APPLICATION OF BENEFIT INCIDENCE ANALYSIS (BIA) AS A TOOL TO EVALUATE CLIMATE ACTION SPENDING ON CLIMATE SMART AGRICULTURE INITIATIVES: AN EXPERIMENTAL STUDY OF THE USAGE OF BIA ON AGRICULTURE-RELATED SPENDING IN ZAMBIA

ABSTRACT

Using survey data obtained through semi-structured questionnaires which were administered using a multi-stage random sampling process, this study sought to undertake an experimental application of the Benefit Incidence Analysis (BIA) socio-economic evaluation tool on 117 rural farming households in Chongwe District of Zambia. The sampled households were receiving agricultural support through the Government-financed Farmer Input Support Programme (FISP). Specifically, this experimental study of the usage of BIA on agriculture-related spending in Zambia was aimed at proving possible replication of the usage of BIA for evaluating socio-economic and distributional impacts of financing for Climate Smart Agricultural (CSA) practices. Results prove that BIA assessment variables such as income/expenditure quintiles, education status, gender and age are also applicable to and essential in evaluating CSA initiatives. Despite this study proving applicability to CSA assessments, undertaking a BIA is highly technical and data intensive. Such an undertaking would heavily rely on the timely availability of complementary economic and financial data and an intermediate to advanced level of technical capacity in order to administer the analysis.

Key words: Benefit Incidence Analysis; Climate Smart Agriculture; Climate Change; Climate Spending; Evaluation; Socio-Economic Analysis

INTRODUCTION

The discourse related to climate change seems to be gaining momentum and increasing in intensity year after year. In 2019, the Inter-Governmental Panel on Climate Change (IPCC) reported that a quarter of the Earth's ice-free land area had been subjected to human-induced degradation and that climate change had exacerbated the land degradation. The IPCC further stated that climate change and land degradation were projected to cause reductions in crop and livestock productivity, modify the plant species mix and reduce biodiversity [1]. This position highlighted the projected increase of global food insecurity. The 2019 position held and published by the IPCC was augmented two years later when it stated in its 6th Assessment Report (AR6) that it was unequivocal that human influence had warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere had occurred. The AR6 indicated that this human influence was unprecedented in at least the last 2000 years [2].

Ironically, the release of the AR6 in August of 2021 coincided with the occurrence of climate induced disasters experienced in Africa, America and Europe at the time of publication. According to a United Nations press release, an estimated 90,000 people in South Sudan had been affected after heavy rains inundated homes and agricultural fields, and had forced families and their livestock to higher ground [3]. In the American State of California, in Greece and in Siberia, climate induced wildfires had been uncontrollably ravaging each of the three states [4,5,6,7]. These occurrences evidenced the conclusions and projections of the IPCC that stated, at the coincidental time of publishing the AR6, that with further global warming, every region was projected to increasingly experience concurrent and multiple changes in climatic impact-drivers [2].

It can be observed that Africa, like other continents, has not been spared from the ravaging effects of climate change. The United Nations and other observers have argued that, due to the limited capacities, high poverty levels and poor governance systems, among other factors, African countries are more likely to bear the brunt of climate change [8,9,10]. The African Union has equally observed that the Continent may face the greatest risk arising from climate change and that such risk has a higher likelihood of affecting productive sectors, like agriculture, which most African countries rely on [11]. Herein lies the argument for the propagation and adoption of Climate Smart Agriculture (CSA) practices for African countries. The CSA agenda is generally driven with a view to enhance agricultural resilience to adverse climatic conditions, increase agricultural productivity and to promote agricultural practices that either limit or eliminate contributing factors to climate change [12,13].

This paper therefore seeks to argue for the use of the Benefit Incidence Analysis (BIA) as a plausible socio-economic analysis tool that could be applied in evaluating the impact of climate change spending on adaptation and resilience programs such as CSA initiatives. In augmenting the argument for the possible application of BIA on CSA, it is worth noting that the IPCC has "recognised the value of diverse forms of knowledge such as scientific, as well as Indigenous knowledge and local knowledge in understanding and evaluating climate adaptation processes and actions to reduce risks from human-induced climate change" [14]. Therefore, the paper presents the results of an experimental BIA study on an agricultural programme, undertaken in Chongwe District of Zambia, and argues for possible applicability to CSA programmes.

WHAT IS BIA AND WHY THIS TOOL?

The BIA tool is useful for evaluating the poverty and social impact of Government spending by assessing distributional dynamics. According to [15] a BIA considers who, in terms of socio-economic groups, receive what benefit from government spending initiatives. The tool is most commonly used to examine the impact of public expenditures and public expenditure reforms [16].

