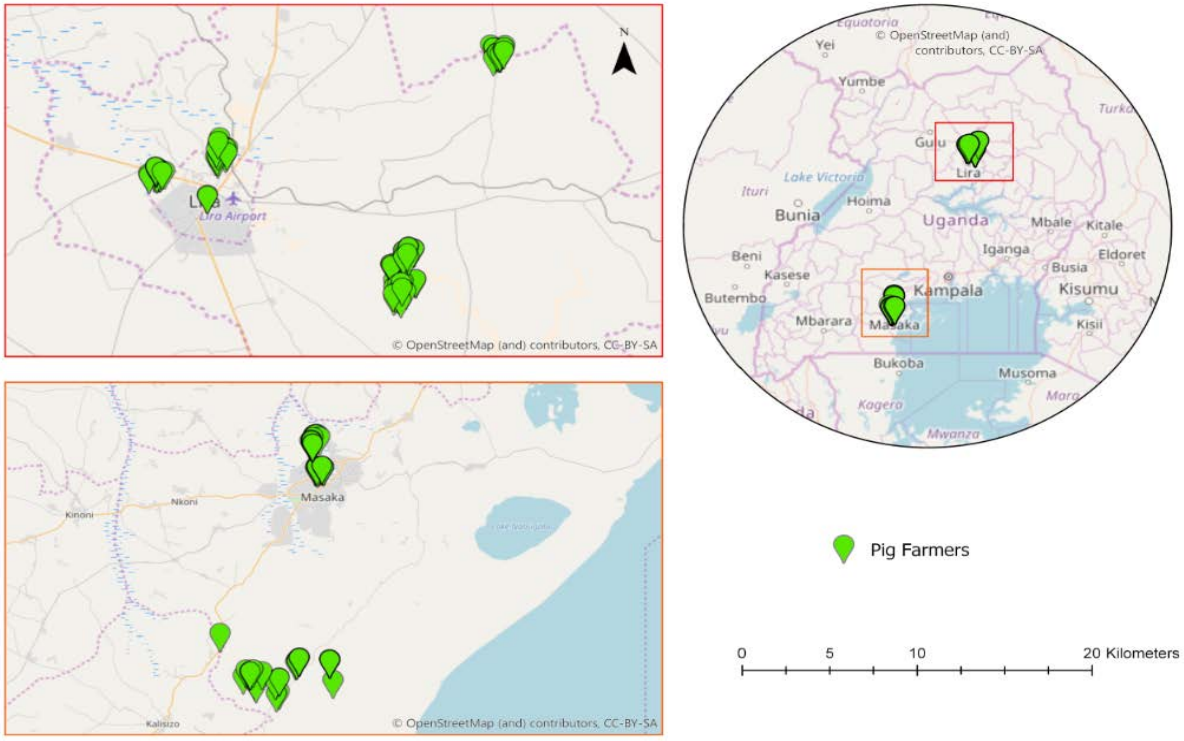

Figure 1. Study sites of pig farmers in Masaka and Lira Districts of Uganda

Langi language was used in Lira district.

Measures of variables. Demographic variables were categorical that is education, age, experience, marital status. Perceived benefits were measured by five variables on the following multiple-item-latent constructs: income, asset ownership, food and nutrition, social capital and leisure. Twenty six (24) items on perceived benefits (see Table 1), were operationalized by multiple-item measures on a five-point Likert scale (1 ~strongly disagree; 5 ~ strongly agree).

Pig stock was measured in terms of all types of pigs reared for sell by the pig farmer. The measures were operationalised as; finishers stock (pigs ready for slaughter), piglets/weaners (young pigs reared for fattening), and boars (male pigs stocked for breeding services), sows (female pigs stocked for reproduction), and gilts (pregnant female pigs). Each pig was counted as a single unit and the total number of stock held per unit in the last 12 months was recorded.

