

REFERENCES

- ABAY, F., BJØRNSTAD, A. and SMALE, M. (2009). Measuring on Farm Diversity and Determinants of Barley Diversity in Tigray. *Momona Ethiopia Journal of Science*, 1(2), p. 44–66. DOI: [10.4314/mejs.v1i2.46048](https://doi.org/10.4314/mejs.v1i2.46048).
- ADAM, H. and ZAKARIA, H. (2015). Determinants of female labour force participation in farm and non-farm livelihood enterprises: the case of female labour participation in northern Ghana. *Journal of Social Science and Humanities*, 1(31), p. 239–260.
- ALBORE, A. (2018). Review of determinants of sustainable rural livelihood diversification of smallholder farmers in Ethiopia. *International Journal of Advanced Research*, 6(2), p. 251–259. DOI: [10.2147/IJAR01/6436](https://doi.org/10.2147/IJAR01/6436).
- ALI, H., SHAFI, M. M. and KHAN, N. P. (2017). Factors affecting off-farm employment of small farmers in Peshawar Valley. *Arts and Social Sciences Journal*, 8(2), p. 1-8. DOI: [10.4172/2151-6200.1000262](https://doi.org/10.4172/2151-6200.1000262).
- ASANTE, B. O., VILLANO, R. A., PATRICK, I. W. and BATTESE, G. E. (2017). Determinants of farm diversification in integrated crop – livestock farming systems in Ghana. *Renewable Agriculture and Food Systems*, 33(2), p. 131-149. DOI: [10.1017/S1742170516000545](https://doi.org/10.1017/S1742170516000545).
- ASFAW, A., SIMANE, B., HASSEN, A. and BANTIDER, A. (2017). Determinants of non-farm livelihood diversification: evidence from rainfed-dependent smallholder farmers in northcentral Ethiopia (Woleka sub-basin). *Development Studies Research*, 4(1), p. 21–36. DOI: [10.1080/21665095.2017.1413411](https://doi.org/10.1080/21665095.2017.1413411).
- ASMAH, E. E. (2011). Rural livelihood diversification and agricultural household welfare in Ghana. *Journal of Development and Agricultural Economics*, 3(7), 325–334.
- ASRAVOR, R. K. (2017). Livelihood diversification strategies to climate change among smallholder farmers in northern Ghana. *Journal of International Development*. DOI: [10.1002/jid.3330](https://doi.org/10.1002/jid.3330).
- AZIZ, S. A., SIDIQUE, S. F. and SAID, R. (2017). Determinants and effects of non-farm enterprise diversification on household economic wellbeing in Rural Nigeria. *International Journal of Economics and Management*, 11(1), p. 187–204.
- BERRANG-FORD, L., FORD, J. D. and PATERSON, J. (2011). Are we adapting to climate change? *Global Environmental Change*, 21(1), p. 25–33. DOI: [10.1016/j.gloenvcha.2010.09.012](https://doi.org/10.1016/j.gloenvcha.2010.09.012).
- BEYENE, A. D. (2008). Determinants of off-farm participation decision of farm households in Ethiopia. *Agrekon*, 47(1), p. 140–161.
- BIRTHAL, P. S., ROY, D. and NEGI, D. S. (2015). Assessing the impact of crop diversification on farm poverty in India. *World Development*, 72, 70–92. DOI: [10.1016/j.worlddev.2015.02.015](https://doi.org/10.1016/j.worlddev.2015.02.015).
- CHAMBWERA, M., HEAL, G., DUBEUX, C., HALLEGATTE, S., LECLERC, L., MARKANDYA, A., ... and NEUMANN, J. E. (2014). Economics of adaptation. In K. J. M. Field, C.B., V.R. Barros, D.J. Dokken, A. N. L. M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel and MacCracken, L. L. W. S. Mastrandrea, P.R. (Eds.), *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 945–977). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- CHANDRA, A., MCNAMARA, K. E., DARGUSCH, P., MARIA, A. and DALABAJAN, D. (2017). Gendered vulnerabilities of smallholder farmers to climate change in conflict-prone areas: A case study from Mindanao, Philippines. *Journal of Rural Studies*, 50, p. 45–59. DOI: [10.1016/j.jrurstud.2016.12.011](https://doi.org/10.1016/j.jrurstud.2016.12.011).
- COCHRAN, W. G. (1977). *Sampling Techniques* (third edit). New York: John Wiley and Sons.
- DANSO-ABBEAM, G., ABBAN, B. A. A. and DONKOH, S. A. (2017). Off-farm participation and technical efficiency among smallholder farmers in the Northern Region, Ghana. *Applied Studies in Agribusiness and Commerce*, 11(1-2), p. 35–44. DOI: [10.19041/APSTRACT/2017/1-2/5](https://doi.org/10.19041/APSTRACT/2017/1-2/5).