Traditionally, BIA is a technique that has been utilized to assess the distributional impact of government spending on healthcare, with the specific aim of identifying the different socio-economic groups that benefit from subsidies. The BIA is largely conducted with a view to determine that government funds and services provided through such funding disproportionately benefit the lowest socio-economic groupings. Its main objective is therefore to assess whether government spending is pro-poor [15].

The BIA was pioneered by two World Bank backed studies by Selowsky (1979) for Colombia and Meerman (1979) for Malaysia [17]. Most studies that have consequently used the BIA model of analysis have largely centered on the health and education sectors [18,19,20,21,22] and have been beneficial in proving that most government subsidy spending has been pro-rich [17].

It is such benefits that stem from the use of BIA that this study sought to harness with a view to applying the analysis tool on climate action spending. Specifically, the study seeks to prove that BIA can be a useful tool to apply on evaluating the socio-economic and distributional impact of CSA initiatives.

METHODOLOGICAL APPROACH TO STUDY

Study Setting

This experimental study was undertaken in Zambia, a Sub-Saharan African country located in the central-southern part of the Continent. Specifically, the study was undertaken in Chongwe

District of Lusaka Province in Zambia. Chongwe is largely a rural agriculture district. According to official statistics, Chongwe District has an estimated 36,319 households, of which 62 percent are agricultural households. The statistics further indicate that of the agricultural households in the District, over half of them are classified as rural households that largely engage in unproductive small-scale agriculture [23].

The Government of Zambia has been implementing a programme called the Farmer Input Support Programme (FISP) since 2002. The overall objective of the FISP has been to improve access to farming inputs for underprivileged small-scale farmers and thereby boost agricultural productivity and contribute to increased household food security and income. In addition, the FISP also aims to enhance the participation and competitiveness of the private sector in the supply and distribution of agricultural inputs. This entails improving the access to adequate agricultural inputs to targeted small-scale farmers in a timely and effective manner [24,25]. It is through the FISP programme that the Government has been supporting small-scale farmers in Chongwe, by providing them with critical inputs.

The study therefore sought to undertake an experimental application of the BIA socio-economic evaluation tool on the support provided by the Government of Zambia to small-scale farmers in Chongwe District. While not all of the FISP beneficiaries have been implementing CSA practices, and while it can be observed that not all the inputs currently being supplied through the FISP are CSA-supporting inputs, it was the considered view of the authors that undertaking the experimental BIA study on the FISP with a view for possible application on fully-fledged CSA initiatives was still beneficial. And that the results could be applicable for usage on fully-fledged CSA programmes.

Nature of Study

This was a quantitative study that followed the 'Applied Research' paradigm. [26] argue in favour of applied research by stating that such research is customised towards an investigation to obtain new knowledge directed towards a specific problem that needs to be solved. Hence, the 'Applied Research' paradigm was preferred for this experimental study as it was tailored to address the specific issue of assessing socio-economic impacts and distributional dynamics of CSA initiatives.

Sampling Technique and Data Collection

Random probability sampling was utilised for the purpose of the BIA. To effectively undertake the study, multi-stage random sampling was used with the aim of reducing the margin of error and increasing results confidence levels. Since Chongwe district has an estimated 22,500 farming households, this meant that these farming households are divided into about 188 Standard Enumeration Areas (SEA) – as determined by the Zambia Statistics Agency (ZamStats). Hence, 30 SEA's were randomly selected within 5 of Chongwe's 17 wards. The 5 randomly selected wards fell within the boundaries of Agriculture Farming Blocks which are delimited by the Ministry of Agriculture for the purpose of administering agricultural activities. This approach was utilised to fulfil a near 20 percent sample size of the SEA and 30 percent sample size of the wards spread across the Agriculture Farming Blocks. After sampling SEA's and wards, 120 questionnaires were administered for collection of data.

BIA Methodology

By making use of Stata and Microsoft Excel for computation and analysis of the data, the following steps were undertaken:

1. Given that at the time of data collection, the 2015 expenditure quintiles had not been published, the expenditure quintiles in the 2010 Living Conditions Monitoring (LCMS)

Survey Report for Chongwe district were used to compute current quintiles. The current expenditure quintiles were computed by adjusting the 2010 quintiles for inflation (and pricing) using the 2010 and 2015 Consumer Price Index (CPI) figures [27].

