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Effect of government intervention in relation to COVID-19 cases and deaths in Malawi

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The COVID-19 pandemic affected the world in various ways. In response to this, countries set up various interventions such as lockdowns, physical distancing, and mandatory face covering, among others. Governments also put in place measures to ensure compliance. However, the extent to which the various responses impacted the deaths and confirmed cases remains debatable. This paper explores this question by looking at how government stringency measures impacted deaths and cases in Malawi. We employ an instrumental variable (IV) approach to assess the impact of government action on confirmed COVID-19 cases and deaths. We measure government policy by the stringency index. By leveraging the IV approach, we circumvent potential endogeneity concerns between our main policy variable and the outcome variables. Our data comes from the University of Oxford COVID-19 project and spans a daily frequency from 20 February 2020 to 25 April 2022, covering multiple waves of the pandemic. Overall, the findings show that despite Malawi never having implemented a full lockdown, the government policies may have helped to reduce both cases and deaths related to COVID-19. Specifically, the IV shows that a unit increase in the government stringency index results in a drop of 179 cases and 6 deaths. All the results are statistically significant at 1% level and remain robust to the use of the ordinary least-squares method. This study demonstrates the efficacy of non-pharmaceutical tools implemented by the government to fight COVID-19. Thus, policymakers need to place more emphasis on the need for the public to adhere to these stringency measures in the event of new waves of the pandemic or similar outbreaks.

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Introduction

After failing to contain the initial COVID-19 outbreak, countries around the world adopted an array of non-pharmaceutical interventions designed to curb it's further spread and the rising number of deaths, as well as mitigating the overstretching of national health systems. Generally, these interventions took the form of the following nine yardstick interventions: cancellation of public events; restrictions on public gatherings; stay-at-home requirements; public information campaigns; restrictions on internal movement; international travel controls; public transport carrying capacity control; school closure; and workplace closure (Roser et al., 2020). However, the degree of such measures and the public adherence to them differed across localities.

The spread of COVID-19 has resulted in a wide range of responses from governments across the globe. Most affected countries adopted a range of restrictive mitigation measures such as social distancing, border closures, and travel/business restrictions (Osuchowski et al., 2020). The disease led to the highest global number of lockdowns in history (Rozanova et al., 2020). By March 2020, over 250 million people had gone into lockdown in Europe, and 1.7 billion people worldwide were in some form of isolation (Osuchowski et al., 2020; Rozanova et al., 2020). Healthcare systems worldwide started increasing hospital capacities and adapting to specific COVID-19 patient needs as a fundamental response (Osuchowski et al., 2020). However, the pandemic has challenged global mechanisms for a coordinated response. Countries have largely been responding independently, each trying to find mechanisms that work for them (Rozanova et al., 2020).

Whilst this has been the case at the global level, the first level response in Malawi was the declaration of a state of national disaster on 20 March 2020. The country registered its first (two) confirmed coronavirus cases on 2 April 2020 (Chaziya et al., 2021; Mzumara et al., 2021). Following this, the Government of Malawi put in place measures to mitigate the spread of the virus. These included an international travel ban, school closures at all levels, cancellation of public events, decongesting workplaces and public transport, mandatory face coverings, and a testing policy covering symptomatic people (Chaziya et al., 2021; Mzumara et al., 2021). The Government of Malawi also attempted to initiate a national lockdown for 21 days starting on 21 April 2020, but the high court of Malawi overruled the decision due to an injunction that was sought by the Human Rights Defenders Coalition (HRDC) (Chirwa et al., 2021).

