Smallholder farmers in ethiopia pdf

Farmer Abu Geda (centre) with Dedefo Abdo Wayu of CropLife Ethiopia (left) and spray services Abate Bedasso (right) discuss pests related to issues that have been affecting crops. Photo CropLife InternationalEthiopia is growing rapidly, and 20 percent of people now live in cities. Fast forward to 2050, and the United Nations Population Division estimates that this number will increase to almost 40 per cent, a key challenge for Ethiopia's small farmers in producing sufficient food. We sell our products to people in cities, so we are interdependent with them, Obese Gelgalu, a small horticultural farmer in Siveey, Ethiopia, explained to CropLife International. It plays an important role in feeding cities by harvesting various vegetables including cabbage, green beans, onions and chili. But like many other farmers, Gelgalu is struggling to protect its crop from diseases and pests that can lead to low yields. This is particularly common in developing countries, where producers often do not have access to the necessary crop protection tools or to learning how to use them effectively. To bridge the technology and knowledge gap in Ethiopia, the Netherlands Development Organization SNV is working with the Ethiopian Ministry of Agriculture and Natural Resources and CropLife International as part of its Horti-LIFE program. Launched in 2016, Horti-LIFE, otherwise known as horticultural livelihoods, innovation and food safety in Ethiopia, aims to help 30,000 small farmers grow healthy crops and improve farmers' access to urban markets by 2019. Through YouTubeFarmer field schoolsCentral for the project are farm field schools. A small group of farmers, originally developed by the Food and Agriculture Organization in South-East Asia, regularly meets to study and discuss best agricultural practices. Last year, Gelgalu took part in one of Horti-LIFE's farm field schools. The training she received there helped her deal with the problem of pests and affection: We benefit from their knowledge. We share our experiences with our neighbors and give each other lessons, she explained. By the end of 2017, the project had already established 125 schools in 65 villages. In each school, leading farmers grow training grounds for growing crops under different circumstances. Student farmers can then study the growth of these crops and form their own observations on which methods work best. The aim is to get student farmers to directly see the benefits of good agricultural practices, and apply them on their own farms. The exercises follow a comprehensive approach Pest control; a sustainable pest and sute control system that combines cultural, biological and chemical measures. It encourages farmers to control their crops and intervene only with crop protection tools Necessary. To ensure that small farmers such as Gelgalu know when and how to safely use pesticides, CropLife International has been training farmers and spray service providers. In the case of Horti-LIFE, when farmers have to intervene, schools show them the benefits of working with spray service providers. Now that farmers find pests on their vegetables and need advice on spraying their crops, they call me. By destroying pests from their farms, we help farmers grow good quality products, said Abate Bedasso, an Ethiopian spraying service provider that benefited from the Horti-LIFE program. With scientists predicting that crop losses for pests will continue to grow due to global warming, it is increasingly important that African farmers have a foundation in advanced agricultural practices and integrated pest control to ensure a healthy crop and provide for their families. - Gloria Jaconelli, Communications Manager, CropLife InternationalSpray Service Providers are trained - in accordance with integrated pest control - to identify problematic pests and diseases; which are the right products to treat them; When and how to spray; and what personal protective equipment to wear. The program follows a model train-trainer, so that each new spray service provider can share their training and continue training with their peers. Because of the project, we use fewer pesticides than before, Helgalu said. Indeed, preliminary results showed that recommendations from spray service providers had helped farmers in the Horti-LIFE project reduce pesticide use by 26 per cent. Another important goal of the project is effective environmental protection. It is extremely important to prevent chemical contamination. Not only can this pose a risk to our health and other aspects of the environment, but it can also affect productivity, Bedasso said. Effective pesticide management involves safe waste management, and all training programs for spray service providers also cover container management skills. To date, CropLife International - through Horti-LIFE - has produced 248 spray service providers in Ethiopia.LivelihoodsThese field schools also have social and environmental benefits on the villages that can help countries work towards achieving sustainable development goals. In Africa, many farmers still control their shipments by hand. After participating in farmers' field schools, farmers are exploring better ways to deal with water. In addition to reducing manual labor, farmers see an increase in their profits. To date, Horti-LIFE has helped participating farmers double their yields, increasing their net income by 140 percent. This leads life in these small villages is entirely dependent on agriculture: It's so important here, said Abu Geda, who agriculture in Sieway for 20 years. His farm helps him provide for his wife and family of six children. A good harvest season makes all the difference for us, he said. This means that we can plan improvements in our lives like building new homes or buying vehicles. For other families, the benefits of a good harvest can be as simple as being able to put food on the table, or allowing children to go to school. The fall of the army worm invasion is creating massive communication problems in AfricaInsy sorts threaten to destroy vast swathes of major crops across the continent. Overall, Horti-LIFE directly helps Ethiopia solve six SDGs, including the absence of poverty and zero hunger. Looking to the future, programs like this will be key in helping Africa's farmers fight new challenges, including the Fall Armyworm. Since the fall army worm was first discovered on the African continent in 2016, this new pest has devastated crops in at least 44 countries, with an estimated economic impact of $1.3 billion. In Latin America, the autumn army worm is controlled by combining an integrated pest control approach with plant biotechnology, but biotechnology crops in most African countries are not yet available. Since scientists predict that crop losses for pests will continue to grow due to global warming, it is increasingly important that African farmers have a foundation in