**BAT 404 - Analytics Techniques and Tools**

Final Project Proposal Topic:   
EDA to Typhoon Mitigation and Response Framework (TMRF)

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**Abstract**

The Philippines' apparent vulnerability to natural disasters emerges from its geographic location within the Pacific Ring of Fire. The country is surrounded by large bodies of water and faces the Pacific Ocean, which produces 60% of the world's typhoons. Approximately twenty tropical cyclones pass through the Philippine area of responsibility each year, ten of which are typhoons and five of which are catastrophic (Brown, 2013). Due to a lack of preparedness and response, families in rural areas are more likely to be hit. According to the Weather Underground (n.d.), hurricanes are becoming a global threat as they solidify and more super tropical storms emerge. As a result, every municipality should have a high level of safety and security. However, government agencies and non-governmental organizations in the Philippines promote emergency preparedness, but they have yet to acquire the public's general attention like in Yolanda’s storm surge disaster where there is insufficient public awareness of storm surges, higher casualties have occurred (Commision on Audit, n.d.). The Commission on Audit also reported that the mayor of Tacloban City had stated that more lives may have been saved if storm surges were labeled as tsunami-like in nature. According to the National Research Council et al. (n.d.), preparedness is indeed the way of transforming a community's awareness of potential natural hazards into actions that strengthen its ability to respond to and recover from disasters and proposals for preparedness must address the immediate response and all the longer-term recovery and rehabilitation.

The objective of this analysis is to construct an Exploratory Data Analysis to Typhoons from the year 2019 that prompted the most casualty rates in the country and data on the municipal governments that had the least number of affected families’ individuals per typhoon. Moreover, global datasets about hurricanes in the U.S. from the Centre for Research on the Epidemiology of Disasters' Emergency Events Database (EM-DAT) will be utilized in the same manner as mentioned in the Philippines Data set to know which Location in the United States had the most successful response and mitigation plan for typhoons. This information will be used to construct a Typhoon Mitigation and Response Plan that may help the Philippines deal with hurricanes. Integrating various programs from other countries will increase the likelihood of Filipinos' survival and recovery from typhoons.

**Problem Statement**   
 The primary issue addressed by this project is the lacking of a mitigation and response framework among the cities and municipalities located throughout the Philippine archipelago. This was a significant component that might have a long-term impact on the lives of all Filipinos. Concerning this subject, the Senate Economic Planning Office (2017) conducted a study that evaluates the most often experienced problems and issues by various organizations in the Philippines. Among these concerns include a lack of coordination and collaboration amongst parties, the inadequate ability of line agencies and local government units to carry out DRRM tasks; reduced emphasis assigned to DRRM operations; inadequate enforcement of rules and policies; and scarcity of and difficulty in obtaining DRRM data/information. These are the concerns that this study seeks to address.

**Significance of the proposed project**

This data analysis research will provide fresh light on the country's reaction to and mitigation of the consequences of typhoons. This research will specifically benefit the following:  
 *Government* - This research will aid them in taking immediate action, prior to a disaster, to mitigate losses in the case of a typhoon disaster. The planning process and suggested ideas from established frameworks in the United States will assist them in determining how to plan, create, and develop the community while fostering risk-reduction collaborations.

*Community* - This research educates the community about the solutions and methods that might be implemented to ensure their safety during typhoon catastrophes and floods.

*Students* - Students would immediately benefit from this research since its findings may motivate them to investigate data analytics as a way to assist the community in which they live in developing efficient disaster mitigation and response plans, particularly for typhoons. They will also be informed of their precautions to safeguard themselves and their loved ones against storms and floods.

*Parents* - This research may persuade parents to pursue programs that include instruction to assist pupils in coping with the damaging impacts of typhoons.

*Future Researchers* – This paper discusses mitigation and response frameworks to minimize the devastation caused by typhoons. Thus, the findings of this study may be utilized to inform future conversations and analysis of effective frameworks employed by governments throughout the world that the Philippine government could adopt for its own system.

**Methods**   
 The primary issue tackled by this project is the inadequacy of a mitigation and response framework across the Philippine archipelago's cities and municipalities. This was a critical component that might have long-term consequences for the lives of all Filipinos. The Senate Economic Planning Office (2017) researches this subject, evaluating the most often encountered challenges and concerns by various organizations in the Philippines. The researchers will conduct an Exploratory analysis approach on the data sets selected for this study to address this. The primary objective of the exploratory analysis is to discover (Calzon, 2022). And according to IBM Cloud Education (2020), no concept of the link between the data and the variables existed before the analysis. Once the data has been analyzed, the exploratory analysis will assist the researchers in identifying linkages and developing ideas and answers to the deficiency of typhoon disaster mitigation and response frameworks in the Philippines.