The extant literature investigating the effectiveness of these different government stringency measures lacks a consensual verdict thus far. From the pioneering work of Hsiang et al. (2020), one strand of the empirical literature provides strong evidence supporting the effectiveness of these measures (Achuo, 2020; Arshed et al., 2020; Hadianfar et al., 2021; Haldar and Sethi, 2020). Achuo (2020) and Carlitz (2021) provide robust evidence from the African continental experience detailing a (significantly) inverse long-run effect of stringency measures on the COVID-19 incidence rate. In addition, government stringency measures have been tested globally across multiple waves of the pandemic and reaffirmed this line of evidence, further establishing that such government stringency measures are effective across successive waves worldwide (Hale et al., 2021). Some studies have gone to length to reveal that the effectiveness of the policies depends on the timing and strictness of the intervention (Dergiades et al., 2020, 2022) as well as any given country's economic status—with poor countries being more susceptible to the spread of the disease (Ratto et al., 2021). Conversely, another camp (Berry et al., 2021; Gibson, 2020) finds no quantifiable evidence supporting the notion that these measures effectively lower the prevalence and incidence of cases and related deaths. For instance, Ratto et al. (2021) found that government stringency measures were ineffective in the initial wave of the pandemic, but are significantly and negatively associated with the COVID-19 incidence rate in subsequent waves.

At a time when countries were faced with a common enemy, COVID-19, many expected the global community to work together to fight towards a common goal— achieving a COVID-19-free world again. To this end, the World Health Organization created the COVID-19 Vaccines Global Access (COVAX) initiative to facilitate the equitable distribution of COVID-19 vaccines (Kunyenje et al., 2023). However, it is apparent that the goal has not been achieved, as COVID-19 vaccine distribution is considered to inequitably favour the wealthiest nations, a situation some have labelled the "vaccine apartheid" (Hassan et al., 2021; Tatar et al., 2021). Indeed, in most low-and middle-income countries (LMICs), including Malawi, non-pharmaceutical measures remain the first line of defence against COVID-19, as the majority of the population remains largely unvaccinated (Pieroni et al., 2020).

Malawi, therefore, presents a compelling case study to assess the effectiveness of government stringency policies in curbing COVID-19 confirmed cases (and by extension boosting recovery rates), and case fatalities on two other grounds. Firstly, as of 25 April 2022, the country had recorded 85,747 confirmed cases and 2633 deaths (Roser et al., 2020). This significantly contradicts initial expert predictions that over 50,000 lives would be lost to COVID-19 in Malawi. Indeed, from the onset of the pandemic, the Government has deployed and strengthened its stringency measures. The current work, therefore, answers the following question: "Are the observed lower COVID-related deaths and high recovery rates attributable to the Government's stringency measures or a mere stroke of luck?"

Secondly, with the hindsight that Malawi not only has its own developmental goals (e.g., Malawi Vision 2063; Malawi Growth and Development Strategy) but has also subscribed to a number of regional and international developmental goals (e.g., Sustainable Development Goals (SDGs); African Agenda 2063) whose implementation and progress has been largely disrupted by the pandemic. For instance, COVID-19 directly stalls the country's progress towards achieving zero poverty and hunger (SDG-1&2); good health (SDG-3); quality education (SDG-4); decent work and economic growth (SDG-8); as well as reduced inequality (SDG-10) (World Economic Forum 2020). Meanwhile, on the local scene, COVID-19 has greatly undermined the implementation of the newly launched Malawi Vision 2063 which is the country's blueprint for long-term vision and aspirations (NPC, 2020). Therefore, understanding whether the government's COVID-19 stringency measures are effective is an essential component in ensuring that the set goals are neither derailed nor delayed in the aftermath of the pandemic. Further, such knowledge will prove to be helpful in the future should similar pandemics occur. Moreover, the degree to which these measures work may depend on public confidence in the effectiveness of the measures—the question we turn to in this work.

In addition, our study makes two-fold methodological contributions to this new, vibrant COVID-19 literature. First, the identification strategy we have employed (i.e. instrumental variable approach) circumvents endogeneity concerns that often severely undermine the reliability of estimation results from the ordinary least squares (OLS) estimates. Second, by focusing on one country as a case study, we mitigate methodological difficulties arising from potential spatial heterogeneities of the COVID-19 dynamics present in cross-country studies. Thus, heterogeneity issues are purged from our analysis by focusing on a particular case study—Malawi.

Data and methods

Data source and coverage. This study primarily employs a carefully constructed dataset from the Oxford University COVID-19 Government Response Tracker (OxCGRT) (Roser et al. 2020). The database is publicly accessible via https://ourworldindata.org/coronavirus. The OxCGRT database provides up-to-date and comparable information on government policy measures designed to counter the spread of the COVID-19 pandemic. The data spans two years from February 2020 to 25 April, 2022. We complement the OxCGRT database with some dummy variables to control for some seasonal effects as well as a dummy that captures democratic/institutional changes.

