

UNIVERSITY OF MALAWI

DEPARTMENT OF ECONOMICS



Our Research in 2024





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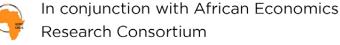
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Malawi's Secondary School Education System and Intergenerational Poverty.

Chiwaula, L. S., & Winiko, S. M.



Education systems can reduce inter-generational poverty transmission if they promote equitable access to education for all children. This chapter demonstrates that the selection of learners into poor-quality Community Day Secondary Schools (CDSS) in Malawi is influenced by household poverty status.



Children from poor households have a 46% higher probability of being at a CDSS than children from non-poor households.



Household poverty status is not an important factor at initial selection into a CDSS, but poverty retains poor children at a CDSS, while non-poor children are taken out.

CONCLUSION

We conclude that poverty selects children from poor families into poor-quality secondary thereby schools in Malawi, promoting intergenerational poverty transmission through low human capital-building. This situation can be reversed by providing bursaries to students from low income families who get selected to conventional government secondary schools, and improving quality of public primary schools and CDSSs through provision of adequate teaching and learning materials, including teachers.

A Ricardian analysis of the economic impacts of climate change on agricultural production in the low-income agrarian economy

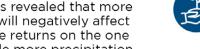
Mulagha-Maganga, A., Chiwaula, L. S., Kambewa, P., & Ngaiwi, M. E.

ABSTRACT

Quantifying the economic impacts of extreme climate scenarios on agriculture at a country level is important, informing the formulation of tailored adaptation policies and sustainable livelihoods. This study examined the current and potential economic impacts of climate change on Malawi's agriculture using Ricardian analysis based on a four-year World Bank's Living Standards Measurement Survey (LSMS) panel data from 1,246 farming households. The marginal impact analysis was conducted for temperature and rainfall. The study then predicted the impact of climate scenarios on net revenue up to the year 2099.



The results revealed that more warming will negatively affect agriculture returns on the one hand, while more precipitation will generate gains on the other hand.





An ensemble of Global Circulation Models' simulation affirms that impacts from global warming will be more important than those from precipitation change.



The impacts are non-neutral to production efficiency with technically efficient farmers having moderate impacts in magnitude relative to inefficient farmers.



With strategic climate adaptation choices results show the potential to abate some of the damages and enhance positive gains from future climate change.

Mtocha, C. A., Chirwa, G. C., & Mazalale, J.



For many years, the international development community has placed a high priority on reducing poverty as a key policy objective. Nevertheless, in Malawi, multidimensional poverty has remained alarmingly high exceeding 50% for the past decades. While previous research on poverty in Malawi has focused on income-based measures, little is known about the changes in multidimensional poverty and their underlying factors. This study employs the Alkire-Foster method to calculate the Multidimensional Poverty Index (M-MPI) for Malawi from 2010 to 2019, utilizing nationally representative data from the Integrated Household Panel Survey and the recently developed Malawi-specific M-MPI. The study utilizes unconditional quantile regression model and the Oaxaca-Blinder decomposition to understand the driver sand dynamics of multidimensional poverty in Malawi.

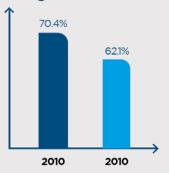


The findings indicate that multidimensional poverty and its incidence have decreased over the study period moving from 70.4% in 2010 to 62.1% in 2019, with household income, the literacy and education level of the household head being among the main factors influencing this change.



However, household size, experience of shocks, social protection programs, rural residency, and marriage were identified as factors leading to MPI increase overtime. Access to credit had an ambiguous impact on poverty changes.

Multidimensional Poverty Changes in Malawi.



✓ RELEVANCE

The study's relevance extends beyond the borders of Malawi, offering pertinent insights for policymakers in other developing nations. The study findings furnish a valuable foundation for the formulation of targeted, cost-efficient interventions aimed at poverty alleviation and the optimization of economic growth trajectories across diverse global context.

Examination of the Relationship between Budget Deficit and Economic Growth in Malawi.

Nguluwe, B., & Dunga, H. M



The research delved into the intricate relationship between budget deficits and economic growth in Malawi, using extensive annual time series data from 1980 to 2018. Employing advanced approach and cointegration analysis, the study aimed to discern the nuanced long-term relationship between these variables. Additionally, the Toda-Yamamoto Granger causality test was deployed to investigate the causal links between budget deficits and economic growth.