- DEBELE, B. N. and DESTA, G. D. (2016). Livelihood diversification: strategies, determinants and challenges for pastoral and agro-pastoral communities of Bale Zone, Ethiopia. *International Review of Social Sciences and Humanities*, 11(2), p. 37–51.
- DOWNING, T. E. (1993). The effects of climate change on agriculture and food security. *Renewable Energy*, 3(4). DOI: [https://doi.org/10.1016/0960-1481\(93\)90115-W](https://doi.org/10.1016/0960-1481(93)90115-W)
- DUBE, L. and GUVEYA, E. (2016). Factors influencing smallholder crop diversification: a case study of Manicaland and Masvingo Provinces in. *International Journal of Regional Development*, 3(2), p. 1–25. DOI: [10.5296/ijrd.v3i2.9194](https://doi.org/10.5296/ijrd.v3i2.9194).
- FAO. (2016a). Diversification strategies and adaptation deficit: Evidence from rural communities. By Solomon Asfaw, Alessandro Palma and Leslie Lipper. ESA (No. 16.02).
- FAO. (2016b). The state of food and agriculture: Climate change, agriculture and food security. Rome.
- GEBREYESUS, B. (2016). Determinants of livelihood diversification: The case of Kembata Tambaro zone, Southern Ethiopia. *Journal of Poverty, Investment and Development*, 23, p. 1–10.
- GIL, J. D. B., GARRETT, R. and BERGER, T. (2016). Determinants of crop-livestock integration in Brazil: Evidence from the household and regional levels. *Land Use Policy*, 59, p. 557–568. DOI: [10.1016/j.landusepol.2016.09.022](https://doi.org/10.1016/j.landusepol.2016.09.022).
- GREENE, W. H. (2012). *Econometric analysis* (Seventh ed.). England: Pearson Education Limited.
- GSS. (2012). 2010 population and housing census: summary report of final results. Accra.
- GSS. (2014). Ghana living standard survey round 6 (GLSS6): Labour force report. Accra.
- GSS. (2015). Ghana poverty mapping report. Accra, Ghana.
- HERRERO, M., THORNTON, P. K., NOTENBAERT, A. M., WOOD, S., MSANGI, S., FREEMAN, H. A., BOSSIO, D., DIXON, J., PETERS, M., VAN DE STEEG, J., LYNAM, J., PARTHASARATHY RAO, P., MACMILLAN, S., GERARD, B., MCDERMOTT, J., SERÉ, C. and ROSEGRANT, M. (2010). Smart

- investments in sustainable food production: Revisiting mixed crop-livestock systems. *Science*, 327, p. 822–825. DOI: [10.1126/science.1183725](https://doi.org/10.1126/science.1183725).
- JAVED, S., NADEEM, A. M., RAFIQUE, M. Z. and KAMRAN, M. A. (2015). Determinants of income diversification among rural households of Pakistan. *Journal of Economics and Sustainable Development*, 6(14), p. 45–50.
- JIAO, X., POULIOT, M. and WALEIGN, S. Z. (2017). Livelihood strategies and dynamics in Rural Cambodia. *World Development*, 97, p. 266–278. DOI: [10.1016/j.worlddev.2017.04.019](https://doi.org/10.1016/j.worlddev.2017.04.019).
- JOST, C., KYAZZE, F., NAAB, J., NEELORMI, S., KINYANGI, J., ZOUGMORE, R. and KRISTJANSON, P. (2015). Understanding gender dimensions of agriculture and climate change in smallholder farming communities. *Climate and Development*, 8(2), p. 133–144. DOI: [10.1080/17565529.2015.1050978](https://doi.org/10.1080/17565529.2015.1050978).
- KASSIE, G. W., KIM, S. and FELLIZARJR, F. P. (2017). Determinant factors of livelihood diversification: Evidence from Ethiopia. *Cogent Social Sciences*, 3, p. 1–16. DOI: [10.1080/23311886.2017.1369490](https://doi.org/10.1080/23311886.2017.1369490).
- LEMAIRE, G., FRANZLUEBBERS, A., CÉSAR, P., CARVALHO, D. F. and DEDIEU, B. (2013). Integrated crop–livestock systems: Strategies to achieve synergy between agricultural production and environmental quality. *Agriculture, Ecosystems and Environment*, 190(1), p. 4–8. DOI: [10.1016/j.agee.2013.08.009](https://doi.org/10.1016/j.agee.2013.08.009).