Analytical methods. Analysis of data was limited to identifying the socio-economic characteristics of pig farmers, examining benefits of upgrading by smallholder pig farmers and determining the effect of benefits and the farmers' socio demographics towards the number of pigs kept. Quantitative data was analysed using SPSS. Purification of the multiple-item constructs was carried out. An explanatory factor analysis was conducted in SPSS to determine the best multiple items for each construct. After which Cronbach's alpha was calculated to show construct reliability for the benefit items of; income, asset ownership, food and nutrition, social capital and leisure. Ordinary Least Squares (OLS) model was used to determine the relationship of benefit constructs and demographic variables on farmer's pig stock. The five constructs of benefits were; income, asset ownership, food and nutrition, social capital and leisure. Demographic variables were used against number of pig stock held in the last 12 months. The variables were; sex of respondent, age, marital status, religious affiliation, education level, years/ experience in pig farming, banking status, value of assets used in pig farming, and most important source of income. Triangulation of quantitative analysis was done using qualitative data collected on pig farmers in focus group discussions. The FGDs were held during the gender scooping study conducted between December, 2015 and March, 2016 in the same locations of Kyanamukaka subcounty and Katwe-Butego municipal division in Masaka, and Barr sub-county and Ober-Kampala municipal division in Lira district.

RESULTS

Measure of reliability for benefit items. Table 1 shows results of realibility for the 24 items used to describe the benefits devied from upgrading in pig value chains. Cronbach's alpha for all constructs was 0.7 or greater than 0.7, except for leisure, indicating a high level of construct reliability. Factor loadings for most of the items was greater than 0.7, showing that the items were closely related to their corresponding constructs (Hair *et al*., 2014).

Socio-demograpic characteristics of pig farmers. Results that describe socio-demographic characteristics of pig farmers in the study area are shown in Table 2 and Figure 2. Majority (62%) of the pig farmers are female. Majority (70%) of the women engaged in pig farming are above the youthful stage but still in the active age group. Out of 42 percent of the non-married farmers, 31 percent were women, which implies that more women chose pig farming as an enterprise to give them quick returns thus sustain their families. Pig farmers had more than 5 years of experience in pig farming. This duration indicates that pig farmers have long experience to execute their duties for proper and profitable production of pigs. Results also indicate that farmers participating in pig farming were generally above the youthful age of 35 years and have primary level education.

Figure 2. Author talking to female (woman) pig farmer while transporting a pig to the market/ buyer in Lira district
Source: Author, Rosemirta Birungi, 2017.

Table 1. Reliability and factor loading measures of benefit items used in the study

Construct	Cronbach's Alpha	Item	Factor Loading
Income	0.74	I will get money/income for paying school fees	0.46
		I will get money/income to improve my standard of living	0.73
		I will get money to save/put aside for future use	0.78
		I will get money/income to pay medical bills	0.58
		I will get money/income to pay for farm labor	0.46
Asset Ownership	0.86	It will help me purchase household items I need	0.54
		It will help me construct a house	0.64
		It will help me to open/start a side business	0.72
		It will help me to acquire land	0.76
		It will help me acquire other animals like cows , goats	0.51
		It will help me in marriage after converting into money	0.55
		It will help me provide employment to people in my village	0.50
		I will get biogas for home use	0.58
		I will get money/income to pay house rent	0.47
Food and Nutrition	0.88	It will provide me with food for consumption	0.74
		It will provide me alternative food source	0.72
		I will get oil from pork to use for cooking	0.84
		I will get medicine from pork and oil	0.75
		I will get balanced diet	0.68
Social capital	0.70	It will help me get friends	0.75
		It will make me famous/popular	0.58
		I will get manure for fertilizing our gardens	0.57
Leisure	0.34	I will get time to go for sports and betting	0.58
		I will get time to go for drinking alcohol	0.88

Table 2. Proportion (%) of respondents by gender (n=179)

Demographic variable	Proportion (%) of respondents by gender	
	Female	Male
Not married	30.6	11.8
Married	69.4	88.2
Age 35 years and below	41	28
Age above 35 years	70	40
Education above primary level	44	34
Education primary and below	67	34
Experience less than 5 years	85	58
Experience 5 years and above	26	10

Socio-economic characteristics of pig farmers. Table 3 shows results for the socio-economic charcateritistics of pig farmers in Masaka and Lira districts of Uganda. Percentage scores obtained are presented under five categories (see Table 3); gender, banking status, value of assets used in pig farming, most important non-farming source of income, and average number of pigs held in the past 12 months.

Banking status: Almost equal proportions of female (55.86%) and male (54.41%) pig farmers had no bank accounts. Similarly almost equal proportions, 42.34% of female and 44.12% of male pig farmers had individual bank accounts, while 1.8% of female and 1.47% of male had bank accounts together with their spouses. Results show that on average the pig farmers, are not well banked. According to Sebstad & Manfre, (2011) limited access to and use of financial banking services constrains women's ability to effectively participate in payment systems, accumulate and control lump sums for upgrading.

