"Analyzing Disease Patterns in the Philippines: Insights from the Integrated Disease Surveillance and Response Dataset (2008–2022)"

Members:

Mamaril, Justin Kenneth

Reyes, Alexzander

San Jose, Alexander

San Juan, Edson Ray

Titong, Lee Ivan

Introduction

This study focuses on analyzing trends of diseases in the Philippines through an Integrated Disease Surveillance and Response database from 2008 to 2022. Disease case reports are analyzed for periods, and their influencing environmental factors and health policies are recognized for their trends. It helps analyze the distribution of diseases throughout different regions and assess the total as well as geographic spread of the diseases. Using bar charts, line graphs, and heatmaps, the study hopes to contribute to the advancement of disease epidemiology, public health response, and policy-making in the Philippines.

Research Question

The study aimed to analyze disease patterns in the Philippines based on the Integrated Disease Surveillance and Response Dataset (2008–2022). Understanding these patterns may inform public health strategies, improve disease prevention efforts, and guide resource allocation. Specifically, this study intended to answer the following questions:

1. What are the diseases with the highest total reported cases in the Philippines?
2. What are the trends in total disease cases over time?
3. How do disease cases vary across different regions of the Philippines?
4. What correlations exist between the occurrence of specific diseases and their distribution over time?

Data Directory

This dataset has 74,880 rows and 9 columns and encompasses daily reported disease cases from 879 municipalities across 12 cities in the Philippines between 2008 and 2022. Major variables consist of unique identifiers (UUID), reporting frequency, date of observation, disease information, including the common name and ICD-10 code, administrative region codes, and case totals. The data was gathered to support the temporal and spatial analysis of trends in disease to inform about patterns and determinants. The structure supports the aim of the study to explore disease occurrence in terms of focusing on cases, deaths, and geographical information.

Analysis Process

The analysis of the pattern of diseases in the Philippines (2008–2022) was carried out with a structured approach with the Integrated Disease Surveillance and Response Dataset. The process combines inspection, aggregation, application of statistical techniques, and graphical visualization to explore trends, regional variations, and correlations of disease occurrences. Descriptive analysis identifies central tendencies and variability, while trend and correlation analyses evaluate the course of diseases and interrelation over time. Visualization tools, including line graphs, bar charts, heatmaps, and box plots, are used to portray patterns, compare disease frequencies, and indicate regional differences, thus answering key questions related to disease trends and distributions.

Future Research Questions:

- How effective is the Philippines' health system in preventing new diseases and improving early detection and treatment?
- What role do public awareness campaigns play in modifying health behaviors and preventing disease outbreaks, and how can these campaigns be optimized?
- How do communities respond psychologically to disease outbreaks, and what interventions can mitigate the psychological impacts on affected populations?
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Analysis and Insights for Question 1

Among the findings based on the Integrated Disease Surveillance and Response Dataset for the period from 2008 to 2022 in the Philippines, Dengue Fever stood out as the leading cause with a total of 265,372 cases. It was followed by Typhoid Fever with 21,917 cases and Leptospirosis with 8,034 cases. The notable causes of disease include Acute Bloody Diarrhea, Hepatitis A, and Rotaviral Enteritis. Lower counts include Cholera, Chikungunya Viral Disease, and Rabies. These distributions are visualized in the bar chart, showing the fluctuations in Dengue Fever cases that challenge and offer significant opportunities for public health interventions and resource allocation.