Formula used: i) Average 2015 CPI / Average 2010 CPI = I
ii) 2010 quintiles x I = 2015 quintiles

Table 1: Expenditure Quintiles, 2010 and Computed 2015 figures

Quintile	**2010 Range (ZMW)***	**Computed 2015 Range (ZMW)***
First Quintile	Below or equal to 63	Below or equal to 91
Second Quintile	63 <x≤ 93	91 <x≤ 134
Third Quintile	93 <x≤ 140	134 <x≤ 202
Fourth Quintile	140 <x≤228	202 <x≤ 329
Fifth Quintile	Above 228	Above 329

* **ZMW**=Zambian Kwacha, the official currency of Zambia

It must be noted that while the expenditure quintiles for inflation and pricing were adjusted, the structure/groupings remained the same. Hence the assumption was that the quintile structure had remained consistent from 2010 to 2015 for the purpose of this study.

2. The per capita monthly expenditure for each household captured in the study was computed by dividing the total household monthly expenditure by the number of household members.

3. The data was then clustered into expenditure quintiles using the computed per capita monthly expenditure. The beneficiaries were allocated into the quintiles where they fell based on the social status (per capita expenditure).

4. After establishing the total number of households in each quintile benefit of the total expenditures, the average benefit derived by the number of households in each expenditure group was multiplied. This process assumed that the costs of a service delivery did not vary with income or consumption level, or any other factor. A BIA was therefore conducted by expenditure, sex of household head, age of household head and level of education of household head.

BIA formula:- Utilisation X Net Unit Cost

It is important to note that the unit of analysis in a household survey can either be an individual or household and the welfare measure can either be income or consumption/expenditure [28]. In view of this, the unit of analysis used in this study was a household and the welfare measure was per capita expenditure.

The purpose of undertaking the BIA in this study was to establish to which particular group benefits accrue and if these benefits are equitably and equally distributed. It must be noted however that a BIA has limitations since it does not take behaviour into account. For example, the likely change in demand from households that would result from policy changes.

Variables

The analysis made use of the following variables:

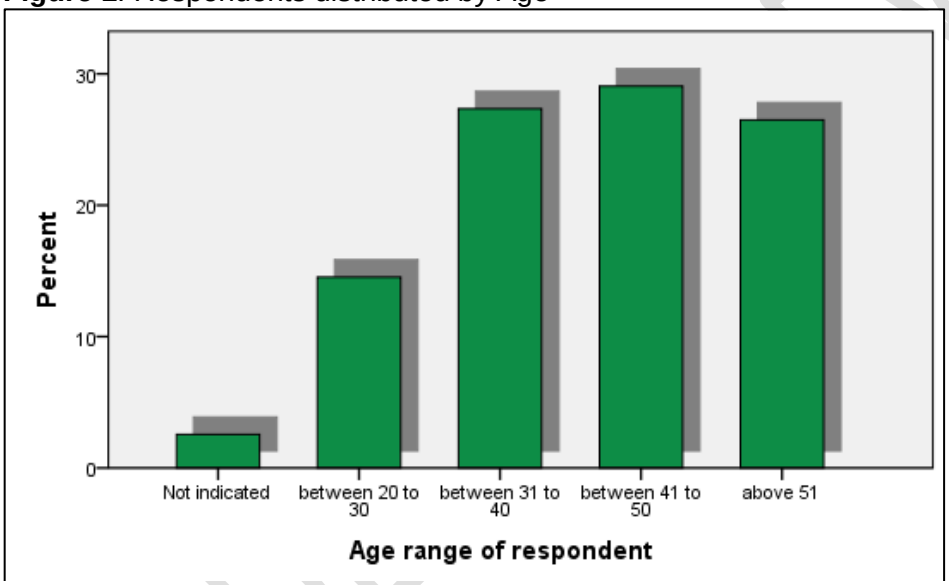
Dependent	Independent
Distribution (Benefit)	Per capita expenditure (household expenditure)
	Gender
	Level of education
	Age

RESULTS

Respondent Characteristics

One hundred and twenty (120) questionnaires were administered to randomly selected farmers with the aim of soliciting responses to satisfy the BIA objective of the study. Of the administered questionnaires, 117 were received and duly completed, indicating a 97.5 percent response rate. All farmers targeted lived in rural Chongwe, with 61.5 percent being male while 35 percent were female, and 3.4 percent had not indicated gender. With regard to age, 29.1 percent of the respondents were aged between 41-50 years while 27.4 percent were between 31-40 years. Only 17 percent of respondents fell in the category of 20-30 years.

