Climate risk perception and energy use behaviour among young people: experimental evidence from Ghana and Nigeria

Imhotep Paul Alagidede
Principal Investigator (PI) - University of the Witwatersrand, Business School, 2 St. David's Place, P O Box 98, Johannesburg, 2193, South Africa.
Email: imhotep.alagidede@wits.ac.za and alagidede@gmail.com

and

Pyemo Nathan Afego
Co-Investigator (CI) University of Pretoria, Centre for the Advancement of Scholarship (Human Economy Programme), Private Bag X20, Hatfield, 0028, South Africa.
Email: u19408723@tuks.co.za and pyemo.afego@yahoo.com

Abstract

Ghana and Nigeria account for 61 percent and 68 percent of West Africa's population and GDP respectively, and over 60 percent of the population in both countries is below the age of 25 years. There are several reasons why the young generation could become an integral part of these countries' climate-resilient development agenda. First, young people are powerful agents for change and play a vital role in achieving the Sustainable Development Goals (SDGs), especially SDG 13 (Climate Action). Second, compared to older generations, young people are more willing to adopt new practices or technologies: Their enthusiasm for innovative technologies and sustainable practices have real potential not only for making sure that their communities are resilient to the impacts of climate change, but also for driving sustainable economic development. Finally, they are more likely to challenge certain norms that may be hindering sustainable socio-economic progress. Yet, as the impact of climate change intensifies over time, it is the young people of today who will face the worst effects if current practices do not change. These effects include those resulting directly from the combustion of fossil fuels, which can cause adverse effects on human health as well as on economic assets of sustainable livelihood. Existing research on climate perceptions in Africa involve general, not youth, audiences. In this study we seek to provide evidence of how young people in Ghana and Nigeria think about climate change, as well as identify the determinants of their energy consumption behaviours. To do so, we adopt a choice experiment to exploit variations in their intention to engage in energy-efficient behaviours with a view to identifying barriers, and potential policy responses to support citizen action on climate change mitigation.

Keywords: Climate Risk; Energy Consumption; Young Adults; Experiments; Ghana; Nigeria.

JEL Classification: Q54; Q4.

1. Background and problem statement

The question of how young people think about climate change is drawing increased attention from stakeholders who seek to understand its consequences for policy support, particularly in the developing world, such as Africa, where they constitute the majority of the population (Akrofi et al. 2019). The relevance of young adults or millennials as key actors in the fight against climate change is evidenced by the fact that they constitute the largest group of actors whose decisions are relevant to the future of the environment (Giachino et al. 2020).[1] Furthermore, compared to older generations, African millennials have attained higher levels of education, which, for their generation more than others, is tied to higher future earnings and well-being. Important segments of the young generation, therefore, are those who chose to study at university (Buendía-Martínez et al. 2020).

There are several reasons why particular attention needs to be paid to Ghana and Nigeria. Firstly, the two countries are located in West Africa – a region that will be among the most highly affected by climate change in the future (De Longueville et al. 2020). Secondly, with an estimated 64 percent of people under the age of 25 (UNFPA, 2018), the two countries are home to some of the world's largest and fastest growing youthful populations. In addition, both countries have enjoyed such astonishing growth in the middle class (Handley, 2015), which in turn is likely to create a surge in demand for energy-using assets. However, given inadequate and unreliable grid-supplied electricity across large swathes of the countries, increases in energy demand will most likely exacerbate dependence on fossil fuel-powered electric generators (Marais et al. 2014). This, therefore, raises concerns about increases in CO_2 emissions from direct energy use which can cause adverse effects on human health as well as on economic assets of sustainable livelihood.

