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Determinants of Poultry Market Participation Decisions: The Case of Producers in Kaffa and Bench Majji Zones, Southern Ethiopia

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Abstract
Poultry products have long been a pathway for income generation for the poor. Rapidly growing and changing markets in the developing world provide real opportunities. However, there were also threats to participation of the poor in marketing of poultry products. Objective of this study is to analyze determinants of poultry market participation decision in Kaffa and Bench Majji zones of Southern Ethiopia. A total of 150 sample poultry producers was interviewed using semi structured questionnaire to collect the data required for the study. Descriptive statistics and probit regression model were used for the analysis of the data gathered. Accordingly, out of the 13 variables entered into the econometric model; household size, level of education, frequency of extension contact, family size, breed type owned and number of poultry owned positively and significantly while distance to nearest market negatively and significantly influence the poultry market participation decision in the study area. Therefore, all concerned bodies should focus on improving the infrastructure, providing capacity building by dissemination of technology through market oriented extension approach, increasing access to improved technology, access to credit to improve the skill of producing and market participation for better return.
Keywords: producers, poultry, market participation, probit regression

INTRODUCTION

In Ethiopia, livestock production as the one component of agriculture covers 40% of the agricultural output playing an important role in the national economy as it contributes 13-16% of the total GDP. The Livestock Master Plan(LMP) forecasts the poultry sub-sector to help close the total national meat production-consumption gap and achieve the increase of the share of chicken meat consumption to total meat consumption from the current 5% to 30% by 2030(Shapiro et al., 2015).

Like in other developing countries, in Ethiopia poultry keeping is practiced by rural households using family labor and usually referred as village poultry keeping (Halima *et al*., 2007). Thus, rural poultry represents a significant part of the rural economy in particular and of the national economy of country as a whole. Besides the provision of employment and easily disposable cash income for small-holder farmers, particularly in the off-season from cropping, rural poultry integrates very well into other farming activities as it requires relatively little labor and capital(Pongruru and Nagalla, 2016). The majority of poultry production in country is based on the traditional scavenging system that owns large population of chickens with estimated 51 Million (CSA, 2014). Of this 96.6% representing native chickens of non- descriptive breed, 0.55% hybrid of chickens and 2.8% exotic breed of chickens mainly kept in urban and peril –urban areas (Akililu, 2007).

Increased incomes, urbanization and population growth is also expected to lead in increasing demand of animal products in the developing world, which can in turn improve incomes of poor farmers and food processors (Nebiyuet al., 2016). This expected increase in demand for animal products expanding market opportunities for poor smallholder livestock producers. Therefore, improving access to markets of poor smallholder poultry producers can help them benefit from the rapidly growing demand. The poultry product marketing requires critical evaluation of the existing poultry marketing system, identifying determinants of farmers' participation in the poultry market (Awol, 2010). The International Livestock Research Institute (ILRI) and its partners have identified that encouraging market participation of smallholder livestock producers is a major pathway for getting rural people out of poverty and improving their food security, as livestock contribute to the livelihoods of more than two-thirds of the world's rural poor (Holloway et.al., 2002).

South nation nationalities and peoples region contributes 10 Million, from which (1,486,175) 14% the poultry population is from which 942,291 and 543,884 are found in Kaffa and Benchmaji zones, respectively (CSA, 2014). Adiyo, Chena, Gimbo and Guraferda are districts of Kaffa and Benchmaji zones in which chicken production is characterized by extensive poultry production system (under smallholder) which provide income for poor households(Kibreab et al., 2015). Even if the population is high, the farmers do not benefited from the sector, for this the contribution of low poultry market participation has its own role. According to Kibreab et al. (2016) in increasing the productivity of poultry sector, market problem is one of the identified challenges in the study areas. Assessing the existing marketing system play a decisive role in vibrant economies as mechanisms for exchange necessary for specialization and hence leads to higher economic growth and the proper coordination of the exchange which reflect and shape producer and consumer incentives in supply and demand

interaction (Andrew et al., 2008).

Despite the high demand for poultry products, producers are not market oriented. This in turn leads to low market participation with very small poultry products supply as compared to the high potential of the subsector in the study area. Therefore this study was design to identify factors affecting the market participation of village chickens and poultry products in Kaffa and Bench-Maji Zones of Southern Ethiopia.

METHODOLOGY

Description of study areas

The research was conducted at Adiyo, Chena, Gimbo districts of Kaffa zone and Guraferda district Bench-Maji zone of South Nation Nationality and Peoples Region. The study area was selected considering agro-ecology, socio economic significance of chicken production and population of indigenous chickens.