Chart of Question 1

Diseases by Total Cases (2008–2022)
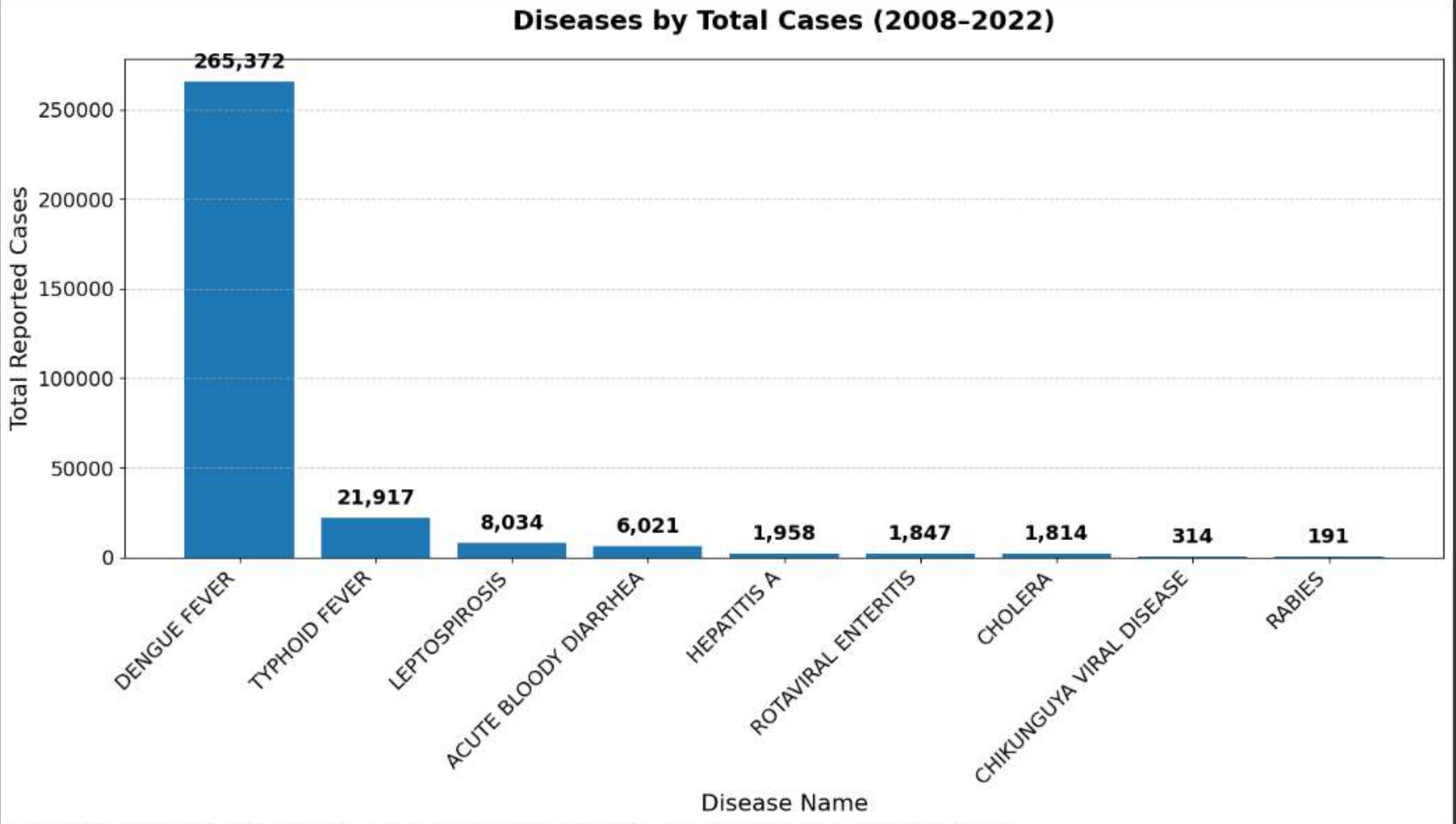
The bar chart illustrates the total reported cases for all diseases in the Philippines from 2008 to 2022, based on the dataset.
The reported cases are distributed across the following diseases:
- DENGUE FEVER: 265,372 total cases
- TYPHOID FEVER: 21,917 total cases
- LEPTOSPIROSIS: 8,034 total cases
- ACUTE BLOODY DIARRHEA: 6,021 total cases
- HEPATITIS A: 1,958 total cases
- ROTAVIRAL ENTERITIS: 1,847 total cases
- CHOLERA: 1,814 total cases
- CHIKUNGUYA VIRAL DISEASE: 314 total cases
- RABIES: 191 total cases

Analysis and Insights for Question 2

The line graph shows yearly cases of disease in the Philippines (2008–2022), which have been strongly indicative of trends. The most cases were reported in 2019 with 48,735 cases, while the least were reported in 2020 with 5,633 cases. The average annual reported cases for the period were approximately 20,497. The graph illustrates fluctuations driven by factors such as outbreaks of diseases, changes in reporting rates, seasonality, and health interventions.

