Effects of El Nino condition on Malawi's economy - 2023/24

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Key messages

- Malawi is no stranger to adverse climatic conditions, but the frequency and magnitude of the conditions has recently intensified, with 11 El Nino cycles recorded from 1987, seven (7) of which had economy-wide negative effects;
- Global and local meteorological forecast show 95% likelihood of El Nino conditions in the 2023-24 production season, characterized by normal to below normal precipitation and record high temperatures, mostly in central and southern Malawi.
- A Rural Investment and Policy Analysis (RIAPA) scenario model output shows reduction in maize production by 8.3% from normal in scenario 1, and a 20% in scenario 2, on account of the forecasted El Nino conditions.
- The 2023/24 Gross Domestic Product (GDP) contracts by -4% in scenario 1 and -8.6% in scenario 2, largely influenced by the shrunk agriculture GDP -9.2% in scenario 1 and -18% in scenario 2. In nominal terms, Malawi's 2023/24 GDP will drop from $645 to $620 in scenario1 and $592 in the conservative scenario 2.
- There is a 3.4% reduction in household consumption capacity in scenario 1 and a 6.7% drop in scenario 2, with eroded consumption capacity more pronounced in urban than rural areas; 2% against 2.6 % in scenario 1, 5.3% against 12.2% for urban and rural households respectively in scenario 2.
- Social protection measures must be target specific considering the spatial and temporal differentials in production capacities among households.

- Ministry of Agriculture should facilitate irrigation focused farming among cooperatives and estate farmers in affected areas, which could off-set the food deficit and lower food inflation, on account of food shortages.

Context

Malawi's 2023/24 production season has already signified departure from normal patterns, characterised by changes in spatial-temporal commencement and distribution of rainfall, amid rising temperatures. Global and local meteorological forecasts show a 95% probability of unusual rainfall patters in the season, with November recording normal to below normal rainfall, particularly in the northern and southern region.

January 2024 has a higher likelihood of above normal rainfall in southern and central regions.

Delays in onset of cropping season rainfall, an early cessation and subsequent shorter duration are already essential characteristics of drought for most part of the season, especially over central and southern Malawi.

Historical seasons analogous to the 2023/2024 cropping season in which El Niño conditions prevailed include 1982/1983, 1997/1998, 2009/2010 and 2015/2016. All were characterized by crop failure, food shortages, households poverty and reduction in economic growth as measured by GDP.

The pivotal placement of crop production in Malawi's food systems and overall economic productivity places the 2023/24 cropping season in the spotlight, in view of its El Nino predictions. This policy brief highlights likely impacts of the 2023/24 El Nino conditions on selected socio-economic indicators and sectors, suggesting programmatic considerations to address the impact.

Methodology

This analysis used a Rural Investment and Policy Analysis (RIAPA) model to assess the impact of El Nino climatic conditions on crop yield and ripple effects on household consumption capacities, poverty and growth as measured by gross domestic product (GDP). Temperature, rainfall, and cereal production data for El Nino years between 1984 and 2016 were matched to measure the difference between actual and trend yields for each year.

These were used to mimic and predict impact of the forecasted El Nino conditions in the 2023/24 season and three more years. For purposes of the analysis, El Nino years were identified based on sea-surface temperatures in October to December and El Nino harvests were those occurring in the austral fall after the peak of El Nino (October to December plus one).

El Nino impact on maize yield at the national level were aggregated from its impact at district level, weighted by maize areas across district based historical yield data. A simple mean approach was used to define cut-off points in figures.

Historical trends and impact of El Nino Conditions in Malawi

Malawi has had 11 El Nino affected years; 1998, 2003, 2005, 2007, 2010, 2015, and 2016 in 1987—2016. The 7 negatively affected years are 1987, 1992, 1995, 1998, 2005, 2015, and 2016.