Table 1. Description of the study area

Measurements	Gimbo	Chena	Adiyo	Gurfarda
Altitude	1800-2800	800-1800	1851-2219	750-1800
Main soil Type	Clay, loam, sandy	sandy clay loam	Clay, loam,clay loam	Sandy, sandy clay, clay
Mean annual rainfall	1150	1170	1190	1145
Mean annualTemp	19.5	18.5	21.5	30.5
Average land size	2.75	1.7	1.8	2.1
Latitude (NS):	07017'316"	07026'71"	07008'42"	06048'66"
Longitude (EW):	036022'243"	036020'54"	035048'05"	035014'96"

Source:-Respective Districts'Office Agricultural Development (2015).

Sampling techniques, data collection and statistical analysis

The study was conducted in four districts of Kaffa and Benchmaji zones of SNNPR which are purposively selected based on their agro-ecology. Accordingly, Adiyo which was highland (altitude>2500masl) representative, Chena and Gimbo as mid-altitude (altitude 1500-2500masl) from Kaffa zone and Gurgarda from Benchmaji zone as low-land (altitude <1500masl) representative were selected. Next, from each district two potential kebles in poultry production were selected purposively. Then after, from the lists of poultry farm households from the selected rural kebles were prepared in consultation with the experts of the office of agriculture in the administration and development agents in the area. Finally, a total of 150 sample poultry producer households were randomly selected from the fresh lists using probability proportional to size (PPS) sampling procedure. Means, standard deviation, percentages, t-test and chi-square test for descriptive analysis; while probit regression model for econometric analysis were used with the aid of STATA version 13.

Theoretical Model

The decision to participate in the poultry market was a binary choice that built on utility maximization theory. This was because of the decision on whether or not to participate was considered under the general framework of utility or profit maximization (Pryanishnikov and Katarina, 2003). Within this framework, economic agents were poultry producers whose participation decisions were measured by perceived utility or net benefit from any option. Although utility was not directly observed, the actions of economic agents were observed through the choices they made. Suppose that U_j and U_k represent a household's utility for two choices, which are, correspondingly, denoted by Y_j and Y_k, respectively. The linear random utility model could then be specified as 1:

$$U_j = \beta_j X_i + e_j \text{ and } U_k = \beta_k X_i + e_k \quad (1)$$

Where U_j and U_k are perceived utilities of poultry market participation and non-poultry market participation choices j and k, respectively, $X_i$the vector of explanatory variables that influence the perceived desirability of each choice, β_j and $U_k$utility shifters, and e_j and $e_k$are error terms assumed to be independently and identically distributed (Greene, 2003). From the economist perspective, an individual i makes a decision to participate if the utility associated with that participation choice (U_j) is higher than the utility associated with decision not to participation (alternative choice), (U_k). In the case of poultry market participation, if a household decides to use option j, it follows that the perceived utility or benefit from option j is greater than the utility from other options (say k) depicted as in equation 2:

$$U_{ij}(\beta_j X_i + e_j > U_{ik}(\beta_j X_i + e_j), k \neq \forall_i \quad (2)$$

Econometric Estimation Model

The qualitative response regression models that are used to estimate the parameters of the qualitative or limited dependent variables are numerous such as LPM, Logit, Probit, switching regression models. What they have in

common is that the dependent variable is a discrete outcome, such as 'yes' or 'no' decisions (Wooldridge, 2002). The most widely used qualitative response models are probit and logit models, i.e., in these models, the probabilities are bound between 0 and 1 and they fit well to the non-linear relationship between the probabilities and the explanatory variables. However, Gujarati (2004) has noted that in most applications, the cumulative normal function (probit) and the logistic function (logit) are quite similar, the main difference being that the logistic function has slightly fatter tails. That is to say the conditional probability (ρi) approaches zero or one at a slower rate in logit than in probit. Therefore, there is no compelling reason to choose one over the other that depends on personal preference, experience and availability of software. In some applications in the explanation of the behavior of a dichotomous dependent variable, the probit model has been found useful (Gujarati, 2004). Thus, based on the assumption of normal distribution of dependent variable; the probit model was used to estimate the probability of selling chickens and poultry products is built on a latent variable with the following formulation:

$\Pr(Yi=1|X_i,\beta_i)=\Phi(h(X_i,\beta_i))+\mu_i$ (3)

Where Yi is a dependent variable which takes on the value of 1 if the farmers participate in poultry market and 0 otherwise. Φ is the standard normal cumulative distribution function, X_i is a vector of factors affecting farmers decision to participate in poultry market, $\beta_i$is a vector of coefficients to be estimated which measures the effects ofexplanatory variables on the farmers decision $\mu_i$is normally distributed disturbance with mean (0) and constant variance and captures all unmeasured variables. The variable Yitakes the value of 1 if the marginal utility the household *i* get from participating in market is greater than zero, and zero otherwise. From equation 3, then:

