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The Impact of Universal Rural Road Access Program (URRAP) on Households' Welfare: The Case of Oromia Region

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Abstract

A major road sector investigate program has been underway in Ethiopia since 1997 which led to a significant improvements in road accessibility. Improved rural roads have a positive impact on rural inhabitants by enhancing their ability to access social services. The main objective of this research is to investigate the economic impact of all weathered URRAP road projects in the Oromia Region. The paper especially looks in depth at the characteristics of households participating in the Universal Rural Road Access Program (URRAP), examines the determinants of household participation in Universal Rural Road Access Program (URRAP), and investigates the impact of Universal Rural Road Access Program (URRAP) on household's welfare. The paper used first-hand data by distributing questionnaires in Oromia Region and a logit model also was used so as to identify the main determining factors. Finally, the prepare presents the output of implementing URRAP in the region by far in the nation has played a noteworthy role in improving rural household's welfare and benefited both in terms of monetary expenditure and time-saving.

Keywords: Universal rural road access program, Oromia region, household, welfare

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Introduction

Improved rural roads have a positive impact on rural inhabitants by enhancing their ability to access social services. These social services are markets and jobs for which the improvement of infrastructure improves the living standards of habitats in a given area is expected to be improved because of the reduction of cost of the transport and the time taken to travel a given distance (Lulit Aklilu, 2012). As per the economic report by the United Nation Economic Commission for Africa (2016) on Africa, expending large investments on infrastructure development is the key to rapid and uninterrupted economic growth, for instance, Ethiopia has registered more than double infrastructure development between 2009 and 2013, which put the country on top of the content (UNECA, 2016). Indeed, in the last 15 years, a total of 81,363Km of federal road excluding routine maintenance work and community roads have been undertaken by the government in four separate RSDP phases. Compared to the planned target, physical accomplishment under the four phases of RSDP stood at 85 percent (RSDP- IV).

The Universal Rural Roads Program (URRAP) achieved 76 percent during the first Growth and Transformation Plan (GTP -1) period for which the program has planned envisioned to connect all Kebeles through a roadway system that requires the construction of 71,523 km of all-weather access roads (Ethiopian Roads Authority (ERA), April 2016). In response to this need, and as part of the RSDP-IV, the government of Ethiopian embarked on a Universal Rural Road Access Program (URRAP) in 2011/2012 and continued up to 2014/2015 that sets out to connect all Kebele by roads of a standard that provides all-weather, year-round access, meets the needs of the rural communities, which are affordable and easily maintainable using local equipment and construction materials (RSDP-IV).

It has now been almost five years since the URRAP came into the picture with a vision of connecting all Kebele's in the country to major all-weather roads by 2014/15 in addition to interlinking each Kebele's with gravel roads. A little more than 71,500Km of rural roads were planned to be constructed throughout the URRAP duration and has achieved the percentage of the rural population with access to roads to 80% from only 30% at the beginning of the program (ERA, 2016). As per ERA's Program valuation in 2016, from the 11 regional states and City Administration of the nations, Tigray and Oromia have the best URRAP performers in GTP-1

which is 95% and 94% of their plans while Amhara and the Southern Nations Nationalities and People's regions performing at medium level.

Statement of the Problem and Objective

Ethiopia has shown a considerable commitment to the road sector which has seen its network increase from 26,550 km in 1997 when the first Road Sector Development Program was launched to 125,000 km in 2016 (a 470.8% increase). In this regard, to obtain the planned achievement, the government has funded about 77% in RSDP IV investments as part of the Growth and Transformation Plan (2010/11-2014/15) which is worth about 300 Billion Birr (ERA, April 2016). This shows the importance of road transport as a means of developing the productivity of other sectors such as agriculture, industry, mining, and tourism, as well as the delivery of education and health services. This commitment has also seen the expansion of the rural network and the initiation of the Universal Rural Road Access Program (URRAP) in 2011, in order to provide all-weather road access to all kebeles in a few years. The success of this strategy can be measured by the RAI, which has reportedly increased from 13% in 1997 to 39% in 2014/15. Furthermore, if URRAP achieves its construction targets, the RAI should increase to about 80% (ERA, 2016).

