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Covid-19 Bulletin

Assessing spatial vulnerability to COVID-19 in Malawi

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This bulletin analyzes the short-run effects of the COVID-19 pandemic. A developing country reliant on agriculture, Malawi periodically faces climate related shocks and food insecurity has never been eradicated.

The recent spread of the COVID-19 in Malawi presents a further challenge to livelihoods, and for policy makers. The degree to which communities may become vulnerable to the pandemic depends on various factors. The current bulletin assesses these factors and identifies parts of Malawi which are the least equipped to absorb the effects of the pandemic compared to the rest of the country. For the purpose of the current analysis, we define vulnerability as the propensity of an area to be exposed to the spread of COVID-19 combined with limited capacity to control the pandemic and significant threats to food security and livelihoods in general. At the individual level, pre-existing co-morbidities (for example high blood pressure, diabetes, general poor health, among others) increase the vulnerability of individuals to COVID-19. We

adopt the same concept to study community level vulnerability. We consequently, develop a composite overall community vulnerability indicator using a combination of sub-indicators for food security, nutrition, disease prevalence, health infrastructure and services as well as population density[1]. For each sub-indicator as well as for the composite vulnerability index, we classify areas as "much less", "less", "more", or "much more" vulnerable compared to the country's average. The higher the value of the vulnerability index, the more vulnerable is the considered community to the pandemic and its complications compared to national average. The indicator, which is applied to assess the vulnerability to the COVID-19 pandemic across all the three administrative regions of Malawi and all the 31 districts (28 districts plus 3 cities) therein,

LOCAL STAPLE FOOD MARKET DYNAMICS UNDER COVID

The pandemic is likely to be more disruptive to local food markets and thus have more serious effects on the poorest and most vulnerable groups and communities than any of the crises in recent years. This is because the poor and vulnerable are affected by changes in local food staple prices significantly more than other population groups, not only because of more limited purchasing power but also because of differences in consumption baskets. Moreover, domestic markets for local food staples such as yam, cassava, white maize, cowpeas, millet or sorghum tend to behave differently during times of crisis than global markets for major commodities such as rice, wheat or yellow maize. For instance, the last global food price crisis had much more significant impacts on the latter group of food commodities. Local food staples markets tend to be rather segmented from global food markets. Staple food prices therefore tend to be isolated from global market shocks. The difference with Covid is that the disruption of food supply chains has hit both domestic and global food markets rather badly.

The global nature and complex ramifications of the pandemic make it impossible to avoid the pain from rising food prices, in particular among vulnerable groups. Different staples weigh differently in local diets. Different communities are affected differently by changes in prices of different staples. Some markets are more connected than others and therefore price changes for the same staple food vary across geography and over time. Consequently, a good understanding of how local staples markets behave and close tracking of changes in food prices at community level have to be key elements of any strategy to protect livelihoods. AKADEMIYA2063 scientists and their partners are working to ensure that governments and other national stakeholders have sufficient information to plan and respond to the effects of the pandemic on local markets.

Ousmane Badiane, Executive Chairperson

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[1] For a more detailed description of the methodology, please see AKADEMIYA2063's COVID-19 Bulletin 2, available at *https://akademiya2063.org/uploads/COVID-19-Bulleti n-002.pdf* .
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can also help predict the capacity of communities to absorb future shocks and plan response strategies. The information can help better target preventive measures as well as facilitate more effective interventions to deal with the effects of shocks once they reach into communities. The applied methodology and the findings are discussed in the following sections.

Patterns of Vulnerability in Malawi

In order to show the overall vulnerability to COVID-19 of across different communities in Malawi, we computed the community level scores of vulnerability following the methodology described previously.