$Y_i^* = \beta_i X_i + \mu_i \mu_i \sim N(0,1)$ (4)

Where Y_i^* is a latent (unobservable) variable representing level of utility the household gets from selling chickens and poultry products and,

$Y = 1\ if\ Y_i^* > 0,$ (5)

$Y = 0\ if\ Y_i^* <= 0$ (6)

The probability of farmers' decision to participate in poultry market depends on households demographic, socio-economic and institutional factors assuming that for each household 'i' its characteristics can be summarized in table 2 below.

Table 2. Description variables used in probit model

Variables	Variable Type	Variable definition and measurement	Hypothesized Effect
Poultry market Participation	Dummy	1 if household sell Chicken and eggs, otherwise 0	
Sex of household head	Dummy	1 if household head is male, otherwise 0	+/-
Experience	Continuous	Number of years engaged in poultry production	+
Household size	Continuous	Number	+
Education level of the HH head	Continuous	Formal education of the household head (years of schooling)	+
Number of poultry owned	Continuous	Number of chickens owned during survey period	+
Type of breeds owned	Categorical	1=local 2=cross 3=pure	+
Extension contact	Continuous	Frequency of extension contact per month	+
Annual Farm Income	Continuous	Total value of livestock and crop sold in the production year (2014) in ETB	+
Non-farm income	Continuous	Income from non-farm activity in 2015 in ETB	+
Distance to market	Continuous	Kilo meters	-
TLUexcluding poultry	Continuous	Number livestock spices owned in2015 converted into TLU.	-
Poultry production type	Categorical	1= traditional(scavenging only) 2= scavenging +conditional supplementation 3= sem-scavenging	+
Credit access	Dummy	1 if took credit and 0 otherwise	+

RESULTS AND DISCUSSION

The result of descriptive statistics and econometric model were discussed as follows:-

Summary descriptive statistics of variables in the model.

The summary of the results of the descriptive analysis for the households' socio-economic characteristics for 150 sample respondents (119 participants and 31 non-participants) from selected kebeles of Kaffa and Bench Maji zones shown in Table 3are discussed.

The result indicated that out of the total respondents about 76 percent were male and 24 percent were female household heads. The result also indicated that 79.8 percent of male household heads responded that they

had participation in poultry marketing while 77.8 percent of female only participated in it. However, x^2 test of variable shows that there was no statistically significant differences between categories with respect to poultry market participation decision.

Type of poultry breed owned was the variable hypothesized to influence individual smallholder farmer participation in poultry marketing. As the result of revealed from descriptive statistic in table 3, there is statistically significant difference in market participation decision between groups; about 81 and 19percent of the sample respondents owned local breed, cross poultry breed, respectively while none of respondents in the study area owned pure poultry breed. Thus, the majority of the respondents reported possession of local breed with an absence of access to improved poultry breed. The possible explanation of the finding is the access and utilization of improved bread enhances the productivity and participation decision of the household in poultry marketing (Warren 2002).

Educational level of the respondent was continuous variable hypothesized to influence participation in poultry marketing. The mean educational level attended by participants and non-participants was 5.1 and 2.5 grades respectively. The statistical test result revealed that there was significant mean difference between participant and non-participant of poultry marketing with regards to educational level of respondent at 1% probability level; showing that higher education had significant and positive effect on household participation of different local business. This is may be that respondents with education grade enables the individuals to have better awareness and understanding about different advantages including economic benefit obtained from participating in poultry marketing than individuals having lower educational level. With respect to household size, the descriptive statistics result reveals that there is statistically significant mean difference in family size of the poultry market participant and non-participant with 5.8 and 5.06 respectively at 10% probability level. Thus, the large number of the family size had the higher potential to participate in other additional activities.

Further, result of descriptive statistics shows that the mean extension contact concerning poultry production by participants and non-participants was 2.59 and 1.06 times per month respectively. The test statics for the variable reveals that there is statistically significant mean difference between two groups at 1% level of probability level. Thus, farmers who have higher extension contact are more likely to know the value of poultry products and advantage of participation in poultry marketing.

Finally with regard to the size of poultry heard, summary of descriptive statistics indicates that the mean poultry heard size was 9.46, 3.56 for participant and non-participant respectively. This was found to be statistically significant at 1% probability level which implies that the larger in the number of poultry heard an individual possessing the more likely decided in favor of participating in poultry marketing.

Table3.Summary statistics of variables by poultry market participation decision categories.