advanced agricultural practices and integrated pest control to ensure a healthy crop and provide for their families. Click here to watch interviews with farmers and project partners. For more information about the project, visit: . Volume 8, Issue 3, March 1993, Pages 199-209Views the full text Of The Food Security Improve remains a major problem in sub-Saharan Africa, where Ethiopia is no exception. As a result of the low agricultural productivity, small farmers in Ethiopia have been strained to have unsustainable livelihoods. The study seeks to analyse the determinants of agricultural livelihoods of small farmers, especially in the context of the Yyu Biosphere Reserve, where farmers are legally prohibited from expanding farmland and wildlife often invade farmers' fields. A household survey was conducted to collect gender-based data from 334 small farmers, supported by focus group discussions and key interviews with whistleblowers. By comparing socio-economic and household characteristics between households headed by men and women, comparison of the average T-test. Tobit's regression analysis was also used to determine the probability and degree of the determining variables in predicting household participation in agricultural livelihoods. The result shows that increased production factors, in particular agricultural physical capital and land, as well as access to credit, credit, Labour support systems have been found to significantly increase participation in agriculture in both male-headed and female households. The invasion of wild animals on the farmers' fields had little impact on livelihoods on farms. However, this places an additional burden on farmers, as they have to regularly patrol their fields. The results show that the livelihoods of farms depend to a large extent on ownership and the efficient use of scarce production factors. They require sustainable and integrated approaches to improve the future productivity of small agriculture in Ethiopia.Smallholder agriculture is a key factor in many economies in Africa. However, the potential of small farmers is not often recognized, and the agricultural sector remains vulnerable to various problems in Africa (DCED, 2012). As in many countries in sub-Saharan Africa, Ethiopian agriculture is also one of the most vulnerable. Most of Ethiopia's agricultural production is carried out by small farmers. A study by Gebreselassie and Bekele (2013) found that about 94% of food crop production and 98% of coffee production are produced by small farmers. Large private and public companies make up only 6% and 2% of food and coffee production respectively. Small-scale farmers in Ethiopia mainly generate income from agricultural production, which includes mainly crops and livestock. Crop production is the dominant sub-charge, accounting for about 60 per cent of agricultural GDP, while the livestock sector accounts for 20 per cent of agricultural GDP. The remaining subsex, such as fishing, forestry and hunting, contribute approximately 20% (Demeke, Guta, Ferede, 2004). Ethiopia's agricultural sector as a whole accounts for 38.8 per cent of national GDP and the main source of livelihood for 77.3 per cent of the labour force (Serihun, Wakiaga, Kibe, 2016). While small farmers in Ethiopia are expected to feed the country's growing population, they are limited by a number of problems that hamper their ability to provide food security for most people. As a result, the country is considered one of the most food insecure countries in the world, where about 10.2 million people do not have food (FAO, 2016). Various factors are responsible for the low agricultural productivity in Ethiopia. Among the main factors, unprecedented population growth, with an average population growth of two million a year, is a major obstacle to the economy's ability to feed the population and provide adequate services. This is fragmentation of land holdings and reduced productivity, leading to mass underemployment (Teshome, 2014). In addition, land degradation combined with traditional cultivation practices, irregular precipitation, disease and pests, mismanagement of land drought poses a serious threat to household food security and agricultural productivity in the country. The livelihoods of small farmers depend mainly on small-scale farming, where 64.5% of them own less than a hectare of land (Gebreselassie, 2006). In addition, small farmers are limited by low yields, low productivity and lack of market access, including credit markets. Access to credit is also one of the most important factors, especially for investment in agricultural resource improvements (Mersha and Ayenew, 2018). Small farmers are the main victims of these problems. As a result, they must diversify their income into non-agricultural sectors in order to prevent the risk of agricultural production and to replenish their income for food security. However, the limited opportunities for non-agricultural activities and the lack of income generated from non-agricultural activities have made the rural poor more vulnerable. Agriculture continues to be a key employment sector in Ethiopia (Davis and Bezemer, 2004). Some evidence suggests that women play a vital role in agricultural production in Africa (DCED, 2012; SOFA and Doss, 2011; Manjur, Amare, Hailemariam, Tekle, 2014; Ogato, Boone, Subramani, 2009). Gender differences can thus affect farmers' livelihoods, as livelihood choices depend to a large extent on cultural roles, social mobility and access and ownership of capital and assets. Men and women have different access to resources, new technologies, education, health care and other resources. In addition, the productivity of livelihoods is affected by the question of who decides what to produce, when to produce and how much to produce. They imply that gender-based disaggregated approaches are of paramount importance in determining the determinants affecting livelihoods among male-headed households and appropriate targeted policies. The study was conducted in the Yayu Biosphere Reserve, which is a protected and registered biosphere reserve in Ethiopia. Small farmers living in the transition zone of the biosphere reserve have a different scenario in terms of livelihood opportunities compared to other farmers living in other parts of the country. Small farmers in the area are legally prohibited from entering protected areas of forest and are therefore unable to expand their agricultural land and are unable to use other alternatives to livelihoods in the forest. As a result, existing agricultural land in the transition zone fragmented because of the growing population in the area. In addition, the encroachment of wild animals on the farm field can have its own contribution to the impact on the livelihood of the farm. All these factors have created a unique circumstance for the identification of the actual determinants of the livelihoods of farms in the biosphere