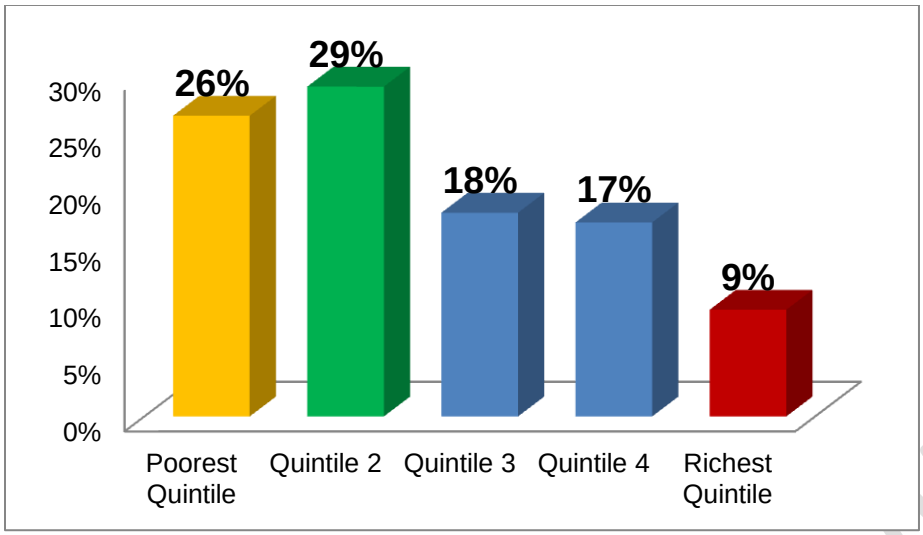
Figure 1: Respondents distributed by Age



Benefit Incidence by Expenditure Quintile

The results indicated that over half of the benefits from the agricultural programme were allocated to quintiles 1 (poorest quintile) and 2 in Chongwe district. The largest proportion of benefits however accrued to quintile 2, at 29 percent. Beneficiaries in quintiles 3 and 4 almost received the same ratio of benefits from the agriculture support initiative. The data further confirmed that a 9 percent fraction of beneficiaries fell in the richest quintile grouping

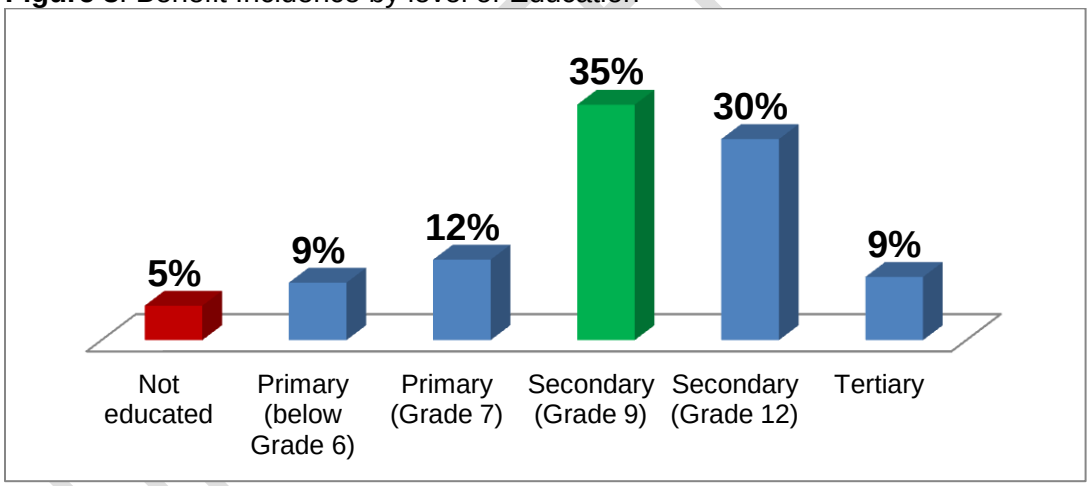
Figure 2: Benefit Incidence by Quintile of Expenditure



Benefit Incidence by Education Status

Data analysed revealed that over 60 percent of benefits from the agricultural programme were enjoyed by those beneficiaries that had at least attained secondary education. Non-educated farmers were the lowest benefiting grouping at 5 percent. Interestingly, the results show that those with the highest qualification among the respondents did not receive significant benefits from the programme. Data seems to suggest that the higher the education status, the more benefits accrued from the FISP, except for tertiary qualification holders.

