ANTIMICROBIAL RESISTANCE (AMR) IN EUROPE AND CENTRAL ASIA

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AGENDA

- Intro to AMR
- Business Objective
- Analysis/Key Takeaways

INTRO TO AMR

WHAT IS AMR?

Antimicrobial resistance is essentially resistance to antibiotics and the development of difficult to treat or untreatable bacterial, fungal, and parasitic diseases that would normally be curable with antibiotics.

HOW BENEFICIAL ARE ANTIBIOTICS?

Before the discovery of antibiotics in 1928, millions to hundreds of millions of people died directly because of epidemics such as the Black Plague or due to bacterial and fungal complications developed after infection (i.e. Spanish Flu of 1918). [1]

WHAT CAUSES AMR?

AMR has developed because of both overuse and misuse of antibiotics.

- Using antibiotics for viral illnesses where they will not benefit
- Using antibiotics as a form of prevention rather than treatment
- Incomplete regimens

INDUSTRY OUTLOOK

1.2 MILLION[1]

The number of deaths directly attributable to AMR in 2019

200,000[2]

The number of American lives saved annually by antibiotics

$3.4 TRILLION[3]

Expected annual cost of drug-resistant infections by 2030

28 MILLION[3]

Number of people who will be pushed into poverty due to AMR by 2050

BUSINESS OBJECTIVE

- Antimicrobial resistant pathogens are becoming a major concern with global warming and ineffective/overuse of antibiotics and has the potential to kills millions of people.
- The objective of this project is to expand on the current AMR evidence base to improve planning and surveillance for AMR pathogens and highlight pathogens of concern.
- Data was selected from the Global Health Data Exchange which includes data from a variety of international sources.[4]
- After reviewing data from WHO, CDC, and other large international health data banks, the dataset from GHDE seemed most robust and most ripe for analysis so I utilized their dataset.
- Focused on a specific region, not the entire globe.
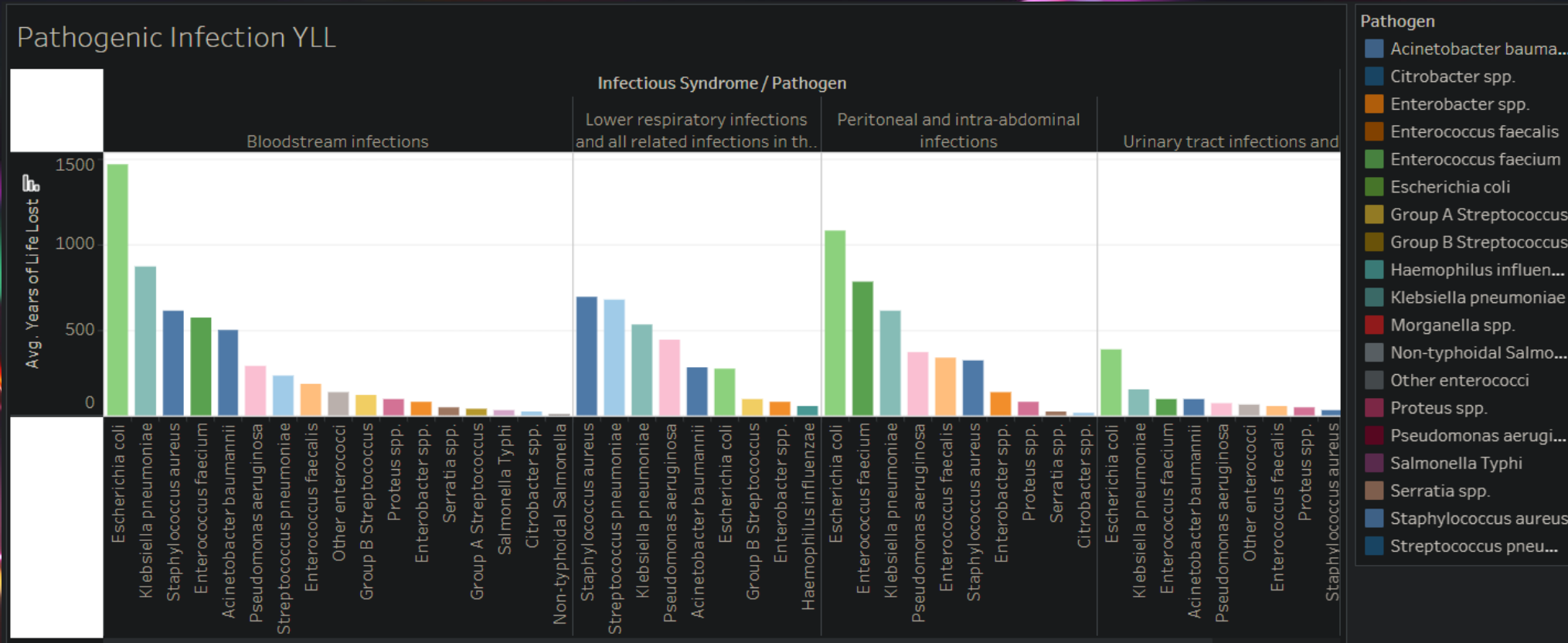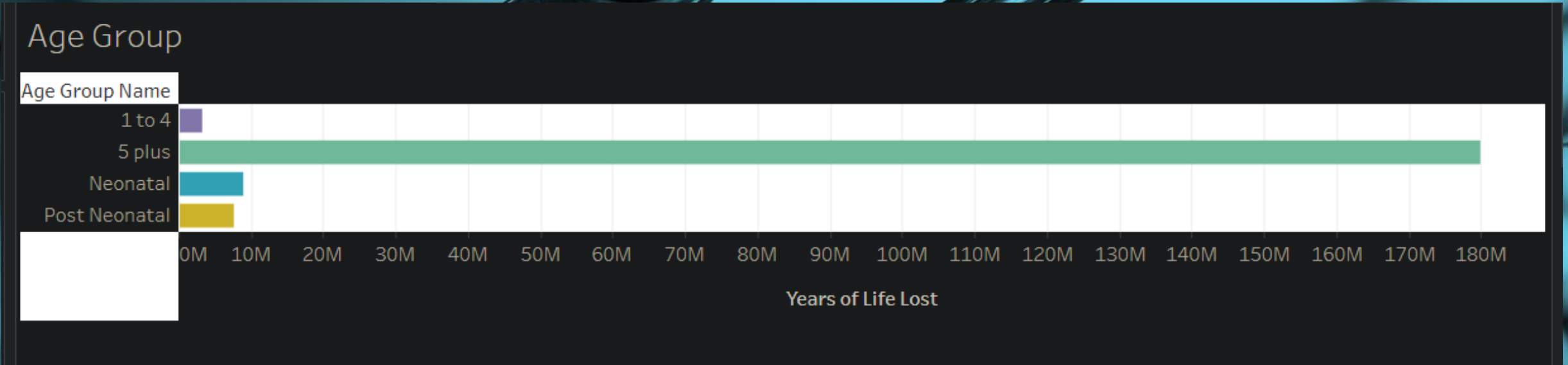
ANALYSIS

