Detailed Report

This is the detailed report component of submissions for the Pale Blue Dot: Visualization Challenge.

1. How does your visual inform a decision or action that furthers one or more of the key competition SDGs (zero hunger, clean water and sanitation, climate action)?

   By offering insights into food security hotspots and leveraging rainfall data to validate these findings, obtained through an analysis of disaster occurrences in the region, our visual aids in informing actionable decisions to advance Zero Hunger initiatives. The validated food insecurity risk map not only directs targeted interventions but also facilitates resource allocation tailored to empower communities in addressing food insecurity challenges. Proposed interventions encompass community training initiatives focused on resilient and climate-smart agricultural practices, alongside exploration of alternative food production methods suitable for high temperature and low rainfall areas, fostering sustainable solutions to combat hunger.

2. How did you create your submission? Include the tools you used (e.g., Python, Excel, specific python packages), how you processed the data, and (if applicable) how you managed your codebase. If you have a public repository with code, you can share a link here.
   Firstly, we obtained seasonal IPC phase classification data by extracting reports from the National Disaster Management Authority in Kenya and compiling them into an Excel file. These reports provided detailed assessments of food security status in prioritized counties annually. Next, we determined the predominant food security phase for each prioritized county by analyzing the most consistent class over the period 2014 to 2023. Map A was then generated to illustrate counties consistently falling within specific IPC classes, with Turkana and Marsabit counties consistently classified in the Crisis stage.
   To develop a food insecurity map of the identified counties in IPC Class 3, we then utilized disaster data sourced from HDX, which was initially in Excel format. We then geocoded the dataset to location coordinates. Given that multiple occurrences of disasters often happened in one location, we aggregated these occurrences to create a count by location file. This data was then interpolated using the Inverse Distance Weighting Method in QGIS to generate a smooth surface representing the frequency of disasters across the region. Lower values indicated none or fewer occurrences, while higher values indicated higher

occurrences. This directly translated to the level of food security in the region ie., lower values indicated none or minimal food insecurity, while higher values indicated higher levels of food insecurity. We then leveraged raster rainfall data to validate the food security risk map created using disaster data.

While we utilized disaster data as a key factor in identifying food insecurity hotspots, it's important to note that this is just one facet of a comprehensive analysis. The incorporation of disasters and other known variables serves as a guiding factor, allowing us to identify potential areas of heightened food insecurity risk. We acknowledge that this isn't the sole determinant, and our approach is centered on pinpointing hotspots. From our perspective, there appears to be a discernible relationship, but for more nuanced and accurate insights, it is recommended to integrate this information with other relevant variables. The synergy of multiple factors can enhance the precision of identifying regions at greater risk, providing a more comprehensive understanding of the complex dynamics contributing to food insecurity.

3. What motivated you to choose this topic?

Our motivation for selecting this topic was influenced by recent and prolonged floods in Northern Kenya, particularly in the North Eastern region, attributed to El Niño rains during the Oct-Nov-Dec season. Preceding these floods, the region had endured prolonged drought. Given the susceptibility of this area to extreme weather events, donors and third-party organizations played a significant role in providing aid during crises. Additionally, the forecast from the Kenya Meteorological Department predicting an impending drought following the El Niño floods underscored the need for proactive adaptation measures.

Furthermore, a significant development in our motivation arose late last year when one of our team members actively engaged with the Red Cross, supporting them in a climate adaptation project. This team member had a unique opportunity to interact directly with communities, especially in North Eastern Kenya and the Coastal region. Through these interactions, which included discussions on the importance of preparedness, the team member gained insights into local perspectives on weather patterns. This aligns with existing research indicating that these regions are prone to extreme weather events.

Engagement with the community revealed that, even as they anticipate El Niño, these regions are inevitably bound to return to drought conditions, creating a repetitive cycle. The firsthand experience of the community's challenges and

their resilience inspired our interest in exploring how Geographic Information Systems (GIS) could be leveraged to develop intervention and implementation strategies. This personal connection with the community further fueled our commitment to employing advanced technologies to provide insights into food security hotspots, facilitating targeted interventions, and minimizing the impact of extreme weather events and disasters on food security in the region. Our aim is to contribute meaningfully to Kenya's national development agenda, particularly the Big 4 agenda, by addressing the crucial issue of food security through the application of cutting-edge technologies and community engagement.

4. How did you learn about the broader context of your chosen issue (e.g., historical, social, political)? This could include drawing on the lived experiences of team members, reading articles and literature, conducting interviews with community members, etc. Did what you learned change your approach?
   Our understanding of the broader context surrounding our chosen issue was enriched through a multifaceted approach. We extensively studied news reports to gain insights into the historical, social, and political dimensions of the recurring floods and droughts in Northern Kenya, especially in the North Eastern region. This allowed us to comprehend the immediate challenges faced by communities and the subsequent interventions by various stakeholders.

   Additionally, we delved into reports from the National Disaster Management Authority (NDMA), which provided detailed assessments of food security status in prioritized counties annually. These reports not only served as valuable sources of information but also offered a comprehensive overview of the evolving dynamics of food security in the region.

   Furthermore, a pivotal aspect of our knowledge acquisition came from the firsthand experiences of our team members. One team member, actively engaged with the Red Cross in a climate adaptation project, had the opportunity to interact directly with communities in North Eastern Kenya and the Coastal region. These interactions provided unique perspectives on the lived experiences of the communities, emphasizing the cyclical nature of extreme weather events and the challenges they pose.

   The integration of news reports, NDMA assessments, and personal experiences through community engagement enriched our understanding of the issue. While our initial approach was shaped by existing literature and reports, the direct interaction with communities added a human element to our research. This personal connection reinforced our commitment to developing practical

solutions through GIS technologies and community engagement, emphasizing the need for targeted interventions that consider the historical, social, and political dimensions of the issue.

5. What are the ethics and/or equity issues you considered? What are some possible strategies or approaches for addressing them?
   Our project emphasized transparency, community involvement, and equity considerations throughout the research process. By acknowledging potential biases and limitations in our findings, actively engaging with communities, addressing the specific needs of marginalized groups (Pastoralists in Northern Kenya), and using publicly available data, we aimed to conduct a responsible and ethical analysis that contributes meaningfully to the broader goals of sustainable development and addressing the challenges outlined in **SDG 2: Zero Hunger.**

6. Would your team like to share the URL of an interactive visualization?
   Not Applicable