Small Towns and Their Effects on the Livelihood Diversification of Rural Households in the Wolaita Zone, South Ethiopia Region

Kataro Galasso Gamo

kataro.galasso@wsu.edu.et

Wolaita Sodo University https://orcid.org/0000-0003-3789-1313

Research Article

Keywords: Small Towns, Livelihood Diversification, Effects, Rural Households, Wolaita Zone

Posted Date: August 1st, 2024

DOI: https://doi.org/10.21203/rs.3.rs-4828008/v1

Additional Declarations: The authors declare no competing interests.

Abstract

The new development policies and strategies of Ethiopia envisage small towns as a strategic tools for strengthening rural urban linkages and livelihood diversification to support overall economic development and poverty reduction. This is due to the role of small towns in bridging urban and rural areas and the interdependence of the rural and urban economies. However, Ethiopian small towns do not seem to be on the right track in terms of their relationship with the agricultural sector as required by government policy and strategies. Past studies failed to determine the potential benefits of small towns for diversifying income through reinforcing rural urban links across the country. The objective of this study is to examine the capacity of small towns to diversify the incomes of rural households to assist in achieving the goals of sustainable development. The study is based on a mixed methods approach using both quantitative and qualitative data with a questionnaire survey of 355 households from the Damot Pulassa district of the Wolaita Zone as the main data collection tool. The study also collected qualitative data through informant interviews from 15 households and experts. The research question addressed in this paper is what contributions can small towns make to diversify the incomes of rural households? A binary logit model was applied to investigate the factors influencing household participation in income diversification. In this regard, out of the 12 explanatory variables included in the model, 5 were significant. The results confirm that factors such as age, farm land size, yearly cash income, access to credit and distance from the small town were key determinants of farmers' participation in income diversification. Furthermore, the study identifies income diversification as a cumulative effect of several factors, and therefore urges policy makers to pay due attention to them with a view to overcoming challenging factors. To promote the effects of small towns on rural household income diversification, both agricultural and urban sector productivity should be enhanced through improved agricultural productivity and enhanced performance of the small business sector in small towns through the complete support of the government.

Introduction

Many developing countries, including Ethiopia, base their development strategies on agricultural sector led development strategies. They rely upon the agricultural sector to curb poverty and bring about overall development. Agriculture is a nucleus and engine of economic policiy in these countries (Baye 2017; Todaro 2012; Weldegebrial,2012). Nevertheless, rural development without corresponding and harmonious development of diverse economic activities in small towns may not be sustainable. However, overall economic development and poverty reduction in such countries are unlikely without the rural development and additional livelihood diversification of smallholder farmers. This is because a large proportion of the population depends on agriculture with limited land, traditional farming, subsistence production, and poor utilization of agricultural technologies (Yishak, 2017). In this case, off/nonfarm economic activities account for a good part of rural household livelihood diversification (Himanshu et al., 2017; Leng et al., 2020; Yishak, 2017).

The economy of rural areas is often closely interwoven with economic activities in small towns. The linkages with small towns are so inescapable that the structure of the rural economy can vary in response to the economic and social functions of towns. This is because the economic structure of small towns reflects the capacity of local regions to capture forward and backward linkages and their multiplier effects (Douglass, 1998). The combined effect of strong forward and backward linkages can therefore be instrumental in increasing agricultural production and productivity, which ultimately helps foster rural development. Moreover, this strong linkage can help create farm and nonfarm employment opportunities and income, which contribute to poverty reduction and development in rural areas. The contribution of small towns (through forward and backward linkages) to poverty reduction and rural development rests on several factors. Land tenure system and production and management capabilities are among the factors that determine agricultural production and rural development (Tacoli, 2002). Markets, credit (and finance) and infrastructure are among the other vital elements that harness forward and backward linkages and contribute to rural welfare improvement (Todaro and Smith, 2009). Therefore, ensuring the functioning of such essential elements for rural development is absolutely vital. This is because the collective effect of ensuring conducive infrastructure and institutional arrangements (such as property rights and markets) can nurture economic activities and facilitate rural development (Start, 2001; Alston, 2002).