reserve. Very limited empirical research studies about the determinants of the livelihoods of farms, especially in the context of small farmers living in and around biosphere reserves. In addition, gender disaggregated analysis of this kind of research is almost zero. The aim of the study is thus to promote gender disaggregation of empirical analysis of how to provide for the livelihood of male and female farmers in areas where biosphere reserves exist. Until specific determinants of livelihoods on farms are identified, it will also be difficult to develop appropriate livelihood policies. Thus, the study also serves as a research contribution to the development of appropriate policies and strategies that contribute to sustainable livelihoods. Small farmers could be identified as farmers who own small plots of land on which they grow natural crops and one or two cash crops, relying almost exclusively on family labour. Small farmers differ from other farmers in the agricultural sector in terms of their limited resources. Small farmers in sub-Saharan Africa use simple and outdated agricultural technologies and cultivate small tracts of land (DCED, 2012, p.1). The agricultural sector in sub-Saharan Africa is one of the foundations and livelihoods of the majority of the population. However, the sector's performance remains underdeveloped. Almost 33 per cent of the region's population is found to be malnourished (FAO, 2005), and calorie intake is also reported to be the lowest in the rest of the world (Kariuki, 2011). In addition, the agricultural sector depends on irregular precipitation and is practiced in the traditional way. A report by the International Institute for Water Management (IWMI, 2010) indicates that about 95% of agricultural land in sub-Saharan Africa is grown using seasonal rains. There are a number of factors that determine the livelihoods of small farmers in sub-Saharan Africa. Low agricultural yields as a result of declining agricultural performance may be among the major problems affecting African shallow agriculture (DCED, 2012). There are several determinants behind these problems. A number of empirical studies have shown that land is an important production factor determining the livelihoods of small farmers in sub-Saharan Africa. Empirical evidence provided by Newman and Canadarajoy (2000) from Ghana and Uganda confirms that land ownership is one of the most important factors to the livelihoods of small farmers. The same study also found that women farmers were disadvantaged groups in land management, and as a result there was a tendency to participate in non-agricultural life. Other studies such as Kariuki (2011) have also confirmed a strong link between agricultural livelihoods, property ownership land rights in Africa. Yahya and Xiaohui (2014) in their study in Eastern Tanzania confirmed a positive link between farm size and food security status of small farmers. The percentage increase in access to resources such as land and physical capital increases the likelihood that agriculture will be provided with food by 3,448 times. The same study found that female-headed households were restricted in their family's food security because of their limited access to land and capital. Another study conducted by Cassi, Kim and Fellizar (2017) in the Gozamin region of Ethiopia showed that agricultural land had a significant and positive impact on agricultural income. The same study showed that an increase in the size of land by 1% leads to an increase in farmers' incomes by 0.30%. Similarly, a study in Kussa (2012) in Amhar, Tigre, Oromia and THEN in Ethiopia confirmed that land ownership as well as soil fertility are among the main determinants affecting the agricultural production of small farmers. A study conducted in the Nigerian state of Enugu showed that access to credit was a determining factor in improving agricultural productivity by enabling farmers to acquire new varieties and additional agricultural land. However, high interest rates on credit, small loan size and longer loan time were reported as a major problem for small farmers. Similar studies in Sidam in southern Ethiopia have shown that access to credit is a limiting factor for agricultural participation, as credit is a source of financing for investment in physical capital. The study found that official microfinance institutions are less accessible to rural communities, and 50% of selected households do not have access to official credit services (Yona and Mathewos, 2017). Empirical data from Mukas, Simpas and Salami (2017) also show that about 66.6 per cent of all small farmers in rural Ethiopia were limited in lending, reflecting the key role of lending in significantly improving agricultural productivity. A study by Ragasa, Berhane, Tadesse and Taffesse (2012) in four regions of Ethiopia found that agricultural resources, particularly access to synthetic fertilizers and improved seeds, were identified as the main determinants of increasing the productivity of smallholder farmers. The results also show that households headed by have difficulty accessing agricultural and information services compared to their male counterparts. In the same vein, Koussa (2012) also confirmed a positive and significant link between investment in fertilizers and agricultural production in Ethiopia. A study in four African countries, notably Burkina Faso, Senegal, Rwanda and zimbabwe, found that agricultural productivity among small farmers depends, in particular, on agricultural resources, the availability and use of fertilizers, seeds, animal cravings and land ownership sizes (Reardon et al., 1997). The same finding was also reported by Yahya and Xiaohui (2014) that fertilizers, seeds and pesticides significantly increased the likelihood of small farmers being food-provided in Tanzania. Similar results were also reported by Abrha (2015) that agricultural resources such as chemical fertilizers, improved seed varieties and the expansion of services as influential determinants of agricultural production in northern Ethiopia.Although there is limited literature on the impact of wild animals on agricultural production, the encroachment of animals on the farmers' field also has the additional potential in determining agricultural livelihoods for small farmers. This is especially true for small farmers living closer to forest reserves. A study conducted in Western Ethiopia by Kvirin (2005) identified wild animals such as baboons, vervet monkeys, wild pigs and porcupine as the main animals responsible for damaging crops and vegetables grown in the area. Similarly, a study conducted by Gobosho, Feisse and Gutema (2015) in southwestern Ethiopia found that olive baboons, shrub pigs and warthogs, grizzly monkeys and porcupines are animals that damage farmers' fields. The same study also found that olive baboons were also predators of chickens and small ruts grown by farmers. In addition, the