Rural road construction is also important in other sector activities like the Productive Safety Net Program which is one of the known social protection programs that involves labor-intensive methods to construct community infrastructure like feeder roads, health posts, and primary schools as well as to rehabilitate natural resources in some of the poorest weredas (Lulit Aklilu, 2012). The agricultural sector is also cooperating with the Ethiopia Roads Authority (ERA) in the construction of access roads in areas of high agricultural potential.

In the Oromia region more than 31,400 km of URRAP road is constructed by involving more than 400 Contractors and 160 Consultant are involved and since the commencement of the URRAP in 2011/2012 in the Oromia region and up to 2014/2015, 3125 projects have been developed and it was planned to construct 30,374.05 Km with the cost of ETB: 23.8 Billion. However, the achievement in this regard was only 63% of the road has been constructed with the cost of ETB13 Billion which is 53% only (ORA, 2014).

SMEC, one of the ERA consults has tried to evaluate the quality of ride and transportation costs in 2016 and tried to evaluate the impact of the delay effect in completing the URRAP road project (SMEC, 2016). Moreover, the economic benefit of rural feeder roads in Ethiopia has been studied as part of an effort to revitalize the agricultural and rural sectors (David Stifel, Bart Minten & Bethlehem Koru, 2016). However, evaluation of the economic importance of the URRAP road project in the Oromia region with respect to the increase public welfare by increasing benefits such as access to health centers, employment opportunity, access to education, access to other villages, travel time and transportation cost, farm gate prices and market prices, impact on agricultural productivity, access to the modern energy owing to the road construction, and expansion of urbanization have not been dealt in depth.

Though the aforementioned great achievements have been observed as the nation, the benefit and the change in the public welfare as a result of the implementation of the Universal Rural Road Access Program (URRAP) in the Oromia Region has interested the researcher to conduct proceed as the main objective of the study. The main objective of this research is to investigate the economic impact of all weathered URRAP road projects in the Oromia Region. The specific objectives of this research are to: To assess the characteristics of households participating in the Universal Rural Road Access Program (URRAP) ; to examine the determinants of household's participation in Universal Rural Road Access Program (URRAP) and to investigate the impact of Universal Rural Road Access Program (URRAP) on household's welfare

Literature Review

As discussed by Gachassin, M. et al. (2010), the impacts of road construction in rural areas have impacts in different ways, among those the impact on human capital, the market access, and labor activities in different sectors of the country's economy.

Better access to roads could have a considerable role in economic growth in the country, especially for countries that have very low initial road density and even more so for landlocked countries like Ethiopia. A number of studies have looked at the impact of the road on economic growth. A study by Worku (2010), analyzed the impact of road sector development on economic growth in Ethiopia which used time series data on the country's road network and GDP growth over the period 1971-

2009. Worku used the total road network per worker and he arrived at a positive impact of the road on overall GDP, it does not show the variation in road access in different parts of the country and how this might affect economic performance at lower levels of administrative units. It would be interesting to find out, as we try to do in this paper, whether road infrastructure has economic impact in rural Ethiopia where about 80% of the population resides, like the Oromia Region. Recognizing the fact, agriculture is the source of the rural population, increasing their access to market, technology, and agricultural input is vital to increase their income.

A study by Renkowet.al. (2004) shows that physical remoteness brings economic isolation and this increases fixed transaction cost incurred by farm households in Kenya which use the maximum likelihood model to estimate how transaction costs and market participation is responsive to rural infrastructure. Finally, Renkow underlined that public infrastructure facilitate market integration and minimize transaction cost. A major limitation of Renkow et al. (2004) is that they do not have a direct measurement of the road accessibility of rural villages. They rather classify villages into those that are served by trucks and those served by non-motorized vehicles. Their finding that remoteness increases fixed transaction costs is only significant for villages served by trucks.