YEARS OF LIFE LOST PER CAPITA
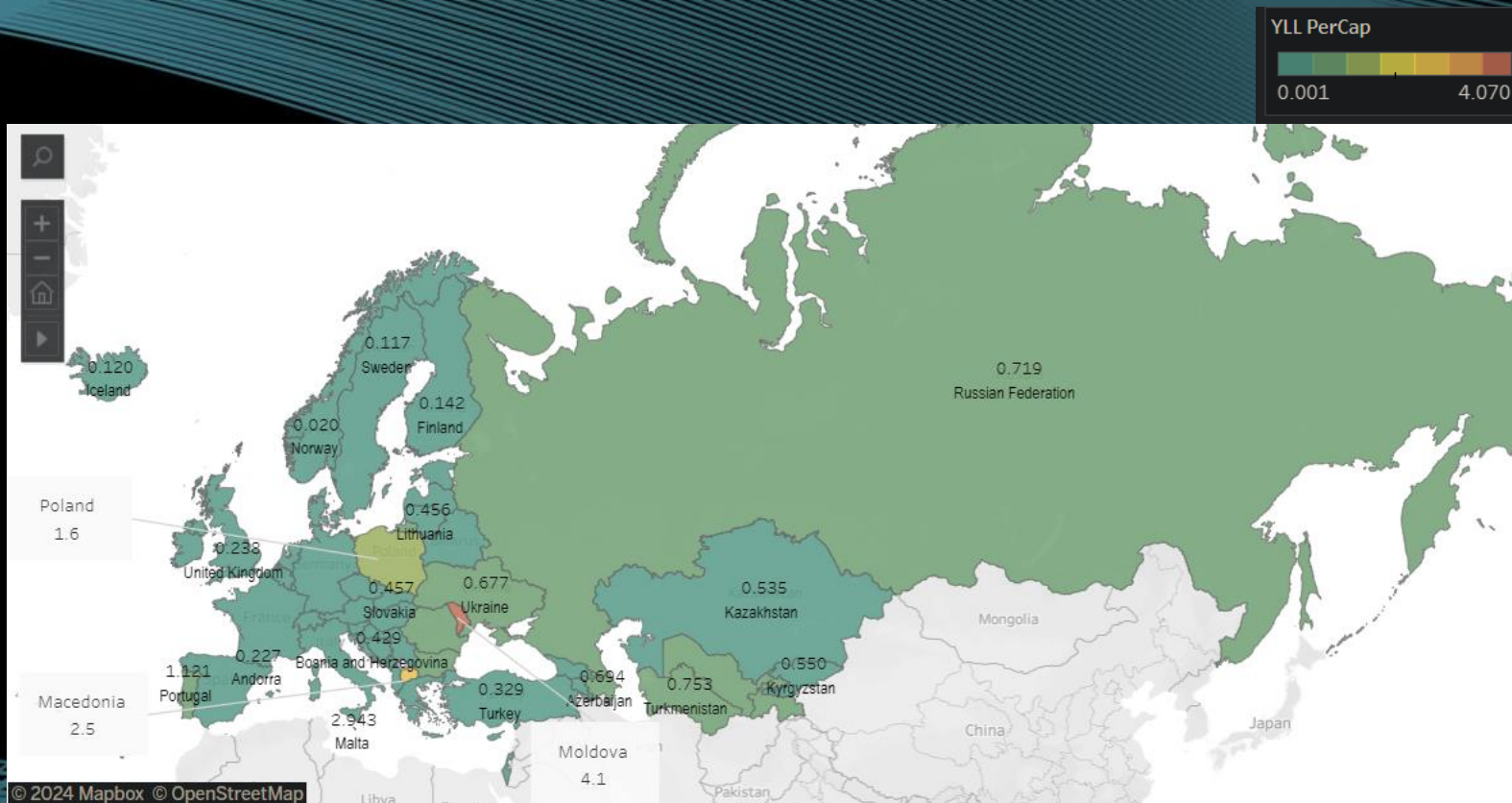
- Joined 2019 population data with pathogen dataset
- Roughly .6 more YLLs for each color
- Moldova, Macedonia, and Poland highest
- This accounts for population size
- AMR has potential to wreak havoc if it is more widespread

YLL BY TYPE OF INFECTION

- Originally interested in whether the infection was due to the original illness or was a separate infection.
- However, data did not allow for such analysis
- Illustrates that E. coli is a major concern and need further assessment.
- Not all infection classes included here, please see dashboard, for everything

AGE AND YLLS

Age Group

| Age Group Name	Years of Life Lost
1 to 4	(small bar ~3M)
5 plus	(bar ~180M)
Neonatal	(bar ~8M)
Post Neonatal	(bar ~7M)

- Age did not showcase enough nuance to understand the relationship between age and YLLs as hoped
- It needs to be further studied or more information needs to be presented in the dataset on actual age.