- LIEBIG, M. A., RYSCHAWY, J., KRONBERG, S. L., ARCHER, D. W., SCHOLLJEGERDES, E. J., HENDRICKSON, J. R. and TANAKA, D. L. (2017). Geoderma Integrated crop-livestock system effects on soil N, P, and pH in a semiarid region. *Geoderma*, 289, p. 178–184. DOI: [10.1016/j.geoderma.2016.11.036](https://doi.org/10.1016/j.geoderma.2016.11.036).
- MATHENGE, M. K. and TSCHIRLEY, D. L. (2015). Off-farm labor market decisions and agricultural shocks among rural households in Kenya. *Agricultural Economics*, 46(5), p. 603–616. DOI: [10.1111/agec.12157](https://doi.org/10.1111/agec.12157).
- MATSHE, I. and YOUNG, T. (2004). Off-farm labour allocation decisions in small-scale rural households in Zimbabwe. *Agricultural Economics*, 30, p. 175–186. DOI: [10.1016/j.agecon.2003.01.001](https://doi.org/10.1016/j.agecon.2003.01.001).
- MESFIN, W., FUFA, B. and HAJI, J. (2011). Pattern, Trend and Determinants of Crop Diversification: Empirical Evidence from Smallholders in Eastern Ethiopia. *Journal of Economics and Sustainable Development*, 2(8), p. 78–90.
- MoFA. (2013). Agriculture in Ghana: Facts and figures (2012). Ministry of Food and Agriculture, Statistics, Research and Information Directorate (SRID). Accra. Retrieved from <http://www-e-agriculture.gov.gh/index.php/2014-07-22-14-39-46/agric-facts-and-figures-2012>.
- NEUDERT, R., GOETTER, J. F., ANDRIAMPARANY, J. N. and RAKOTOARISOA, M. (2015). Income diversification, wealth education and well-being in rural south-western Madagascar: Results from the Mahafaly region. *Development Southern Africa*, 32(6), p. 1–27. DOI: [10.1080/0376835X.2015.1063982](https://doi.org/10.1080/0376835X.2015.1063982).
- NGIGI, M. W., MUELLER, U. and BIRNER, R. (2017). Gender differences in climate change adaptation strategies and participation in group-based approaches: an intra-household analysis from rural Kenya. *Ecological Economics*, 138, p. 99–108. DOI: [10.1016/j.ecolecon.2017.03.019](https://doi.org/10.1016/j.ecolecon.2017.03.019).
- NHEMACHENA, C., HASSAN, R. and CHAKWIZIRA, J. (2014). Analysis of determinants of farm-level adaptation measures to climate change in Southern Africa. *Journal of Development and Agricultural Economics*, 6(5), p. 232–241. DOI: [10.5897/JDAE12.0441](https://doi.org/10.5897/JDAE12.0441).
- OFOLSHA, M. D. and MANSINGH, J. P. (2015). Determinants of female-headed households' livelihood diversification strategies choice in Ambo District, Ethiopia. *Journal of Extension Education*, 27(2), 5423–5430.
- OSARFO, D., SENADZA, B. and NKETIAH-AMPONSAH, E. (2016). The impact of nonfarm activities on rural farm household income and food security in the Upper East and Upper West Regions of Ghana. *Theoretical Economic Letters*, 6, p. 388–400. DOI: [10.4236/tel.2016.63043](https://doi.org/10.4236/tel.2016.63043).
- OWITTI, O. L. (2015). Gender Differences and Relations in Rural Household Livelihoods of Gog District, Anywaa Zone, Gambella Region, South Western Ethiopia. *International Journal of Gender and Women's Studies*, 3(1), p. 51–79. DOI: [10.1564/ijgws.v3n1p7](https://doi.org/10.1564/ijgws.v3n1p7).
- OWUSU, V., ABDULAI, A. and ABDUL-RAHMAN, S. (2011). Non-farm work and food security among farm households in Northern Ghana. *Food Policy*, 36(2), 108–118. DOI: [10.1016/j.foodpol.2010.09.002](https://doi.org/10.1016/j.foodpol.2010.09.002).
- RAHMAN, S. and AKTER, S. (2014). Determinants of Livelihood Choices: An Empirical Analysis from Rural Bangladesh. *Journal of South Asian Development*, 9(3), p. 287–308. DOI: [10.1177/0973174114549101](https://doi.org/10.1177/0973174114549101).
- REHIMA, M., BELAY, K., DAWIT, A. and RASHID, S. (2013). Factors affecting farmers' crops diversification: Evidence from SNNPR, Ethiopia. *International Journal of Agricultural Sciences*, 3(6), p. 558–565.
- RIEDE, J. O., POSADA, R., FINK, A. H. and KASPAR, F. (2016). What's on the 5th IPCC Report for West Africa? In J. A. Yaro and J. Hesselberg (Eds.), *Adaptation to Climate Change and Variability in Rural West Africa* (pp. 7–24). Springer International Publishing.