Dercon et al. (2009) used a panel data approach for fifteen rural villages in Ethiopia and examine the impact of agricultural extension programs and roads access on poverty and consumption growth. Thus, they find that access to all-weather roads reduces poverty by 6.9% and it increases average consumption growth by 16.3% after controlling for regional fixed effects and seasonal shocks. Even if this paper was interesting, the authors used a very crude measure of road access, basically a dummy variable indicating whether the household has access to all-weather road to the nearest town. This road accessibility measure does not capture the actual change in roads through upgrading, maintenance, and construction of new roads. For this study, we use a bit of similar data to Dercon et al. (2009), but our paper uses a relatively better indicator of road access which varies over time (which is not fixed).

Similarly, a study by Jalan and Ravallion (2002) has found robust results on the geographic poverty trap of rural households using longitudinal data from 1985-90 on 5600 farm households in rural China. They hypothesize that consumption growth is a function of a household's own capital and geographic capital. The study takes road density per ten thousand population as one of the

geographic variables which affect the productivity of private capital. Using GMM estimation, the authors find that roads have positive and significant impacts on consumption growth in China. In addition, the study emphasizes consumption growth needs road density level to exceed 6.5 km per 10,000 population.

Khandker and Koolwal(2011) examine the impact of rural roads in the long run by using household-level panel data from Bangladesh between 1997 and 2005. They estimate the benefit of road projects on consumption expenditure before and after the project in control and treatment villages. Results from GMM estimation show positive and significant outcomes of roads on per capita expenditure in the short run, especially for extremely poor households. However, in the long-run large benefit will be accrued to higher-income groups due to the increasing rate of return to rural investments and expansion of non-farm employment. They also identified the initial difference in the households' characteristics and the quality of roads determines the long-run impact of the roads. According to, Mu and Dominique (2007); Khandkeret et. al (2006); Stifel et.al (2012) and Wondemu and Weiss (2012), the study roads have a significant impact on poverty reduction and economic growth using impact evaluation techniques and panel data estimation by taking specific road projects.

A well-developed road transport sector in developing countries is assumed to fuel up grow the process through a variety of activities of the development endeavors of a nation. Among these, the creation of market access opportunities for agricultural products is the major one. The issue of market access is more relevant for a country like Ethiopia where the rural population accounts for about 85% of the national population who are engaged in production for both the domestic and international markets (CSA, 2008). Moreover, road transport facilities play a role in both the production and consumption decisions of every household in their day-to-day activities. Besides, road transport facilities are essential for expanding education, health service provision, trade facilitation – both within the country and the export market, and better public as well as private service provisions, including banking and insurance services, to the destitute and marginalized rural dwellers. Likewise, roads serve as key infrastructural units, which provide linkages to other modes of transportation like railways, shipping, and airways.

Understanding channels through which road access reduces poverty and brings economic growth is essential for policy makers and development practitioners for which roads benefit rural households (Binswanger et al, 1993). The effect of roads on poverty and economic growth is transmitted through reducing transportation cost, and improving the connectivity of rural households to different markets and urban centers. Farm households who have poor road access are likely to sell their outputs at lower prices at the farm gate. In addition, roads empower farmers by giving them access to better technologies, lower input costs, higher output prices, and off-farm employment opportunities (Binswanger et al, 1993; Decron et al, 2009).

Methodology of the Study

The study used primary data which has been collected using a structured questionnaire on 150 households in the Oromia region of Ethiopia in 2017. The collected data comprises household characteristics, credit, and different welfare indicators.