Many rural areas however have few or none of the most important functions that contribute to strengthening forward and backward linkages. Missing functions in rural areas can affect economic activities and rural development in many ways. However, small towns situated near to rural areas can contribute to bridging part of that gap and play a significant role in facilitating rural development (Tacoli, 2002; von Braun, 2008). One major contribution of these small towns is that they act as bridges to higher-order towns and cities. In addition, they provide various functional services to rural and urban households. These services, which are termed the roles of small towns in this paper, are often physically connected to and located in small and larger towns. These functions, which can influence employment, income, market accessibility or technology use can therefore be vital for rural development and household welfare improvement. Towns can also act as local centers that households use to establish networks with various economic agents to advance their livelihood strategies and eventually play a role in strengthening rural urban linkages.

Even if there is economic centrality of agriculture in the study area, many households engage and pursue diverse off/nonfarm livelihood activities to maintain and improve their livelihood/wellbeing (Yishak, 2017). Therefore, understanding the driving factors of each livelihood strategy is crucial for improving the response mechanisms related to poverty, food security and livelihood improvement in the study area. Nevertheless, research on the contribution of small towns into rural household income diversification under conditions of resource scarcity in the study area is limited. The factors that determine rural households' participation in diversified income activities have not been well identified. The diverse income sources pursued by rural households in the study area were not assessed in detail. This study therefore aimed to assess the effect of small towns on diversified income sources and identify the determinants that influence household participation in income diversification.

Research Methodology

Description of the Study Area

This study was conducted in the Wolaita Zone of southern Ethiopia. It is located 390 km southwest of the capital city of the country, Addis Ababa. The zone is roughly located between 6.4 ^{0} - 7.1 ^{0} N and 37.4 ^{0} - 38.2 ^{0} E, latitude and longitude respectively. It covers a total area of 4,541 km^2 and is composed of 16 administrative districts and 6 registered towns.

Sampling Techniques

A multistage sampling procedure was employed to select sample households. In the first stage, out of the 16 districts in the zone, Damot Pulassa was selected purposively due to the small land size and the population pressure existing in the area. In the second stage, Kebeles were selected due to their distance from the small town. In the third stage, the sampling frame (complete village household lists) was obtained from each kebele's administrative office. Among the three Kebeles there are approximately 3155 households. Therefore, the number of households can be calculated via the formula of Yamane (1967):

$$n = \frac{N}{1 + N(e^2)} = \frac{3155}{1 + 3155(.05)^2} = 355$$

where: n = sample size required N= size of the population = 3155 and

e= margin of error = 0.05 (5 percent). The total sample in the present study included 355 HHs from three rural Kebeles. Thus, in this study, numerical data were collected from 355 households using a questionnaire to provide a quantitative description of the general situation of the effects of small towns on rural households' income diversification and the factors influencing their diversification. Three hundred fifty-five rural households were selected from among the total sampled Kebeles using a simple random sampling technique. A total of 106, 109, and 140 households were sampled from Zamine Wulusho, Golo Shanto and Bibso Olola, respectively, of rural kebeles.

Types and Methods of Data Collection

Both primary and secondary data, which were qualitative and quantitative in nature, were used. Primary data were collected from sample households using structured interview schedules. Secondary data were obtained from different sources. In addition, key informant interviews with households and experts were conducted to supplement the research findings with qualitative information

Method of Data Analysis

In this study, descriptive statistics and econometric models were used to analyze the data collected from the sample households. For descriptive statistical methods, quantitative categorical data were analyzed using percentages, frequencies and chi-square tests. Quantitative continuous variables were analyzed using t tests and minimum, maximum, mean and standard deviation values. After computing the descriptive statistics, binary logistic regression was used to identify factors affecting rural households' participation in income diversification where the dependent variable was found to be dichotomous (1 if the household participated in income diversification and 0 otherwise; SPSS 16 for Windows was used for the econometric analysis.

A logistic regression model was applied in this study to assist in estimating the probability of farmers participating in income diversification activities according to one of two values: participatory or not participating. The dependent variable in this study was the participation of rural households in income diversification. Household income diversification is a dichotomous variable representing the status of rural household income diversification and takes the value of 1 if a household is diversified and 0 otherwise. The income diversification situation of a household is identified by assessing the main income sources taken by respondents. Households who generated their income from only agriculture were considered no diversified, while rural households who derived additional income from nonfarm or off-farm activities were considered to participate in income diversification. A review of the literatures and author's knowledge in the income diversification situation of the study area were used to identify the potential determinants of household income diversification. Therefore, by setting household participation in income diversification as the dependent variable, the following variables were selected to analyze whether they explain household participation in income diversification.