The findings revealed a consistent positive influence of budget deficits on economic growth, affirming the Keynesian theory, which posits that budget deficits stimulate the economy

Complex and Multifaceted Sociodemographic Depression Correlates in Malawi During COVID-19. In COVID-19 and Psychological Distress in Africa

Chikatentha, D., Jamu, E. S., & Chijere-Chirwa, G.



Mental Health Disorders are many ranging from anxiety, depression, all the way to phobias. The aftereffects of the COVID-19 pandemic have been very detrimental to citizens' social and economic welfare at both national and household level. Socially, the containment measures and restrictions have directly impacted access to social services such as child healthcare and education, religion and culture, among others. Economically, the pandemic has slowed down the global economy and, in turn, the national economy and household income through loss of jobs and businesses. Previous studies focused on Depression in Malawi but not in the context of the COVID-19 pandemic. This paper presents the first analysis on socioeconomic factors associated with mental health during COVID-19 period.: The study assessed mental health (proxied by depression) during COVID-19 in Malawi. The study used the sixth wave of the 2020 – 2022 High Frequency Phone Survey on COVID-19 produced by the Malawi National Statistical Office (NSO). The survey has 1,584 respondents. In terms of analysis, we conducted univariate, bivariate and regression analysis.



This study suggests that males (19%) were more likely to be depressed compared to females.



In terms of age, the older age group seems to have less depression



In addition, the effect of wealth status on depression was heterogenous

Agricultural input subsidy, food price shocks and malnutrition in Malawi.

Novignon, J., Chirwa, G.C., and Frempong, B.R.



This chapter examined the impact of Malawi's Farm Input Subsidy Programme (FISP) on nutrition. Household panel data from the Malawi Integrated Household Panel Surveys for 2010 and 2013 was used. Using Poisson and two-stage least square(2SLS) regressions models, results suggest a generally positive impact of the FISP programme on household nutritional status.



A gender-disaggregated analysis indicates that while there was no difference in the direction of impact, the magnitude was higher for female-headed households than for male-headed households. There was also evidence of a positive impact of food price fluctuations on nutritional outcomes.



The findings emphasize the relevance of farm input subsidy programmes in reshaping agricultural and nutritional outcomes in developing countries.

Faith and food in rural Malawi: an investigation into the sociocultural determinants of household food security.

Tembo, D., Manja, L. P., & Joshua, M. K.



This study demonstrates that religion and culture play a substantial role in shaping the dietary preferences of rural Malawians. Therefore, it is imperative that cultural and specifically religious factors are given due consideration when devising strategies aimed at alleviating household food in-security and promoting food security. Despite years of substantial agricultural output, household food insecurity remains a persistent problem, primarily due to sociocultural factors that influence how food is consumed with in households.



It has been proven that social activities such as weddings, initiation ceremonies, and funerals can significantly impact a household's food status.



The study underscores the need for policymakers to incorporate cultural factors into food security interventions to produce more effective and equitable policies.

The impact of multidimensional poverty on antenatal care service utilization in Malawi

Amanda Grace Chatata, Chirwa, G.C



Poverty remains a key barrier to accessing essential maternal health services, particularly in low- and middle-income countries like Malawi. Despite there cognised importance of antenatal care (ANC) in ensuring healthy pregnancies as well as improving maternal and child health outcomes, ANC services remain underutilized by many women living in poverty.



Underutilisation of ANC is not solely driven by a lack of financial resources but also by a range of non-monetary factors that constitute multidimensional poverty, such as limited access to education, healthcare services, and infrastructure.



While much of the existing literature focuses on monetary poverty this study explores how multi-dimensional poverty impacts ANC utilisation.



By examining how various deprivations intersect to limit access to ANC, this research contributes to understanding the broader issue of healthcare inequality.

Public Debt, Economic Growth, and Inflation Dynamics in Malawi',

Bangara, B.C.



Rising public debt has been an issue of concern among developing countries and the burden that it exerts on indebted countries has been a subject of debate among economists, academics, policy makers, and the general public. This paper investigates the relationship between public debt, economic growth, and inflation dynamics in Malawi over the period 1984-2020. It employs the autoregressive distributed lag and error correction models.



The findings reveal that domestic and external debt have a positive and significant impact on economic growth, while total public debt has a negative and significant impact on economic growth in the long run.