Chart of Question 2

Total Disease Cases in the Philippines (2008–2022)

Legend:
- Total Cases
- Average Cases (20,498)

Data points:
- 2008: 8,167
- 2009: 11,685
- 2010: 26,865
- 2011: 13,171
- 2012: 46,658
- 2013: 24,875
- 2014: 19,711
- 2015: 15,577
- 2016: 28,391
- 2017: 13,141
- 2018: 16,593
- 2019: 48,735
- 2020: 5,633
- 2021: 6,996
- 2022: 20,970

Y-axis: Total Cases
X-axis: Year
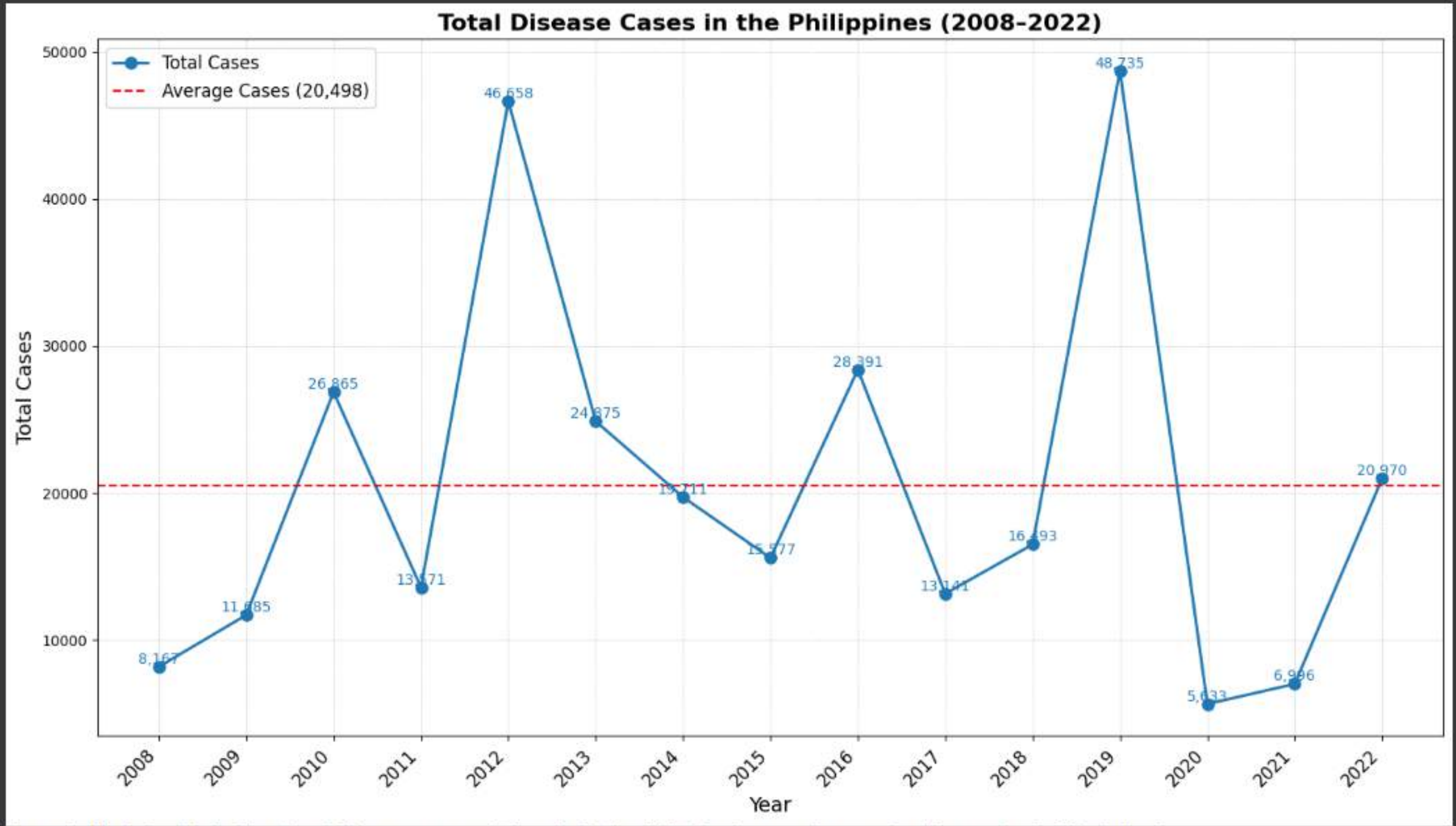
The graph illustrates the total number of disease cases reported yearly in the Philippines from 2008 to 2022. The data reveals significant trends:

- The highest total cases were recorded in 2019, with 48,735 cases.
- The lowest total cases were observed in 2020, with 5,633 cases.
- The average number of cases reported per year during this period was approximately 20,497.

The graph highlights fluctuations in total disease cases over time, which may reflect varying factors such as outbreaks, reporting improvements, or health interventions.