Value of assets used in pig farming: Almost equal proportions of female (32.43%) and male (38.24%) pig farmers had assets of value below UGX 200,000 (approx.US$70) used in pig farming, similarly 24.32% of female and 20.59% of male pig farmers had assets of value between UGX 200,00-400,000 (approx. US$70-140). Results show that generally, men and women pig farmers had no wide asset gap in value of assets used in pig farming. Quisumbing *et al*., (2015) found out that underlying patterns of asset use, ownership, and control influence men's and women's abilities to participate in and benefit from interventions for promoting participation in high-value agriculture.

Most important non-farming source of income: Men and women pig farmers had different proportions of non-farming activities as their most important source of income. Mostly women (7.21%) considered general merchandise trade as their most important non-farming source of income while men (4.41%) considered the same. Paid labour was another most important non-farming source of income for men and women pig farmers. Mostly men considered salaried labour (11.76%) and casual labour (7.35%) as another important non-farming source of income while women (7.21%) considered salaried income and casual labour (0.90%) as their other important income sources. The results generally show that male pig farmers had higher involvement in non-farming activities as the most important source of income compared to their female counter-parts. Past studies reveal that smallholder farmer involvement in non-farming activities increases their ability to overcome constraints and vulnerabilities associated with smallholder farming, such as climate induced feed stress, disease and market shocks (Kirsten *et al*., 2013).

Table 3. Socio-economic characteristics of smallholder pig farmers (n=179)

	Female (n=111)		Male (n=68)	
	Frequency	Percentage	Frequency	Percentage
Gender				
0=Male	111	62.0	-	-
1=Female	-	-	68	38.0
Banking status				
1=Have Individual account	47	42.3	30	44.1
2=Have Joint Account with Spouse	2	1.8	1	1.5
3=Have Joint Account with family members	-	-	1	1.5
4=Have Joint Account with business partner	-	-	-	-
5=Have no bank account	62	55.9	37	54.4
Value of assets used in pig farming				
1= below 200,000	36	32.4	26	38.2
2=200,00-400,000	27	24.3	14	20.6
3=400,001-600,000	10	9.0	8	11.8
4=600,001-800,000	9	8.1	7	10.3
5=800,001-1,000,000	13	11.7	2	2.9
6= Above 1,000,000	16	14.4	11	16.2
Most important source of income				
1=Crop farming	49	44.1	35	51.5
2=Livestock Farming	9	8.1	3	4.4
3=Trading Agricultural produce	2	1.8	2	2.9
4=General Merchandise trading	8	7.2	3	4.4
5= Pig farming	24	21.6	5	7.4
6=Pig Trading	1	0.9	-	-
7= Transport service	-	-	1	1.5
8=Slaughter services	-		-	-
9= Pig Slaughter services	-	-	-	-
10=Butcher	-	-	1	1.5
11= General Food Services	1	0.9	1	1.5
12=Pork Joint	2	1.8	-	-
13= Salaried labour	8	7.2	8	11.8
14=Casual labourer	1	0.9	5	7.4
15= Other (specify)	6	5.4	4	5.9
Average no. of pigs held in the past 12 months	7		6	

Pig stock held by male and female farmers. Gender-disaagregated scores of pig stock held are shown in Figure 3. Majority of female pig farmers have less than 5 pigs (46.3%), while majority of male pig farmers have between 11 to 15 pigs (43.7%). This result indicates that women pig farmers are typically smalholder livestock farmers. Fewer women (4.2%) have above 15 pigs, far less compared to men (17.2%) who hold stock above 15 pigs. This characteristic indicates that women pig farmers and at more risk of loosing all of their pig herd in case of calamities such as theft and disease outbreaks especially Africa Swine Fever.

Food and nutrition was a significant variable among women ($p<0.05$) but with a negative coefficient ($\beta=-1.6$). This shows that a unit increase in food and nutrition, would decrease a female farmer's pig stock held by 1.6 percent (Table 4). This can be attributed to women being directly involved in decision making on food security at household level. Njuki *et al*. (2013) found out that women in smallholder livestock farming have a great contribution to food security in their households. Results of this study attest to this finding by showing that a unit increase in food and nutrition security reduces on the number of pigs held by a woman. Njuki and colleagues attribute the significant role of women in household food and nutrition to commitment towards their gender role of child care, to an extent that a woman would rather sell off their animal to get food for the family than see their children live without food. Results (Table 5) show that a unit increase in time spent on leisure, significantly increases the number of pigs kept by women ($p<0.04$). This result implies that a unit increase in time for leisure would increase production among female pig farmers by 3.8 percent.