Table 1. *Definition and units of measurement of explanatory variables used in binary logit model.*

Variables	Description and measurement	Expected sign
SEX	is a dummy variable taking value 1 if the household head is male, 0 otherwise	-
AGE	Age of household head (years).	+
EDUC	Formal education of household head (grades or number of years in school).	+
MSTATUS	Marital Status of the Household head (1 if married)	
FAMLSZ	Family size of household in number	+
FARMSZ	Total farm land size of household (hectare).	-
SOSER	A dummy variable that takes value 1 if a household use social service from small town and 0 otherwise.	-
ADMSER	A dummy variable that takes value 1 if a household use administrative service from small town and 0 otherwise.	-
CREDIT	Farmers access to formal credit, dummy variable (=1, if yes; =0, otherwise)	+
DISMKT	Distance of the respondents' house from the small town (km).	-
FERTLZR	It is a dummy variable that takes value 1 if a household use fertilizer and 0 otherwise.	+
INCOM	Total yearly cash income of households (Birr)	+

Results and discussion

Descriptive results

The results showed that of the total sampled households, approximately 79.2% were male and 20.8% were female (Table 2). The results also showed that 87% of the sampled households were married, 2% were single, 1.4% was divorced and 9.6% were widowed. On the other hand, 36.3% of the sampled households had family size less than 5, and 63.7% had a family size 5 or above, which is larger than the national average family size of 4.6 (CSA, 2016). Similarly, 62% of the sampled households held less than one hectare of land, and 55.8% of the households had an annual cash income of less than 2000 birrs.

Table 2
Categorization of Households on Hypothesized Dummy Variables

Respondents category					
Variables	**Category**	**No diversification Farm only (127) 42.3%**	**Diversify (173) 57.7%**	**Total**	**Chi-square**
		N%	**N%**	**n%**	
Sex	Male	16279.8	11978.3	281 79.2	.792
	Female	4120.2	3321.7	74 20.8	
Fertilizer use	No	21	21.3	4 1.1	1.000
	Yes	20199	15098.7	351 98.9	
Access to Credit use	No	2311.3	74.6	30 8.5	.033
	Yes	18088.7	14595.4	325 91.5	
Access to Admn service	No	125.9	64	18 5.1	.471
	Yes	19194.1	14696	337 94.9	
Access to Infrastructure	No	115.4	85.3	19 5.4	1.000
	Yes	19294.6	14494.7	336 94.6	

Source: Own survey, 2023

As indicated in Table 2 above, the chi-square test revealed that sex, use of fertilizer, access to credit, access to administrative service and infrastructure were statistically significantly different at the 1% probability level (Table 2)

As indicated in Table 3, of the total farmhouses held, 94.6% of the respondents were working in small towns where agricultural inputs were provided. This result is consistent with the findings of previous studies (Akkoyunlu 2015; Gebre and Gebremedhin 2019; He et al. 2013). Similarly, of the total 355 sample of household respondents more than 340 received a different kind of administrative service from that of a small town. The qualitative data also indicate that the services provided by small towns to the hinterlands of rural farm households include extension services, social justice, and social awareness creating services. These results are in agreement with the findings of (Kocho et al. 2011), who reported that approximately 79% of the respondents had received access to financial credit and 74.4% had received market access. In addition, small towns provide public services. This indicated that small towns are vital for providing agricultural input, output, and social, instructional, and economic services.

Table 3
Descriptive Statistics of the Role of Small Towns in Terms of Rural Household Heads.

Market access			Agricultural input		Credit access		Administration service		Education		Health	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
No	19	5.4	17	4.8	30	8.5	42	11.8	9	2.5	8	2.3
Yes	336	94.6	338	95.2	325	91.5	313	88.2	346	97.5	347	97.7
Total	355	100	355	100	355	100	355	100	355	100	355	100

Source: Survey data, 2023

From the total sample households of 355 respondents, 346 received an educational opportunity from a small town. Moreover, of the total sample of rural farm household respondents 347 received health services from the town health center. This approach is helpful for enhancing the livelihood diversification of rural areas and farm households. Overall, the above findings are similar to those of (He et al. 2013); the function of a small town is also important for diversifying rural livelihoods, in particular, it is helpful for farmers to contribute nonfarm economic activities. This is more significant for those who are nearby the town and found around the small town. Small towns are more likely to practice nonfarm economic activities than other people who are far from small towns. For nearby residents, small town provide and create other new jobs for nearby rural farm households. As indicated in the descriptive data of the sample, 355 households, 325 of whom had market access to engage in petty trade. Consequently, the small town adds to the livelihood diversification of its nearby rural household heads.