Variables	**Non-Participant** (31)		**Participant** (119)		**Total** (150)		**Tests**
Categorical	**№**	**%**	**№**	**%**	**№**	**%**	**χ2 -value**
Sex of respondents							
Male	23	20.2	91	79.8	114	76	
female	8	22.22	28	77.78	36	24	0.51
Breed type owned							
Local	30	25.86	91	76.47	121	80.66	
Cross	1	3.45	28	96.55	29	19.33	12.46 **
Pure	0	0	0	0	0	0	
Poultry production system							
scavenging only	18	33.96	35	66.05	53	35.33	
scavengin+supplementation	12	13.95	74	86.05	86	57.33	5.91
Sem-scavenging	1	9.09	10	90.90	11	7.33	
Credit access							
Yes	17	14.52	100	85.47	117	78	0.32
No	14	42.42	19	57.57	33	22	
Continuous	**Mean**	**Std**	**Mean**	**Std**	**Mean**	**Std**	**t-value**
Education level	5.06	2.54	2.18	1.57	3.67	3.73	3.58***
Household size	5.8	1.99	5.06	1.85	5.64	1.98	1.89*
Total livestock unit	3.86	2.02	3.52	1.37	3.79	1.90	0.91
Farm income	8035.58	4733.1	8330	4477.2	8097.56	4519.57	0.65
Non-farm income	6604.17	6474.3	7000	5103.6	6756.66	5402.81	0.17
Extension contact	2.59	1.19	1.06	0.76	2.27	1.28	6.84***
Distance to nearest market	3.08	2.95	5.24	2.70	3.54	3.03	3.72***
Farming experience	7.86	3.100	5.00	2.63	7.26	3.22	1.34
Number of Poultry owned	9.46	6.89	3.56	1.10	8.22	6.59	4.81***

*Note: ***, **and * refers significant at 1%, 5% and 10% probability level Std=standard deviation*

Source: own computation (2016)

Determinants of Poultry Market Participation Decision from probit model

The Model Chi-Square statistic, which is the difference of the values of the two log likelihood functions (i.e. the null model -2 Log likelihood and the full model -2 Log Likelihood), is 38.19. If the P-value for the overall model fit statistic is less than the conventional 0.05 ($p<0.01$) indicating an evidence to show that at least one of the independent variables contributes to the prediction of the outcome. The overall model fit statistic for this model is less than 0.05 and highly significant at ($P<0.0003$) with thirteen degrees of freedom, indicating that at least one of the parameters in the equation is nonzero thus our model fits reasonably well. Further, the overall rate of correct classification is estimated to be 81.46%, with 94.96% of the low weight group correctly classified (sensitivity) and only 31.25% of the normal weight group correctly classified (specificity). Finally, the $x^2$for goodness-of-fit statistic shows that Pearson $x^2=0.5105$, there no statistically significant difference between observed and predicted values thus we cannot reject our model.

The probit model result shows that among the thirteen explanatory variables considered in the model, decision to participation in poultry market is influenced significantly by the following six variables: household size, distant to the nearest, extension contact, number of poultry owned, type of breed owned, and educational level of household head. Consequently, only those six variables that significant determine poultry market participation decision discussed.

Table 4.Estimated result of probit regression model

Variables	Coefficients *(β)*.	Marginal effect	z-values
Sex household head	0.2922357	0.07149	0.86
Educational level of Household	0.1083747	0.0242593	1.81 *
Household size	0.1660495	0.0371696	2.04 **
Total livestock unit(TLU)	0.0448058	0.0100296	0.52
Farm income(10000	-0.0977	-0.0000219	-0.29
Non-farm income(1000)	0.0206	0.0000462	0.81
Frequency extension contact	0.264279	0.059158	2.52 ***
Distance from market	-0.1665557	-0.037283	-3.62 ***
Credit access	-0.0355032	-0.0078881	-0.12
Poultry rearing experience	0.0389873	0.0087272	0.96
Poultry production type	-0.3598498	0.0805512	1.36
Number of poultry owned	0.044676	0.0100006	1.91 *
Type of poultry breed	0.5092593	0. .113996	2.20 **

LR chi2(13) = 38.19 with (Prob> chi2 =0.0003)
estat classification=Correctly classified (81.46%), Sensitivity(94.96%), Specificity (31.25%)
estatgof = Pearson chi2(136) = 135.90 with Prob> chi2 = 0.5105)

*Note: **, ** and * variables significant at 1%, 5% and 10% level of significant.*

Source: Own computation (2016)

Education of the household head has a positive effect on the decision to participate in the poultry market at 10% probability level. This may be higher educational level enhance the capacity of an individual to diversify livelihood and explore local, available opportunity. The marginal effect result showed that for each additional higher grade attended by the respondent, the probability of the decision to participate in poultry production for marketing increase by 2.4 percent. These finding is consistent with those of Bett *et al.(*2012) that found education to positively influence participation in the indigenous chicken market in Kenya.