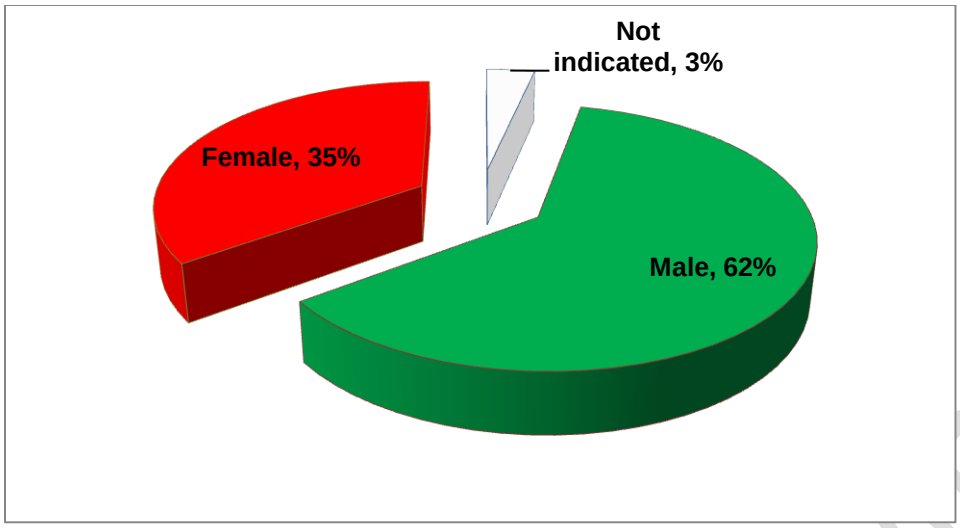
Figure 3: Benefit Incidence by level of Education



Benefit Incidence by Gender of Beneficiaries

The study revealed that while females benefited from the agricultural programme in Chongwe district, the largest benefits were received by male headed households at 62 percent.

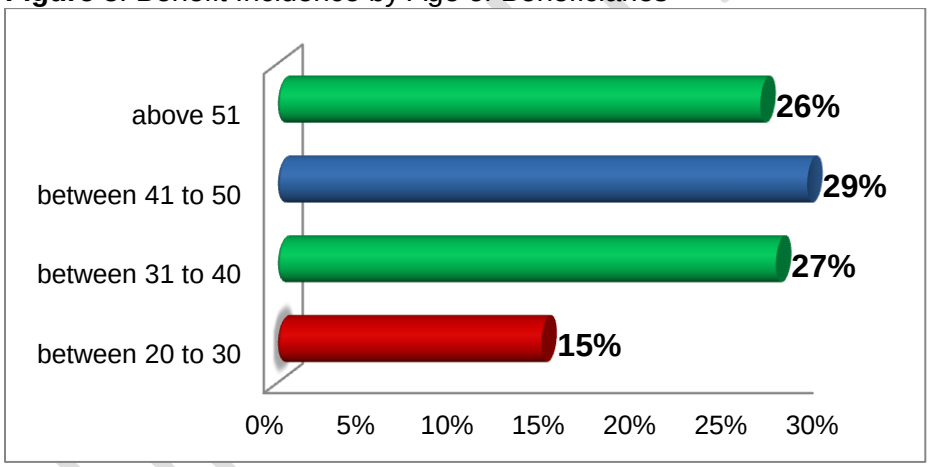
Figure 4: Benefit Incidence by Gender



Benefit Incidence by Age

This variable was analysed to establish the distribution of benefits of the agriculture programme in terms of the age group. With reference to the Living Conditions Monitoring Survey data, the Chongwe district age groups were divided and clustered into 4 categories; 20-30, 31-40, 41-50 and 50+. Results indicated that age groups 31-40 and 51+ received almost the same measure of benefits, while age group 20-30 had the lowest benefits (15 percent) from the subsidy programme. Respondents falling within the 41-50 bracket received the highest level of benefits from the FISP at 29 percent.

Figure 5: Benefit Incidence by Age of Beneficiaries



DISCUSSION

The BIA revealed that the largest benefits from the agriculture programme accrued to the two lower expenditure quintiles. However, given that the FISP's original objective was to be pro-poor, the programme slightly missed this objective due to the benefits significantly accruing more to the 2nd quintile grouping (29 percent), compared to the poorest 1st quintile grouping (26 percent). This clearly shows evidence of poor targeting. In addition, while the results showed a decline in benefits to the higher quintile, it was worrying to observe that the richest quintile grouping still received significant benefits (close to 10 percent) from the government programme. In the case of applying BIA to CSA programmes, such results could be similarly

used to understand how far climate action measures in agriculture are pro-poor. This is especially vital given the essential objectives of CSA and other adaptation and resilience building initiatives being aimed at targeting the most vulnerable [29,30,31,32]. It must be noted that aspects such as benefit incidence by level of education, can also be considered as proxy variables useful for measuring benefits of CSA initiatives that accrue to different socio-economic classes. An interesting observation from the results was that the tertiary education holders received the least benefits from the agricultural programme. This is probably due to such beneficiaries likely having other sources of income or livelihoods. Such dynamics are worthwhile factors for consideration when it comes to CSA assessments or during the conceptual and design stages for CSA initiatives [29,32].