There are two main contradicting issues in sample size determination, the degree of precision, and the cost of sampling. A too large sample size may provide a higher precision while it is inefficient in terms of time and money and the reverse is true for a too small sample size. The only solution is to select a sample size that can create a delicate balance between these two critical factors Stratified sampling techniques will be used to select 150 households from the total population which will be proportional to the sample size. The main rationale behind the usage of the stratified sampling technique is the heterogeneous nature of the households in the study area. Households have a significant difference in many characteristics like level of living standard, family size, means of livelihood, and other related factors.

Once the treated and control group of the study area for the questionnaire survey were identified, the probability sampling technique was employed to generate the needed-sample size for the study. The overall sample size of both groups (treated and non-treated) was determined by using the sample size determination equation that considers the desired confidence level (95 %), error margin (5%), and non-response rate (5%) where the exact number of households in the project operation are known. The required sample size was determined using Yamane (1967) sample size determination formula**.** As a result, the required sample was about 150 individuals selected for this study purpose.

Both descriptive statistics and econometrics approaches had been employed for the purpose of data analysis. Before estimating the econometric model, the study used frequency tables, graphs, and tables to describe the data. A propensity scores matching model (PSM) accompanied by a binary Logit model has been used as an econometric model.

Variable description and priori expectation

The independent variables are identified from previous studies and theories. These variables are expected to result in (and therefore, explain) saving culture variation across individuals in the study area. The independent variables are explained as follows:

Household size (FAMSIZ): It is a continuous variable measured by the total number of individuals living in a given household. This variable is expected to affect participation positively

Gender (GHH): it is a dummy variable taking value 1 if the gender of the household head is male and 0 otherwise. Compared with female-headed households this study hypothesized that male-headed households will have a higher probability of program participation

Educational Level (EDUIN): it measures the highest level of education the household head achieves and it is expected to correlate positively with participation

Marital status (MARIT): It is measured using a dummy variable that takes the value of 1 for married households and 0 otherwise. As married households have a good capacity to contribute to community development their likelihood to be part of the program will be higher.

Age (AGEHH): It is a continuous variable that measures how old the household head is. This variable is expected to affect the chance to program participation positively

Livestock ownership (TLU): this is measured by using tropical livestock unit and applying the appropriate conversion factor. Having a higher amount of livestock is expected to positively affect the chance to program participation

Total Farm Asset (FARMASS): It is used to measure the total valuable farm asset of the household. It is expected to affect program participation positively

Off-farm activity (OFFFARM): it takes the value 1 if the household participated in any kind of off-farm activity, and 0 otherwise; that household with off-farm activity are expected to be have a higher probability of program participation

Credit Access (CRED): it is a dummy variable with 1 for households with credit access and 0 otherwise. Households with credit access are expected to have a lower probability of program participation

Safety Net (SAFNET): this variable will take 1 if the household is participating in the Safety Net program and 0 otherwise. And it is expected to affect the likelihood of program participation negatively.

Regarding the welfare measurements, 3 different welfare indicators are used. First, households are asked to rate how much they can access important public facilities like health stations, education centers, and other nodes. Second, they are asked to specify the time and cost they are saving due to their participation in the URRAP road project. Moreover, the control groups households are asked the amount of time and cost they are incurring in order to access these different public facilities, so that we can easily compare with the participant counter parts. Finally, the validity and reliability of the data will be checked carefully. Validity and reliability of scores on instruments, additional standards for making knowledge claims, lead to meaningful interpretations of data.

Results and Discussion

Descriptive Analysis

This part presents the description of the demographic and socio-economic characteristics of households under the study. As Table 1 below indicates, many of the respondents are male (84%) and married (83.78%). On the other hand, from the total number of respondents considered in this study, around 61% and 63% have access to electricity service and are Safety Net program participants respectively. Compared with non-participant households in the rural road project large proportions of participants are found to have electricity access and Safety Net participation. With regard to participation in off-farm income activity, many of the respondents are found to be non-participants (77%). And no variation is observed between the two groups in this aspect.