Table 4. Mean and Standard deviations of benefit variables (n=179)

Variable	Mean	Standard deviation
Income	23.0	2.3
Asset ownership	33.5	4.0
Food and Nutrition	20.0	4.1
Social capital	13.3	2.0
Leisure	08.4	1.4

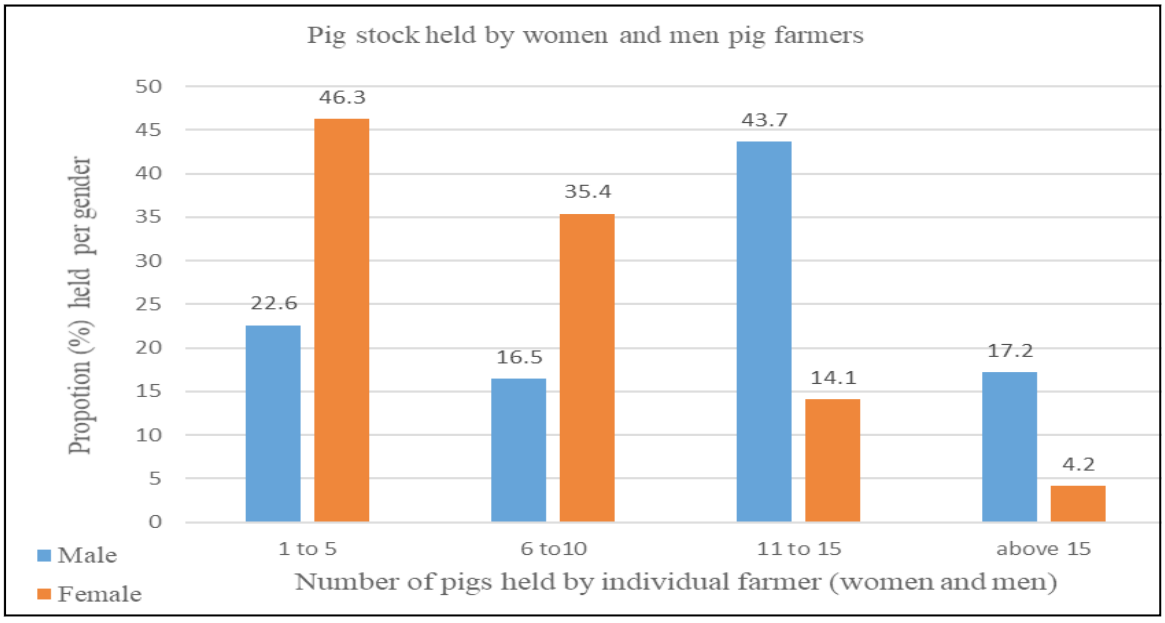

Figure 3. Percentage of pig stocks held by women and men pig farmers (n=179)

Table 5. Determinants of pig stock among male and female farmers (n=179)

	Female			Male		
Pig stock in the last 12 months	Coef.	Std. Err.	P>t	Coef.	Std. Err.	P>t
Age1	12.56	4.55	0.01*	10.85	6.41	0.10
MaritalStatus2	-0.31	4.82	0.95	-3.90	9.72	0.69
HighestEducation1	-6.89	4.49	0.13	-5.72	5.99	0.34
SocialCapital~T	0.27	1.46	0.86	2.18	2.01	0.28
IncomeTT	-0.75	1.12	0.50	-5.90	2.05	0.01*
FoodNutrition~T	-1.59	0.68	0.02*	0.26	1.35	0.85
AssetOwnership~T	-0.07	0.72	0.92	-0.74	1.02	0.47
LeisureTT	3.84	1.81	0.04*	-2.87	2.90	0.33
_cons	22.43	24.57	0.36	160.89	36.12	0.00
	Number of observation Female = 111			Number of observation Male= 68		
Prob>F=0.0162				Prob > F = 0.0019		
R-Squared=0.1638				R-squared = 0.3275		
Adj R-squared =0.0982				Adj R-squared = 0.2363		