The study results also highlighted the lack of a pro-gender aspect in the agriculture programme. This contributed to the skewed benefits that the BIA results revealed, with female headed households only having received a third of the benefits compared to male headed households at 62 percent. In terms of application to CSA initiatives, such gender skewed results would be particularly important given the strong gender dynamics that are advocated for and included within the framework for CSA implementation [33,34,29]. It has been observed that in order to achieve CSA in a socially sustainable manner, there is need to understand the roles, capabilities and responsibilities of women and men to ensure equal access to CSA benefits [35,36].

Lastly, the BIA results indicated that the youth grouping (aged 20-30) received the lowest benefits (15 percent) from the programme compared to the sum of the adult population benefits (82 percent for age range 31 and above). The highest benefits accrued to the middle aged (41-50) at 29 percent, followed by the young adult grouping (31-40) at 27 percent. Interestingly, data revealed that even beneficiaries aged above 51 received more benefits (26 percent) than the youth grouping. The age variable is a useful indicator to observe in relation to assessing the uptake of CSA practices or benefits, particularly with regard to the younger generation who must be the larger target group for such climate action initiatives. Targeting younger groupings through CSA initiatives is essential if climate action is to be sustainable [37,38,39,40,30].

CONCLUSION AND RECOMMENDATIONS

The study sought to undertake an experimental application of BIA usage on Zambia's agriculture programme, the FISP, with the intention of proving applicability on CSA initiatives. The results have proved that BIA assessment variables such as income/expenditure quintiles, education status, gender and age are also applicable to and essential in evaluating CSA initiatives. It is worth noting however, that despite proving applicability to CSA assessments, undertaking a BIA is highly technical and data intensive. Such an exercise relies heavily on the timely availability of complementary economic and financial data. In addition, it requires the possession of intermediate to advanced levels of technical know-how in order to administer the analysis.

As an off-shoot of this study, it may also be worthwhile to recommend the restructuring of agricultural programme interventions such as the FISP to either accommodate CSA dynamics or to model the entire intervention programme on the CSA framework and principles [41].

ACKNOWLEDGEMENTS

I would like to posthumously acknowledge the late Dr Crispin Mphuka, who was the former Head of the Economics Department at the University of Zambia and a former Economics Association of Zambia President. Dr Mphuka took time out of his very busy schedule to assist

with the technicalities of undertaking a Benefit Incidence Analysis (BIA) for this study. May his soul rest in peace.

REFERENCES

1. IPCC (2019). Climate Change and Land: An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Summary for Policy Makers.

2. IPCC (2021). Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson- Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

3. United Nations OCHA (2021) Thousands of people suffering the impact of flooding [Press release]. 6 August. Available from: <https://reliefweb.int/sites/reliefweb.int/files/resources/press_release_flood_impact_august_2021.pdf> [Accessed: 9 December 2021].

4. Papadimas, L. (2021). 'PM apologises as Greece counts costs of wildfire catastrophe'. Reuters News, 9 August 2021 [online]. Available from: <https://www.reuters.com/world/europe/greece-starts-count-cost-after-week-devastating-fires-2021-08-09/> [Accessed 9 August 2021]

5. BBC (2021). 'Dixie Fire: Firefighters tackle historic California wildfire'. BBC News, 9 August 2021 [online]. Available from: <https://www.bbc.com/news/world-us-canada-58141340> [Accessed 9 August 2021]

6. Bell, B. (2021). 'Greece wildfires spread, causing mass evacuations'. BBC News, 7 August 2021 [online]. Available from: < https://www.bbc.com/news/world-europe-58124129> [Accessed 9 August 2021]

7. Agence France-Presse in Moscow (2021). 'Smoke from Siberia wildfires reaches north pole in historic first'. The Guardian, 9 August 2021 [online]. Available from: <https://www.theguardian.com/world/2021/aug/09/smoke-siberia-wildfires-reaches-north-pole-historic-first> [Accessed 9 August 2021]