Energy use and adoption of energy-efficient technologies are among the most important practical concerns that underlie climate change mitigation and adaptation (Stern et al. 1992). However, despite evidence linking climate change to energy use behaviours (Chen, 2016), much remains unknown in the two countries about: (a) the behavioural and structural processes that govern individuals' energy consumption preferences (b) what determines their relative importance (c) how they affect each other, and (d) how the driving forces in these countries (e.g., the local political economy, infrastructure, and culture) interact to facilitate or inhibit *intended* and *actual* adoption of mitigation and adaptation behaviours by individuals. This is of significance, because failure to mitigate and adapt to climate change could severely harm the economic and social wellbeing of large parts of the populations of these countries in the years to come.[2]

Furthermore, human responses, particularly mitigation responses, require understanding of the activities that drive climate change at the level at which the responses will be made (Stern et al. 1992). Young adults, as members of the same generation, share not only age but also the collective environment to which they are exposed. In this way, they assume an important role of

[1] Millennials are the demographic cohort of persons reaching young adulthood in the early 21st century.
[2] See Stern et al. (1992).

transformation as social and political actors (Buendía-Martínez et al. 2020). Thus research is needed on the conditions controlling the relationships young people in the two countries have with their environments and how they combine multiple influences (e.g., traditional beliefs, mass media accounts, and experiences with recent weather or air pollution events) to form their judgments about the extent and seriousness of climate change and other environmental problems.

2. Research Objectives

The objectives of this study are two-fold: the first is to understand how young people in West Africa think about climate change, and the second is to identify the determinants of their energy consumption behaviours, including the factors that may limit their intention to behave in the most energy-efficient way. The analysis will focus on two countries, Ghana and Nigeria, which together account for 61 percent and 68 percent of West Africa's total population and GDP, respectively.[3]

To achieve these objectives, a choice experiment will be conducted with students at the University of Ghana and the University of Nigeria, respectively, in order to derive actionable insights which are generalizable along the following questions:

(i) What demographic factors (e.g., gender, marital status, geographic location etc.), and psycho-social, cultural and structural factors (e.g., cognitive biases, desire, social norms and values, income, personality, beliefs and knowledge etc.), influence individuals' intentions to engage in sustainable energy use behaviours?

(ii) What is the level of influences of the above-mentioned factors on the valuations of their willingness to pay for renewable energy options?

(iii) How do their climate change perceptions compare with actual trends and shifts in frequency and intensity of extreme climatic conditions around their environment (e.g., heat waves, droughts, insect outbreaks, and floods)?

Student samples represent a feasible population to study why young people may or may not consider climate change a serious problem (Wang et al. 2018). Thus the University of Ghana and University of Nigeria can be considered a representative student sample base, as the two are among the biggest universities not only in their respective countries but in the West Africa region as a whole. Furthermore, the two universities enjoy a solid national and international reputation; they include a wide range of departments in different research fields, and attract students from all corners of their respective countries and beyond.

[3] See Hoppe and Aidoo (2012).

3. Conceptual framework

The Theory of Planned Behaviour (TPB, Ajzen, 1991) is commonly used to explain a wide range of intentions and behaviours in various fields of research, including those related to climate change mitigation (e.g., Luo and Zhao, 2019). The TPB argues that an intention is formed by weighing attitudes (positive or negative evaluation of a behaviour), subjective norms (the social pressure to perform a particular behaviour), and perceived behavioural control (the distance felt to a problem). Furthermore, the more substantial the intention, the more likely the behaviour is to be performed (Ajzen, 1991).

However, the driving forces of behaviours that contribute to climate change can also be structural, i.e. beyond an individual's reasonable control (Gifford et al. 2018). For example, how can one install solar panels as a poor person? In addition, some cultural beliefs (e.g., the belief that solutions to problems lie outside of human control) may influence many aspects of a person's life in ways that can act as strong barriers to environmental behaviour change. Furthermore, the perception of climate risks and one's own mitigative capacity are affected by cognitive biases, such as the optimism bias, whereby an individual perceives their personal risk as lower than average (Gifford et al. 2018), which in turn limits their motivation to take mitigative action.

Also, the status of Ghana and Nigeria as developing countries implies that historic responsibility for causing climate change – and consequently the motivation for the citizens to take mitigative action – is considerably low (Davis-Reddy and Vincent, 2017). Another factor, at least in the case of Nigeria, is that the level of fossil fuel subsidies is relatively high. This means that the price of fossil-fuel powered electricity is low, which further implies that the environmental costs of this electricity option are not internalized. Thus, a rational consumer has little incentive to conserve energy or to shift toward renewable energy options.