- RYSCHAWY, J., CHOISIS, N., CHOISIS, J. P. and GIBON, A. (2013). Paths to last in mixed crop – livestock farming lessons from an assessment of farm trajectories of change. *Animal*, 7(4), p. 673–681. DOI: [10.1017/S1751731112002091](https://doi.org/10.1017/S1751731112002091).
- SHAHBAZ, P., BOZ, I. and HAQ, S. (2017). Determinants of Crop Diversification in Mixed Cropping Zone of Punjab Pakistan. *Direct Research Journal of Agriculture and Food Science*, 5(11), p. 360–366. DOI: [10.26765/DRJAFS.2017.2257](https://doi.org/10.26765/DRJAFS.2017.2257).
- SIMTOWE, F. P. (2010). Livelihoods diversification and gender in Malawi. *African Journal of Agricultural Research*, 5(3), p. 204–216. DOI: [10.5897/AJAR09.386](https://doi.org/10.5897/AJAR09.386).
- SOLTANI, A., ANGELSEN, A., EID, T., SAEID, M., NAIENI, N. and SHAMEKHI, T. (2012). Poverty, sustainability, and household livelihood strategies in Zagros, Iran. *Ecological Economics*, 79, p. 60–70. DOI: [10.1016/j.ecolecon.2012.04.019](https://doi.org/10.1016/j.ecolecon.2012.04.019).
- TARAWALI, S., HERRERO, M., DESCHEEMAEKER, K., GRINGS, E. and BLÜMMEL, M. (2011). Pathways for sustainable development of mixed crop livestock

- systems: Taking a livestock and pro-poor approach. *Livestock Science*, 139, p. 11–21. DOI: [10.1016/j.livsci.2011.03.003](https://doi.org/10.1016/j.livsci.2011.03.003). TESSEMA, R. A. (2017). Assessment of the implementation of community-led total sanitation, hygiene, and associated factors in Diretiyara district, Eastern Ethiopia. *PLoS ONE*, 12(4), p. 1–11. DOI: [10.1371/journal.pone.0175233](https://doi.org/10.1371/journal.pone.0175233).
- THORNTON, P. K. and HERRERO, M. (2015). Adapting to climate change in the mixed crop and livestock farming systems in sub-Saharan Africa. *Nature Climate Change*, 5(9), p. 830–836. DOI: [10.1038/nclimate2754](https://doi.org/10.1038/nclimate2754).
- ULLAH, R., JOURDAIN, D., SHIVAKOTI, G. P. and DHAKAL, S. (2015). Managing catastrophic risks in agriculture: Simultaneous adoption of diversification and precautionary savings. *International Journal of Disaster Risk Reduction*, 12, p. 268–277. DOI: [10.1016/j.ijdrr.2015.02.001](https://doi.org/10.1016/j.ijdrr.2015.02.001).
- VALBUENA, D., ERENSTEIN, O., TUI, S. H., ABDOULAYE, T., CLAESSENS, L., DUNCAN, A. J. and WIJK, M. T. VAN. (2012). Field crops research conservation agriculture in mixed crop – livestock systems: Scoping crop residue trade-offs in Sub-Saharan Africa and South Asia. *Field Crops Research*, 132, p. 175–184. DOI: [10.1016/j.fcr.2012.02.022](https://doi.org/10.1016/j.fcr.2012.02.022).
- WILBY, R. L. and DESSAI, S. (2010). Robust adaptation to climate change. *Weather*, 65(7), p. 180–185. DOI: [10.1002/wea.504](https://doi.org/10.1002/wea.504).
- WINTERS, P., BANK, T. W., STATES, U., ZEZZA, A., AZZARRI, C., COVARRUBIAS, K. and QUIN, E. J. (2009). Assets, Activities and Rural Income Generation: Evidence from a multicountry Analysis. *World Development*, 37(9), p. 1435–1452. DOI: [10.1016/j.worlddev.2009.01.010](https://doi.org/10.1016/j.worlddev.2009.01.010).
- WOSSEN, T., BERGER, T., HAILE, M. G. and TROOST, C. (2017). Impacts of climate variability and food price volatility on household income and food security of farm households in East and West Africa. *Agricultural Systems*, 163, p. 7-15. DOI: [10.1016/j.agsy.2017.02.006](https://doi.org/10.1016/j.agsy.2017.02.006).
- ZAKARIA, H., ABUJAJA, A. M., ADAM, H. and YAKUB, W. (2015). Does gender make any difference in livelihoods diversification? Evidence from northern Ghana. *International Journal of Agricultural Extension and Rural Development Studies*, 1(1), p. 36–51.