**Reliability of the Organizations Where the Data sets Originated**

*Humanitarian Data Exchange Typhoon Data se 2019 t from the Philippines:*

The HDX or The Humanitarian Data Exchange is an open platform for exchanging data between humanitarian organizations and disasters. HDX, launched in July 2014, aims to make humanitarian data more accessible and usable for research (Sustainable Development Goals Helpdesk, n.d.). Users in over 200 nations and territories have accessed their increasing collection of datasets. HDX is administered by OCHA's Centre for Humanitarian Data in The Hague. It is a new data platform that will enable humanitarians to access and exchange credible, up-to-date data. There is widespread agreement that data saves lives. Data enables the humanitarian community to develop short- and long-term strategies for providing vulnerable people with the assistance they need to create meaningful actions and decisions for the present society problems.

Collecting and maintaining data involves a variety of obstacles, particularly during the outset of a humanitarian crisis. Responders end up gathering a large amount of data on the ground in a variety of different formats during an emergency. This form of rapid, responsive data collection is beneficial for meeting the immediate needs of the impacted people, but less so when data sets are combined to examine patterns overtime or provide detailed information of what is happening during a crisis. OCHA pioneered the creation of Humanitarian Data Exchange (HDX) following significant study. HDX is a new data-sharing platform that adheres to the highest data gathering standards, providing meaningful and reliable data access. HDX is a one-of-a-kind technology that will alter the role of data in humanitarian operations in the future, enabling organizations to give more focused help and adapt to changing requirements. As a result of these evidences, the organization's data sets are both reliable and suitable for data analysis purposes.

2019-2022 American EM-DAT from CRED

The second set of data comes from the CRED Center for Research on the Epidemiology of Disasters. In 1971, Professor Michel F. Lechat of the Université catholique de Louvain, an epidemiologist, launched a research program to examine health difficulties in crisis scenarios. Two years later, he founded CRED as a non-profit organization with international recognition. In 1980, the Centre was designated as a World Health Organization (WHO) Collaborating Centre (European Commission, n.d.). This organization fosters disaster research, education, and information transmission. Its objectives include increasing the efficacy of developing nations' disaster management capacities and supporting policy-oriented research using the Emergency Events Database (EM-DAT).

The EM-primary DAT's mission is to support humanitarian action on national and international levels. The database provides critical core data on the incidence and consequences of more than 22,000 catastrophic disasters worldwide between 1900 and the present (Centre for Research on the Epidemiology of Disasters, n.d.). CRED has been involved in the domains of international disaster and conflict health research for more than 40 years, with programs spanning relief, rehabilitation, and development. The Centre fosters humanitarian emergency research, training, and technical skills, notably in public health and epidemiology. This indicates that the data sets they've supplied are the result of their years of research and skill. As a result, the second data set that will be used in this study is suitable for data analysis.

**Objectives:**

The Philippines is a tropical country that lies within the equator, which means that it is prone to disasters like typhoons. A data set from the Humanitarian Data Exchange (2019) encoded all typhoons which landed and gravely damaged the country on 2019. Another dataset will be of use on this data analysis is from the CRED's Emergency Events Database (EM-DAT). This project aims to evaluate this data sets and obtain knowledge that will help the researchers obtain the following outputs:

*Humanitarian Data Exchange Data set about Philippines*

1. Determine the typhoon(s) from 2019 that brought the greatest number of casualties to the municipality in the Philippines.

2.Acquire the data about the municipalities who had the greatest and least number of affected families, individuals per typhoon.

3. Get the information that shows the municipality(s) who were most affected by typhoons from the year 2019.

*The Centre for Research on the Epidemiology of Disasters' Data set about the America*

1. Determine the typhoon(s) from 2019-2022 that brought the greatest number of casualties to the different locations in America.

2. Acquire the data about the location(s) who had the greatest and least number of affected families, individuals per typhoon.

3. Get the information that shows the location(s) who were most affected by typhoons from the year 2019-2022.

The main objective of this analysis would be to obtain the data which will determine the municipality(s) from the Philippines and location(s) from America who had the most successful response and mitigation plan to typhoons. Their planning systems would be analyze by the researchers to find what things the current plans of the Philippine Government are lacking in terms of typhoon disasters response plans compare to that of America.

**The Initial Plan to Obtain the Main Objective:**

The data set which the researchers obtained does not include the level of strength that a typhoon had. So, they have devised a plan that after listing the municipalities who have the highest number of casualties per typhoon, they will look into news articles online that will demonstrate the levels or strength of typhoons when they land on those specific municipalities and locations. The municipalities who suddenly lowered their casualties on the following typhoons and at the same time had a high level of typhoon strength, will then be considered as the one who had the most successful mitigation and response plan.