To account for these contextual nuances, we adopt the Theory of Behavioural Choice (TBC) of Gifford et al. (2018) as the conceptual framework for addressing our research objectives. The TBC explores how *structural barriers* (e.g., limited financial capacity or physical infrastructure to actually perform the desired behaviour), *perceived barriers* (e.g., limited cognition or belief that the problem is elsewhere etc.) as well as social norms and values may influence individuals' *intended* and *actual* adoption of climate mitigation behaviours. These are further described in Figure 1.

We are unaware of any application of the TBC framework in West Africa in the context of the energy consumption preferences of individuals and using experimental methods. Thus, the main hypothesis proposed in this study is that the more barrier dimensions that individual's experience, the less likely they will report intentions to engage in mitigative energy behaviours.

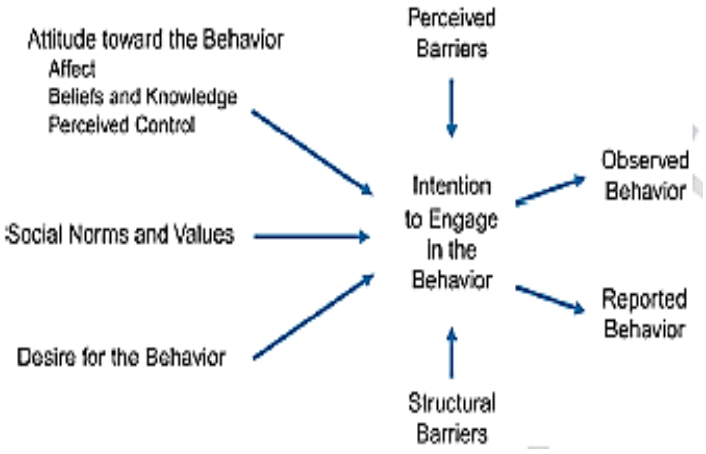

Fig 1. Conceptual framework to explain individuals' intention to engage in climate change mitigation behaviour, adapted from Gifford et al. (2018)

4. Methodology and Data

Experimental methodologies are proving useful in providing insight into the underlying factors that influence perceptions and (region-specific types and patterns of) behaviours that slow down or accelerate human contributions to climate change (Gifford and Chen, 2017). Specifically, they provide the means to identify the *actual* determinants of energy consumption behaviours of individuals, many of which are psychological in origin (Swim et al. 2011).

Student samples represent a viable population to study why young adults may or may not consider climate change a serious problem. Thus, a choice experiment survey[4] will be employed across a general sample of 220 young adults who are enrolled in "non-environmental" fields of study at the University of Ghana and University of Nigeria, to ascertain their perceptions of climate change risks and the factors that inhibit or facilitate their intention to engage in mitigative energy behaviours. The two universities are among the oldest and largest institutions of higher learning in West Africa, and are located in climatic zones that have shown vulnerability to extreme climatic events.[5] To lessen the probability of confounding the field of study (or other individual student characteristics) with the university from which data is collected, we will limit the sample to "non-environmental" majors, avoiding majors such as in "environmental studies" or "environmental science" which are likely to be disproportionately concerned about climate change.

[4] In a choice experiment, participants are given a hypothetical setting and asked to choose their preferred alternative among several alternatives – where each alternative is described by a number of attributes or characteristics that represent samples of choice scenarios drawn from the universe of all possible choice scenarios (Bennett and Blamey, 2001).

[5] See Adesina and Odekumle (2011); Agyemang-Bonsu et al. (2008).

The instrument for the experiment will: (a) measure individuals' attitudes, norms, values, beliefs and knowledge regarding climate change risks, electricity use, the environment, and climate variability and; (b) examine the psychological and structural barriers that may limit their intentions to act in climate-positive ways. Specifically, the instrument will be designed based on a set of measures and attributes that are partly adapted from the secondary literature (e.g., Gifford and Chen, 2017). Participants will be asked to choose between alternative scenarios containing different levels of the same scales, measures, items and attributes.[6] However, to ensure that the study is tailored to the project's local contexts, these will be augmented with data obtained from informal conversations with local student networks at the two universities as well as with government officials.