results of Ango, Boerjeson and Senbeta (2017) in the Oromia region of Ethiopia show that wildlife raids have resulted in farmers incuring additional costs to protect their plots and sometimes through the schooling of their children. The study shows that the encroachment of wildlife has undermined farmers' willingness to invest in improved agricultural technologies. The above data show how the agricultural livelihoods of small farmers are affected by various factors. Given the importance of Ethiopia's agricultural sector, improving agricultural productivity in general and the livelihoods of small farmers in particular is critical to the long-term food security and overall progress of the Ethiopian economy. The definition of determinants affecting the agricultural livelihoods of small farmers is therefore an important step in this regard and enriches the available literature on the subject. The Yayu Biosphere Reserve is one of Ethiopia's most protected reserves at latitude: 8'0'42 N-8'44'23N and longitude: 35 20'31E-3618'20E in southwestern Ethiopia, about 564 km from the capital, Addis Ababa. The Biosphere Reserve was in UNESCO and is known for its wild coffee growing in its habitat and home to a variety of wild flora and fauna. The total area of the reserve is estimated to be land where 117,736 hectares belongs to the Transitional1 zone, and 21,552 and 27,733 hectares of land goes into buffer2 and core3 zones (Gole, 2003). The reserve has a total of six areas and three of them, namely Yayu, Khurumu and Dorenni are known for their vast nature reserves, where wild coffee also grows beneath it. The study was conducted in two districts, Yyu and Khurumu, as part of the NutriHAF4 project in Ethiopia. In particular, the study was conducted at Wabo and Bondo-Megela Kebeles (village) from Yyu district, as well as in the village of Gaba and Wangegne from the Khurumu district (Figure 1). Training villages are the intervention zones of the NutriHAF project. Human activities and agroforestry are common in these villages. Each of the four training villages has basic, buffer and transition zones. As indicated in Table 1, the main zone is higher in the villages of Yyu district than in the Khurumu area (i.e. about 46% and 33% in the villages of Wabo and Bonds, respectively). The villages in Yyu are closer to the protected main forest area and further from the main road than Khurumu. Villages in Yyu also have a higher proportion of buffer zones. On the contrary, in the villages of Khurumu district the share of the transition zone is higher than in the Yayu district (i.e. about 56% and 61% in the villages of Gaba and Vangengne respectively). In addition, villages in the Khurumu area are relatively farther from the protected main zone and closer to the main road. Although Gaba is the nearest village from the main road, it is relatively farther from the market. A study by beyene on the biosphere (2014) found that illegal deforestation was common, especially in the biosphere transition zone in the past, where expansion of agricultural land, mismanagement of forest, access to forests and roads have been identified as some factors in the loss of forest cover. The implementation of the biosphere reserve protection programme was instrumental in reducing the rate of deforestation in the biosphere zone from 0.29% to 0.16%. Human activity is strictly prohibited in the main zone of the biosphere. Although farmers are also not allowed to expand land in the buffer zone, they have the right to collect fruit and coffee beans from the natural coffee forest in the buffer zone. Both qualitative and quantitative approaches to the study of the determinants of farm livelihoods in the study area were observed. A household survey was conducted and gender-based data were collected from four villages in yayuan Khurumu districts. By adopting the Yamane5 Formula (1967) to determine the minimum sample size, 334 small farmers were selected using stratified sampling methods. The sample was stratified from the point of view of households headed by men and women, for comparison In addition, further stratification has been made for training villages in order to ensure their representation in the general sample. With regard to the sample composition of households, 79 per cent of respondents were male-headed households, while the remaining 21 per cent were female-headed households, in proportion to the total household in the study area. The training villages of Vaz were selected with certain criteria. Wabo, Bondomegela (Bondou) Gaba and Wangegne. The villages have a forest farming system that is suitable for high-rise farming systems. In addition, the proximity of villages to certain infrastructures, such as market access, transport, agricultural and health-expansion services, farm field schools and training centres, has been found to support the project's success. In addition, the villages are the places where a local organization called ECCCFF6 intervenes to facilitate research and to obtain permission to conduct research in the area. The sample size was proportional to the population for each study area and village. Table 2 summarizes the sample size for each district and village, as well as the composition of male-and female-headed households in each village. Gender-based disaggregated data were collected using household surveys, focus group discussions and key interviews with informants. The data was analyzed using descriptive and infernal statics. Gender disaggregated comparisons were made to determine the statistical significance of average differences in household characteristics and socio-economic variables between households headed by men and women. In addition, Tobit regression analysis was used to analyse the probability and degree of determinant variables in predicting agricultural livelihood participation. The Tobit model was selected as an appropriate assessment model based on the nature of the dependent variable: continuous and clustered at some upper and lower boundaries. Limiting values (i.e. zeros) are taken into account in the Tobit model, avoiding biased and ineffective assessments of Ordinary Least Square Estimates (since OLS biases are evaluated by calculating only those observations above cluster limits, i.e. zeroes). The Tobit model helps to determine changes in probability to be above the limit, as well as changes in the value of the dependent variable, where values are already above the limit (McDonald s Moffitt, 1980; Wuldridge, 2002). Table 3 summarizes the dependent and explanatory variables used to assess the determinants of farm livelihoods in Area. Following Wuldridge (2012, p. 597), Tobit's model for the hidden y's variable for actual participation in agriculture, which is rightly censored in this study, is given: (1) y∗'xi'β'ui (1) Where y' zgt; 0, ui - Normal (0.2) ∗ ∗ модель вероятности дается так: (2) P (y>0'x'P(y∗>0'x) 1'φ (xз/σ σ φ) детерминанты участия в фермерских хозяйствах даются: (3) ЭΦА30∑i-1nXi'i (3) Где: EFA является вовлечением в сельскохозяйственную деятельностьСи - вектор независимых переменных; y - термин ошибкаВ результате описательной статистики показали, что как мужчины, так и женщины возглавляемых домашних хозяйств заниматься больше на сельское хозяйство, чем другие несельскохозяйственные средств к существованию. Вместе с тем средняя доля участия в сельском хозяйстве выше и статистически значима для домашних хозяйств, возглавляемых мужчинами, чем для их коллег-женщин, т.