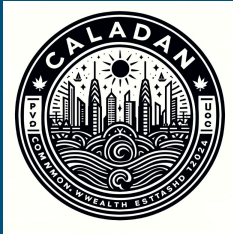
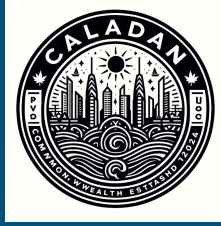


PSA: Caladan needs help

Team 06: Jaden, Aryan, Samyuktaa, Neveah



Data Flow



Challenge 1: Data Collection

Extracted policy data from Cosmos DB

Extracted metrics data from Azure Data Factory and Azure SQL Database

Challenge 2: Data Transformation

Transformed raw data in Azure Data Lake into ODS

Created a unified dataset that includes both metric and policy data

Challenge 3: Data Loading and Analysis

Loaded transformed data from ODS into Azure Synapse Studio

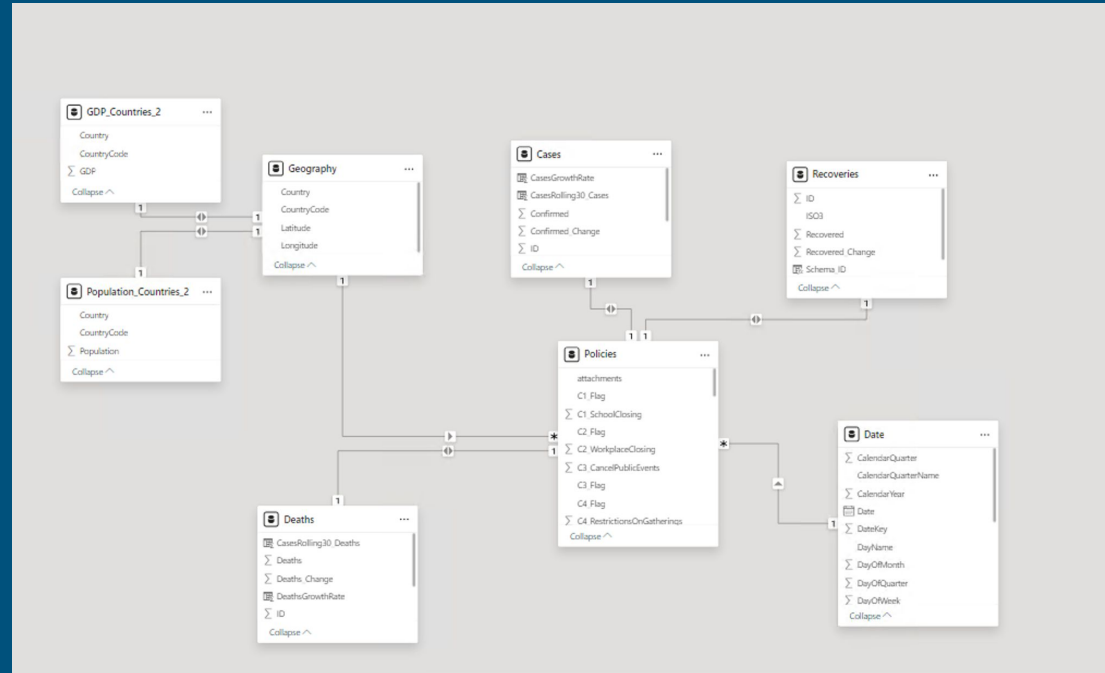
Created a data warehouse in Azure Synapse.