5. Contributions of the study

This study will make a number of contributions. The first contribution is reflected in the fact that Ghana and Nigeria are interested in pursuing low-carbon growth strategies, and their Intended Nationally Determined Contributions (INDCs) and economic development plans identify energy as a key sector. For example, the government of Nigeria recently announced plans to have 30 percent of its electricity supply from renewables by 2030.[7] It further noted that to meet its conditional and unconditional targets, the country has to reduce dependency on fossil-fuel-powered electric generators and improve the effectiveness of its energy efficiency policies (ICF, 2016). Thus understanding the factors that affect pro-environmental energy use behaviours among the population – particularly in countries that are only starting to consider this as a policy issue and where there is limited knowledge about the factors that influence the environmental considerations of citizens – can form an important input for the design of successful policies to influence the behaviours of citizens in ways that align with environmental sustainability objectives.

Secondly, understanding the demographic characteristics associated with specific energy use behaviours in these countries can provide useful background information for the efficient targeting and prioritization of nudge interventions to reduce climate-altering carbon emissions. In addition, establishing the psycho-social and structural barriers to pro-environmental behaviours can also contribute to supporting citizen action on climate change mitigation.

---

[6] Specifically, the following measures or attributes will be included in the choice experiment: (i) perceived awareness about the adverse consequences of climate change for oneself, others and the environment; (ii) perceived severity of one's own concerns about the consequences; (iii) perceived judgments of one's own vulnerability to climate risks; (iv) the belief that climate change is caused by human action; (v) beliefs and experiences with climate variability and changes in weather conditions; (vi) intention and willingness to adopt behaviour to reduce the environmental impact of their electricity use pattern; (vii) share of renewables in the electricity they purchase and consume; (viii) cost of electricity; (ix) reliability of electricity service (measured as the frequency of outages and their average duration); (x) habitual purchase decisions that could reduce one's personal CO2 emissions from direct electricity use; (xi) perceived inability to actually change anything about a global problem such as climate change; (xii) perceived psychological and structural barriers that limit one's capacity to act; and (xiii) how much one would be willing to pay for a renewable energy option.

[7] See *MSN Africa* (2021): "Nigeria targeting 30% electricity from renewables by 2030," retrieved from https://www.msn.com/en-xl/africa/nigeria/nigeria-targeting-30percent-electricity-from-renewables-by-2030-%E2%80%93-osinbajo/ar-BB1dCpN9 (accessed 13th February, 2021).

Thirdly, the increasing penetration of renewable energy solutions across Africa suggests a need for greater learning about how behavioural nudges may help encourage energy use behaviours that align with environmental sustainability goals. A systematic analysis of behavioural intention to engage in carbon-reducing energy behaviours in the group of countries selected for this study, therefore, will fill an important knowledge gap in the existing literature on nudging and pro-environmental behaviour which until now has focused on developed regions like Western Europe, Japan and the U.S.

Finally, climate change is a threat for all countries and means the applicability of this research has the potential to extend beyond the two countries of study. In addition, the idea of using incentives to nudge pro-environmental behaviour is gaining traction around the developing world. Thus lessons from this study will be of great value in provoking a deeper discussion of policies and actions that could help strengthen mitigation and adaptation behaviours in Africa and beyond.

References

Adesina, F.A. and Odekunle, T.O., 2011, July. Climate change and adaptation in Nigeria: Some background to Nigeria's response–III. In *International Conference on Environmental and Agriculture Engineering* (Vol. 15, No. 2, pp. 146-154).

Agyemang-Bonsu et al. 2008. Ghana climate change impacts, vulnerability and adaptation assessments. Environmental Protection Agency, Accra, Ghana

Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), pp.179-211.