Variables. This analysis considers two outcome variables: COVID-19 confirmed cases and confirmed deaths (i.e. case fatalities), both drawn from the OxCGRT database. More crucially, our main independent policy variable is the stringency index (also drawn from the OxCGRT database), which assesses the degree of government intervention in COVID-19 for various countries around the globe. This index is a composite indicator, consolidating nine different metrics, namely: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movement; and international travel controls (Roser et al., 2020). The stringency index runs on a scale from 0 to 100 where a value of 0 means a complete absence of government policy measures designed to counter the pandemic, while a value of 100 implies that the government has adopted the strictest possible measures. In the context of Malawi, the data for the government stringency index starts from 20 February 2020. Therefore, our analysis uses daily observations spanning 20 February 2020 to 25 April 2022.

In order to control for seasonal variations in the number of confirmed cases and deaths, our analysis includes dummy variables: *planting* (capturing the planting season in Malawi between November and March); *harvest* (to capture the harvesting season which normally extends from April to June); and finally, election which accounts for potential shocks in the COVID-19 prevalence and fatality cases attributable to mass gatherings during persistent demonstrations against the then alleged rigging of the 21 May 2019 presidential elections, which eventually resulted into constitutional court proceedings. This also included political campaign rallies in the run-up to the 23 June 2020 fresh presidential elections following the court's nullification of the contested 2019 election results and during the inauguration ceremony of the then newly elected president (Lazarous Chakwera) on 6th July 2020. Hence, *election* takes the value of 0 prior up to July 2020 and 1 otherwise.

Instrumental variable approach. In our analysis, we are concerned with the potential endogeneities that may arise between our main explanatory variable (stringency index) and the outcome variables (i.e. confirmed cases and case fatalities). Endogeneity would mean that there is a reverse causality between stringency and our outcome variables. The potential source of endogeneity in the present study is the possible reverse causality between COVID-19 and stringency. The more COVID-19 cases increased, the more stringent the COVID-19-related policy became. And the more stringent the policy became, the more confirmed positive cases and deaths from COVID-19 lowered. Dealing with this requires looking for a variable that may only affect our outcomes, via stringency. Because of this, we employ an instrumental variable (IV) approach. We use an exogenous change in policy as an instrument. Specifically, we employ the date of the constitution of the COVID-19 task force in Malawi as an instrument.

We argue that the instrument is exogenous since the date of implementation cannot influence the number of COVID-19 cases or deaths because this is a policy shift and not inherent with the deaths and cases, we are evaluating. On the exclusion condition of the instrument; firstly, the date the task force was formed is not endogenous because this is a policy variable determined outside the equation we are testing. Indeed, the date was randomly voted at the presidential cabinet meeting. Secondly, the date can only affect the day on which the task force started working and in itself does not directly affect the number of individual deaths or cases. To test the instrument relevance assumption, we will use the Stock and Yogo test (Angrist and Pischke, 2008; Baltagi, 2009; Cameron and Trivedi, 2005), to check that the F statistic from the first stage is greater than 10. Specifically, the regression model employed in the analysis takes the following functional form:

$$Y_t = \beta_0 + \beta_1 \text{stringency\_index}_t + \beta_2 \text{election}_t + \beta_3 \text{harvest}_t + \beta_4 \text{planting}_t + \varepsilon_t$$

where Y_t is the outcome variable (i.e. confirmed cases or deaths), stringency_index is our main policy variable, while election, harvest, planting are exogenous dummy variables as described in the preceding subsection, and ε are residuals.

Results

This section presents our results in two ways. First, we provide the descriptive statistics for the data employed in the analysis. Next, we discuss our empirical results from the IV regression.

Descriptive results. Table 1 shows the summary statistics of the variables. From the table, it is apparent that of the 85,747 total confirmed cases as of 25 April 2022, only 2633 died; representing an overwhelming 97% survival rate. During the period, 18% was election time, 26% was harvesting period and 44% was planting season. What is more interesting is that since 20 February 2020, the government stringency index has been fairly strict at around 45 (out of 100), with the highest level of strictness recorded at 65.