And lastly, the researchers will then research that municipality(s) disaster plans and incorporate them with one another to create a more effective plan.

Example:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Municipality or Location | Typhoon name 1 and casualties | Typhoon name 2 and casualties | Typhoon name 3 and casualties | … | … | … |
| Municip 1 | **Level 4**  **Casualties – 45 families affected and so on…** | **…Level 4** | **…** | **…** | **…** | **…** |
| Municip 2 | **…** | **…** | **…** | **…** | **…** | **…** |
| … | **…** | **…** | **…** | **…** | **…** | **…** |

**Expected output**  This research is planned to produce an exploratory data analysis of typhoons from the year 2019 that resulted in the highest casualty rates in the country and data on the local governments that experienced the fewest impacted families each typhoon. Additionally, worldwide hurricane datasets from the Centre for Research on the Epidemiology of Disasters' Emergency Events Database (EM-DAT) will be used in the same way as the Philippines Data set to determine which U.S. location had the best successful reaction and mitigation strategy for typhoons. These data will be utilized to develop a Typhoon Mitigation and Response Plan based on the one that the U.S. had, which can potentially assist the Philippines in dealing with hurricanes. By incorporating diverse strategies from other nations like the United States, the chance of Filipinos surviving and recovering from typhoons will likely increase.

**Sustainable Development Goals (SDGs) of the Project**

The SDGs which this project aims to attain are Sustainable Cities and Communities and Climate Action. These SDGs are further described as follows;

1. Goal 11: **Sustainable Cities and Communities** - This SDG strives to mitigate the negative consequences of natural catastrophes (globalgoals.org, n.d.).

2. Goal 13: **Climate Action** - This goal strives to take immediate action to address climate change and its consequences (United Nations, n.d.). Specifically, enhancing resilience and adaptation ability in all nations to climate-related dangers and natural disasters.

These SDGs is aligned with the TMRF project as it will provide a mitigation and response plan based from the tested and used framework by the U.S. government to their states. This framework will help the Philippine government in taking immediate action, prior to a disaster, to mitigate losses in the case of a typhoon disaster.

**Evaluation of the X variables inside the Data sets:***Humanitarian Data Exchange Typhoon Data se 2019 t from the Philippines*

|  |  |
| --- | --- |
| **X Variable** | **Definition** |
| Region |  |
| Region code |  |
| Province |  |
| Province code |  |
| City\_Mun |  |
| City\_Mun code |  |
| Year |  |
| Incident |  |
| Date Occurred |  |
| 2015 Population |  |
| Affected\_FAM |  |
| Affected\_PERs |  |
| Inside\_EC\_Fam\_Cum |  |
| Inside\_EC\_Fam\_Now |  |
| Inside\_EC\_Per\_Cum |  |
| Inside\_EC\_Per\_Now |  |
| Outside\_EC\_Fam\_Cum |  |
| Outside\_EC\_Fam\_Now |  |
| Outside\_EC\_Pers\_Cum |  |
| Outside\_EC\_Per\_Now |  |
| Totally damaged houses |  |
| Partially damaged houses |  |
| IDP\_Cum |  |

*Events Database (EM-DAT) in America 2019-2022*

|  |  |
| --- | --- |
| **X Variable** | **Definition** |
| *Dis No* |  |
| Year |  |
| Seq |  |
| Glide |  |
| Disaster Group |  |
| Disaster Subgroup |  |
| Disaster Type |  |
| Disaster Subtype |  |
| Disaster Subsubtype |  |
| Event Name |  |
| Country |  |
| ISO |  |
| Region |  |
| *Continent* |  |
| *Location* |  |
| *Origin* |  |
| *Associated Dis* |  |
| *Associated Dis2* |  |
| *OFDA Response* |  |
| *Appeal* |  |
| *Declaration* |  |
| *Aid Contribution* |  |
| *Dis Mag Value* |  |
| *Dis Mag Scale* |  |
| *Latitude* |  |
| *Longitude* |  |
| *Local Time* |  |
| *River Basin* |  |
| *Start Year* |  |
| *Start Month* |  |
| *Start Day* |  |
| *End Year* |  |
| *End Day* |  |
| *Total Deaths* |  |
| *No Injured* |  |
| *No Affected* |  |
| *No Homeless* |  |
| *Total Affected* |  |
| *Reconstruction Costs ('000 US$)* |  |
| *Reconstruction Costs, Adjusted ('000 US$)* |  |
| *Insured Damages ('000 US$)* |  |
| *Insured Damages, Adjusted ('000 US$)* |  |
| *Total Damages ('000 US$)* |  |
| *Total Damages, Adjusted ('000 US$)* |  |
| *CPI* |  |
| *Adm Level* |  |
| *Admin1 Code* |  |
| *Admin2 Code* |  |
| *Geo Locations* |  |

