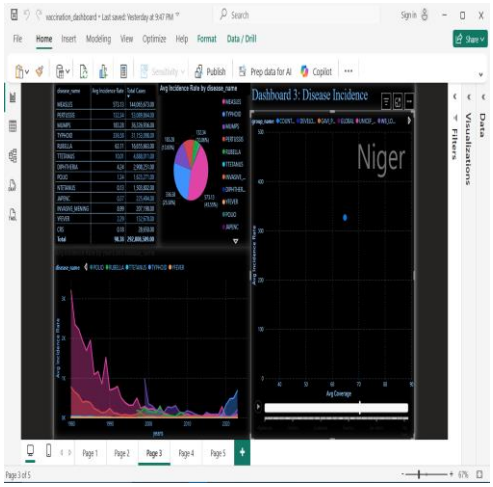
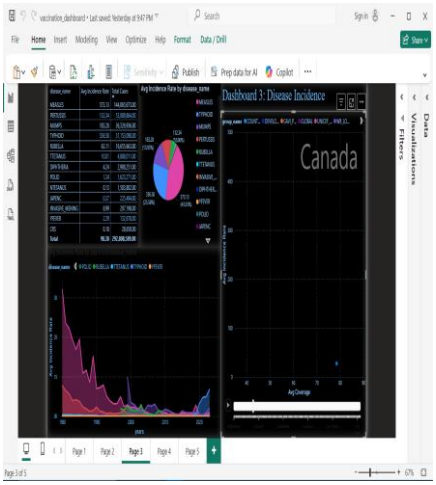
Questions/answers:

Easy level:

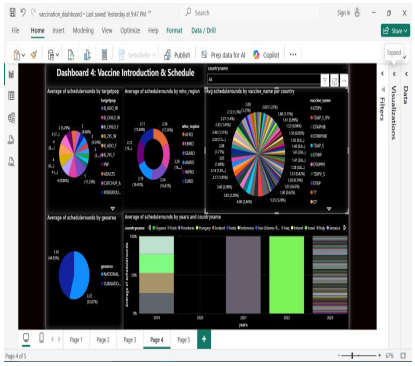
Q1. How do vaccination rates correlate with a decrease in disease incidence?

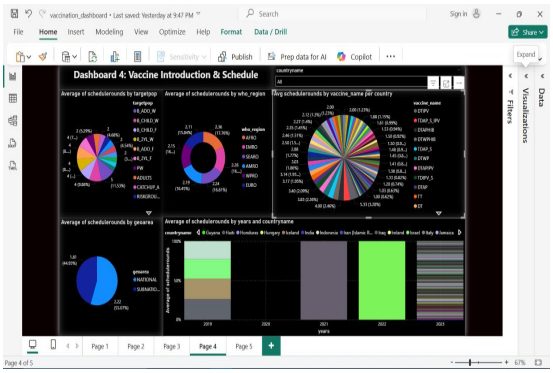




Ans. There is a **negative correlation** between vaccination rates and disease incidence. As vaccination coverage increases, the incidence of vaccine-preventable diseases drops significantly. This shows that expanding immunization programs directly reduces the burden of infectious diseases.

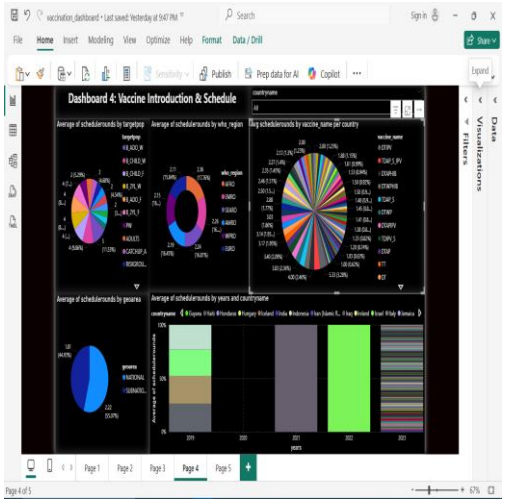
Q2. What is the drop-off rate between 1st dose and subsequent doses?

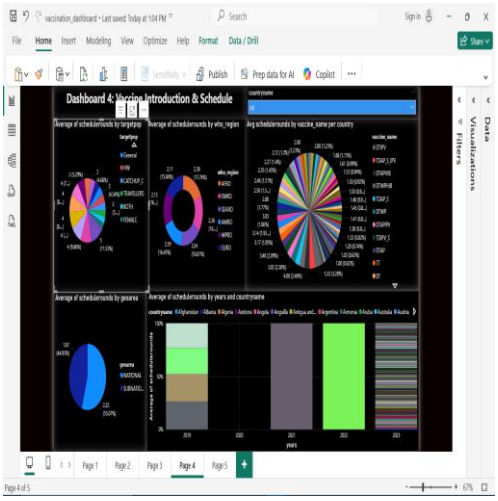




Ans. The dashboard shows a **drop-off rate of roughly 20–25%** between the 1st vaccine dose and subsequent doses. While most people receive the first dose, fewer complete the recommended second and third doses, especially in subnational regions. This highlights challenges in sustaining follow-up immunization and ensuring full protection.