Figure 1: The distribution of community vulnerability to COVID-19 in Malawi
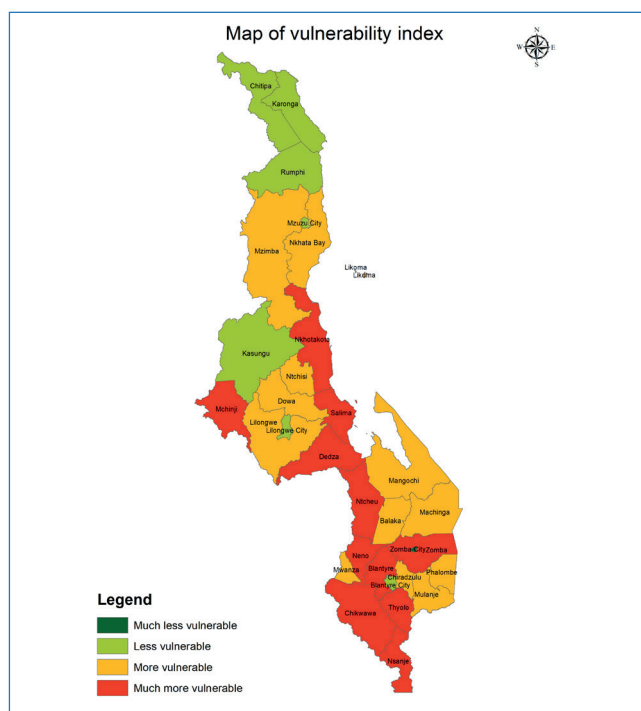
Constructed by Alankara, Ranjith (IWMI), data prepared by authors using Malawi Housing Census data, and World Bank's LSMS (2020)

Figure 1 shows that when every factor that contributes to overall community level vulnerability is accounted for, an overwhelming 35 % of districts (11 of the 31 districts analysed) are much more vulnerable (Dedza, Mchinji, Nkhotakota, Ntcheu, Salima, Neno, Zomba, Blantyre, Chikwawa, Thyolo and Nsanje). Further, another overwhelming 39% (12 districts) are also much vulnerable (Mwanza, Mulanje, Chiradzulu, Phalombe, Machinga, Balaka, Mangochi, Lilongwe, Dowa, Ncthisi, Mzimba and Nkhatabay). Only 8 (26%) of the districts (Blantyre City, Zomba City, Lilongwe City, Kasungu, Mzuzu City, Rumphi, Karonga, and Chitipa) are less vulnerable and non is much less vulnerable. This information is important because it can guide the Malawi government in intervention planning.

We now look into the individual sub-indicators to gain further insight as to the primary determinants of the diverging community vulnerability. **Nutrition status and COVID-19 vulnerability**

Whether a high proportion of residents in a community are undernourished or not, may contribute to the outcomes of a COVID-19 spread in that community. Figure 2, shows that the prevalence of stunting (as a measure of poor nutrition) is higher in 9 districts (Dedza, Neno, Mchinji, Zomba Rural, Ntcheu, Mangochi, Mzimba, Lilongwe Rural and Ntchisi). These districts are considered much more vulnerable from the perspective of stunting. On the other hand, 6 districts including Likoma, Blantyre City, Karonga, Zomba City, Lilongwe City, and Mzuzu City have lower proportions of stunting and are hence considered much less vulnerable.

Figure 2: The distribution of vulnerability from a perspective of stunting in Malawi
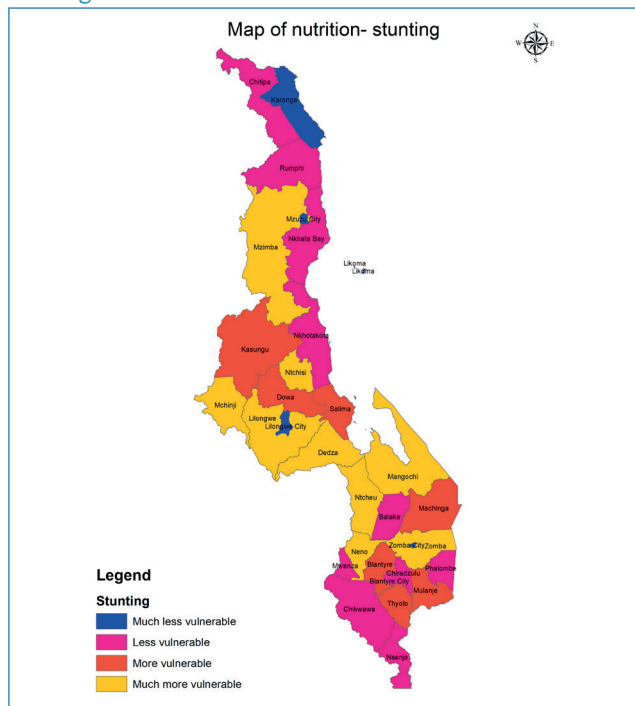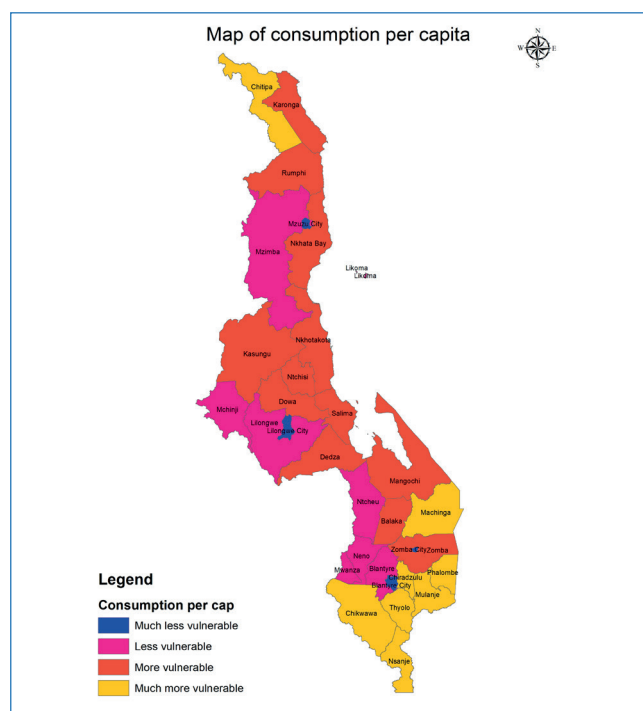