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COMPARING MORTALITY AND YLDS
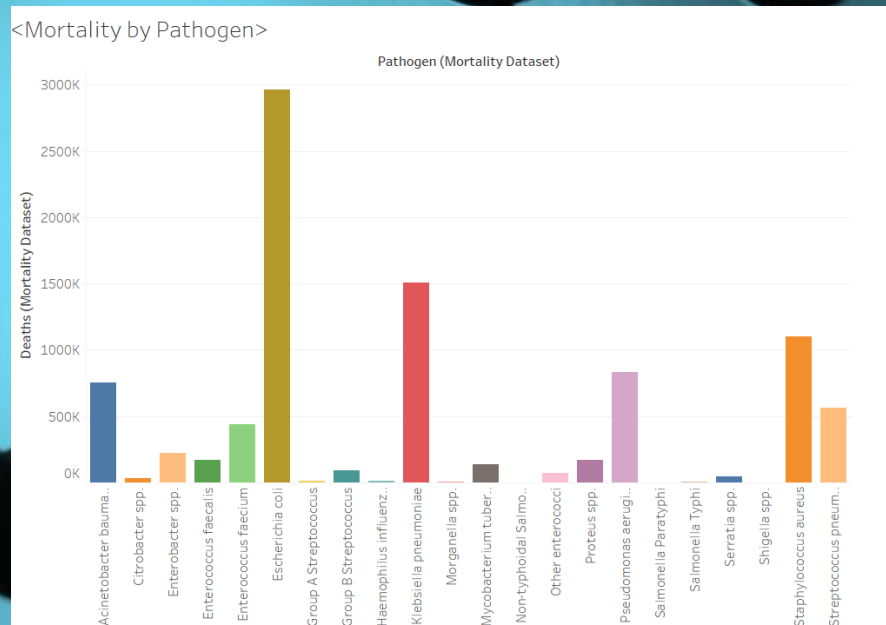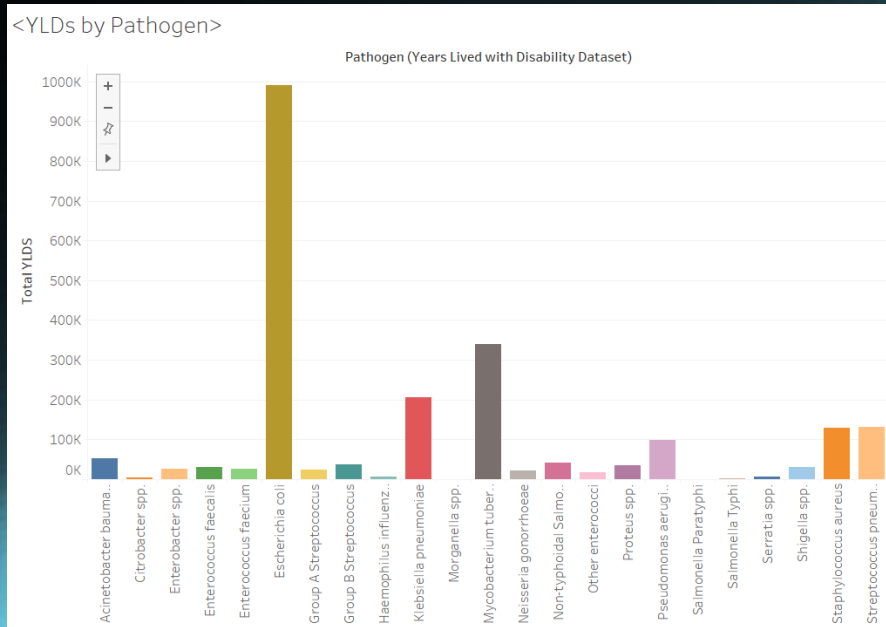
- In this dataset, there were no reported deaths from gonorrhea, but it did cause disability.
- What we would expect to see is present. Diseases with high mortality have low disability and vice versa.
- Except E. Coli which is both deadly and causes great disability. This may indicate that it is wider spread than the others.