This indicates the need for the government to focus on the long-run effects of rising total public debt and debt to- GDP ratio, since in the long run, rising public debt becomes a heavy burden, with negative consequences for the economy.

Socioeconomic inequality in health care access in Malawi.

Chirwa, G.C.



This chapter explores the evolution of socioeconomic inequalities in healthcare access in Malawi. Data for the chapter comes from three rounds of the nationally representative Integrated Household Surveys (IHS) of 2005, 2010, and 2016. Concentration curves and concentration indices were used to assess the socioeconomic inequality in health care access.



The findings indicate that the concentration curves show more use of health care by wealthier individual's. This is also supported by the concentration indices for health care access, which were positive and increasing in value.



These findings mean that universal health coverage may not be achieved as many people are already being left behind due to a lack of access to health care.



Therefore, there is a need for policies such as intensifying mobile clinics and health cards for the less privileged to address the factors that contribute to this disparity in health care access.

Unintended consequences of farm input subsidies: women's contraceptive usage and knock-on effects on children

Mwale, M.L., Kamninga, T.M.



Sub-Saharan Africa's countries adopted farm input subsidies, with a twin goal of bolstering food security and reducing poverty. Many scholars evaluate the subsidies against these intended impacts, while ignoring the potential unintended consequences. In this paper, we take advantage of a rare combination of information on both contraceptive usage and a subsidy program, from Malawi's 2020 multiple indicator cluster survey, to investigate whether Malawi's farm input subsidy program (FISP) affected women's contraceptive usage. Using the instrumental variables method, we find that women that lived in FISP households increased contraceptives usage. This is in line with the hypothesis that the women aimed to prevent pregnancy, and hence dedicate uninterrupted time to farming, complementing the FISP.



More of women's time in farming could imply less of their time in domestic chores. We, therefore, further investigated whether children, in the same households, increased participation in the domestic chores, to take up roles left by the farming women. We find that this is the case.



These findings therefore highlight the importance of understanding both the intended and unintended consequences of welfare programs to ensure that the impacts of such programs are not over-or underestimated.

Public Revenue-Expenditure Nexus in Malawi: Are There Asymmetries?

Bangara, B.C



Despite the impressive performance of domestic revenue mobilization over the years, the expenditure-revenue gap has continued to widen, leading to increased government deficits in Malawi. This chapter uses the Autoregressive Distributed Lag (ARDL) model and Cointegrating Vector Auto-regression(VAR) to examine the asymmetries between government revenue and expenditure in Malawi.



The results reveal that there exists a unidirectional causality between government revenue and expenditure, and that causality runs from government revenue to expenditure without feedback mechanism.



The short-run results show that expenditure and revenue reinforce each other, indicating a significant long-run and short-run relationship. However, the lagged values of the short-run model for revenue show that increases in taxes have a negative impact on government spending, implying the absence of fiscal illusion.

CONCLUSION

Therefore, the government should push for institutional separation of allocation and taxation functions, as there is strong evidence of causation between government revenues and expenditures.

Socio-economic factors affecting the uptake of fish solar tent dryers in the Lake Chilwa Basin

Nyirenda, H. R., Katundu, M. C., Chiwaula, L., & Katola, A

⊘ABSTRACT

This study investigates the socio-economic factors influencing the adoption of fish solar tent dryers in the Lake Chilwa basin, Malawi. The research employs a mixed-methods approach, combining qualitative and quantitative data collection techniques. Data were gathered through focus group discussions with 25 participants and surveys administered to households in Kachulu and Nchenga, targeting adopters and non-adopters of fish solar tent dryers. The analysis included logistic regression to assess the impact of socio-economic characteristics, such as age, sex, marital status, education, access to savings accounts, extension services, and fish processing training, on the uptake of fish solar tent dryers.



The findings reveal that fish processed with fish solar tent dryers are of higher quality, cleaner, have a longer shelf life, and command better market prices than traditional methods.



Access to extension services and training significantly increases adoption rates. However, economic challenges hinder widespread adoption, particularly the high costs of constructing and maintaining fish solar tent dryers.

CONCLUSION

The study concludes that enhancing extension services and providing financial support can significantly improve the uptake of fish solar tent dryers, thereby promoting sustainable fisheries management and improving the economic status of fish processors in the Lake Chilwa basin.