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Again, another measure of whether a community has good access to food as a proxy for nutrition is the expenditure on food per capita. Higher expenditures on food per capita indicate a higher access to food based nutrients.

Food consumption expenditure and COVID-19 vulnerability

In terms of food expenditure (Figure 3), 8 districts including Mulanje, Machinga, Thyolo, Nsanje, Chikwawa, Chradzulu, Chitipa, and Phalombe have low food expenditure per capita and considered much more vulnerable on the basis of this indicator. These are mostly Southern region districts, which are generally poor, with limited sources of income and low agriculture potential. There is also considerable vulnerability in respect of food expenditure per capita in Chitipa. Districts with the least vulnerabilities with respect to food expenditure are the urban centres (Blantyre City, Zomba City, Lilongwe City and Mzuzu City) which emanates from the fact that incomes per capita are generally higher in urban centres than in rural areas.

Figure 3: Vulnerability based on food consumption expenditure in Malawi

Map of consumption per capita

Legend
Consumption per cap
- Much less vulnerable
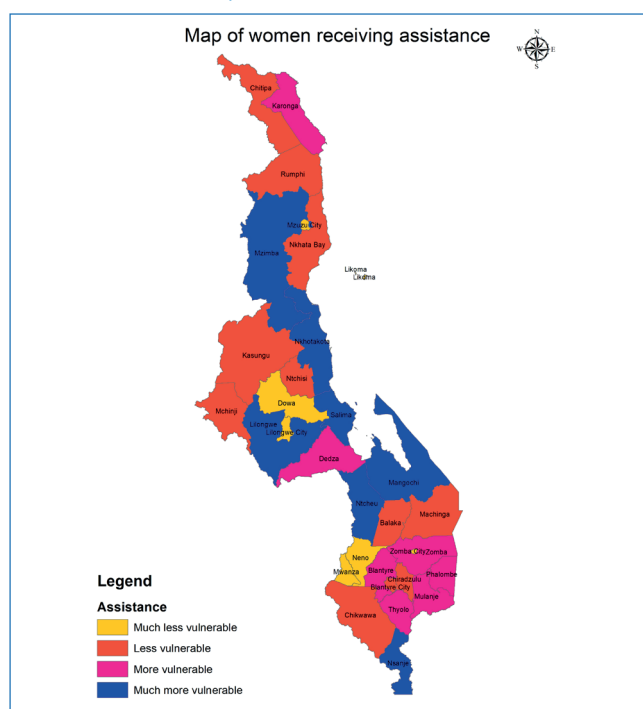- Less vulnerable
- More vulnerable
- Much more vulnerable

Constructed by Alankara, Ranjith (IWMI), data prepared by authors using Malawi Housing Census data, and World Bank's LSMS (2020)

Health infrastructure and access indicators

Access to health services and COVID-19 vulnerability

It is expected that where health care is limited, the severity of COVID-19 impacts is likely to be amplified. To capture the variation in health coverage and infrastructure across districts, two indicators are used. (i) The first indicator relates to the percentage of women

Figure 4: The percentage of women receiving assistance during childbirth from health professionals