AMRYLLS VS. DRUG SUSCEPTIBLE OR NO INFECTION
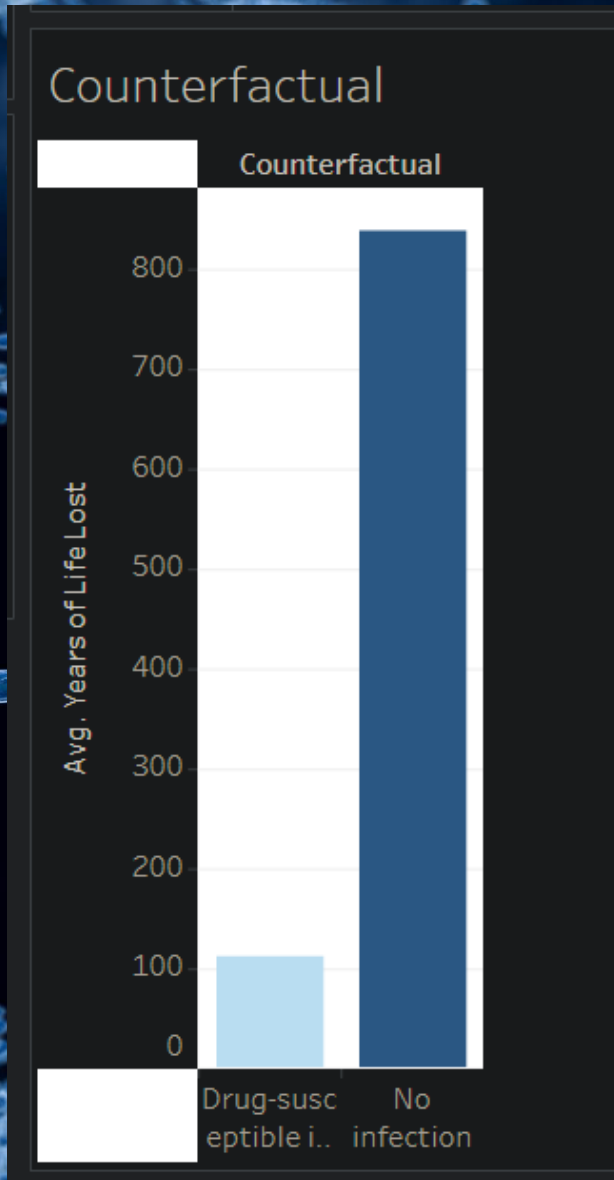
- Counterfactual compares two difference scenarios
- What would happen if the person had never been infected? Or if the pathogen they had was curable?