**Reference Data Sets:**

Centre for Research on the Epidemiology of Disasters. (2022). 2019-2022 EM-DAT of America.   
 Retrieved March 2022, from Centre for Research on the Epidemiology of Disasters:   
 https://public.emdat.be/data

Human Data Exchange Organization. (2019). Philippines 2019 Events Data. Retrieved   
 March 2022, from Human Data Exchange Organization: <https://data.humdata>.

# **References**

Brown, S. (2013, November 11). *The Philippines Is the Most Storm-Exposed Country on Earth*. Retrieved March 2022, from world.time.com: https://world.time.com/2013/11/11/the-philippines-is-the-most-storm-exposed-country-on-earth/?fbclid=IwAR1xfQgQHZkgjZck\_X9EBg\_Jvj76wm7EL-I8OHJebNGkpLxIsEgHLxqPcrU

Calzon, B. (2022, March 9). *Your Modern Business Guide To Data Analysis Methods And Techniques*. Retrieved March 2022, from datapine.com: https://www.datapine.com/blog/data-analysis-methods-and-techniques/

Centre for Research on the Epidemiology of Disasters. (2022). *2019-2022 EM-DAT of America*. Retrieved March 2022, from Centre for Research on the Epidemiology of Disasters: https://public.emdat.be/data

Centre for Research on the Epidemiology of Disasters. (n.d.). *Welcome to the EM-DAT website*. Retrieved March 2022, from Centre for Research on the Epidemiology of Disasters: https://www.emdat.be/

Commision on Audit. (n.d.). *Disaster Management Practices in the Philippines : An Assessment*. Retrieved March 2022, from coa.gov.ph: https://www.coa.gov.ph/disaster\_audit/doc/National.pdf

European Commission. (n.d.). *CRED - Centre for Research on the Epidemiology of Disasters*. Retrieved March 2022, from knowledge4policy.ec.europa.eu: https://knowledge4policy.ec.europa.eu/organisation/cred-centre-research-epidemiology-disasters\_en

globalgoals.org. (n.d.). *Sustainable Cities and Communities*. Retrieved April 2022, from globalgoals.org: https://www.globalgoals.org/goals/11-sustainable-cities-and-communities/

Human Data Exchange Organization. (2019). *Philippines 2019 Events Data*. Retrieved March 2022, from Human Data Exchange Organization: https://data.humdata.

IBM Cloud Education. (2020, August 25). *Exploratory Data Analysis*. Retrieved March 2022, from ibm.com: https://www.ibm.com/cloud/learn/exploratory-data-analysis

National Research Council, Division on Earth and Life Studies, Commission on Geosciences - Environment and Resources, U.S. National Committee for the Decade for Natural Disaster Reduction. (1991). *A Safer Future: Reducing the Impacts of Natural Disasters (1991).* Retrieved March 2022, from nap.nationalacademies.org: https://nap.nationalacademies.org/read/1840/chapter/7

Senate Economic Planning Office. (2017, May). *Examining the Philippines’ Disaster Risk Reduction and Management System*. Retrieved March 2022, from legacy.senate.gov.ph: https://legacy.senate.gov.ph/publications/SEPO/PB\_Examining%20PH%20DRRM%20System\_Revised\_27June2017.pdf

Sustainable Development Goals Helpdesk. (n.d.). *The Humanitarian Data Exchange (HDX)*. Retrieved March 2022, from Sustainable Development Goals Helpdesk: https://sdghelpdesk.unescap.org/node/1086#:~:text=The%20Humanitarian%20Data%20Exchange%20(HDX)%20is%20an%20open%20platform%20for,over%20200%20countries%20and%20territories.

United Nations. (n.d.). *#Envision2030 Goal 13: Climate Action*. Retrieved April 2022, from un.org: https://www.un.org/development/desa/disabilities/envision2030-goal13.html

Weather Underground. (n.d.). *Prepare for a Hurricane or Typhoon*. Retrieved March 2022, from wunderground.com: https://www.wunderground.com/prepare/hurricane-typhoon?fbclid=IwAR33lsq6x66YI-9NFX94Ofy8jgC2TwH9gT\_\_W9AItLA8P2pWyBJmnoYTM1w