As the region is a less favored region with declining agricultural land, broad facilitating policies are required to support local economies with limited opportunities for income generation. Such policies should focus on infrastructure provision, finance insurance and credit provision, education and health services, administrative services and agricultural inputs thus providing a more secure environment for the development of agricultural and nonagricultural sectors.

Binary Logit Model Results

In this section, selected explanatory variables were used to estimate the logistic regression model to analyze the determinants of households' income diversification behavior. A logit model was fitted to estimate the effects of the hypothesized explanatory variables on the probabilities of household participation in income diversification. A set of 12 explanatory variables (5 continuous and 7 discrete) were included in the logistic regression analysis. These variables were selected on the basis of theoretical explanations, personal observations and the results of survey studies. To determine the best subset of explanatory variables that are good predictors of the dependent variable, logistic regression was estimated using the method of maximum likelihood estimation, which is available in Statistical Package for the Social Science (SPSS) version 16. All the above mentioned variables were entered in a single step. The definitions and units of measurement of the variables used in the model are presented in Table 4

Table 4
Logit model estimates for factors affecting farmers' participation in income diversification.

Variables in the Equation						
Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Sex	.223	.306	.532	1	.466	1.250
Age	.057	.014	17.668	1	.000	1.059
Education	.115	.088	1.731	1	.188	1.122
Marital Status	.087	.366	.057	1	.811	1.091
Family Size	− .142	.142	1.004	1	.316	.867
Farm Land Size	2.493	1.037	5.777	1	.016	12.094
Social Service provision	− .235	.647	.133	1	.716	.790
Administrative service prov.	− .032	.696	.002	1	.963	.968
Distance from small town	-1.238	.724	2.923	1	.087	.290
The use of Fertilizer	− .048	.593	.007	1	.936	.953
Access to Credit	1.081	.588	3.378	1	.066	2.947
Yearly Income Level	.243	.098	6.138	1	.013	1.275
Constant	-5.686	1.450	15.383	1	.000	.003

a. Variable(s) entered on step 1: Social service provision, Farm land size, Administrative service, Use of fertilizer, Distance from the small town, Access to credit, Marital status, Sex, Age, Education, Household Size, Income level.

The logit model results used to the study factors influencing household participation in income diversification are shown in Table 4. Among the 12 variables used in the model, five

were significant with respect to income diversification at less than 10%. These variables include age, farmland size, distance from the small town/market center, access to credit and annual household income, whereas the remaining seven explanatory variables were found to have no significant influence on household participation in income diversification. The effect of the significant explanatory variables on income diversification in the study area is discussed below:

Age

Age was found to have a positive and significant effect on the probability of income diversification at a probability level less than 1%. When other factors were held constant, the likelihood of a household diversifying into off-farm activities increased by 5.9% when the age of the household head increased by 1 year. This result is opposite to that of Abera et al., (2021), who reported that age has a negative effect on households' livelihood diversification.

Yearly Income of the Household

This variable was found to have a positive and significant influence on income diversification into non/off farm activities at the 5% probability level. This result implies that households with large cash incomes are more likely to diversify their income generating activities into non/off farm activities. This result shows that farmers with low incomes are less likely to participate in income diversifying activities than those with high incomes. A possible reason is that farmers who have adequate income sources can overcome financial constraints to engage in alternative income-generating activities. Hence, higher income can encourage them to invest in other income-generating (especially nonfarm) activities. The model results reveals that, other factors being constant, the probability of a household diversifying into nonfarm or off-farm activities increases by 27.5% for farmers with higher yearly incomes.

Access to Credit

Access to credit affects the level of income diversification of households positively and significantly at 10%. This means that credit utilization by households increases income diversification by 9.4%. This result is similar to that reported by Babatunde and Qaim (2009); and Zerai and Gebreegziabher (2011), who noted that credit can increase the capacity of households to start nonfarm businesses. Households with access to formal credit are more likely to participate in nonfarm activities than are those without access, and this access improves the level of income diversification. Access to the credit market provides opportunities for farm households to obtain the necessary capital to start up or to participate in nonfarm employment.

Distance from the Market

Distance from the market was significantly and negatively related to the level of income diversification at the 10% probability level. This implies that moving further from the small towns or the market centers lowers the degree of income diversification. If the other factors remain constant, the marginal effect of farm household income diversification decreases by 29% as household residence increases from small towns or market centers by 1 h. This result is consistent with the results reported by Fufa (2015); Ergicho and Markos (2015); and Yishak (2017). This negative relationship indicates that the households that lived farther from small towns are less likely to be involved in nonfarming and off-farming activities. A possible justification could be that households that are closer to small towns do not have much cost accessing market incentives for the diversification of income sources. It is obvious that; if farmers are unable to reach the market to sell their outputs from nonfarm activities, they could be discouraged from involving in such activities. Therefore, a long distance to the nearest market reduces the level of income diversification of households.