Analysis and Insights for Question 3

From the boxplot analysis of disease cases across regions in the Philippines from 2008 to 2022, significant regional disparities can be seen. For instance, Mandaluyong had the highest total case count at 83,173, while the totals for Palayan and Navotas were much lower at 1,913 and 2,344, respectively. The median number of cases was 0 for most regions, indicating sporadic reporting. Mandaluyong had the highest mean case count, at 13.33, whereas other regions, such as Cagayan de Oro, showed much lower averages, like 1.28. The case counts reached up to a maximum of 2,398 in Mandaluyong. These results show that some regions have more outbreaks, which means there is a need for specific public health interventions and resource allocation for these regions.
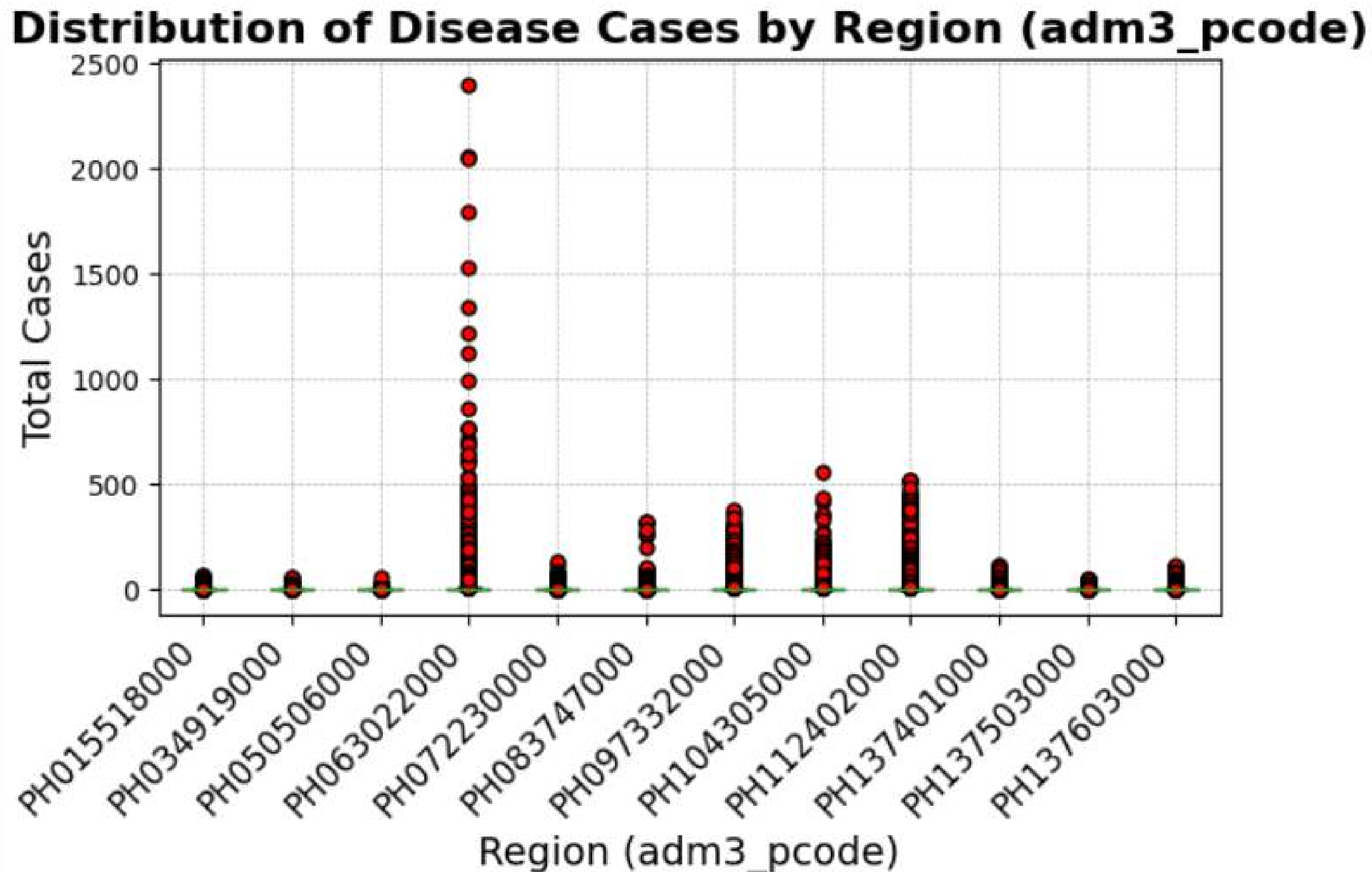
Chart of Question 3