Implemented a Snowflake Schema

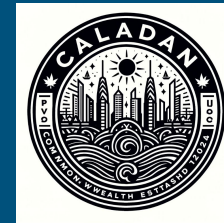
Data Schema



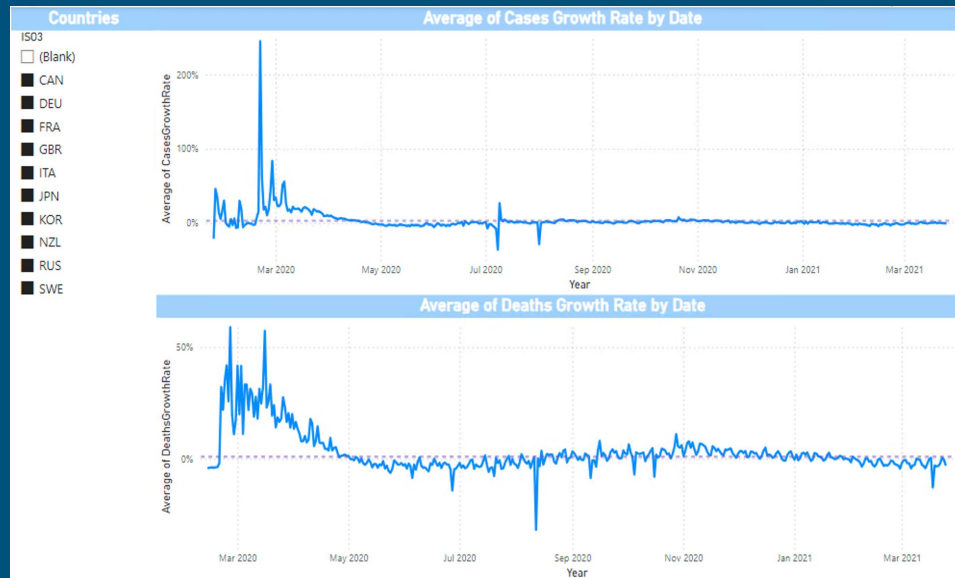
- For our Data Schema we used Snowflake Schema, with our fact table as the Policies data.
- The dimension tables were:
 - Geography
 - Date
 - Cases
 - Recoveries
 - Deaths
- We added two external datasets to understand the countries' population and GDP - to be used in our decision tree regression



EDA



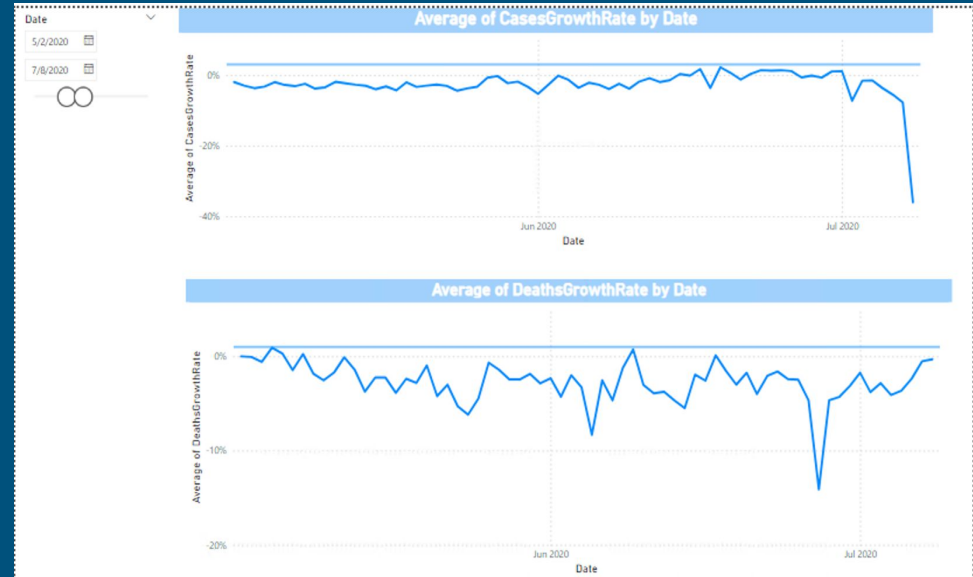
First made a simple visualization for the 14 months to see cases and death growth rates.