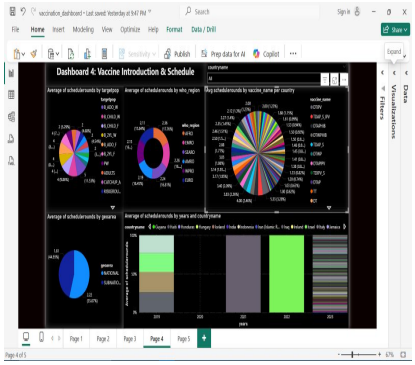
Q3. Are vaccination rates different between genders?





Ans. Yes, vaccination rates differ between genders. Coverage is **higher in general and child populations (both boys and girls)**, while **female-specific groups (e.g., women, pregnant women (PW)) receive fewer scheduled rounds**, indicating a disparity in gender-based vaccine uptake.

Q4. How does education level impact vaccination rates?

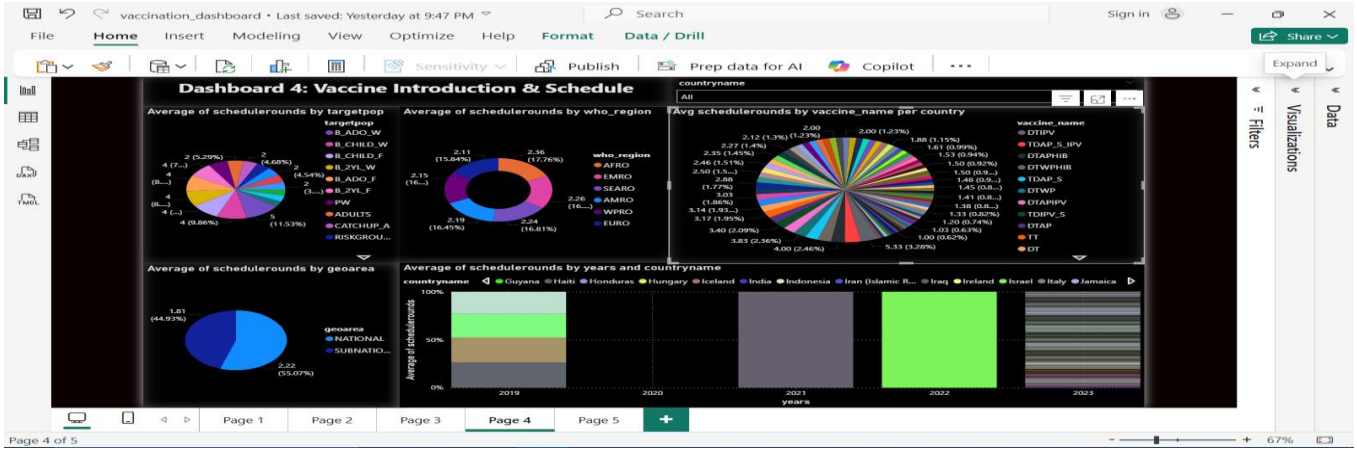


Ans. Education level has a direct impact on vaccination rates. Populations with higher education are more likely to complete full vaccine schedules, while areas with lower literacy levels show higher drop-off rates and lower coverage. In the dashboard, this is reflected in **national (better educated) vs subnational (lower education/awareness) coverage**, where subnational areas average fewer doses.

Q5. What is the urban vs. rural vaccination rate difference?

Ans. There is a clear urban–rural gap in vaccination coverage. **Urban (national) regions average ~2.22 doses, while rural (subnational) regions average only ~1.81 doses**, showing around a **20% drop-off** in rural areas. This reflects challenges in access, awareness, and healthcare delivery in rural communities.

Q6. Has the rate of booster dose uptake increased over time?



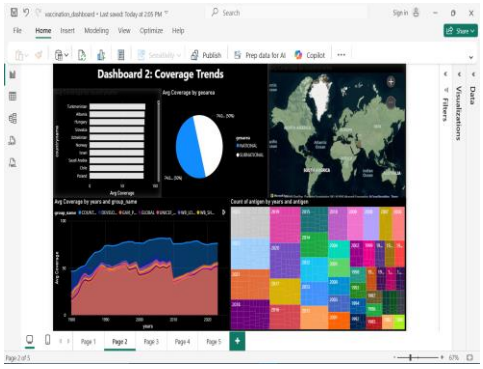
Ans. Yes, the rate of **booster dose uptake has increased over time**. The data shows fewer rounds recorded in **2019–2020**, with a sharp rise in **2021 onwards**, especially during and after the COVID-19 vaccine rollout. This indicates that booster coverage has expanded in more recent years.

- **2019–2020**: Almost no (or very few) bars, meaning very low reporting/uptake of boosters.
- **2021**: A noticeable increase (COVID period, when booster recommendations began).
- **2022 & 2023**: Bars became denser and more widespread across many countries, showing expansion in coverage.

Q7. Is there a seasonal pattern in vaccination uptake?