El Niño impact differs across districts, and the impact in the south seems to be larger, where maize yield could be more than 30% lower than expected in the most seriously affected districts, e.g., Mangochi, Mulanje, Mwanza in darker red color (Fig. 1) or less than 10% lower , e.g., in Lilongwe, Karonga in yellow color (Figure 2).
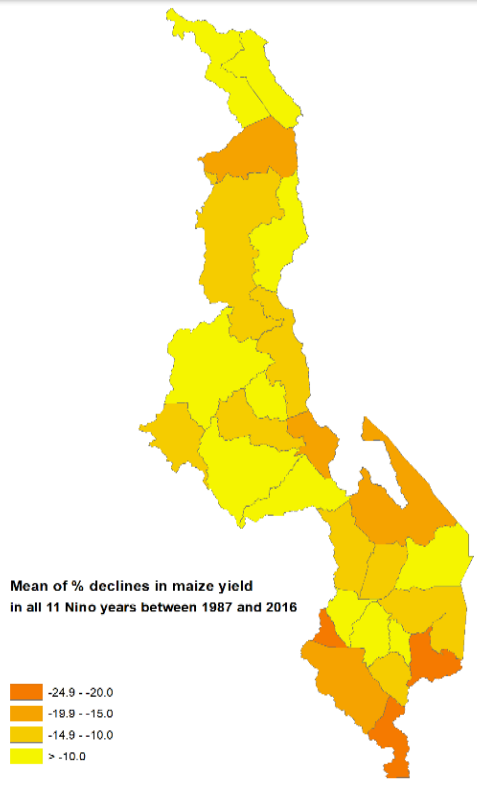
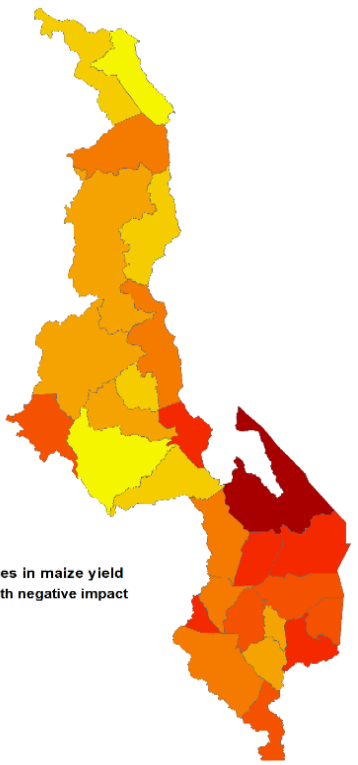Figure 1. Mean declines in maize yield by district in 11 El Nino years

Distribution of El Nino affected rural population in Malawi – average over 7 El Nino years with Negative yield impact

Analysis further reveals that 57% of Malawi's rural population live in 15 districts where maize yield lowered by 15—30% due to El Niño impact in the past (Fig 3).
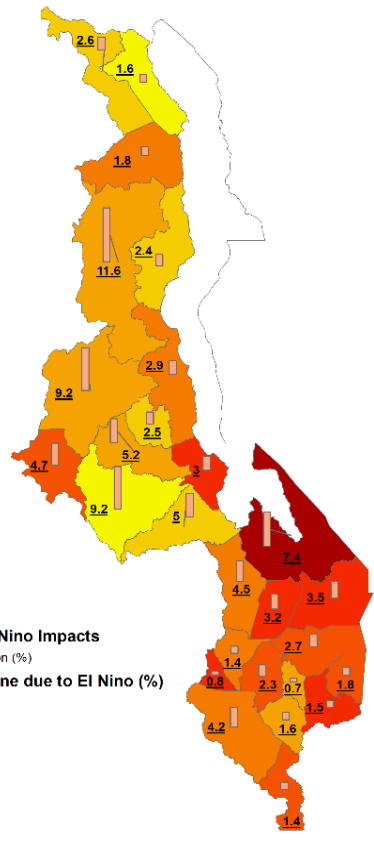

Figure 3. Distribution of El Nino affected population by district

Figure 2. Mean declines in maize yield by district in 11 El Nino years

Further, 20% of rural population affected are in Mangochi (in darkest red color in the map), Salima, Balaka, Machinga, Mulanje, and Mwanza (in second darkest red color in the map) with reduced maize yield (Figure 3).

Note: The colors in the map for districts reflect the differential average impacts of the seven El Niño years in which maize yield fell from its trend level across districts. Numbers shown in the map for individual districts are percentage of national total maize areas affected by El Niño

Distribution of El Nino affected maize areas in Malawi – average of over 7 El Nino years with negative yield impact

Analysis shows that El Niño will affect maize production in the entire Malawi and 60% of maize areas are in the districts that were affected with low maize yields (15—30%) in the past El Niño years. Analysis shows that 15 districts fall in this group (Figure 4).

Nearly 20% of maize areas are in Mangochi (in darkest red color), Salima, Balaka, and Machinga (in second darkest red color) with past maize yields lowered by more than 30% lower in the past El Niño years.