Map of women receiving assistance

Legend
Assistance
- Much less vulnerable
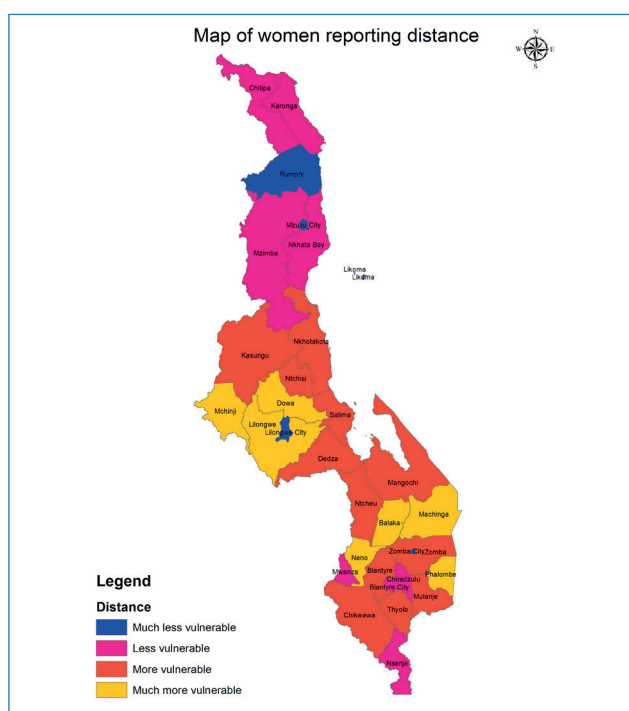- Less vulnerable
- More vulnerable
- Much more vulnerable

Constructed by Alankara, Ranjith (IWMI), data prepared by authors using Malawi Housing Census data, and World Bank's LSMS (2020)

aged 15-49 receiving assistance from a doctor, nurse, midwife or similar medical professional during childbirth, and the second indicator relates to (ii) the percentage of women aged 15-49 reporting that the distance to a health facility poses major problems.

Figure 4 shows that seven (Nsanje, Mangochi, Salima, Nkhotakota, Ntcheu, Mzimba, Lilongwe Rural) of all the districts have very low proportion of women receiving assistance from a doctor, nurse, midwife, or similar medical professional during birth. Many of these districts are also categorized as having a very high overall vulnerability index underscoring the importance of access to healthcare in determining community vulnerability. Again, the districts with better access to healthcare services include Dowa, Neno, Mwanza, Likoma, Zomba City, Lilongwe City, and Mzuzu City. Of the seven districts which are categorized as much less vulnerable overall, at least two (Lilongwe City and Mzuzu City) have relatively better access to health professionals during delivery. This further underscores the importance of access to health professionals in determining overall community level vulnerability to COVID-19 and its outcomes.

Figure 5: The percentage of women aged 15-49 reporting that the distance to a health facility poses major problems

Map of women reporting distance

Legend
Distance
- Much less vulnerable
- Less vulnerable
- More vulnerable
- Much more vulnerable

Constructed by Alankara, Ranjith (IWMI), data prepared by authors using Malawi Housing Census data, and World Bank's LSMS (2020)

The extent to which hospitals are available in a community can be an indicator of access to health and may be important in determining the outcomes of a health related pandemic such as COVID-19.

Figure 5 shows variation in the proportions on women who reported distance as a challenge for accessing health facilities. The percentage of women aged 15-49 reporting that the distance to a health facility posed

major problems varied spatially too. Lilongwe Rural, Phalombe, Machinga, Balaka, Mchinji Dowa, and Neno have highest proportions of women who reported that distance was a challenge in accessing healthcare. By contrast, women in five districts namely Rumphi, Likoma, Zomba City, Lilongwe City and Mzuzu City have the lowest proportions of women that mentioned distance as a critical problem for health care access. When these results are interpreted together with overall community vulnerability maps in Figure 2, it can be concluded that many of the districts where residents stay closer to hospitals (e.g. Lilongwe City, Rumphi, and Mzuzu City) are also much less vulnerable overall to COVID-19. This underscores the importance of access to hospitals in determining overall community level vulnerability to COVID-19. Although the south has more health facilities per capita followed by the northern region, it is clear that health facilities are in general, few and many households have to generally travel far to access health facilities in Malawi.

Disease burden and COVID-19 vulnerability

Further to examining health infrastructure and access to health services, we also examined, and added two measures of health outcomes namely, the prevalence of high blood pressure and diabetes, which are known to be highly correlated with COVID-19 mortality[2]. Thus, communities with high prevalence of such health conditions and comorbidities, are expected to experience more severe impacts from the disease than other areas.