Before turning to the main regression results, it is instructive to undertake a visual inspection of the trajectories of the cases and deaths alongside the stringency index, in order to appreciate their time series dynamics. To do this, we compute the correlations between the stringency index and the two outcome variables and

Table 1 Descriptive statistics.

Variable	Mean	Standard deviation	Minimum	Maximum
Confirmed cases	33,306.847	30,403.496	0.000	85747
Confirmed deaths	1096.532	999.591	0.000	2633
Stringency index	45.292	12.441	5.560	64.81
Election	0.183			
Harvest	0.260			
Planting	0.437			

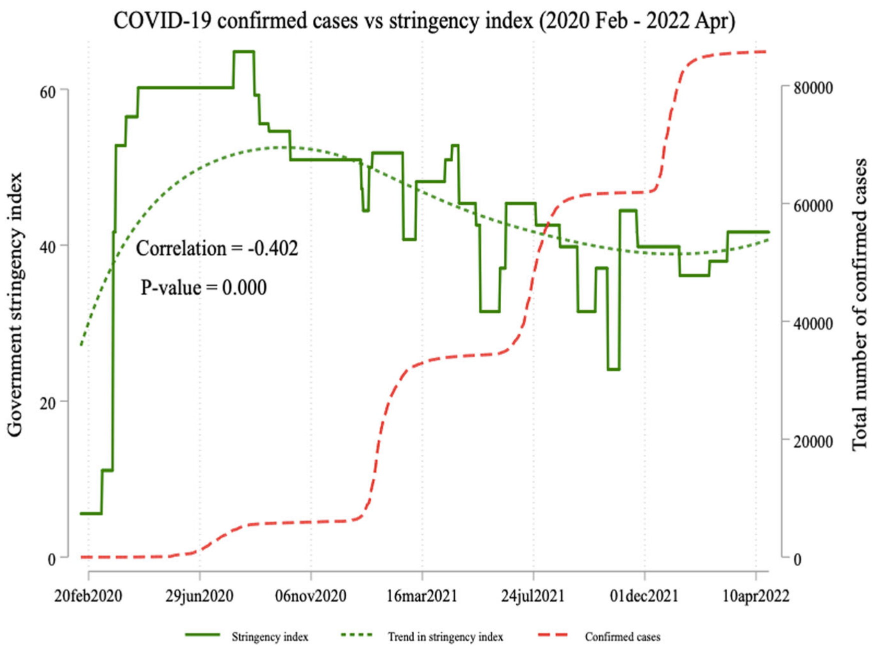

Fig. 1 Trends in confirmed COVID-19 cases and stringency index. The figure shows the evolution of COVID-19-confirmed cases and the government stringency over time.