8. Otto, F. E. L. and Harrington, L. J. (2020). 'Guest post: Why Africa's heatwaves are a forgotten impact of climate change'. Carbon Brief, 13 July 2020 [online]. Available from: < https://www.carbonbrief.org/> [Accessed 27 July 2020]

9. Selormey, E. E. and Logan, C. (2019). 'African nations are among those most vulnerable to climate change. A new survey suggests they are also the least prepared'. The Washington Post, 23 September 2019 [online]. Available from: <https://www.washingtonpost.com/> [Accessed 27 July 2020]

10. United Nations (2019). 'Report of the Secretary-General on the 2019 Climate Action Summit and the Way Forward in 2020'. Climate Action Summit, New York, 21 – 23 September 2019. [online]. Available from: <https://www.un.org/en/climatechange/assets/pdf/cas_report_11_dec.pdf> [Accessed 27 July 2020]

11. African Union (2014). African Strategy on Climate Change. AMCEN-15-REF-11

12. Kangogo, D., Dentoni, D., and Bijman, J. (2021). 'Adoption of climate-smart agriculture among smallholder farmers: Does farmer entrepreneurship matter?' *Land Use Policy*, 109 (2021), https://doi.org/10.1016/j.landusepol.2021.105666

13. Zougmoré, R., Partey, S., Ouédraogo, M., Omitoyin, B., Thomas, T., Ayantunde, A., Ericksen, P., Said M., and Jalloh, A. (2016). 'Toward climate-smart agriculture in West Africa: a review of climate change impacts, adaptation strategies and policy developments for the livestock, fishery and crop production sectors', *Agriculture & Food Security*, (2016) 5:26 DOI 10.1186/s40066-016-0075-3

14. IPCC (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability – Summary for Policy Makers. IPCC WGII Sixth Assessment Report

15. McIntyre, D and Ataguba, J. E. (2011). How to do (or not to do) a benefit incidence analysis. Health Policy and Planning Journal [online] 26 (2), pp. 174-182. Available from: < http:// https://www.jstor.org/stable/45090718/> [Accessed 10 March 2022]

16. Demery (2003). Toolkit for Evaluating the Poverty and Distributional Impact of Economic Policies.

17. Mitra, A. (2015). 'Public Spending in Higher Education in India: A Benefit Incidence Analysis', *Higher Education for the Future,* 2(1), pp71–91, DOI: 10.1177/2347631114558191

18. Wokadala, J. and Barungi, M. (2015) 'Benefit Incidence Analysis of Government Spending on Public-Private Partnership Schooling under Universal Secondary Education Policy in Uganda', *Africa Education Review*, 12(3), pp381-397, DOI: 10.1080/18146627.2015.1110900

19. Bowser, D., Patenaude, B., Bhawalkar, M., Duran, D. and Berman, P. (2019). 'Benefit incidence analysis in public health facilities in India: utilization and benefits at the national and state levels', *International Journal for Equity in Health*, (2019) 18(13) https://doi.org/10.1186/s12939-019-0921-6

20. Sambodo, N. P., Doorslaer, E. V., Pradhan, M. and Sparrow, R. (2021). 'Does geographic spending variation exacerbate healthcare benefit inequality? A benefit incidence analysis for Indonesia', *Health Policy and Planning*, 36, 2021, pp1129–1139, doi: 10.1093/heapol/czab015

21. Khan, J. A. M., Ahmed, S., MacLennan, M., Sarker, A. R., Sultana, M. and Rahman, H. (2017). 'Benefit incidence analysis of healthcare in Bangladesh – equity matters for universal health coverage', *Health Policy and Planning*, 32, 2017, pp359–365 doi: 10.1093/heapol/czw131

22. Hailu, A. Gebreyes, R. and Norheim, O. F. (2021). 'Equity in public health spending in Ethiopia: a benefit incidence analysis', *Health Policy and Planning*, 36, 2021, ppi4–i13 DOI: https://doi.org/10.1093/heapol/czab060

23. Central Statistical Office (2012). Zambia 2010 Census of Population And Housing: Population Summary Report. Lusaka: Living Conditions Monitoring Branch - CSO

24. CSPR (2011). An Assessment of the Implementation and Viability of the Farmer Input Support Programme in Zambia: With Case Studies of Mazabuka and Monze Districts

25. Sianjase, A. (2013). Impacts of Farmer Input Support Programme on beneficiaries: The case of Gwembe District. MA. University of Zambia.