Table 1

Socio-Economic and Demographic Characteristics of Respondents by Participation Status

VARIABLES	Participant (%)	Non-participant (%)	Total (%)
Access to electricity			
No	64	13.7	39.19
Yes	36	86.3	60.81
Safety Net program participation			
No	64	8.22	36.49
Yes	36	91.78	63.51
Access to credit service			
No	69.33	32.88	51.35
Yes	30.67	67.12	48.65
participation in off-farm income activity			
No	77.33	76.71	77.03
Yes	22.67	23.29	22.97
Gender of the household head			
Female	8	24	16
Male	92	76	84
Marital Status			
single	4	28.77	16.22
Married	96	71.23	83.78

Source: own computation (2018)

Table 2 below summarizes the average of some variables used in this study. A comparison has made between the two groups and a simple mean difference t-test was employed to check the statistical significance of the variation across the two groups. The average age, education level, and household asset is found to be 30.8, 5, & 3532.8 ETB for participants and 33, 4.3, and 930 ETB for non-participants respectively. As the mean difference test indicates there is a statistically significant difference in these factors. The participant households are older, more educated, and wealthier than their non-participant counter parts.

Moreover, the average land holding size and the annual expenditure made by the households is also found 0.76 and 13865 ETB for participants and 0.46 and 5496 ETB for non-participants respectively. Indeed, the average cost households spend to access some important public nods like, markets, schools, health center, and government officials is not overwhelmingly different. The average expenditure of participants is larger by around 2 Birr than the non-participants.

However, the average time households consume to access the aforementioned public nods are magnificently different between the two groups. Those households without access to the rural road project consume around 720 minutes for a single trip while it is 684 minutes for the participant households. This indicates that, participating households are benefiting from the rural road project in terms of time-saving.

Table 2

Summary of Socio-Economic Factors by Participation

Variables	Participant		Non-participant		Sig (t-test)
	Mean	**S.D**	**Mean**	**S.D**	
TLU	7.383901	5.625418	29.67221	233.8871	
Asset	3532.821	3788.668	930.2814	990.0511	*
Annual expenditure	13865.58	8366.131	5496.667	4846.35	*
Land size	.7656183	.3261236	.4657516	.3262977	*
Education	5.086306	3.870506	4.386667	2.818344	***
Age	30.8855	6.284742	33.16031	6.350173	**
Cost	316.5284	235.7261	314.24	236.0192	

Source: Own Computation

Determinants of household's participation in the rural road project

As one objective of this study is to explore the determinants of household participation in the rural road project, the study used a logit model to identify the main determining factors. But, before conducting the logit regression it a must to check whether there is a problem of heteroscedasticity and multicollinearity or not. Therefore, the variance inflation factor (VIF) test of multicollinearity and the Breusch-Pagan test of heteroscedasticity were conducted. The VIF test confirmed that there is no problem of multicollinearity. The average value of the VIF is 2, which is less than 10.

In addition, the heteroscedasticity test also revealed the error term is homoscedastic. There is no enough evidence to reject the null hypothesis which says the error term is homoscedastic at any level of significance. Thus, there is no problem of heteroscedasticity.

After checking all the pre-requests to use the logit model the model estimation is conducted by using STATA 14 econometric software. As it can be shown in Table 3 below, the model fit reasonably well the data. The overall significance test (F-test) confirmed that the model is overall significant. The null hypothesis, which states all the explanatory variables are jointly zero in affecting the dependent variable is rejected at any level of significance (prob > chi2 = 0.000). The estimated result of the logit model analysis is presented in Table 3 below. The estimation result revealed that, household's participation in the rural road project is affected significantly by different factors. To shed light on some of them an attempt is made to interpret significant variables only in the subsequent section.