Farmland Size: Farm size positively and significantly influenced the probability of farmers participating in income diversification into nonfarm and off-farm activities at a less than 5% significance level. This result implies that farmers with large farm sizes are more likely to diversify their livelihood into nonfarm and/or off-farm forms than farmers with small farm size are. The odds ratio of 12.094 for farm size indicates that, other things being constant, the odds ratio in favor of farmers' participation in income diversification increases by a factor of 9.4% as the farm size increases by one hectare. The results of this study contrast with the earlier findings of Yishak (2017).

Conclusion and Recommendations

This study examined the effect of small towns on the income diversification of farming households' decisions near small urban areas in the Wolaita Zone in the southern Ethiopian region. Agricultural production has been declining from time to time in the region due to frequent land fragmentation, uncontrolled population growth and rapid urbanization, and this has forced people to look for alternative income options other than agriculture. A significant number of rural households engage in diverse income generating activities away from pure crop and livestock production. According to the study, it is becoming increasingly clear that the agricultural sector alone cannot be relied upon as the main activity for rural households as a means of improving livelihoods in the study area. The effect of small towns on income diversification is playing a prominent role in rural households' income and food security, even though, policy makers are paying more attention to the agricultural sector in Ethiopia.

A binary logistic regression model was used to determine the determinants of rural household income diversification. The model results suggest that household participation in income diversification is influenced by various factors. The results indicated that out of the 12 variables five were found to significantly influence households' participation in diversified income activities at different probability levels. These variables include age, farm land size, distance from the small town/market center, access to credit and yearly income. The model results indicated that age, farm land size, yearly income and access to credit positively and significantly influenced farmers' participation in income diversification activities, while the distance from small towns/market centers negatively and significantly affected the diversification of income into nonfarm, off-farm and combined nonfarm and off-farm activities.

The study results showed that small towns have a statistically significant effect on the income diversification decisions of farming households. These findings prove that farming households near urban areas diversify their income to farming and unskilled nonfarm activities more than households far from

urban centers. The findings of the study held to possible policy recommendations in the area of income diversification. The strong significant association between total annual cash income and diversification requires policy measures to pave the way for solving financial problems through developing and strengthening financial institutions, creating credit access and promoting better income generating options.

Therefore, the results of the study indicate that as the area is overpopulated with a large population migrating to urban areas due to small farm land size and displacement due to rapid urbanization, people migrate to urban areas to participate in unskilled and low-paying activities. Therefore, the government should design deliverable strategies to improve the livelihood of farming households near urban areas to minimize the number of people migrating to larger cities. These strategies should strengthen urban agriculture and facilitate mechanisms to enable farmers to obtain agricultural technologies that increase agricultural productivity. Moreover, micro and small enterprises in small towns should work hand in hand with farmers who have lost part of their farmland for development purposes to create job opportunities. Finally, the South Regional State should apply additional efforts to empower small towns to create a favorable working environment for displaced households to generate income from nonfarm activities.

Declarations

Acknowledgments

This work was financially supported by Wolaita Sodo University

Ethical statement

The Wolaita Sodo University Institutional Review Board (IRB) completed and authorized a thorough risk assessment and ethical evaluation prior to the research execution and the start of data collection.