Distribution of El Nino affected crop areas in Malawi,   average over 7 year El Nino years with negative impact

More than 55% of Malawi's crop areas are in the districts with maize yield 15—30% lowered in the past El Niño years. Analysis shows that 15 districts fall in this group. Further, more than 20% of crop areas are in Mangochi (in darkest red color), Salima, Balaka, Machinga, Mulanje, and Mwanza (in second darkest red color) with maize yield more than 30% lower in the past El Niño years (figure 5).
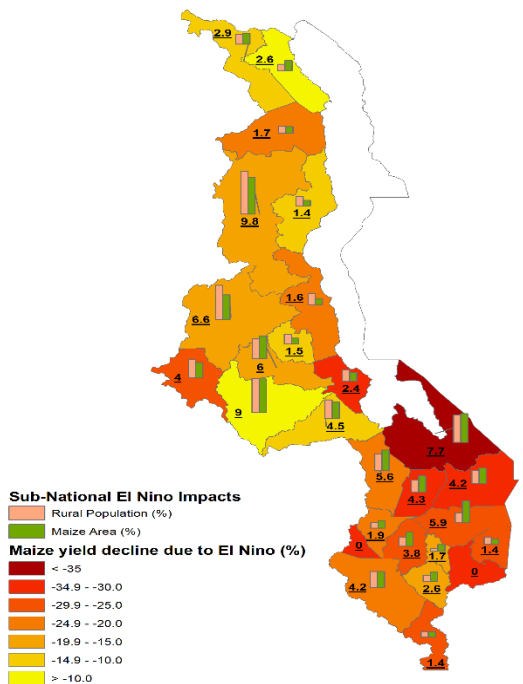

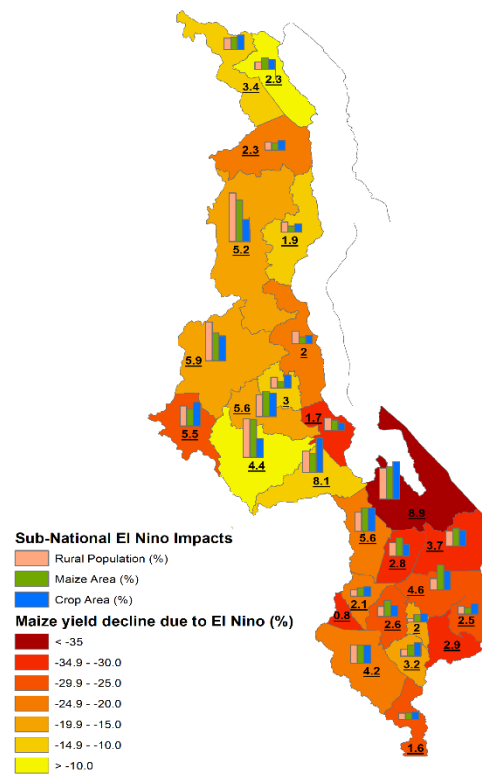Figure 4. Maize yield decline due to El Nino in most affected areas, Malawi

Figure 5. El Nino affected crop areas in Malawi by district over the 7 years with negative impact

NB: The colors in the map for districts reflect the differential average impacts of the seven El Niño years in which maize yield fell from its trend level across districts. Numbers shown in the map for individual districts are percentage of national total crop areas affected by El Niño

Economywide impacts of 2023 El Niño in Malawi — RIAPA model simulation analysis

Economy wide impacts of El Nino conditions were based on two scenarios created from historical El Niño impacts on maize yield. Analysis shows that exogenously El Nino conditions will shock maize productivity in 2024 with declines in maize production.

Scenario 1: maize productivity shock based on the average impact of all past El Niño years (average over 11 El Niño years) and size production falls by 8.3%

Scenario 2: maize productivity shock based on the 6 and 7 El Niño years with negative yield impacts in Malawi, maize production falls by 20.1%.

Foresight & Rapid Response Modeling System (FARRMS)

The Foresight and Rapid Response Modelling System (FARRMS) was applied on the crop and climate data to model impacts of El Nino conditions based on global models (trade and world commodity prices), infrastructure (roads water and power) biophysical (crops and livestock).

These fed into the dynamic economywide model which had investment tools, (non-food policies and investments), value chain tools (policy priorities value chains -PPVC, demography and macroeconomy).