Akrofi, M.M., Antwi, S.H. and Gumbo, J.R., 2019. Students in climate action: a study of some influential factors and implications of knowledge gaps in Africa. *Environments*, *6*(2), pp. 1-15.

Bennett, J. and Blamey, R. eds., 2001. *The choice modelling approach to environmental valuation*. Edward Elgar Publishing.

Buendía-Martínez, I., Hidalgo-López, C. and Brat, E., 2020. Are Cooperatives an Employment Option? A Job Preference Study of Millennial University Students. *Sustainability*, *12*(17), p.7210.

Chen, M.F., 2016. Extending the theory of planned behavior model to explain people's energy savings and carbon reduction behavioral intentions to mitigate climate change in Taiwan–moral obligation matters. *Journal of Cleaner Production*, *112*, pp.1746-1753.

Davis-Reddy, C.L. and Vincent, K., 2017. Climate risk and vulnerability: A handbook for Southern Africa. *Introduction to International Disaster Management*. https://www.researchgate.net/publication/268497958_Climate_Risk_and_Vulnerability_A_Handbook_for_Southern_Africa

De Longueville, F., Ozer, P., Gemenne, F., Henry, S., Mertz, O. and Nielsen, J.Ø., 2020. Comparing climate change perceptions and meteorological data in rural West Africa to improve the understanding of household decisions to migrate. *Climatic Change*, *160*(1), pp.123-141.

Giachino, C., Truant, E. and Bonadonna, A., 2020. Mountain tourism and motivation: Millennial students' seasonal preferences. *Current Issues in Tourism*, *23*(19), pp.2461-2475.

Gifford, R.D. and Chen, A.K., 2017. Why aren't we taking action? Psychological barriers to climate-positive food choices. *Climatic Change*, *140*(2), pp.165-178.

Gifford, R., Lacroix, K. and Chen, A., 2018. Understanding responses to climate change: Psychological barriers to mitigation and a new theory of behavioral choice. In *Psychology and climate change* (pp. 161-183). Academic Press.

Handley, A., 2015. Varieties of Capitalists? The Middle–Class, Private Sector and Economic Outcomes in Africa. *Journal of International Development*, *27*(5), pp.609-627.

Hoppe, M. and Aidoo, F., 2012. *Removing barriers to trade between Ghana and Nigeria: strengthening regional integration by implementing ECOWAS commitments* (No. 67999, pp. 1-11). The World Bank.

ICF International, 2016. Analysis of Intended Nationally Determined Contributions (INDCs). New Climate Institute. https://www.climatelinks.org/sites/default/files/asset/document/INDC%20White%20Paper%20-%20June%202016_public_RALI.pdf

Luo, Y. and Zhao, J., 2019. Motivated attention in climate change perception and action. *Frontiers in Psychology*, *10*, p.1541.

Marais, E.A., Jacob, D.J., Wecht, K., Lerot, C., Zhang, L., Yu, K., Kurosu, T.P., Chance, K. and Sauvage, B., 2014. Anthropogenic emissions in Nigeria and implications for atmospheric ozone pollution: A view from space. *Atmospheric Environment*, *99*, pp.32-40.

Stern, P.C., Young, O.R. and Druckman, D.E., 1992. *Global environmental change: Understanding the human dimensions*. National Academy Press. https://www.nap.edu/catalog/1792/global-environmental-change-understanding-the-human-dimensions

Swim, J.K., Stern, P.C., Doherty, T.J., Clayton, S., Reser, J.P., Weber, E.U., Gifford, R. and Howard, G.S., 2011. Psychology's contributions to understanding and addressing global climate change. *American Psychologist*, *66*(4), p.241-250.

UNFPA, 2018. Adolescents and Youth Report: West and Central Africa. Retrieved from https://wcaro.unfpa.org/sites/default/files/pub-pdf/UNFPA-WCARO-YOUTH-EN-WEB.pdf

Wang, S., Leviston, Z., Hurlstone, M., Lawrence, C. and Walker, I., 2018. Emotions predict policy support: Why it matters how people feel about climate change. *Global Environmental Change*, *50*, pp.25-40.