Credit Access: credit access determines participation positively and significantly. Compared with households without credit access those households with credit access have a higher likelihood of participation. The probability of participation for credit user households is larger by 64% compared with non-credit users. One plausible reason for this might be the fact that credit can enable households to be financially strong and resilient. Thus, they can get easily community contributions for the road project, which enables them to participate in the program. Indeed, households with credit access are those who are found in the lowest level of income group. Thus, as the road project is pro- poor the likelihood of these households will be larger.

Safety Net program participation: it is the other significant variable, which affects participation positively. Those households who are benefiting from the Safety Net program have a higher probability to participate in the rural road project. This is due to the fact that most of the time public facilities might be constructed by using the labor of the surrounding community. In addition to this rural road projects might be supported by Safety Net workers and therefore they will have higher probability. Moreover, Safety Net workers and participants are those economically poor households and in turn the rural road project is aimed at addressing the poor and those peripheral areas of the country. Thus, Safe Net participation increases the likelihood to be part of the rural road project.

Table 3

Logit Model Estimation Result for Determinants of Household's Participation

	Coefficient	Marginal Effect
Access to Electricity	-1.578	-3.729171
	1.762	
Safety-Net program participation	3.108**	0.6346607
	1.537	
Access to credit service	1.514***	0.3614452
	1	
participation in off-farm income activity	-0.425	-0.1054901
	-1.01	
Ln (Education)	-0.0386	-0.0096499
	-0.401	
Ln(Age)	-1.669	-0.4173151
	1.352	
Gender	-1.606*	-0.3563544
	-0.853	
Marital Status	-0.976	-0.2332026
	-1.004	
TLU	-0.000905	-0.0002263
	0.000633	
Ln Asset	0.881***	0.220214
	-0.326	
Ln (Annual expenditure)	-0.014	-0.0035125
	-0.0782	
Ln(Land size)	1.546***	0.3864533
	-0.435	
Constant	1.236	
	-5.322	

Notes: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: *own computation (2018)*

Gender of the household head: this variable is founds to affect participation positively and significantly. Compared with female-headed household's male headed households have lower chance of participation. As the result showed that, female-headed households are 35% more likely to participate in a rural road project. This is because female-headed households are most of the time economically poor and labor deficient. Thus, they will have a higher chance of participation.
The household total value of the asset: asset holding is one of the indicators of wealth. In this study, the value of assets determines participation positively and significantly. As the household's asset holding increases by one Birr the probability to participate increases by 1.246343 units.

Land size: land size is the other important factor that determines participation. In this regard, the results of this study indicated that participation is positively and significantly affected by land size. If household's land holding size increase by 1 hectare the probability of participation increases by 1.471752 units.

5.3 The effect of the rural road project on household welfare

In order to estimate the average effect of participating in the rural project on household welfare, this study used a propensity score matching (PSM) approach. in the PSM estimation technique, the first step is to find a control group that can be exactly similar with the treated one except for the program participation. Thus, this study tried to assure this by using different matching algorithms. As the result can be seen in the appendix, from the total number of respondents 121 households are found matched, of which 74 are from non-participants and 47 are from participants **(**see; appendix 4**).** Right after the matching procedure is completed and the best counterfactual, which can truly represent the treated households had they been non-treated, the average treatment effect is estimated on the two welfare indicators; total transport expenditure for one trip and total time is taken for one trip in order to access some important public nods.

Table 4

Average Treatment Effect (ATT) Of the Rural Road Project

Average treatment effect (ATE)	Treated	Control	Difference	Significance
Transportation Cost outlay (For one trip)	181.4309	283.5312	-102.1003	*
Time is taken to access important nodes (a single trip)	506.5652	690.4509	-183.8857	*

*Denotes significance at 1%

Source: own model estimation result (2018)

The average treatment effect of participating in rural road projects is presented in Table 5 below. This table summarizes the welfare effect of the rural road project. As stated earlier, welfare is measured by two main indicators in this study. These are the monetary outlay that households will spend in one trip in order to access relevant public nods and the time taken to access these nodes too. A Priory it is expected that households with a good infrastructural facility will spend less on transportation and they can also access public facilities shortly without taking longer time.