Outputs of the analysis were agri-food systems; GDP, Jobs, Water use, Resilience and Green House Emissions, while Household level outputs included income, poverty, hunger, inequality, gender and diets (Figure 6).
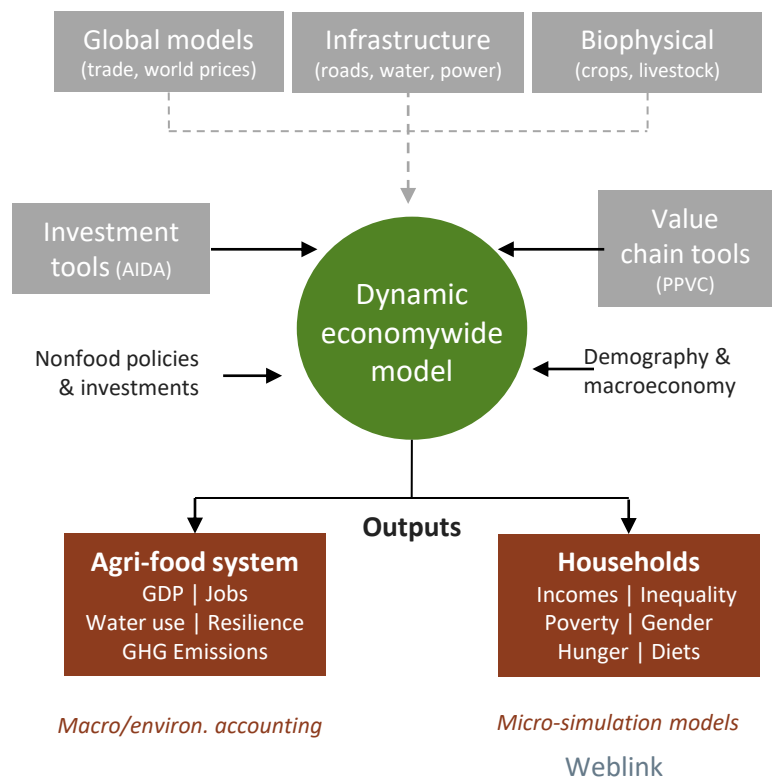

Figure 6. fforesight & Rapid Response Modeling System (FARRMS) framework

Analysis results in figure 7. show that the 2023/24 Gross Domestic Product will contract by 4 percent in scenario1, worsening in scenario 2, where it contracts by 8.5%. The agriculture-food system GDP contracts by 7.2 percent and the agriculture GDP contracts more; 9.2 percent in scenario1
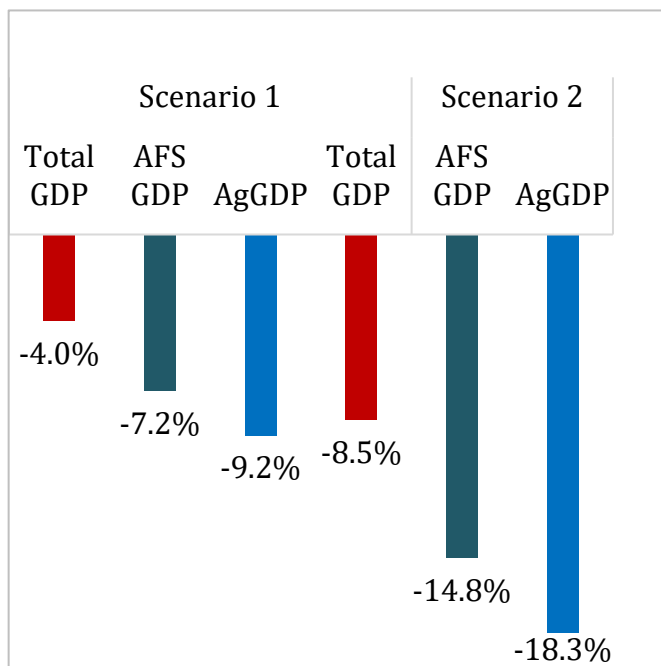

Figure 7. The 2023/24 El Nino impacts on Gross Domestic Produce (GDP)

The estimates are much more bigger in the conservative scenario 2; where the agri-food systems GDP will contract by 14.8 percent, while the agriculture GDP contracts by 18.3 percent (Figure 7).