* =Significant variables among men and women pig farmers

DISCUSSION

Leisure time is important for women involved in smallholder pig farming. Findings reveal that time spent by women as leisure, significantly increases pig production. However, it's important to note that women engage in pig farming activities as part of their household chores (Dione *et al*., 2020). This implies that household tasks done by women need to be shared or women need to be given an opportunity of being relieved from some of the household tasks, to allow some ample time for leisure. Possibly, allowing time for leisure will increase the pig stocks held by women. More so, past evidence reveals that in Uganda, women's labour responsibilities for household-based livestock keeping of dairy cows under zero grazing system created time poverty and disempowered some women (Bain *et al*., 2010). These results are supported by general observations on work-based performance (Gupta, 2000); that workers who are allowed more time for leisure and only work for 6 hours per day, are more efficient at work and their output increases compared to their counter parts who work for 12 hours per day without leisure. Gupta reveals that leisure is indispensable to human existence and that after a day's work, muscles and other parts of the body become stiff and so need to spend some time on leisure. This therefore explains why women involved in smallholder pig farming need more time for leisure if they are to increase their pig stocks.

Age was significant and positively correlated with the number of pigs held by a female and male farmer. The older the farmer, the more number of pigs held. This could be attributed to the fact that pig production in the tropics is mostly popular among the elderly, and generally perceive it as a likely solution to animal protein deficiency and as a tool to fight poverty among poor households. This finding is also in agreement with the study by IDRC (2011) which found that age of the farmers was significant determinant in upgrading decisions among the smallholder farmers especially the elderly rural poor. In this study of smallholder pig farmers, the level of significance for age was higher in female than male pig farmers. This could be attributed to the fact that, immediately most women reach retirement age, they tend to engage in on-farm activities while the men get off-

farm. Considering the age of the farmer, mature farmers provide much labour and have experience. Shongwe *et al*. (2013) indicated that the household head age represents the experience in farming and more years correspond to more farming experience. In this study 47% of the pig farmers were above 35 years, an age group generally known to be active in agricultural enterprises, hence have a positive effect on the number of pigs held by smallholder men and women farmers.

Income was significant at one percent though with a negative coefficient (β=-5.90). Results show that a unit increase in male farmer's income, would reduce his pig stock held by 5.9 percent. This result corresponds to previous evidence that, pigs are mostly reared by women which they receive through in-kind payment while men prefer to invest their income mostly in rearing large animal such as cattle (Mutua *et al*., 2010). Therefore when men's incomes raise, it is not a surprise that the pig stock held reduces. Therefore, this indicates that if pig stock held by farmers is to be improved, there is need to build capacity of women to upgrade in pig farming.

CONCLUSION

Cronbach's alpha results on constructs of perceived benefits derived from upgrading i.e.; income, asset ownership, food and nutrition, social capital and leisure indicate a high level of construct reliability. Factor loadings for most items that described benefits derived from upgrading, was greater than 0.7, showing that the items were closely related to their corresponding constructs. Upgrading is about acquiring capabilities and accessing new market segments through participation in particular chains (Bolwig *et al*., 2011). Results of this study showed no major differences in socio-economic factors, particularly banking status, and value of assets among men and women pig farmers, implying that there was no gender gap in socio-economic capability for upgrading in pig farming.

Furthermore, food and nutrition and leisure were significant factors that influenced the number of pigs held by female smallholder pig farmers. Since women have a great contribution to food security in their households and across agricultural value chains, interventions emphasising more on gender empowerment should be increased so as women pig farmers can have more access to banking services, assets, and non-farming income sources. Possibly this will help to increase women's access and control of benefits accruing from upgrading in pig farming.

In conclusion, rather than considering gender perspectives of "who has access and control of benefits" in agricultural production and in other works of agricultural value chains, researchers and development interventionists need to first specify the characteristics or description of benefits accrued or derived by women participation. This study emphasizes that identifying the gender-disaggregated benefits derived by women and men can help gender-based project implementation to answer the critical gender analysis question: "What needs and opportunities exist for increasing women's access to and control of benefits?" In addition, specifying the perceived benefits will help development interventions target and benefit both sexes effectively to meet practical gender needs of both women and men. Specifically to agricultural value chains, failure to pay attention to perceived benefits by women and men would lead to implementation of upgrading interventions that could unintentionally harm rather than benefit women; yet they are the most labour providers in smallholder agricultural production.

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STATEMENT OF NO CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this paper.

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