Household size is associated positively and significantly small holder farmer's household decision to participate in poultry marketing at 5% probability level. The possible reason behind this finding in the study area the available human resource in the household might encouraged the family to participate in other activities including poultry marketing. The marginal effect result shows that for each additional productive member of the family, the probability of the decision to participate in poultry marketing increase by 3.7 percent. The finding of this study is consistent with Tillahun (2013), who reported as family size the main source of labor for all types of farming, poultry and livestock production activities undertaken. The study result is consistent with the result of Awol (2010) which indicated that size of family was positively related to poultry market participation.

Distance to nearest market influences market participation decision as expected negatively and significantly at 1 percent probability level. The most probable reason for this result could be that households, which are far apart from woreda market, incurred high transportation and other related costs. Incurring high amount of transportation and other related costs due to long distance to market will discourage them to participate in the market. The marginal effect also indicated that as the distance to woreda market increases by one kilometer the probability to participate in poultry market decreases by 3.7 percent. The study by Onoja *et al*.(2012) confirms that households which are closer to market outlets are more likely to sell their fish than those households living further away. Further, the result is also similar to those findings of Tillahan(2013) and

Dawit(2010).

Number of poultry owned had a positive influence on the decision to participate in the households' poultry market participation decision at 10 percent significance level. This may imply that those with more poultry are likely to make the decision to participate in the poultry market. This may be due to the fact that that large size of poultry herd could have surplus poultry products beyond the household consumption and they are sure of a continuous supply of poultry. The marginal effect result showed that for one more additional poultry size in the hand of the rural smallholder farmer the probability to participate in poultry marketing increase by 1 percent. This result is consistent with those of Ayiekoa et al. (2015) that showed that the number of indigenous chickens owned positively influences participation in the indigenous chicken market, since the size of the flock allowed producers to participate in the indigenous chicken market. The result is also consistent with those of Awol (2010); Betti et al (2012) and Tillahun (2013).

The model result also indicated that frequency extension contact influences the small holder farmer poultry market participation decision positively and significantly at 1% probability level. The possible reason is that utilization of extension service help to improve technical capacity of the households. Therefore, utilization of extension service enable the targeted farmer adopt improved production system with improved breed that boost the production and in turn leads to market participation. The marginal effect result showed that the probability to participate in poultry marketing increase by 5.9 percent for additional extension contact on poultry production and marketing per month. This result is in line with finding of Tillahun (2013) and Awol(2010) .

Type poultry breed owned positively and significantly associated with small holder households' poultry market participation decision at 5% probability level. Utilization of poultry bread type encourages the smallholder farmers to start poultry production and increase volume of production small holder farmer to decide in poultry marketing. On the other hand, there is higher probability of experience sharing and duplication of best practice with access of different bread type significantly influences participation decision of household in poultry marketing. The marginal effect result shows that the probability to participate in poultry marketing increase by 11.4 percent for one more use of poultry breed. This finding is consistent with the finding of Abeykoon et al.(2013) revealed that owning naked neck chicken breed was significantly associated with the market participation among indigenous poultry farmers in Anuradhapura district in Sri Lanka.

Conclusion and Recommendation

Type of poultry breed determine small holder farmer participation decision in poultry marketing to decide on startup or expand poultry production based on his/her perception on poultry marketing. Therefore, it is recommended that the respective governmental and nongovernmental stakeholders to work on promoting access to improved bread type by the smallholder farmers. On the other hand, poultry herd size also determines the household decision to participate in poultry marketing; thus providing technical and financial supports that enable them to have larger number of poultry herd is recommended to make higher income from it.

Moreover, providing frequent extension service would enhance farmers' decisions on poultry marketing. To obtain this advantage there is a need to improve extension service system, and technical supervision and follow up must be strong and frequent. Therefore, the respective zone livestock and fishery development departments have great role on the improvement of poultry production and marketing by demonstration market oriented poultry production. In line with extension serves promotion of adult education among the farming community in addition to creating experience sharing event to duplicate best practice is also recommended.

Overall, the findings point out that collective action should be used to enhance the productivity and marketing of poultry which in turn increases market participation. Therefore, the concerned bodies should focus improving on the infrastructure, providing capacity building by dissemination of technology through extension, increasing access to improved technology, access to credit.

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Competing interests
We declare that we do not have competing
Interests
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