Productivity and profitability of small-scale aquaculture in Malawi

Munthali, M. G., Chilora, L., Wineman, A., Nankwenya, B., Chiwaula, L., & Muyanga, M.



Small-scale aquaculture in Malawi contributes to nutrition and food security, and serves as a rural income diversification strategy. Nevertheless, its adoption is low. Drawing on a recent survey of 732 small-scale fish farms across the country, this study assesses the production, yield, profit, and profit per square metre of small-scale fish farms and explores their determinants using regression analysis. Most fish farms are owned and managed by individual farm-households, though communally owned farms are also present.



Small-scale aquaculture is found to be profitable, though the gross margins are slim.



Regression results reveal that production and profit are positively associated with the use of farms for both fingerling and grow-out production and the number of years the farm has existed, while yield and profit/m2 are positively associated with the use of high-quality inputs such as commercial feed and inorganic fertilisers.



These results suggest that small-scale fish farmers in Malawi and other similar settings should adopt improved technologies and follow best on-farm management practices to increase production and profits. This study contributes to the discourse on the pathway through which aquaculture in Malawi can best contribute to the country's development.

Does the perceived feeling of being empowered in decision-making influence voting in Malawi?

Gowokani Chijere Chirwa , Gift Mbwele, Ernest Pondani

⊘ABSTRACT

In any democracy, voting is a legal and recommended means of electing leaders. However, people's perceptions regarding whether they are empowered in decision making may affect their willingness to participate in a general election. This paper assesses community perceptions of them being empowered and whether this is associated with voting. We use multiple correspondence analysis to create an index that captures people's self-expression. The analysis uses a matching approach (propensity score and doubly robust estimators) to assess the relationship between the perception of self-expression and participation in voting. A probit model complements this by evaluating the robustness of the results to changes in the methodological analysis.



The results show a positive association between self-expression and whether people voted in the previous general election in Malawi.



Regarding policy, in order to avert voter apathy in general elections, it may be essential to improve people's self-expression in their communities. Future research should consider using longitudinal data to answer the research question at hand.

The economic costs of orthopaedic services: a health system cost analysis of tertiary hospitals in a low-income country?

Twea, P., Watkins, D., Norheim, O. F., Munthali, B., Young, S., Chiwaula, L. & Hangoma, P.



Traumatic injuries are rising globally, disproportionately affecting low- and middle-income countries, constituting 88% of the burden of surgically treatable conditions. While contributing to the highest burden, LMICs also have the least availability of resources to address this growing burden effectively. Studies on the cost-of-service provision in these settings have concentrated on the most common traumatic injuries, leaving an evidence gap on other traumatic injuries. This study aimed to address the gap in understanding the cost of orthopedic services in low-income settings by conducting a comprehensive costing analysis in two tertiary-level hospitals in Malawi.



The median length of stay for all patients was 9.5 days (8-11).



The mean weighted cost of treatment across the entire pathway varied, ranging from \$195 (\$136—\$235) for Supracondylar Fractures to \$711 (\$389—\$931) for Proximal Ulna Fractures.



The main cost components were personnel (30%) and medicines and supplies (23%).



Within diagnosis-specific costs, the length of stay was the most significant cost driver, contributing to the substantial disparity in treatment costs between the two hospitals."

An evolution of inequality of opportunity in the nutritional outcomes of under-five children in Malawi

Mphamba, P. N., Chirwa, G.C., & Mazalale, J



Malnutrition among children is a significant public health and development issue, especially in low- and middle-income countries, Malawi inclusive, which contributes to preventable diseases and deaths. Significant-socioeconomic disparities persist, which affect access to and equal distribution of basic nutrition. This study analyzed the extent and trends of Inequality of Opportunity (IOP) in the nutritional outcomes of children aged 0–59 months



We find the largest share of circumstance-driven inequality in stunting (8.96 percent), followed by underweight (1.91 percent), and then wasting (0.90



The Shapley-value decomposition results indicate the child's age (29.15 percent for stunting, 12.42 percent for underweight, and 52.36 percent for wasting) and gender (8.28 percent, 18.36 percent and 8.87 percent), wealth (6.36 percent, 22.87 percent and 8.54 percent), and mother's education (6.28 percent, 11.29 percent and 5.51 percent) as the dominant contributors to IOP for all three nutritional outcome indicators; stunting, underweight and wasting, respectively.