The average treatment effect on the treated is found 181.43 Birr in terms of transportation cost and the average treatment effect of the non-treated in terms of transportation cost is 283.53 Birr. The result indicates that participant households are incurring less for transportation. Non-participating households are spending 102 Birr more than the non-participants. This is due to the fact that the road project can fasten the transportation system and residents can easily access transportation facility as many transport service givers can reach these areas by using the well-constructed road as an opportunity.

The other welfare indicating factor used in this study is the time taken to access important public nods. In this regard, the road project has a magnificent effect in making public facilities easily accessible. The average treatment effect on treated is found to be 506.56 minutes per trip. It is 690.45 minutes per trip for non-participants. This indicates that public nodes are less accessible for non-participants compared with their participant counterparts. In order to access public nodes, the non-participant households will take more than 3 hours (183.89 minutes) than the participants.

That means, by getting the benefit of this road project participant households are saving 3 hours more than the non-participants. Moreover, the welfare difference between the groups raised from the program is not only significant economically but is statistically significant at 1% level of significance.

To sum up, the average treatment effect estimated on the two welfare measurements indicated that, participating in the rural road project plays a noteworthy role in improving rural household's welfare. By participating in the rural road project households are benefited both in terms of monetary expenditure and time saving.

Other studies also argued that rural road expansion improves household's welfare. For instance, the studies by Wiegand *et.al*, (2017); Terefe, (2012); Gachassinet.al, (2009); Lyngby, (2008), and Setboonsarng, (2008) also showed that rural road project improves household welfare.

Sensitivity analysis of the treatment effect (ATT)

One main challenge in propensity score matching impact evaluation is controlling unobservable factors. The change in the welfare of households in the rural area might not be attributed to the road expansion only. In order to assure whether the observed welfare change is due to the program effect or not, undertaking a sensitivity analysis is the plausible solution. So as to check the robustness of the estimated results are free from unobservable confoundedness, this study has conducted a sensitivity test by using the rebounds test. As the result presented in Appendix 5 and Appendix 6 showed the estimated results are not affected by unobservable. Because the test result showed as the lower and upper significance levels of this test are not beyond the minimal critical point of 0.05 (5% level of significance).

Conclusions and Recommendations

The primary objective of this study was to examine the effect of rural road projects on household's welfare. It also aimed at exploring factors affecting the household's participation in the rural road project. In order to attain the stated objectives, the study used the propensity score matching impact evaluation tool accompanied by the logit model. Based on the descriptive and econometric analysis result the study draws the following main conclusions. First, the descriptive analysis revealed that many of the households participating in the road project are households with access

to electricity, and Safety Net program participants and are male and married. Second, participant households are found to have a higher level of average age, educational attainment, land size, total asset, and annual expenditure. Third, credit access, Safety Net program participation, gender of the household head, total value of the household asset, and total land holding size are found to be significant determinants of household's participation in the rural road project. Finally, household's participating in the rural road project is found to have improved welfare resulted from the introduction of the program both in terms of time saving and cost outlet. The average treatment effect on the treated and control is, is found to be 181.4309&283.5312 Birr respectively in terms of cost outlay and 506.5652&690.4509 Minutes in terms of time taken to access important nods for one trip.

From the findings of this study the following main recommendations are drawn for policy makers the government and other concerned bodies: As the rural road project plays a magnificent role in improving household's welfare the government and other local communities should expand and promote such kind of road projects in many different areas. Since credit access increases household's participation in rural road projects the government should create a conducive environment for rural households to make credit easily accessible. From the total households considered in this study, the educational attainment of participant households is higher. Thus, awareness creation through informal and formal ways of education can enable households to easily understand the benefit of infrastructural expansion and thus the concerned body should work on this tremendously.