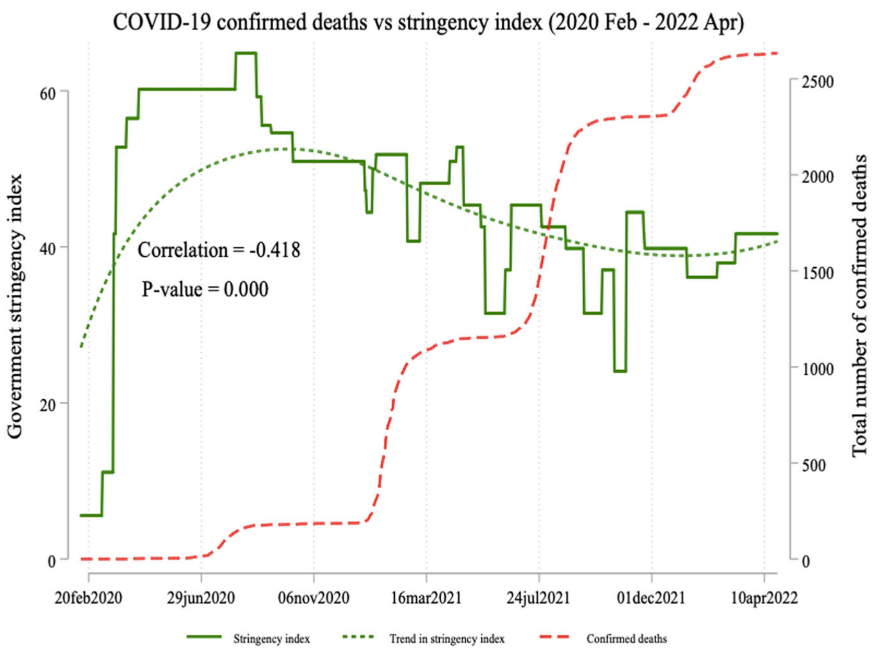

Fig. 2 Trends in confirmed COVID-19 deaths and stringency index. The figure shows the evolution of COVID-19-related deaths and the government stringency over time.

visually depict the results in Figs. 1 and 2. It is apparent from Figs. 1 and 2 that both confirmed cases and deaths have been trending exponentially upward over time. What is more interesting is that, although the number of confirmed cases and fatalities increased in waves, there has been a downward trend in the government stringency index over time. Specifically, we find an inverse co-movement between the stringency index and confirmed cases (deaths) with a correlation value of -0.408 (−0.418). These correlation results are not only quantitatively high but highly significant at a 1% level. These results provide a precursor for the efficacy of the government stringency measures.

First stage tests. Having presented the descriptive analysis in Table 1 and Figs. 1, 2, we move a step forward to undertake our main regression analysis. As indicated earlier, we have employed an IV analysis. This approach requires that we address the issues arising from such an analysis. We undertake a first-stage test to see if our instrument is relevant. The rule of thumb for the first stage test requires that the *F*-statistic from the first stage be greater than 10. From Table 2, the results show that the instrument is relevant as the *F* (465.27, $P < 0.01$) is >10. Hence, we conclude that the instrument is relevant and thus our models result in efficient estimators.

Table 2 First stage taste for confirmed cases as well as deaths.

Adj. R^2	F-stat	Prob > F
0.62	465.27	0.00

Table 3 Regression with IV estimates (confirmed cases).

	OLS	IV
Stringency index	−92.146*** (−13.80)	−178.826*** (−11.93)
Planting	−3649.366*** (−499.11)	−3941.686*** (−506.55)
Harvest	−7332.148*** (−581.87)	−6703.334*** (−579.51)
Election	22,214.262*** (−861.03)	20,779.994*** (−836.04)
Time	148.706*** (−1.25)	145.947*** (−1.24)
N	805.00	805.00
F	7744.44	
Log-likelihood	−7996.01	
Adj. R^2	0.97	0.97

Standard errors in parenthesis.
In the table, *** implies significance at 1% level.

Table 4 Regression with IV estimates (deaths).

	OLS	IV
Stringency index	−5.357*** (0.424)	−6.230*** (0.432)
Planting	−213.789*** (18.460)	−216.730*** (18.507)
Harvest	−304.464*** (22.362)	−298.137*** (21.958)
Election	723.534*** (30.197)	709.101*** (29.588)
Time	4.846*** (0.039)	4.818*** (0.038)
N	805	805
F	11,389.47	
Log-likelihood	−5261.34	
Adj. R^2	0.97	0.97

Standard errors in parenthesis.
In the table, *** implies significance at 1% level.

Main regression results. Having ascertained the credibility of our instrument using the first-stage tests, we now present our results from the various regressions. We begin with results from the effect of government stringency on confirmed COVID-19 cases. Furthermore, we present the OLS estimates to confirm the robustness of the IV results. Table 3 shows the results from these regressions.

From Table 3, we notice that a negative and statistically significant relationship (at a 1% level) exists between government stringency and the number of confirmed cases. More specifically, as the government policy against COVID-19 transmission gets more stringent by 1 unit, the number of COVID-19 cases drops by about 179. It is particularly encouraging to notice that the comparable OLS estimates yield the same qualitative (negative) effect, indicating the efficacy of the measures. However, the results are quantitatively different, as the OLS model tends to underestimate the efficacy of the government stringency index relative to the IV results. It is salient to note from Table 3 that the standard errors tend to become smaller under the IV relative to the OLS, suggesting that the instrument is improving the efficiency of the estimation. Moving away from these results, the findings on the effects of government response on confirmed deaths (case fatalities) are presented below.