е. 94% и 89%, соответственно (таблица 4). Результаты свидетельствуют о том, что сельское хозяйство является основной стратегией обеспечения средств к существованию для большинства домашних хозяйств, возглавляемых мужчинами и женщинами. Средний возраст главы домашнего хозяйства мужчины и женщины составляет 41 и 48 лет accordingly, with a statistically significant average difference. With regard to the level of education of selected households, the average male household manager has a level of primary education, while the average female-headed household is between an illiterate and literate (just can be read and written) group with a statistically significant average difference. This means that women are less educated than their male counterparts, which may be due to gender biases in access to education. The number of working persons and the number of dependents in male-headed households (3.17 and 1.32, respectively), is higher and statistically significant compared to female-headed households (i.e. 2.56 and 0.76, respectively). This may be in line with the size of the family, where male-headed households on average have significantly more family members than their female counterparts. The results imply that male-headed households have a larger household labour force, an important productive factor that can contribute to increased production. In addition, the average number of days during which male-headed households receive support from Debo7 is also three times higher than in female-headed households, where the average difference is statistically significant. This may be due to the fact that male leaders spend enough time outside their homes and thus have better social networks than their female counterparts. Women's leaders are burdened with home activities and have little time to communicate with friends. With regard to land ownership, male-headed households have an average of 1.25 and 0.96 hectares of non-coffee and coffee land, respectively, while households, women have fewer land of both types than their male counterparts (an average of 1.11 and 0.59 hectares for non-coffee and coffee land, respectively). The average land in male-headed households is not very far from the national average of 1.37 hectares (CSA - World Bank, 2013). Average Average it has been found that between households headed by men and women is important in terms of owning coffee land. The result clearly shows that women farmers are disadvantaged in terms of land ownership, which is an important indicator of wealth in the field of research. Other relevant studies in sub-Saharan Africa in general and Ethiopia in particular have shown similar results, with households headed by women in rural Ethiopia having less land than their male counterparts (CSA - World Bank, 2013; Newman and Calagaraja, 2000). In addition, the average share of household participation was found to be higher and statistically significant for female-headed households, while the average male-headed family spent less time on household activities. Household activities are generally not valued, and the burden on women also reduces the time to work online with friends outside their home. In addition, male-headed households have, on average, greater access to credit than their female counterparts. This means that male-headed households have greater potential for investment than their female counterparts. As a result, average investment in agricultural resources (fertilizers and improved seeds) is much higher and significant for male-headed households than female-headed households. On average, investments in fertilizers and improved seeds are 857 and 110 ETB10, respectively, for male-headed households; while 495 and 60 ETB, respectively, for households headed by women. In addition, the male-headed household has an average farm-based physical capital of 6,673 ETP, more than double the amount of physical agricultural capital owned by female-headed households (estimated at 3,022 ETB). As a result, the average income of farmers among male-headed households is significantly higher than in female-headed households. The results show that female-headed households have limited agricultural factors that have a negative impact on production and thus income from agriculture. This finding is supported by Cass, Abate, Warner and Kieran (2015), who found a clear gender gap between households headed by men and women who own natural, financial and human capital, which restrict female-headed households from agricultural resources. In addition, the same study found that female-headed households had a significantly lower proportion of livestock, especially bulls and horses, than male heads. Oxen and equines are used as project power for land cultivation and transportation of goods, respectively in Ethiopia.The average consumption expenditures of households were also found to be higher among male-headed households than their female counterparts, with statistically significant average differences. This may be in line with the total household income earned, where male farmers earn higher higher than women farmers. Similarly, male-headed households own more non-agricultural products than female-headed households (53,558 and 30,214 ETPs for male-headed households, respectively). It has been established that the average difference between households headed by men and women in terms of non-agricultural ownership is significant. The results clearly show that female-headed households have fewer factors of production and income than their male counterparts, indicating the need for targeted and gender intervention to increase the productive capacity of women farmers. Survey and focus group discussions conducted in the field of research have shown that agriculture is the main livelihood