Figure 6: Proportion of the population with blood pressure problems by district in Malawi
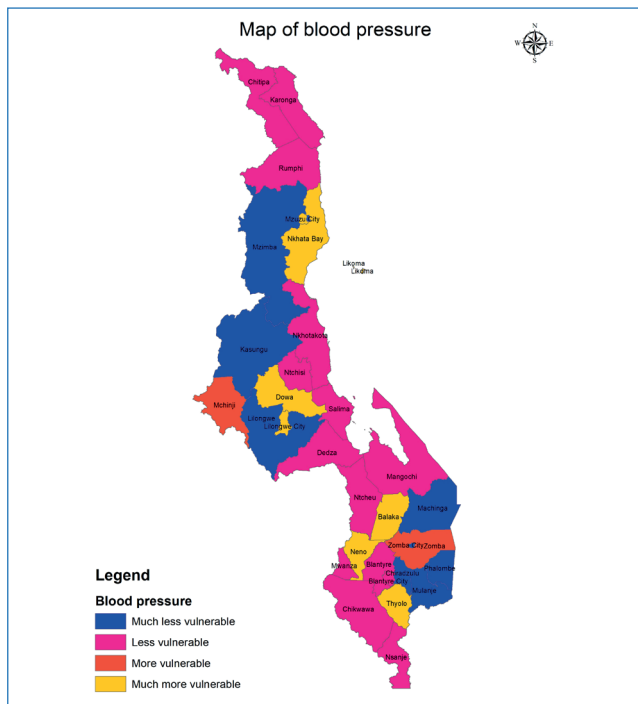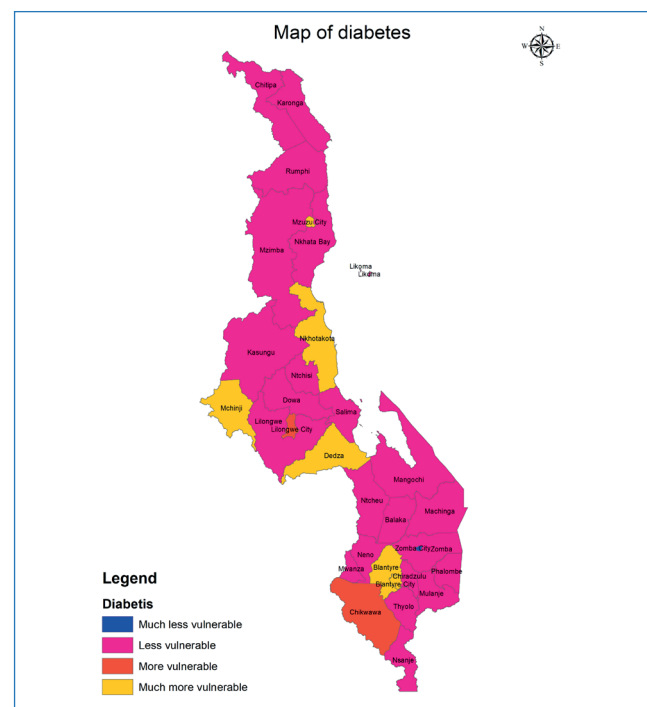

Constructed by Alankara, Ranjith (IWMI), data prepared by authors using Malawi Housing Census data, and World Bank's LSMS (2020)

Figure 6 presents spatial distribution of the proportion of the population with high blood pressure. The spatial distribution of hypertension in Malawi shows that Mzuzu City, Lilongwe City, Balaka, Dowa, Neno, Thyolo, Nkhatabay and Likoma have higher proportions of people with blood pressure problems. Hypertension is therefore a stronger contributor to overall vulnerability in these districts, as opposed to Lilongwe Rural, Phalombe, Machinga, Mulanje, Kasungu, Mzimba, and Chradzulu which have the lowest proportions of people with blood pressure problems. Explaining the reasons behind the differences in blood pressure proportion may require a thorough study, although it is interesting to note that two (Mzuzu and Lilongwe) of Malawi's three cities have high proportions of people with blood pressure problems alongside other rural districts. High blood pressure is a contributor to higher vulnerability in all cities covered by the analysis, suggesting that the causes of this variation may be differences in diets.

Figure 7: Distribution of diabetes prevalence in Malawi.