In Table 4, both the OLS and the IV estimators point to a negative relationship between the stringency index and COVID-19 deaths. What is more interesting is that not only are the results from both methods statistically significant at the 1% level, but they also yield quantitatively comparable estimates and standard errors. Particularly, a one-unit increase in the strictness of the government stringency index was associated with a reduction of about six COVID-19-related deaths. Again, these results point to the fact that the policy had the intended effects.

Discussion

This paper presents the first empirical evidence of the effect of government policy response on the confirmed COVID-19 cases and deaths in Malawi. The study draws on the University of Oxford's COVID-19 data. Various scholars have presented different views on the effect of the various government responses. Given the ongoing debate on the efficacy of governmental responses to the COVID-19 outbreak, exploring this idea is particularly relevant both to Malawi and internationally—including the donor community who have been at the helm of programme support to the fight against COVID-19. We discuss the pertinent findings below.

From the findings, the main results suggest that an increase in the government's policy stringency is associated with a decline in COVID-19 cases and deaths. Our results are similar to the prior findings that have been established by Ndung'u et al. (2022), in selected African countries. Likewise, in 2021, in 113 countries, it was shown that an increase of 10 points on the stringency index was associated with six percentage points ($P < 0.001$, 95% CI = [5%, 7%]) lower average daily deaths (Hale et al., 2021). Furthermore, others have provided evidence that aspects such as school closures have a significant impact on reducing the growth rate of deaths, which is less effective than when a number of policy interventions are combined (Dergiades et al., 2022). Even though there seems to be a negative relationship between the government response to COVID-19 and the cases, as well as the deaths, the situation seems contrary to what transpired in Brazil. There, the government's response is said to have contributed to a massive number of COVID-19 cases as well as deaths (Mundt, 2021).

It is important to understand the pathways through which the stringency affects the outbreak. Even though Malawi did not have a total lockdown, as was the case in some other countries, the approach to fighting COVID-19 was strategic. Since the time at which the COVID-19 committee was constituted to oversee the fight against COVID-19 in the country, the movement of people was restricted through various measures such as time control of markets, closure of public schools, control of the number of people allowed to attend meetings and weddings, etc. Places of leisure such as bars and nightclubs were highly controlled and those who contravened the rules of mobility were arrested. Thus, fear of arrest also impacted the mobility of people during times when they would find it difficult to comply with measures such as social distancing.

Furthermore, in the transport sector, the carriage capacity of public transport was also reduced by almost 60%. The control of the transport sector greatly reduced people's mobility, since most people in Malawi rely on public transport for their daily mobility. This in essence had a negative effect on the transport sector. Furthermore, due to the government limitations on the number of people who were allowed to gather in one place, service providers such as banks were forced to reduce the number of people who could access their premises at any one time. Most of the services were migrated to online platforms, and fewer people were allowed to access banking halls.

Policy implications. Our findings bring to the fore questions of how policy response should be thought of in relation to such outbreaks. While extreme measures such as total lockdown may not be practical in terms of implementation and may also be politically sensitive, the study suggests that there are other institutional measures that can go a long way toward managing pandemic situations. For instance, the setting up of the inter-disciplinary Presidential Taskforce on COVID-19 enabled the initiation of a stringency policy that was not too extreme, in terms of restricting people's movement, but was effective enough to curb the ravaging and debilitating effects of the outbreak.

By and large, the primary policy implication of the findings is that the stringency in the COVID-19 control measures worked to the effect of managing the adverse effects of the outbreak. While the extreme control measure of a country-wide lockdown was not implemented, the policies that were put in place helped to control the spread and fatalities of the outbreak. While the potential longer-term impact of the lockdown is not known, the existing evidence shows that the policy response worked. To this end, this study recommends timely implementation of the COVID-19 stringency measures in the event of future waves of the pandemic to aptly curb the spread of the virus and resulting fatalities. Equally important, these findings also serve as a template for handling similar future outbreaks. Moreover, the efficacy of these stringency measures points to the need for the government and stakeholders to step up their community mobilisation campaigns in order to sensitise citizens on the salience of adhering to the measures as well as the potential dangers of the pandemic.