option for small farmers. While participation in non-agricultural activities is also a common practice in the field of research, it is an alternative to livelihoods, especially for poor households with limited productive factors, such as land and capital. Older households view non-agricultural activities as activities that are practiced in the off-season to cover some of their family's negligible expenses. A number of factors influenced the participation in agriculture. As indicated in Table 4, the annual increase in the age of heads of household leads to an increase in the likelihood of agricultural participation by 0.93% to 56 years. A comparison of male-headed households showed that the livelihood rate of older female-headed households was 0.24 per cent lower than that of their male counterparts. The assessment of the marginal effect indicates that the probability and intensity of agricultural participation increased by 2.2 per cent with every single percentage increase in the value of agricultural physical capital, indicating that the physical capital of farms is a determining factor for the increase in rural household participation in agriculture (table 5). This means that physical ownership is one of the vital determinants that encourage households (especially female-headed households) to become more involved in agriculture. Reardon et al. (1997) also determined that physical ownership, especially animal traction, increases land and labour productivity and thus increases agricultural yields in sub-Saharan Africa. In addition, Yona and Mathewos (2017) in their study in southern Ethiopia found similar results, lack of physical capital is a deterrent to agricultural participation. The findings of Smith, Gordon, Meadows and Zwick (2001) in their Uganda survey confirmed that rural households that are poorer in terms of capital, are more committed to agriculture and have been found to have less diversified livelihoods than their poor counterparts. The probability of rural households being involved in agriculture increases by an average of 2.45% for every additional hectare of coffee farmland Owns. Coffee is one of the farm's main sources of income in research. Coffee land, which is suitable for coffee production, has a higher market value than any other coffee land that rural households possess. This finding is consistent with a number of research results, including Reardon et al. (1997); Karyuki (2011); Koussa (2012); Cassa (2014), Yahya and Syaohui (2014), (Abrha, 2015) and Kassie et al. (2017), depicting a direct link between land ownership and involvement in agriculture. Group discussions with men and women also argued that land was one of the resources available to rural households and that this was one of the reasons for landless and for farmers with smaller plots of land to diversify their livelihoods for non-agricultural activities. Land ownership per capita has been fragmented by the increase in family size and has become one of the determinants affecting agricultural production and household consumption. The evaluation showed that every 100 ETB investments in seed improvement resulted in female-headed households doing more agriculture than their male counterparts. This suggests that investment in agricultural resources motivates female-headed households to become more involved in agriculture. The result is also supported by the findings of a women-led focus group discussion.-led households are limited by financial resources, limiting the amount of investment made to increase agricultural yields and thereby reducing their participation in agriculture. While investment in chemical fertilizers had little impact on farmers' livelihoods, other similar studies conducted by Ragasa et al. (2012) in rural Ethiopia showed that synthetic fertilizers significantly increased farm productivity and that the rate of fertilizer use among female-headed households was significantly lower than that of men. The same study also found that male-headed households were planted with improved and higher levels of seeds than their female counterparts. Households with access to credit are thought to be 4.4 per cent more employed in agriculture than households without access to credit. Credit is a source of capital that enhances the ability of rural households to acquire agricultural resources that increase yields and continues to be a disadvantage for poorer households in revitalizing the agricultural sector. In accordance with this conclusion, Miriam, Patrick and (2014) found that both formal and informal loans played an important role in building the capacity to buy new varieties, lease land, and thereby increase agricultural productivity and participation in the State of Enugu in Nigeria. Similarly, Kassie et al. (2017) pointed out that access to credit allows rural households in Ethiopia to move from agricultural to agricultural livelihoods by increasing their buying capacity Technology. Another Ethiopian study confirmed that agricultural productivity in Ethiopia would increase by 60% if farmers' credit constraints were relaxed (Mukasa et al., 2017). The same study noted that female-headed households were unlikely to have access to affordable credit services because of very high interest rates by creditors and fears that they would not be able to repay them. Discussions in focus groups, which were held with both male farmers and women, showed mixed results. On the one hand, some groups have stressed how access to credit improves their livelihoods. On the other hand, some groups complained that they were not encouraged to borrow as a result of the debt burden. A male-conference from the village of Wabo described his opinion of local credit institutions as: They (lenders) are still asking for loan repayment even in an environment where coffee production is low. They often threaten borrowers that they will sell their homes and other resources if they don't envelop in time. The results of the marginal effect estimate show that a slight increase in household spending resulted in a 1.78 per cent reduction in agricultural participation. If household spending increases, agriculture cannot always provide an immediate solution to the demand for cash. Agriculture is done seasonally, and small farmers must wait until the harvest is ready and sold to the market. Thus, farmers could diversify their livelihoods for other non-agricultural livelihoods in addition to their incomes. The study found that households in the study have traditional social capital where they network and support each other, especially during peak farming periods. One of the main systems of support for labor is Debo. Each additional support received from Debo increased participation in agriculture among both male-headed households and women by 0.34 per cent, suggesting that social capital plays a vital role in determining the living conditions of small farmers. Debo's importance to rural livelihoods is also borne out by the findings of Regiss, Mengistu and Yusuf (2013) and Bekele, Neger and Wondimagnegu (2019). Regassa et al. (2013), in its research in southern Ethiopia, found that Debo plays a key role in supporting households, especially during the growing and harvesting period. The same study found that Debo improves household productivity, saves time and strengthens teamwork and social connections. In addition, Bekele et al. (2019) found that local institutions in southwestern Ethiopia the food security situation of rural households. The results show that participation in Debo increased household food security