Distribution of Disease Cases by Region (adm3_pcode)

Table of Question 3

Region	Total Cases	Median Cases	Min Cases	Max Cases	Mean Cases
PH063022000/Mandaluyong	83,173	0	0	2,398	13.33
PH112402000/Tacloban	71,699	0	0	522	11.49
PH097332000/Iloilo	48,600	0	0	383	7.79
PH104305000/Mandaue	38,448	0	0	554	6.16
PH083747000/Legazpi	12,135	0	0	324	1.94
PH072230000/Muntinlupa	11,663	0	0	129	1.87
PH015518000/Dagupan	9,514	0	0	70	1.52
PH137401000/Zamboanga	8,704	0	0	114	1.39
PH137503000/Cagayan de Oro	7,964	0	0	52	1.28
PH137603000/Davao	11,311	0	0	116	1.81
PH050506000/Navotas	2,344	0	0	55	0.38
PH034919000/Palayan	1,913	0	0	57	0.31

Analysis and Insights for Question 4

The time-series heatmap analysis of disease cases in the Philippines from 2008 to 2022 reveals the main patterns in disease incidence trends. Dengue Fever had the highest number, peaking at 46,387 in 2019 and dropping to 4,816 in 2020. Typhoid Fever saw its highest in 2012 at a total of 2,494 cases, while its low was in 2021 at 335 cases. Leptospirosis peaked to 1,886 in 2012 and its all-time low was 145 in 2020, indicating its possible correlations with natural disasters. The peak cases of Cholera were reported in 2022 with 908 cases and have been increasing in recent years. Other diseases like Hepatitis A, Chikungunya, and Typhoid Fever are also fluctuating. These patterns imply the importance of surveillance and disease-specific control to address outbreaks and environmental causes.
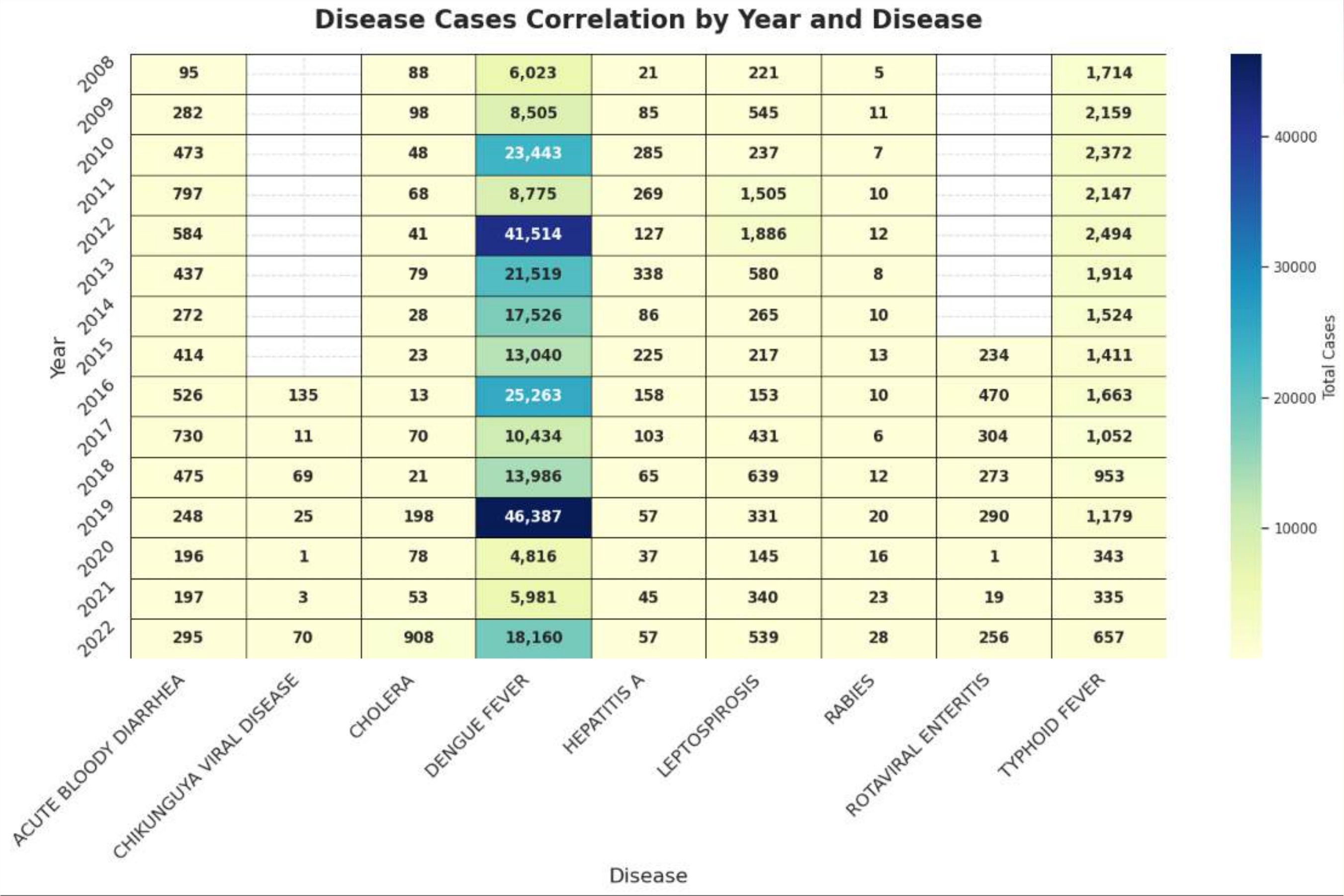
Chart of Question 4