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The prevalence of diabetes in a population may predispose it to many other health problems including COVID-19, and therefore understanding its prevalence over time and space can facilitate policy responses to fight emerging health problems.

Figure 7 shows the prevalence of diabetes across Malawi. There is a clear spatial variation in terms of distribution of diabetes indices in Malawi. For example, whereas Mzuzu City, Mchinji, Zomba City, Nkhotakota, Dedza, Blantyre Rural, Blantyre City, Lilongwe City and Chikwawa have the highest proportions of people with diabetes and thus, those communities are much more vulnerable to COVID-19 impacts since diabetes contributes to community vulnerability. The rest of the districts have low levels of diabetes. Another point to note here is that diabetes prevalence appears to be high in all the cities of Malawi i.e. Zomba, Lilongwe, Blantyre and Mzuzu.

2 Centers for Disease Control and Prevention. 2020. "Evidence Used to Update the List of Underlying Medical Conditions." 28 July. Available at htt ps://www.cdc.gov/coronavirus/2019-ncov/need-extra-precauti ons/evidence-table.html

This is also the case for hypertension and therefore this underscores the importance of diets in the epidemiology of diabetes and hypertension.

Population density and COVID-19 vulnerability

Figure 8: The spatial variation in population density in Malawi
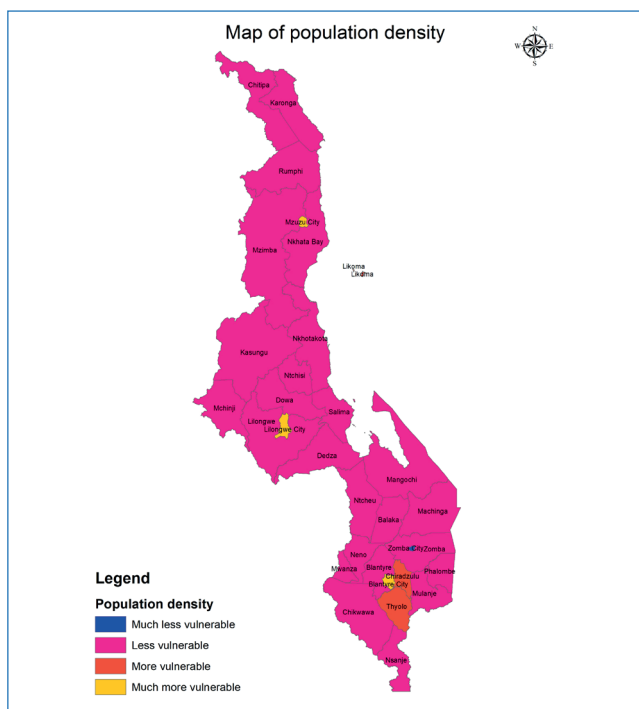
Constructed by Alankara, Ranjith (IWMI), data prepared by authors using Malawi Housing Census data, and World Bank's LSMS (2020)

We then lastly examine population density as reported in the Malawi census of 2018. The idea is that where population density is high, the likelihood of disease spread is high and health services may be stretched. Figure 8 shows the variation in population densities in Malawi.

Malawi is generally more highly densely populated than many countries in the Southern Africa region, perhaps coming only second to Rwanda. The data showed that all the cities namely; Blantyre City, Lilongwe City, Mzuzu City, and Zomba City have very high population densities and thus making them much more vulnerable to COVID-19 impacts. On the other hand, Chradzulu, Likoma, and Thyolo, also have high population densities and are considered more vulnerable. By contrast, the rest of the districts have lower levels of population density relative to the national averages and are categorized as much less vulnerable.

Conclusion

In this bulletin we examined the vulnerability to COVID-19 impacts of various locations in Malawi based on based on a community wide vulnerability indicator that we constructed by overlaying other factors that may predispose people or locations to COVID-19 impacts. These indicators included existing food and nutrition security, population density health access, health services, high blood pressure, diabetes and infrastructure conditions. These factors are likely to raise the probability for a location to suffer more severe effects from shocks such as the COVID-19 pandemic. In the final analysis, we found that the most vulnerable locations are likely to be found in Thyolo, Blantyre Rural, Chikwawa, Dedza, Mchinji, Nsanje, Neno, Nkhota Kota, Ntcheu, Salima, Zomba Rural, Balaka, Lilongwe Rural, Mangochi and Mulanje. Thus, these areas need to be prioritised in the design of intervention efforts to prevent and mitigate the effects of the pandemic and future crises.