by 3.94.The results of the assessment also show that each incidence of pests and disease infection increased the participation of rural households in agriculture by 3.36%. The results also show that the participation of women led by the agriculture was 9.85% lower than their male counterparts for each incidence and pest infestation. The result is that female-headed households are limited over time and other resources to increase their participation in their field because of such problems compared to male-headed households. The incidence of encroachments on household life has had little impact on agricultural livelihoods, despite farmers complaining that wild animals living in the biosphere reserve often invade their farms. However, focus groups of discussions conducted with male and female groups determined these wild animals, especially monkeys, porcupines, warthogs and buffalo were major farming problems because they harmed their crops on the field. Since the research area is a biosphere reserve inhabited by various wild animals, farmers are forced to spend a lot of time and energy patrolling their agricultural areas. Women-headed households have limited labour and financial resources to use guards to patrol and protect their fields from wildlife attacks, as well as to properly manage their fields, bypassing agricultural diseases and pests. A study conducted in the same region of southwestern Ethiopia Kirin (2005) found that baboons, vervet monkeys, wild pigs and porcupine as the worst destructive pests accounted for 0.5% of the loss of the total crop grown in the study. Mojoa, Rothschuh and Alebachew (2015) also found corresponding results in the Guraghe area of southern Ethiopia. The authors found that 93% of households surveyed reported that wildlife attacks contributed to food shortages and mismanagement of natural resources. The study analysed the determinants of rural household livelihoods in the Yayu Biosphere Reserve in south-western Ethiopia. Agricultural livelihoods are found to be the main means of subsistence in the area. The results show that increased production factors, such as physical agricultural capital, land ownership and access to credit and agricultural resources, have contributed to greater participation in rural households. The results also show that the lack of agricultural resources is one of the bottlenecks that keep female-headed households from participating in agriculture. Despite the fact that rural households live in it can be concluded that the encroachment of wild animals has not prevented rural households from taking up agricultural livelihoods. However, this has increased the amount of time they have been extinguished by agriculture as a result of patrolling their fields. Similarly, the incidence of pests and diseases has generally increased rural household involvement in agriculture. Comparison of households headed by men and women suggests that higher participation in negative impact on agricultural livelihoods of female-headed households, in addition to male-headed households. The results also show that both male-headed households and women are more engaged in agriculture if supported by the traditional labour support system in the area. Overall results showed that households headed by men and women still preferred to farm as the primary livelihood option, despite the invasion of wildlife from the biosphere reserve and legal prohibitions on the expansion of agricultural land in the reserve. Rather, the results confirm that the livelihoods of farms are determined by the existence of certain agricultural capitals and increased productivity. The results also confirm that female-headed households can farm in the same way as male-headed households if they are equipped with the necessary productive capitals. The field of study is located in the biosphere reserve of Yyu, where wild animals often invade farmers' fields. As a result, farmers devote enough time to patrolling their fields, especially during peak agricultural seasons. Therefore, there must be effective and participatory wildlife management strategies, such as the construction of protected enclosures with a clear boundary between a farming village and wild animals. Compensation schemes for farmers whose fields are damaged by wild animals should also be separated. Such strategies could reinforce farmers' sense of responsibility for the biosphere reserve. Improving agricultural yields is one of the obstacles to the productivity of small farmers. In addition, these resources are not available to some farmers and are not delivered at the right time. Given the fact that, as a result of the increase in the size of the family in the field of research, there is a fragmentation of agricultural land and capital, improving agricultural resources is one of the few options to increase yields per unit of land. Strategies should therefore be developed to improve agricultural expansion services and access to agricultural technologies in a way that meets the needs of small farmers. Women-headed households are overwhelmed by both agricultural and domestic activities. Labour-saving technologies should be introduced to reduce the burden of their household and increase their productive role. Table 1. Information on the study of the villages and areas of Yyu Biosphere ReserveDistricts in Yyu The Nature Reserve from the protected main forest area (measured from the center of the village)Distance from the main road (measured from the center of the village)Distance from the market (measured from the center of the village)Distribution of land use for each zone (proportion to the total area of the village)Core (%)Buffer (%)Transition (%)YayuWabo350 m1. 8 km1.5 km46.3626.2927.35 Bondo megela/Bondow650 m2.5 km33.329.831.9HurumuGaba850 m270 m270 km2.3 km320.2918.8160.9Table 2. Determining the sample size for each study sites in the reserveVillagesTotal households (N)Sample size (n)Male-ledFmale headedTotalMale HeadedFemale headedTotalYayuWabo1943623034741 Bondo Megela/Bondow45185536831699HurumuGaba388138526722496 Wangegne418127545742498Total 1,837 334Tablica 3. Determining hypothetical variables and measurements for determinants of farm participationVariable TypeExpected sign Dependent variable EFA Share participation in agricultural activities. Farm participation measures the extent to which a household depends on agriculture and therefore a percentage of agricultural income from total income. 