Conflict of interest statement

The author has no competing interest to declare

References

1. Abera, A., Yirgu, T., & Uncha, A. (2021). Determinants of rural livelihood diversification strategies among Chewaka resettlers' communities of southwestern Ethiopia. *Agriculture & Food Security*, *10*(1), 30.
2. Akkoyunlu, Ş. (2015). The potential of rural–urban linkages for sustainable development and trade. International Journal of Sustainable Development & World Policy, 4(2), 20–40
3. Alston, M. (2002) Inland rural towns: are they sustainable? Paper presented at the Academy of the Social Sciences Session on "Rural Communities at the Outlook 2002 Conference", 5-7 March 2002, Canberra, Australia http://www.assa.edu.au/Workshop/Papers/alston.PDF (accessed on January 8, 2021)
4. Babatunde, R. O., & Qaim, M. (2009). Patterns of income diversification in rural Nigeria: Determinants and impacts. Quarterly Journal International Agriculture., 4 (4), 305–320. DLG-Verlag, Frankfurt/M.
5. Baye, G. (2017). Poverty, Peasantry, and Agriculture in Ethiopia. Annals of Agrarian Science 15(3):420–30. https://doi.org/10.1016/j.aasci.2017). 04.002.
6. CSA (Central Statistical Agency). (2016). The federal democratic republic of Ethiopia central statistical agency. International Journal of Scientific and Research Publications, 6(5).
7. Douglass, M. (1998) A regional network strategy for reciprocal rural-urban linkages: An agenda for policy research with reference to Indonesia. *Third World Planning Review*, 20(1): 1-33.
8. Ergicho, Y., & Markos, A. (2015). Assessing determinant factors of income diversification among rural farm households in Ethiopia: The case of Leemo and Anileemo districts, Hadiya Zone, South Nation Nationalities People Region. International Journal of Science and Research, (IJSR) (Online), 2319–7064.
9. Fufa, M. (2015). Factors responsible for income diversification among rural farm households in Agarfa district, Bale Zone, Oromia National Regional State (Ethiopia (Doctoral dissertation, Haramaya University).
10. Gebre, T., and Gebremedhin, B. (2019). The Mutual Benefits of Promoting Rural-Urban Interdependence through Linked Ecosystem Services. Global Ecology and Conservation 20:e00707. https://doi.org/10.1016/j.gecco.2019.e00707.
11. He, C., Samre, T., and S Taharti, S. (2013). 'The Role of Small Towns in Diversifying the Livelihood of Rural Communities. College of Business and Economics Department of Management.
12. Himanshu, Peter L., Abhiroop M., and Rinku M. (2017). Agricultural Input Credit in Sub-Saharan Africa: Telling Myth from Facts. Food Policy 67:93–105. https://doi.org/10.1016/j.foodpol.2016.09.014.
13. Kocho, Tsedeke, Girma, A., Azage, T., and Berhanu G. (2011). Marketing Value-Chain of Smallholder Sheep and Goats in Crop-Livestock Mixed Farming System of Alaba, Southern Ethiopia. Small Ruminant Research 96(2–3):101– 5. DOI: 10.1016/j.smallrumres.2011.01.008.
14. Leng, Chenxin, Wanglin M, Jianjun T., and Zhongkun Zh. (2020). ICT Adoption and Income Diversification among Rural Households in China. Applied Economics 52(33):3614–28). https://doi.org/10.1080/00036846.2020.1715338.
15. Start, D. (2001) The rise and fall of the rural non-farm economy: Poverty impacts and policy options. *Development Policy Review*, 19(4): 490-501.
16. Tacoli, C. (2002) Changing rural-urban interactions in Sub-Saharan Africa and their impact on livelihoods: A summary. Working Paper Series on "Rural-Urban Interactions and Livelihood Strategies", Working Paper No. 7, International Institute for Environment and Development (IIED).http://www.iied.org/pubs/pdf/full/9153IIED.pdf (accessed on March 12, 2021)

17. Todaro, M. and Simth, S. (2003).Economic development, 8th edition publisher copyright licensing agency Ltd, London, United Kingdom.
18. von Braun, J. (2008) 'Rural-urban linkages for growth, employment, and poverty reduction.' In: G. Alemu and E. Wale (*Eds.*) *Proceedings of the Fifth International Conference on the Ethiopian Economy*. Ethiopian Economic Association, Addis Ababa, Ethiopia. http://www.nri.org/projects/reed/docs/wandschneider_2004_icld.pdf (accessed on April 1, 2021)
19. Weldegebrial, G. (2012). Rural Household Livelihood Strategies in Drought-Prone Areas: A Case of Gulomekeda District, Eastern Zone of Tigray National Regional State, Ethiopia. Journal of Development and Agricultural Economics 4(6) https://doi.org/10.1016/10.5897/jdae12.126.
20. Yamane, T. (1967). Statistics, an Introductory Analysis (2nd ed.). Harper and Row
21. Yishak Gecho. Rural Farm Households' Income Diversification: The Case of Wolaita Zone, Southern Ethiopia. **Social Sciences**. Vol. 6, No. 2, 2017, pp. 45-56. doi: 10.11648/j.ss.20170602.12
22. Zerai, B., & Gebreegziabher, Z. (2011). Effect of nonfarm income on household food security in Eastern Tigrai (Vol. 1). An Entitlement Approach.