References

Binswanger, H. P., S. R. Khandker, and M. R. Rosenzweig (1993). How Infrastructure and Financial Institutions Affect Agricultural Output and Investment in India. Journal of Development Economics 41:2, 337-366.

Central Statistical Authority (CSA). 2008. Summary and Statistical Report of the 2007 Population and Housing Census, Population Size by Age and Sex. Addis Ababa: CSA.

Dercon, S., Gilligan, D.O., Hoddinott, J. and Woldehanna, T. (2009). The impact of agricultural extension and roads on poverty and consumption growth in fifteen Ethiopian villages. American Journal of Agricultural Economics 91(4): 1007–1021.

ERA (2009). "The Road Sector Development Programme: RSDP Performance Twelve years later". The Federal Democratic Republic of Ethiopia, Ministry of

ERA (2010). "Revised Universal Rural Road Access Program".Ethiopian Road Authority Addis Ababa.

ERA (2016). "The Road Sector Development Programme: RSDP Performance Thirteen years later". The Federal Democratic Republic of Ethiopia, Ethiopian Roads Authority, Addis Ababa

Ethiopian Roads Authority (ERA). 2009. RSDP Performance: Twelve Years Later. Addis Ababa.

Gachassin, M., Najman, B., &Raballand, G. (2010). The Impact of Roads on Poverty Reduction: a case study of Cameroon.

Jalan, J. and M. Ravallion (2002): "Geographic poverty traps? A micro model of consumption growth in rural China," Journal of Applied Econometrics, 17, 329–346.

Khandker, S.R., Bakht, Z. and G. B. Koolwal (2009), "The Poverty Impact of Rural Roads: Evidence from Bangladesh", Economic Development and Cultural Change, 57, 685–722.

Lulit A. (2012). Impact of Road on Rural Poverty: Evidence Form Fifteen Rural Villages in Ethiopia. The Netherlands.

Lyngby, K. (2008). General study of the impact of rural roads in Nicaragua COWI A/S, Denmark.

Renkow M, Hallstrom DG and Karanja DD. 2004. Rural infrastructure, transaction costs and market participation in Kenya. Journal of Development Economics 73:349–367.

Roads Authority of Oromia National Regional State (ORA) (2014). Annual Report 2014.

Stifel, David, Bart Minten, and Bethlehem Koru (2016). "Economic benefits of rural feeder roads: Evidence from Ethiopia." Journal of Development Studies 52, no. 9: 1335-1356.

Setboonsarng, S. (2008). The impact of rural infrastructure and agricultural support services on poverty: The case of agrarian reform communities in the Philippines. Asian Development Bank Institute (ADBI), Tokyo. ADBI Discussion Paper No. 110.

Terefe, A. L. (2012). Impact of road on rural poverty: Evidence from fifteen rural villages in Ethiopia. Unpublished Masters of Arts in Development Studies, Graduate School of Development Studies. The Hague, Netherlands.

United Nations Economic Commission for Africa (UNECA) (2016). Economic Report on Africa 2016.

Van de Walle, Dominique, and Ren Mu. 2007. "Fungibility and the Flypaper Effect of Project Aid: Micro-evidence for Vietnam." Journal of Development Economics 84(2): 667-85.

Worku, I. Road Sector Development and Economic Growth in Ethiopia. Ethiop. J. Econ. 2010, 19, 101–146.

Wondemu, K., & Weiss, J. (2012). Rural roads and development: Evidence from Ethiopia. European Journal of Transport and Infrastructure Research, 12(4), 417– 439.

Yamane, Taro. (1967). Statistics: An Introductory Analysis, 2nd Edition, New York: Harper and Row.

Wiegand, M., Koomen, E., Pradhan, M. and Edmonds, C. (2017). The impact of road development on household welfare in rural papua new guinea. Tinbergen Institute Discussion Paper 17–076/V, Amsterdam and Rotterdam