100% involvement means that the household is fully engaged in agriculture, and thus the whole family's income comes from agriculture. Continuous, 0 to 100% AGEAge heads household in years. Continuous level of education of the home head.0 - illiterate, 1 - reading and writing, 2 - primary (1-4), 3 - junior (5-8), 4 - secondary (9-12), 5 - tertiary (college diploma and above) - NFAThe value of non-agricultural property, owned by the household in ETBContinuous-EHHA Share of household participation, calculated from hours calculated during the day, from 0 to 100%-IFERTThe investment made on fertilizers in Ethiopian BirrContinuous-IIMSEEDThe investment, made to improve seeds in Ethiopian BirrContinuous-DEPENNumber dependents in the householdContinental-PHYCAPValue Agricultural Capital Household owns in ETBContinuous-CLANDCoffee land (land suitable for coffee production) in hectaresContinental NCNON-coffee agricultural land (land Dedicated to the production of crops other than coffee)Continuous-CREDITAccess to creditDummy, 1 if the household has access to credit, 0 otherwise -IRRIGAccess for irrigationUm, 1 if the household has access to irrigation, 0 otherwise EXPENDHousehold costs incurred to cover the basic consumer goods and services measured in The Ethiopian BirrContinuous-WILDAA The occurrence of damage to wild animals on the field culturesUmmia, 1, if the household has faced the incidence of encroachment on wild animals, 0 otherwise -PDINFEST The occurrence of diseases and pest infestationDummy, 1, if the household has faced the incidence of pests and diseases, 0 otherwise DEBBONumber days the family get labor support (Debo) community during the peak agricultural seasonsContinent table 4. Summary of descriptive statisticsThe materialsThe units of measurementMeil-led householdsFemale-headed households ObserMeanSDObser.MeanSDt-test means differenceProportation of farm participation (0 to 100%)26393.6116.897189.3122.814.3 HH (in years)26340.8113.477148.0111.88-7.2 (1.758)Family size (No. individuals)2634.491.98713.321.471.17 (0.253)The level of education of the leader (0 to 5; 0 illiterate and 5 highest higher (0.173) Сельскохозяйственная продуктивность (сельскохозяйственное производство в эфиопском Бирр на гектар земли)2599313.8412,140.08698818.927976.42494.92 (1544.13)Несельскохозяйственное владение активами (оценивается в эфиопском Birr)26353 557,8992,039.87130,214.3724,373.6523,343.52 (11037.08)Участие в деятельности домашних хозяйств (средние часы, выделяемые в день)2635.6310.087033.8723.75-28.24 (1.892)Инвестиции в удобрения (в эфиопском Birr)263857.29941.9471494.55567.51 362,74 (117,21)Инвестиции в улучшение семян (в эфиопском Birr)263109.5244.287159.97144.3149.53 (30,34)Количество рабочей силы (нет. физических лиц)2633.171.45712.561.320.61 (0.19)Количество иждивенцев (нет. of individuals)2631.321.41710.761.090.56*** (0.18)Farm income (in Ethiopian Birr)26315,396.6617,737.17111,535.0713,365.363,861.59** (2261.52)Non-farm income (in Ethiopian Birr)2633681211.2871421.03834.8−53.03 (152.76)Farm physical capital (valued in Ethiopian Birr)261667311,620.32703022.26044.813650.8*** (1439.5)Coffee land (in hectare)2630.961.04710.590.820.37*** (0.133)Non-coffee farmland (in hectare)2621.251.66711.111.650.14 (0.222)Access to credit (1 if have access; 0 otherwise)2630.430.5710.310.470.12** (0.065)Access to irrigation(1 if have access; 0 otherwise)2630.160.36710.110.320.05 (0.047)Household expenditure (in Ethiopian Birr)2068480.086864.05664629.523938.663,850.56*** (889.03)Incidence of wild animal encroachment (1 if encountered incidence , 0 Otherwise)2620.450.5710.370.490.08 (0.066)Incidence of pest and disease infestation(1 if encountered incidence, 0 Otherwise)2630.20.4710.230.42−0.03 (0.054)Number of support days from Debo (no. дней)2632.996711.061.541.93 (0.719)Таблица 5. Determinants of farm livelihoods in the study area (Tobit estimation)VariableDeterminants of farm livelihoodsCoefficientMarginal Effect (dy/dx)Age2.573** (1.236)0.926Age square−0.023* (0.013)−0.0082Education−0.011 (1.585)−0.004Total working labor−1.982 (1.556)−0.713Total number of dependents−1.711 (1.431)−0.616Engagement in household activities−0.023 (0.172)−0.008aValue of non-farm assets−0.324 (1.982)−0.117Investment on fertilizer0.004 (0.002)0.0014Investment on improved seed0.0004 (0.007)0.00014aPhysical capital6.17*** (1.564)2.22Coffee land6.81** (2.963)2.45Non-coffee Farmland−1.63 (1.115)−0.6bAccess to credit12.79*** (4.126)4.4bAccess to irrigation4.313 (4.762)1.44aHousehold expenditure−4.956* (2.744)−1.78bIncidence of wild animal encroachments6.9 (4.610)2.56bIncidence of pest and disease infestation8.21* (4.960)3.36Support from Debo0.95* (0.492)0.34Interactions: Age*Female HH−0.67* (0.370)−0.24Engagement in household activities*Female HH0.56** (0.240)0.2 Investment on improved seed *Female HH0.07** (0.027)0.03 bIncidence of pest and disease infestation*Female HH−20.87* (11.967)−9.85Cons.26.32 (37.882) Sigma22.45 (2.391)Number of The authors would like to thank all the small farmers and key informants in the Yayu Biosphere Reserve who participated in the data collection. Notes1. Transition or cooperation zones cover 70.5 per cent of the biosphere reserve, which contains areas of settlement, farms and other human activities, where local communities, governing bodies, academics, non-governmental organizations, cultural groups, economic interests and other stakeholders work together to manage and sustain resource development areas (Gole, 2003).2 Buffer zones are clearly defined areas, and tend to surround the main areas. Buffer zones can be used for cooperatives compatible with sound environmental practices, including environmental education, recreation, ecotourism and research (Gole, 2003).3. The main zones are heavily protected areas for the preservation of biodiversity. Activities permitted in this zone are non-special, education and eco-tourism, as well as non-destructive research (Gole, 2003).4 NutriHAF: Diversifying agriculture for a balanced diet through fruits and vegetables in high-rise crop systems in Africa is a project being implemented in Ethiopia and Madagascar. The project in Ethiopia is being carried out in two areas of the Yayu Biosphere Reserve in southwestern Ethiopia5. The Taro Yamaare formula was used to determine the minimum sample size for the study. The formula is given as: n'N1'Ne2, where, n - selected households, N - total household size, e is the sampling error (at 0.05).6. ECCCFF is the Forum on Environment, Climate Change and Coffee Forests, a local organization operating in the Yayu Biosphere Reserve in Ethiopia7. Debo is a traditional system of support for labor and sharing, where a group of farmers come together and support each other during peak agricultural seasons, especially during cultivation and harvest. It is the local social capital8. In this context of research, non-coco-area farmland is a land used to grow crops, vegetables and fruits from coffee. Coffee land is a land suitable for coffee production, and its market value is also higher than non-coffee farmland.9. Home activities include: cooking, extracting water and firewood, caring for children in the house10. ETB (Ethiopian Birr) is a currency unit in Ethiopia. 1 ETB is roughly equivalent to US$0.037. U.S. dollars. smallholder farmers in ethiopia pdf. agroforestry of smallholder farmers in ethiopia practices and benefits. number of smallholder farmers in ethiopia