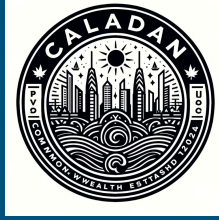
EDA



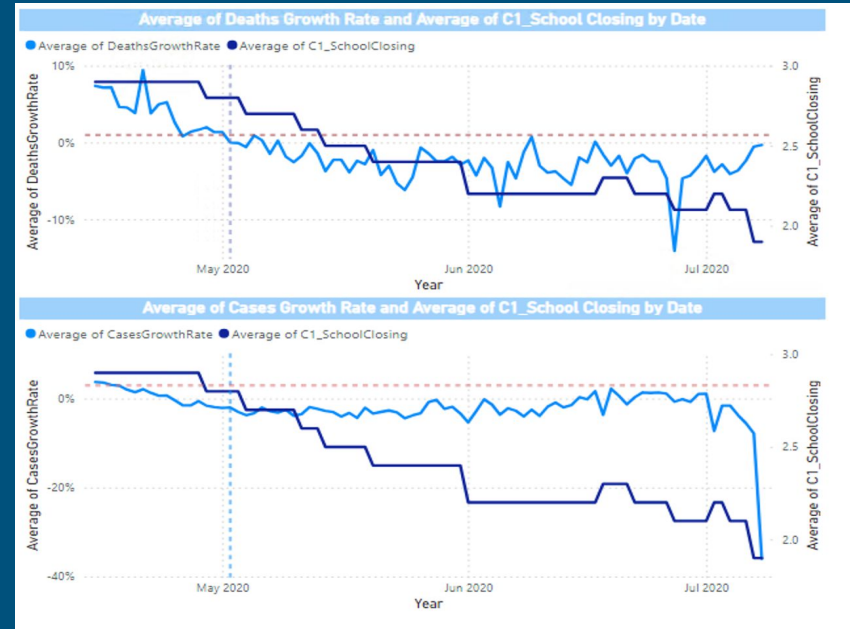
- Identified a time period where the rates were under the benchmarks
 - 0.01 for deaths
 - 0.03 for cases
- Found that the time period was May 2nd to July 8.



EDA



- To figure out which policies were most effective, we created visualizations for each policy between **April 15 to July 8th**.
- We chose April 15, more than 2 weeks before May 2nd, so that we could **taken into account the time required for the policies to take effect**.
- Identified the **top 4 policies** for both cases and death growth rate.