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TOP PATHOGEN PER COUTNRY
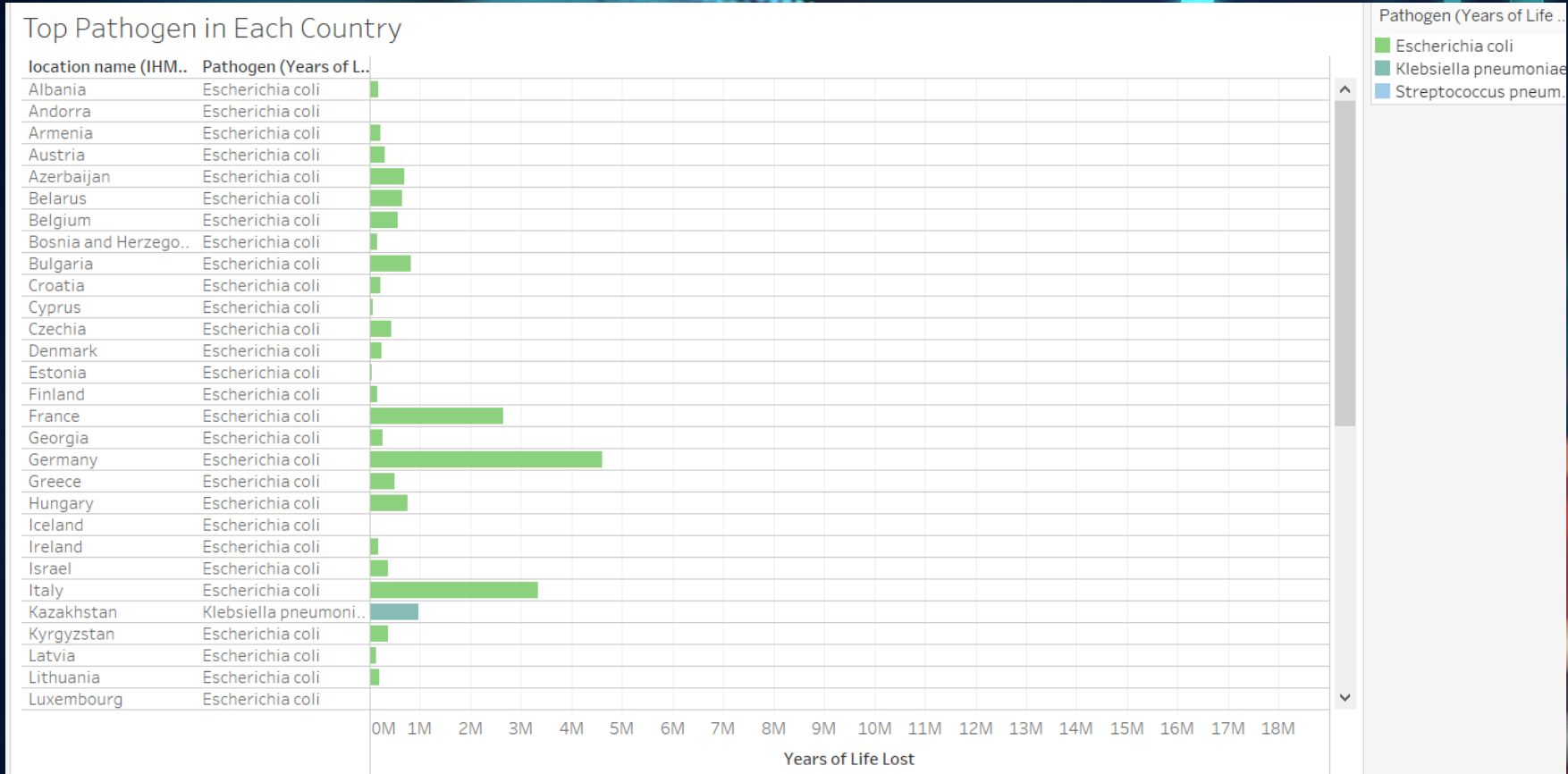
- The entire image is better viewed on the dashboard, but it is clear to see that there are a couple other pathogens that are also top pathogens in countries in the region.
- Both types of pneumonia should be studied to understand why they are disproportionately more prevalent in Kazakhstan and Tajikistan.

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THANK YOU

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CITATIONS

1. Gottfried, J. (2005). *History Repeating? Avoiding a Return to the Pre-Antibiotic Age.*
2. *An estimated 1.2 million people died in 2019 from antibiotic-resistant bacterial infections | University of Oxford.* (n.d.). Retrieved July 18, 2024, from https://www.ox.ac.uk/news/2022-01-20-estimated-12-million-people-died-2019-antibiotic-resistant-bacterial-infections
3. *What is antimicrobial resistance – and how do we prevent it? | News and reports | Wellcome.* (n.d.). Retrieved July 18, 2024, from https://wellcome.org/news/what-antimicrobial-resistance-and-how-do-we-prevent-it?gad_source=1&gclid=Cj0KCQjwkdO0BhDxARIsANkNcrfApvUu2jN9OUiSlocelwcVYu5iF23yTG3PyOBW4pYuq2y2SCcSUBgaArnXEALw_wcB
4. *WHO European Region Bacterial Antimicrobial Resistance Burden Estimates 2019 | GHDx.* (n.d.). Retrieved July 18, 2024, from https://ghdx.healthdata.org/record/ihme-data/who-european-region-bacterial-antimicrobial-resistance-burden-estimates-2019