Modelling and forecasting mobile money customer transaction volumes in rural and semi-urban Malawi: An autoregressive integrated moving average spatial decomposition.

Namakhwa, D., Tchereni, B. H. M., **Masanjala, W**.,Namakhwa, C. D., Kuchande, S. L., &Mgomezulu, W. R

⊘ABSTRACT

Mobile money technologies in Malawi have revolutionised banking and monetary transactions across geographical barriers. Prospects of profit have drawn mobile money agents to invest in the business but find it is more profitable when substantial customers subscribe to the cash-in and cash-out facilities of mobile money. Despite the initial success, several challenges have emerged, including regulatory hurdles, network reliability issues, and the need for increased financial literacy among users. The volumes of transactions in the rural areas are observably lower compared to urban areas. This study uses Bvumbwe township in Malawi to model and forecast the discrepancy of mobile money transactions in rural and semi-urban Malawi.

The study uses ARIMA modelling to understand the temporal manifestation of mobile money subscription in these localities. Using ARMA (1,1) models decomposed for the semi-urban and rural area, the study finds that the semi-urban area has a disproportionately higher and lasting volume of mobile money transactions compared to the rural area.



The study also finds that mobile money transactions are more susceptible to long-lasting effects of external shocks in the rural area compared to the urban area.



Intuitively, the day-to-day relationship in the transactions is also stronger in the rural area.



These findings highlight the need for tailored policy interventions to enhance mobile money adoption and utilization in different geographical contexts.

Community based delivery and administration of SARS-CoV-2 Antigen Rapid Diagnostics Tests (Ag-RDTs): an operational research study in market places in Malawi and Zambia

Gambanga, F. Nchimunya, **L. Makondesa,** J. Chavula, C. Mulenga, N. Mwenifumbo, T. Chitanda, F. Mtaula, J. Tsai, Y. Bitilinyu- Bangoh, J. Gunda, A. Shibemba, A. Choonga, P.Khan, S. & Peter, T

⊘ABSTRACT

To expand access to testing beyond public health facilities and to strengthen surveillance efforts for COVID-19, community testing using COVID-19 antigen-based rapid diagnostic tests (Ag-RDTs) was identified as a major area of focus in Malawi and Zambia. This research aimed to gather evidence on the feasibility and acceptability of community testing in marketplaces. A cross-sectional study with a mixed-methods design was conducted in marketplaces in Malawi and Zambia to understand operational considerations for the implementation of Ag-RDTs for SARS-CoV-2 in a community setting. Programmatic data were collected prospectively as individuals were tested from June to September 2022. COVID-19 testing was done using Abbott Panbio nasal swab test kits. Semiqualitative questionnaires were administered to individuals who tested, healthcare workers, and site-based personnel. Data were collected electronically via the SurveyCTO platform and analyzed using STATA.

DESCRIPTION	MALAWI	ZAMBIA
Total Participants	2,348	1,723
Femal Participants	69% female, with a median age of 37 years	46% female, with a median age of 28 years
Positive Cases	78 positive cases	10 positive cases
Positivity Rate	3.3% positivity rate	0.5% positivity rate



In Zambia, 99% of 300 participants found the market testing experience and sample collection acceptable



In Malawi, 92% of 1,158 testers found the market testing experience and sample collection acceptable



Community testing is a feasible and acceptable intervention to increase testing access in Malawi and Zambia, especially when coupled with community awareness campaigns and mobilization.

An Examination of Inequality of Opportunity in the Use of Family Planning Services Among Women in Malawi

Tughulupi Ndovi, Gowokani Chijere Chirwa & Levison Chiwaula



Equal access to family planning methods is fundamental to achieving health-related sustainable development goals in Malawi. Family planning is known to avert maternal deaths, improving a woman's health status. Malawi increased the contraceptive prevalence rate to 48.6% in 2020 from 38.1% in 2012. However, there persist cases of a high maternal mortality ratio of 349 maternal deaths per 100,000 live births. The question remains as to why these adverse outcomes exist. Several studies in Malawi have established the existence of inequalities in sexual and reproductive health interventions with a focus on health status as an intrinsic component but did not consider the inequality of opportunity that contributes to the existing inequalities. The study Used data from the 2015–2016 Malawi Demographic Health Survey (MDHS) and 2013–2014 Service Provision Assessment (SPA), to examined inequality of opportunity in family planning services. Specifically, using the human opportunity index (HOI).