Study limitations and areas of future research. The main policy variable considered in this study (the stringency index) is an aggregate indicator capturing the overall strictness of COVID-19 prevention measures in the country. As such, our results obscure a great number of spatial heterogeneities. Indeed, in the Malawian context, most of the measures were mainly applicable in urban areas relative to rural areas, as the enforcement of the measures required timely exposure to mass media and community mobilisation—at times by law enforcement officers—to lobby the citizens to comply with the stipulated measures. Thus, we are unable to explicitly offer policy recommendations specially tailored to each district/city. Nevertheless, premised on the anecdotal evidence that the cases and deaths were mostly concentrated in the urban areas, the policy recommendations offered in the preceding text should prioritise urban areas relative to the rural locale. Indeed, exploring district-level data to unearth spatial heterogeneities would be a rewarding area of future research. Furthermore, it should be noted that while the stringency index is a combination of all the policy responses, we did not decompose the effect of the marginal contributions of each of the elements of the policy mix, in order to understand which of the elements of the response were most effective. For instance, it is possible that restrictions on market trading times were more effective in controlling the spread (on the basis that relatively more people go to markets) than restrictions on drinking joints (because relatively fewer people patronise these). Such an analysis could inform policymakers on what measures should be prioritised. Such data could help to answer questions concerning whether school closures were a necessary policy. Therefore, we recommend that if data permits, decomposing the government stringency index into its individual components could provide policymakers with more valuable information.

Conclusion

The Malawi Government implemented a multisectoral approach to managing the COVID-19 pandemic. Even though Malawi is a resource-constrained country with a fragile healthcare system, the response to COVID-19 seems to have resulted in some significant forward strides. In this paper, we provide evidence regarding the effect of Malawi's Governments' stringency measures in the fight against the COVID-19 virus. Despite the widespread social media scepticism regarding the government's response to COVID-19, our research shows that the intervention by the government, as measured by the stringency index, contributed greatly to reducing the number of cases and deaths. It may be said that the setting up of the Presidential Task-force on COVID-19 and the policies that came about from the task force recommendations may have contributed significantly to the reduction in the number of COVID-19 cases and deaths in Malawi.

Data availability

The data used in the study is available for free at https://ourworldindata.org/coronavirus.

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References

Achuo ED (2020) How efficient are government stringency responses in curbing the spread of the covid-19 pandemic? Int J Res Innov Soc Sci 4:8
Angrist JD, Pischke J-S (2008) Mostly harmless econometrics: an empiricist's companion. Princeton university Press
Arshed N, Meo MS, Farooq F (2020) Empirical assessment of government policies and flattening of the COVID 19 curve. J Public Aff 20(4):e2333
Baltagi BH (2009) A companion to econometric analysis of panel data. John Wiley & Sons
Berry CR, Fowler A, Glazer T, Handel-Meyer S, MacMillen A (2021) Evaluating the effects of shelter-in-place policies during the COVID-19 pandemic. Proc Natl Acad Sci USA 118:15
Cameron CA, Trivedi PK (2005) Microeconometrics: methods and application. Cambiridge University Press
Carlitz R(2021) Assessing the costs and benefits of COVID-19 containment strategies in Africa. V-Dem users working paper series 40. pp. 1–15
Chaziya J, Freyne B, Lissauer S, Nielsen M, Langton J, O'Hare B, Molyneux L, Moxon C, Iroh Tam P-Y, Hoskyns L, Masanjala H, Ilepere S, Ngwira M, Kawaza K, Mumba D, Chimalizeni Y, Dube Q (2021) COVID-19 in Malawi: lessons in pandemic preparedness from a tertiary children's hospital. Arch Dis Child 106(3):238 LP–240. https://doi.org/10.1136/archdischild-2020-319980
Chirwa GC, Dulani B, Sithole L, Chunga JJ, Alfonso W, Tengatenga J (2021) Malawi at the crossroads: does the fear of contracting COVID-19 affect the propensity to vote? Eur J Dev Res 34:409–431
Dergiades T, Milas C, Mossialos E, Panagiotidis T (2022) Effectiveness of government policies in response to the first COVID-19 outbreak. PLoS Global Public Health 2(4):e0000242. https://doi.org/10.1371/journal.pgph.0000242
Dergiades T, Milas C, Panagiotidis T (2020) Effectiveness of government policies in response to the COVID-19 outbreak. Available at SSRN, 3602004
Gibson J (2022) Government mandated lockdowns do not reduce Covid-19 deaths: implications for evaluating the stringent New Zealand response. N Z Econ Papers 56(1):17–28
Hadianfar A, Yousefi R, Delavary M, Fakoor V, Shakeri MT, Lavallière M (2021) Effects of government policies and the Nowruz holidays on confirmed COVID-19 cases in Iran: an intervention time series analysis. PLoS ONE 16(8):e0256516
Haldar A, Sethi N (2020) The effect of country-level factors and government intervention on the incidence of COVID-19. Asian Econ Lett 1(2):17804
Hale T, Angrist N, Hale AJ, Kira B, Majumdar S, Petherick A, Phillips T, Sridhar D, Thompson RN, Webster S (2021) Government responses and COVID-19 deaths: Global evidence across multiple pandemic waves. PLoS ONE 16(7):e0253116
Hassan F, Yamey G, Abbasi K (2021) Profiteering from vaccine inequity: a crime against humanity? British Medical Journal Publishing Group
Kunyenje CA, Chirwa GC, Mboma SM, Ng'ambi W, Mnjowe E, Nkhoma D, Ngwira LG, Chawani MS, Chilima B, Mitambo C (2023) COVID-19 vaccine inequity in African low-income countries. Front Public Health 11:695