Further, in scenario 1, the 2024 GDP will be reduced from the base of $645 in 2023 to $620 in 2024 and $592 in scenario 2. In 2025, the GDP will be reduced from the base of $646 to $644 in scenario 1, and $642 in scenario 2. (Figure 8).
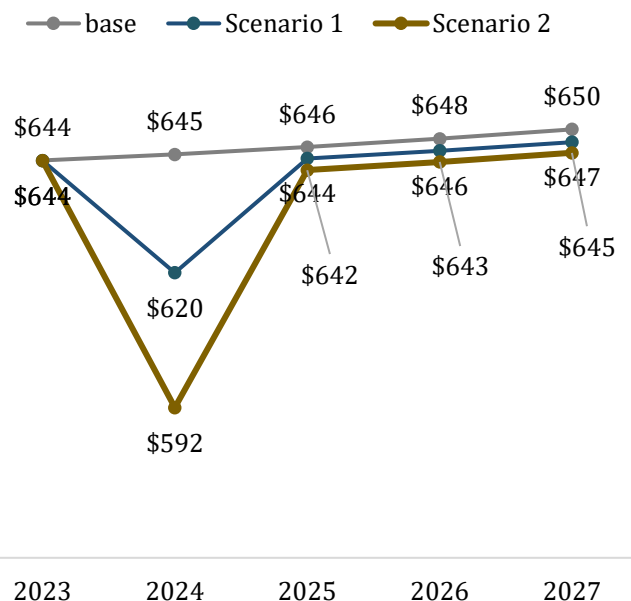

Figure 8. Impact of the 2023/24 on per-capita GDP over time

Model results further show that in 2026, the GDP will be reduced from $648 baseline to $646 in scenario 1 and $643 in scenario 2.

In 2027, the GDP will be reduced from the baseline of $650 to $647 in scenario 1 and $645 in scenario 2 (Figure 8).

2023/24 El Nino Impacts on Household Consumption

Owing to the critical bearing crop production has on household livelihoods, analysis has revealed that the 2023/24 El Nino conditions will erode household consumption capacities by 3.4% in scenario 1 and 6.7% in scenario 2 (Figure 9).
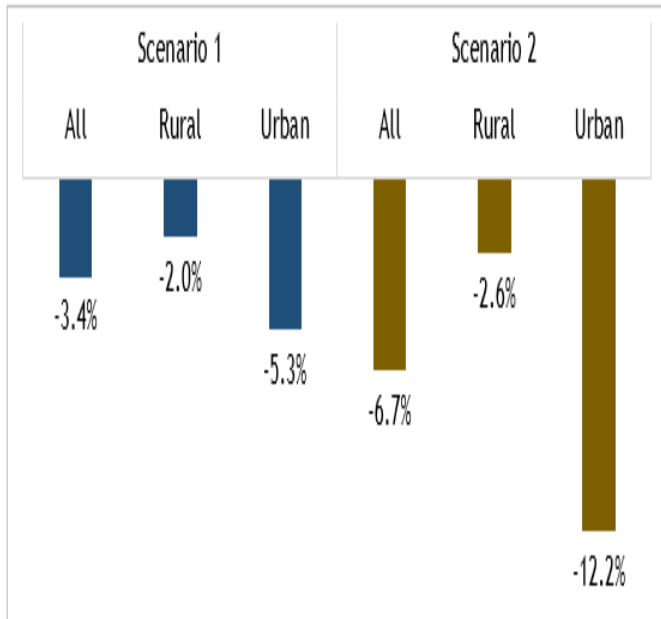
Figure 9. Reduction in household consumption capacities by residence.

Urban residents will experience more loss in their consumption capacities than rural areas in both scenarios - 5.3% and 12.2% in scenarios 1 and 2 respectively, while rural residents will experience a 2% and 2.6% reduction in their consumption capacities in scenarios 1 and 2 respectively (Figure 9).

2023/24 El Nino Impacts on Household Poverty

The erosion of household production and livelihood capacities by the forecasted El Nino conditions has a direct link to its poverty impact. Analysis shows that the forecasted El Nino conditions will augment household poverty levels in the country by a higher magnitude in the urban than rural areas. Scenario 1 of the analysis shows that nationally, household poverty will be increased by 1.6%, while the conservative scenario 2 shows an El Nino conditions poverty increase by 2.6% (Figure 10) .
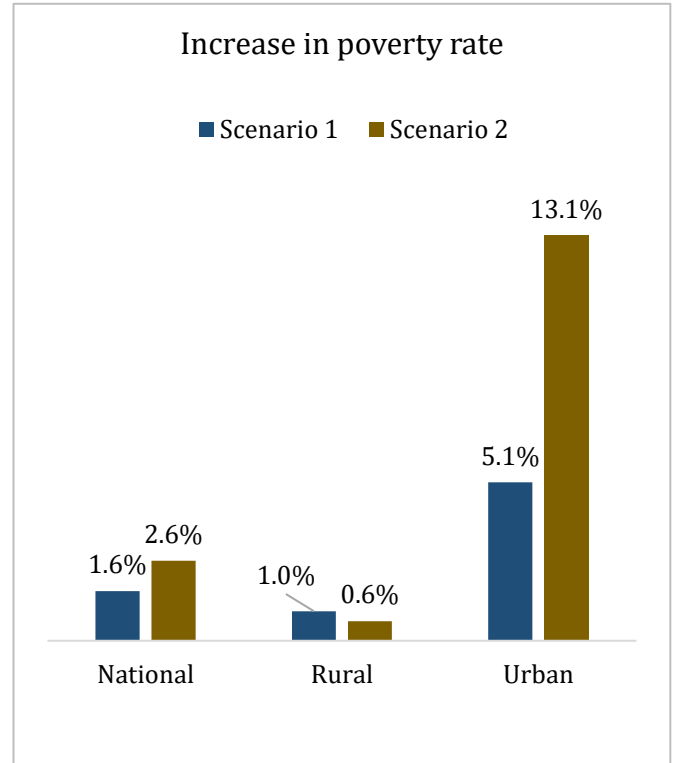