Disease Cases Correlation by Year and Disease

Year	Acute Bloody Diarrhea	Chikunguya Viral Disease	Cholera	Dengue Fever	Hepatitis A	Leptospirosis	Rabies	Rotaviral Enteritis	Typhoid Fever
2008	95		88	6,023	21	221	5		1,714
2009	282		98	8,505	85	545	11		2,159
2010	473		48	23,443	285	237	7		2,372
2011	797		68	8,775	269	1,505	10		2,147
2012	584		41	41,514	127	1,886	12		2,494
2013	437		79	21,519	338	580	8		1,914
2014	272		28	17,526	86	265	10		1,524
2015	414		23	13,040	225	217	13	234	1,411
2016	526	135	13	25,263	158	153	10	470	1,663
2017	730	11	70	10,434	103	431	6	304	1,052
2018	475	69	21	13,986	65	639	12	273	953
2019	248	25	198	46,387	57	331	20	290	1,179
2020	196	1	78	4,816	37	145	16	1	343
2021	197	3	53	5,981	45	340	23	19	335
2022	295	70	908	18,160	57	539	28	256	657

Table of Question 4

Disease	Max Total Cases	Year with Max Cases	Min Total Cases	Year with Min Cases	Total Cases Across All Years
Acute Bloody Diarrhea	797	2011	95	2008	6021
Chikungunya Viral Disease	135	2016	1	2020	314
Cholera	908	2022	13	2016	1814
Dengue Fever	46, 387	2019	4,816	2020	265,372
Hepatitis A	338	2013	21	2008	1958
Leptospirosis	1,886	2012	145	2020	8034
Rabies	28	2022	5	2008	191
Rotaviral Enteritis	470	2016	1	2020	1,847
Typhoid Fever	2,494	2012	335	2021	21,917

Conclusion

This analysis of the Integrated Disease Surveillance and Response dataset from 2008 to 2022 identifies key disease trends in the Philippines. The total cases of dengue fever were the highest, with typhoid fever and leptospirosis peaking in specific years because of environmental factors. There were regional differences in the disease rates, with the more urban areas such as Mandaluyong having more case numbers, and the rural regions had more vector-borne diseases. Useful information has been drawn from graphs and heat maps, but challenges such as inconsistent reporting and missing data call for better surveillance and public health interventions.

Recommendation

Targeted Health Interventions
- The focus place and clients priority should be set among regions with significant disease incidence and prevalence, including urban provinces such as Mandaluyong and underserved rural areas.
- Launch health promotion activities for diseases such as dengue and leptospirosis with programs conducted prior to Monsoon seasons.

Policy and Resource Allocation
- Campaign for greater allocation of state funds toward the development of health facilities with emphasis on areas where there is poor access to such services.
- Introduce into decision-making the data on diseases and areas with high disease incidence so that sources of financing can be allocated more effectively.

Invest in Research and Capacity Building
- To identify effective measures for preventing diseases, carry out more research of the disease incidence distribution related to socio-economic and environmental characteristics.
- Capability built at local level to increase the number of local trained health workers in issues of data management and in outbreak responses.

Thank You!!