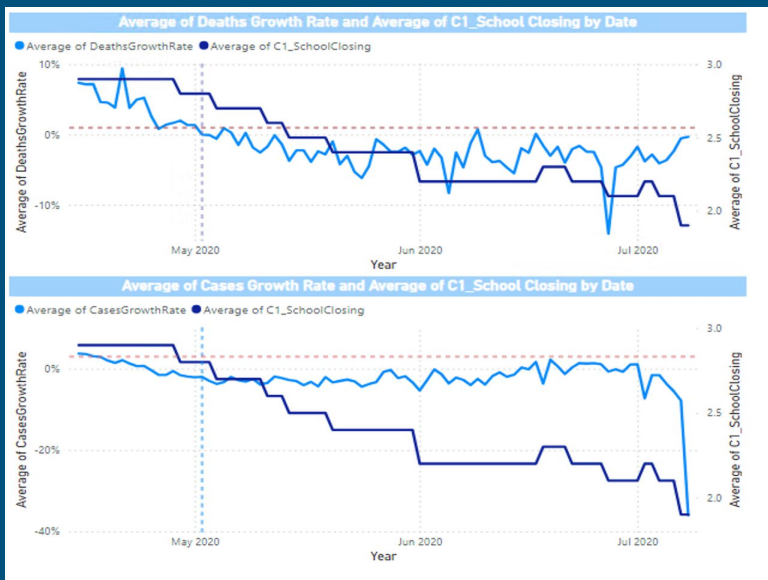


Graph for C1_School Closing

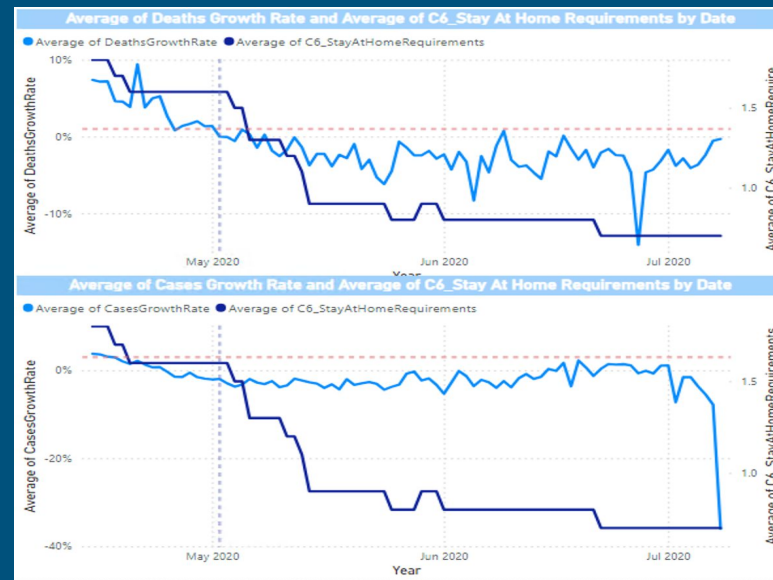
Our Recommended Policies Pt 1



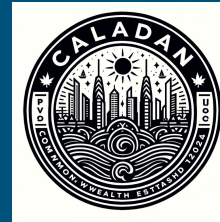
1. School Closing



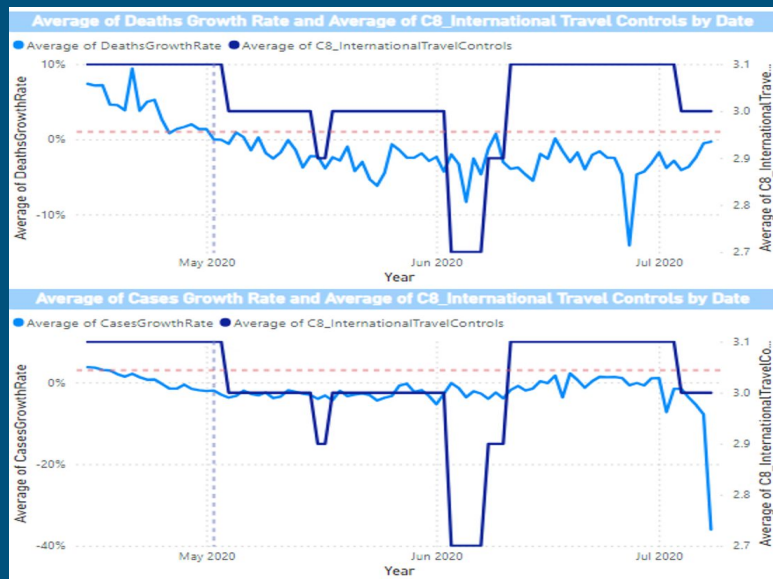
2. Stay at Home Requirements



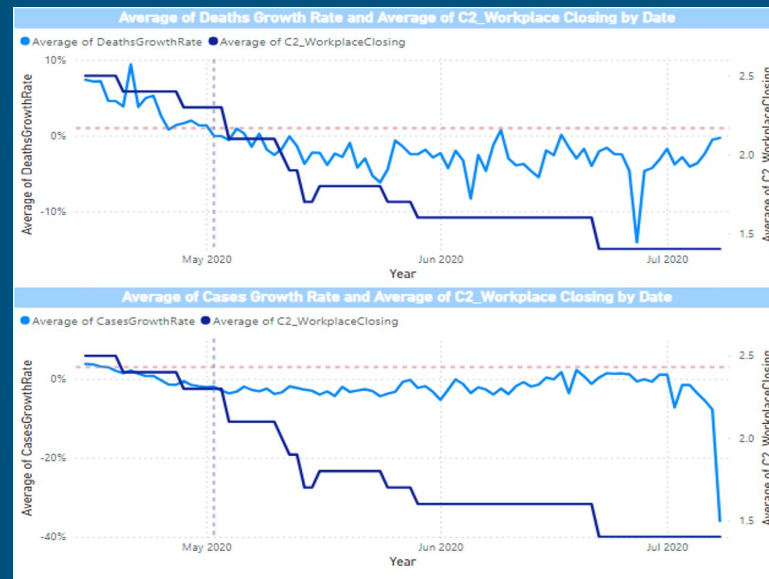
Our Recommended Policies Pt 2

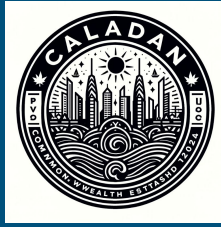


3. International Travel Controls



4. Workplace Closing



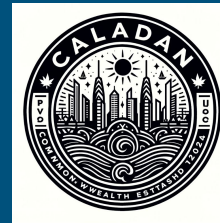


By looking at these graphs we **hypothesize** that the most important policies are:

- School Closing: Level 3
- Stay at Home Requirements: Level 2
- International Travel Controls: Level 3
- Workplace Closing: Level 2



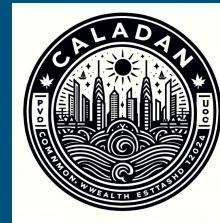
CDA



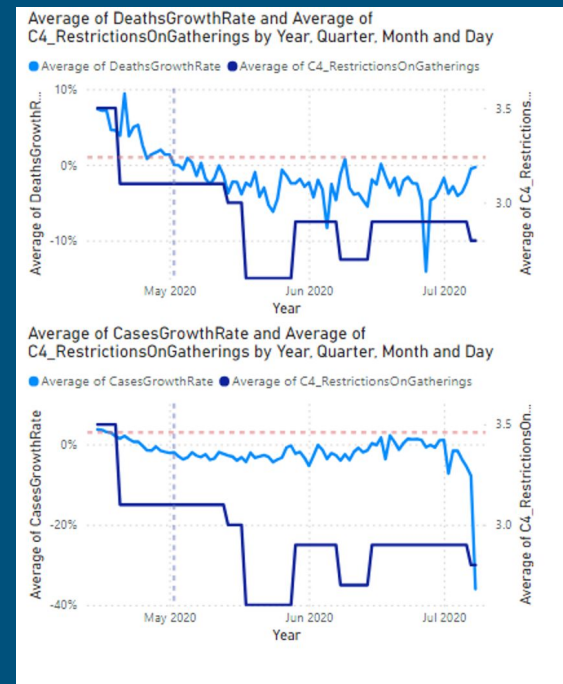
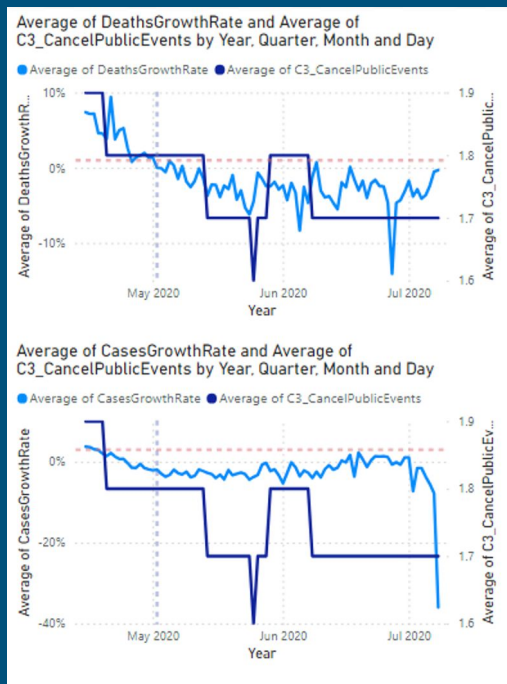
- To verify our hypothesis we created a decision tree regressor and regressed a custom column - “both”: 1 if Cases and Deaths Growth Rate < 0.03 and 0.01 respectively. The explanatory variables was each of the C policies along with their C_flag.
- We then used feature importance to find out which policies were the most effective and these were our findings

Policy Importance for Both:		
	Policy	Importance
0	C1_SchoolClosing	0.250085
10	C6_StayAtHomeRequirements	0.247873
5	C3_Flag	0.157636
1	C1_Flag	0.113304
14	C8_InternationalTravelControls	0.112840
7	C4_Flag	0.036389
2	C2_WorkplaceClosing	0.032102
12	C7_RestrictionsOnInternalMovement	0.012948
11	C6_Flag	0.008643
13	C7_Flag	0.008240
8	C5_ClosePublicTransport	0.008169
9	C5_Flag	0.005449
6	C4_RestrictionsOnGatherings	0.003229
3	C2_Flag	0.003093
4	C3_CancelPublicEvents	0.000000