Figure 10. El Nino induced household poverty rate increase by households

In 2024, there will be 690,536 more hungry people in the country (scenario 2), more in the rural; 531,408 than urban; 221,687 respectively. This indicates a 3.2% increase from the 2024 baseline (scenario 2) nationally and a 3.3% increase in rural areas, against a 2.7% increase in urban areas (scenario 2).

Among urban residents, household poverty rate will increase by 5.1% in scenario 1 and 13.1% in scenario 2, while among rural households, scenario 1 household poverty increase is 1% and 0.6% in the rural areas. This result indicates that urban households are likely to experience the brunt of increased poverty induced by the forecasted El Nino conditions.

Across the productive sectors; the 2023/24 El Nino conditions will have varied negative impacts; with the agriculture sector experiencing the highest of losses. Results show a 6% loss in agriculture GDP in 2024 in scenario 1, while scenario 2 shows a 14.3% loss in agriculture GDP (Figure 11)
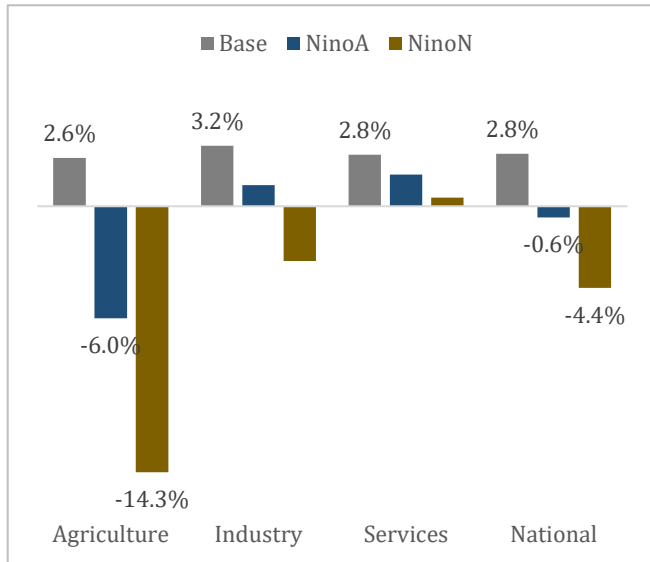

Figure 11. El Nino induced GDP loss by productive sector

The industry sector will experienced no loss in GDP in scenario 1, while the conservative scenario 2 shows a GDP loss of 2.9%. The services sector shows no loss in GDP attributed to El nino, but mild increases in both scenarios; 1.7% in scenario 1 and 0.5% in scenario 1.

Conclusion

- Malawi will experiencee El Nino conditions, with wider economic impacts.

- The agriculture sector is hugely affected, seconded by the industry sector.

- Household food availability and consumption capacity will be eroded, more in urban than rural areas.

- The prevalence of hunger will increase in rural than urban areas

- There will be increases in population falling into a poverty trap.

Recommendations

- Ministry of agriculture should encourage production of drought-tolerant, higher value crops, i.e., legumes, tubers and roots, with more support targeting cooperatives.
- DoDMA should plan and provide for relief provision in areas likely to be affected by El Nino, to build survival capacities, especially among urban residents.
- Ministry of Finance and Economic Affairs should scale-up the targeted social-cash transfers so as to build household productive capacities especially in rural areas.
- Commercial farming through mega-farms should be hastened to improve food production through irrigation. This entails the K50bn funds required to operationalize the investment should be prioritized.

Acknowledgements