Mundt AP (2021) Assessing government responsibility for COVID-19 deaths. The Lancet 397(10282):1345

Mzumara GW, Chawani M, Sakala M, Mwandira L, Phiri E, Milanzi E, Phiri MD, Kazanga I, O'Byrne T, Zulu EM, Mitambo C, Divala T, Squire B, Iroh Tam P-Y (2021) The health policy response to COVID-19 in Malawi. BMJ Global Health 6(5):e006035. https://doi.org/10.1136/bmjgh-2021-006035

Ndung'u N, Shimeles A, Thorbecke E (2022) Preserving lives or livelihoods? Examining the COVID-19 pandemic policy responses in Africa. https://www.researchsquare.com/article/rs-1143592/v1

NPC (2020) Malawi's vision: an inclusively wealthy and self-reliant nation (Malawi 2063). NPC

Osuchowski MF, Aletti F, Cavaillon J-M, Flohé SB, Giamarellos-Bourboulis EJ, Huber-Lang M, Relja B, Skirecki T, Szabó A, Maegele M (2020) SARS-CoV-2/COVID-19: evolving reality, global response, knowledge gaps, and opportunities. Shock 54(4). https://journals.lww.com/shockjournal/Fulltext/2020/10000/SARS_CoV_2_COVID_19__Evolving_Reality,_Global.2.aspx

Pieroni A, Vandebroek I, Prakofjewa J, Bussmann RW, Paniagua-Zambrana NY, Maroyi A, Torri L, Zocchi DM, Dam ATK, Khan SM (2020) Taming the pandemic? The importance of homemade plant-based foods and beverages as community responses to COVID-19. Springer

Ratto MC, Cabrera JM, Zacharías D, Azerrat JM (2021) The effectiveness of government measures during the first wave of the outbreak. Soc Sci Q 102:2088–2105

Roser M, Ritchie H, Ortiz-Ospina E, Hasell J (2020) Coronavirus pandemic (COVID-19). Our World in Data

Rozanova L, Temerev A, Flahault A (2020) Comparing the scope and efficacy of COVID-19 response strategies in 16 countries: an overview. Int J Environ Res Public Health 17(24). https://doi.org/10.3390/ijerph17249421

Tatar M, Shoorekchali JM, Faraji MR, Wilson FA (2021) International COVID-19 vaccine inequality amid the pandemic: perpetuating a global crisis? J Glob Health 11:03086

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Competing interests
The authors declare no competing interests.

Ethical approval
The study's ethics approval was given by the University of Malawi research ethics committee (UNIMAREC). The study was carried out in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Informed consent
Informed consent is not applicable. The study used secondary data. The authors did not directly engage any participants.

Additional information
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