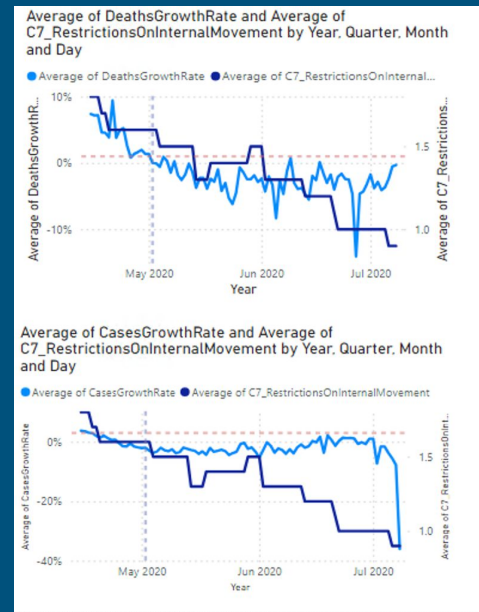
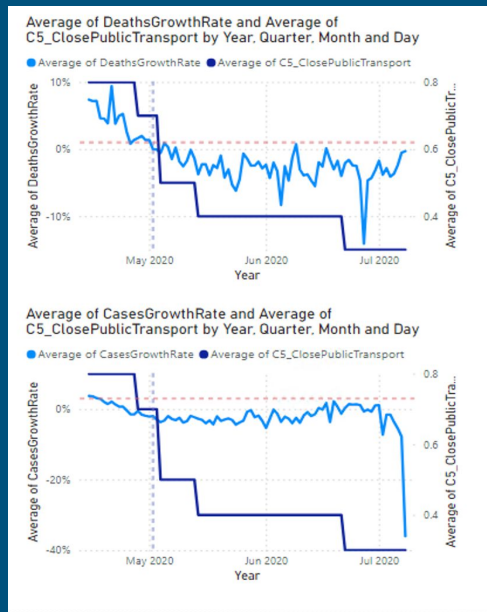
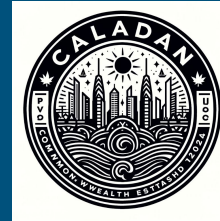
EDA: Policies we did not choose Pt1

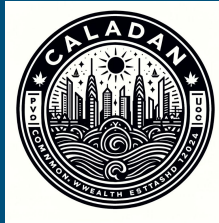


- Using our EDA we found out that some policies were not highly correlated with the decrease of death and/or case growth rate fall within the time period we chose.
- Hence, we did not add them to our policy recommendations.



EDA: Policies we did not choose Pt2



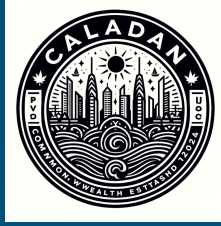


CDA: Policies we did not choose

This EDA was further backed by our CDA, where there feature importance for C7, C5, C4, and C3 was lesser than the rest.

12	C7_RestrictionsOnInternalMovement	0.012948
11	C6_Flag	0.008643
13	C7_Flag	0.008240
8	C5_ClosePublicTransport	0.008169
9	C5_Flag	0.005449
6	C4_RestrictionsOnGatherings	0.003229
3	C2_Flag	0.003093
4	C3_CancelPublicEvents	0.000000

Final Policy Recommendations



The Commonwealth of Caladan hereby instills the following 4 policies to reduce the spread of COVID during the next wave

- 1. Closing Schools:** All schools K-12 will be shut down until further notice
- 2. Stay at Home Requirements:** All citizens of Caladan must stay at home with exceptions for daily exercise, grocery shopping, and 'essential' trips.
- 3. International Travel Controls:** The Commonwealth of Caladan will ban international travel arrivals from some regions.
- 4. Workplace Closing:** The Commonwealth of Caladan will require closing (or work from home) for some sectors or categories of workers.