26. Zikmund W.G., Babin B.J., Griffin M and Carr J.C. (2012). Business Research Methods, 9th Edition, Cengage South western.

27. Central Statistical Office (2015). The Monthly. Vol 152 [online]. [Accessed 27 April 2016] Available from: <www.zamstats.gov.zm>

28. Mphuka, C. (2010). Benefit Incidence Analysis of the Rural Water Supply in Chongwe District

29. Mwongera, C., Shikuku, K. M., Twyman, J., Läderach, P., Ampaire, E., Asten, P. V., Twomlow, S. and Winowiecki, L. A. (2017). 'Climate smart agriculture rapid appraisal (CSA-RA): A tool for prioritizing context-specific climate smart agriculture technologies', *Agricultural Systems* 151 (2017), pp192–203, http://dx.doi.org/10.1016/j.agsy.2016.05.009

30. Everest. B. (2021). 'Farmers' adaptation to climate-smart agriculture (CSA) in NW Turkey', *Environment, Development and Sustainability* (2021) 23 pp4215–4235 https://doi.org/10.1007/s10668-020-00767-1

31. Mulenga, B. P. and Kabisa, M. (2021). 'Building Back Better: Vulnerability and Climate Resilience in Rural Zambia', *Indaba Agricultural Policy Research Institute (IAPRI)*, [online]. Available from: <https://www.iapri.org.zm>

32. Kanyamuna, V. and Zulu, K. (2022). 'Participatory Research Methods: Importance and Limitations of Participation in Development Practice.' *World Journal of Social Sciences and Humanities*, 8 (1) pp. 9-13. DOI: 10.12691/wjssh-8-1-2.

33. Mutenje, M. J., Farnworth, C. R., Stirling, C., Thierfelder, C., Mupangwa, W. and Nyagumboa, I. (2019). 'A cost-benefit analysis of climate-smart agriculture options in Southern Africa: Balancing gender and technology', *Ecological Economics* 163 (2019), pp126–137, https://doi.org/10.1016/j.ecolecon.2019.05.013

34. Food and Agriculture Organization of the United Nations (2021). Climate Smart Agriculture Case Studies 2021: Projects from around the World [online]. Available from: <https://www.fao.org/3/cb5359en/cb5359en.pdf>

35. Food and Agriculture Organization of the United Nations and The World Bank (2017). How to Integrate Gender Issues in Climate-Smart Agriculture Projects [online]. Available from: <https://www.fao.org/3/i6097e/I6097E.pdf>

36. World Bank Group, FAO and IFAD (2015). Gender in Climate-Smart Agriculture: Module 18 for the Gender in Agriculture Sourcebook [online]. Available from: <https://openknowledge.worldbank.org>

37. Pandey, I. (2021). SURVIVAL FOR THE FUTURE: INTERVIEW WITH CLIMATE ACTIVIST LICYPRIYA KANGUJAM. Harvard International Review, 42(1), pp82-87. Retrieved from https://login.ezproxy.bolton.ac.uk/login?url=https://www.proquest.com/scholarly-journals/survival-future-interview-with-climate-activist/docview/2581551207/se-2?accountid=9653

38. UNICEF (2021). 'Making Climate and Environment Policies for & with Children and Young People', *Climate & Environment Discussion Paper* November 2021[online]. Available from: <https://www.unicef.org/media/109701/file/Making-Climate-Policies-for-and-with-Children-and-Young-People.pdf>

39. Rahmaty, M. and Roesch, J. L. (2021). 'Youth Participation in Global Governance for Sustaining Peace and Climate Action', *International Peace Institute* [online]. Available from: <https://www.ipinst.org/wp-content/uploads/2021/04/IPI-E-RPT-Youth-Participation-3.pdf>

40. Chan, S., Singh, S., Chang, K., Tailor, P., Joshi, M., Mohan, M., and Amponsem, J. (2021) Young People and Drivers and Barriers to Climate Adaptation Action. Report. Global Center on Adaptation (GCA)/Centre for Environment Education (CEE)/Kai Analytics/Foundation for Environmental Education (FEE), Rotterdam/Ahmedabad/Vancouver/Copenhagen

41. PMRC (2020). 'Climate Smart Agriculture Strategies for Zambia – Analysis of Policies and Programmes'. Lusaka: Policy Monitoring and Research Centre [online]. Available from: <https://pmrczambia.com/wp-content/uploads/2020/04/Climate-Smart-Agriculture-Strategies-for-Zambia-Analysis-of-Policies-and-Programmes.pdf>