The study established that modern contraceptives are inequitably distributed among women at the national level and respective sub-group analysis.



Age, marital status, number of living children, and sex of the household head had a higher marginal contribution toward inequality of opportunity in family planning methods.



As such, this calls for government-targeted interventions to improve access to family planning services, such as extending the implementation of the community health strategy to those in the urban areas and increasing awareness of the importance of family planning services to teenage women.

The economic implications of noncommunicable diseases on food security and resilience in Malawi

Richard Moyo, Gowokani Chijere Chirwa



Malawi is facing an increase in Non-Communicable Diseases (NCDs) and ongoing food insecurity. Recent reports from the Malawi Vulnerability Assessment Committee (MVAC) indicate that approximately 4.2 million people are expected to experience high levels of acute food insecurity. Additionally, NCDs are now the second leading cause of death among adults in Malawi, accounting for 16 % of all fatalities, with a prevalence of 17 % in males and 14 % in females. Despite the increasing prevalence of NCDs, their specific impact on nutritional status within the context of food security and resilience remains inadequately understood. We assessed the economic implications of NCDs on food security and resilience by utilizing the household dietary diversity score, the food consumption score, and a reducing coping strategy index (rCSI). The study estimated a Propensity Score Matching (PSM) model on a sample of 11,434 households from the Fifth Malawi Household Integrated Survey (IHS5).



The results revealed a multifaceted impact of NCDs on food security. Households with NCD-affected members experienced challenges in accessing a balanced diet, with a decrease in the food consumption score of approximately 0.764 units compared with nonaffected households.



Additionally, these households demonstrated an increase in their rCSI score of approximately 1.162 units, suggesting reliance on different coping strategies to address food insecurity.



The results also indicate that affected households struggled to obtain nutritious meals, with a reduction in their household dietary diversity score of approximately 0.117 units.

CONCLUSION

The findings highlight the importance of integrating health, agriculture, and social protection policies. Expanding initiatives such as the Affordable Input Subsidy (AIP), school feeding programmes and food nutrient fortifications, which not only serve as a social protection measure but also improve food security and nutrition, can have a substantial impact on long-term health outcomes.

Does the Perceived Feeling of Being Empowered in Decision-Making Influence Voting in Malawi?

Gowokani Chijere Chirwa , Gift Mbwele, Ernest Pondani



In any democracy, voting is a legal and recommended means of electing leaders. However, people's perceptions regarding whether they are empowered in decision-making may affect their willingness to participate in a general election. This paper assesses community perceptions of them being empowered and whether this is associated with voting. We use multiple correspondence analysis to create an index that captures people's self-expression. The analysis uses a matching approach (propensity score and doubly robust estimators) to assess the relationship between the perception of self-expression and participation in voting. A probit model complements this by evaluating the robustness of the results to changes in the methodological analysis.



The results show a positive association between self-expression and whether people voted in the previous general election in Malawi.



Regarding policy, in order to avert voter apathy in general elections, it may be essential to improve people's self-expression in their communities.

RECOMMENDATION

Future research should consider using longitudinal data to answer the research question at hand.

Tax and Non-communicable Diseases Attributable to Tobacco and Alcohol Consumption in 5 Sub-Saharan African Countries

Moyo, M., Nyirenda, T., Matanje, B. L., & Chirwa, G. C



Increased taxation on alcohol and tobacco is among the cost-effective measures used to deal with the burden of non-communicable diseases (NCDs) globally. Despite adopting such efforts, the impacts of taxation on alcohol and tobacco are yet to be fully understood. The study's objective is to find empirical evidence regarding changes in the NCD mortality rate associated with changes in the tax rates of tobacco and alcohol. The study adopted the System Generalized Method of Moments (SGMM) to explore the relationship between levels of taxes and NCD mortality rates. The SGMM allowed the inclusion of the dependent variable as an explanatory variable, assuming reverse causality was assumed.



There seems to be a negative relationship between increased taxes and rates of NCDs.



These results suggest that tax increases on the major health risk factors must be implemented to reduce NCDs. Doing so will likely enable the achievement of Sustainable Development Goal 3.4, which is to reduce NCD mortality by one-third by 2030.Medium screening rates -0.461 0.219 -2.10 0.036 -0.890 -0.031 **



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