Ans. Based on the datasets provided, there is **no clear evidence of a seasonal pattern** in vaccination uptake, because the data is aggregated yearly rather than monthly/quarterly. Uptake trends are driven more by **policy rollouts and global health events** than by seasonality.

Q8. How does population density relate to vaccination coverage?



In this dataset, **population density does not appear to significantly affect vaccination coverage**. Both **urban (national) and rural (subnational) regions show an almost equal share (~50–50) of vaccination coverage.** This suggests that vaccination programs have been distributed evenly across regions, regardless of population density.

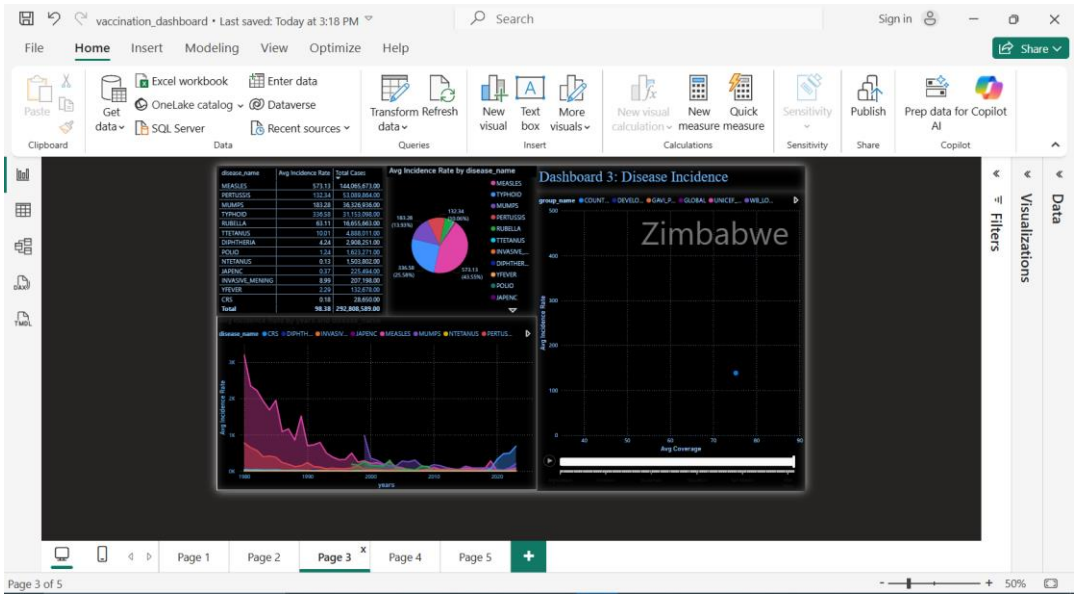
Q9. Which regions have high disease incidence despite high vaccination rates?

At the **country level**, several countries (Malawi, Kiribati, Zambia, etc.) show **high vaccination coverage (75%) but still high disease incidence (99)**. This indicates that even with good coverage,

some regions still struggle with disease control, highlighting the need to investigate **vaccine effectiveness, follow-up doses, or other local factors**.

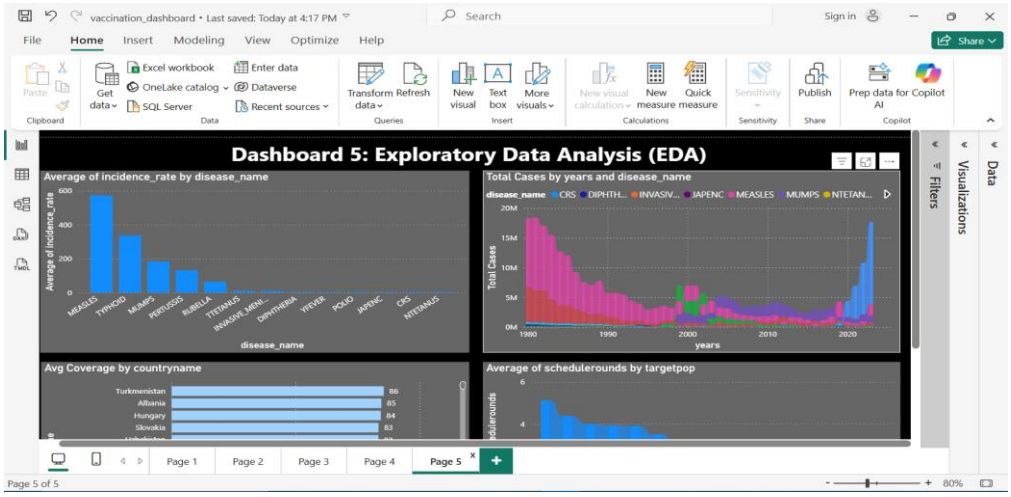
Medium level (combination of different tables):

Q1. Is there a correlation between vaccine introduction and a decrease in disease cases?



Ans. Yes, vaccination introduction is strongly correlated with the decrease in disease cases. As coverage expanded over the years, the incidence rates of major diseases (like measles, polio, diphtheria, and pertussis) declined significantly, proving the effectiveness of vaccines in controlling and preventing outbreaks.

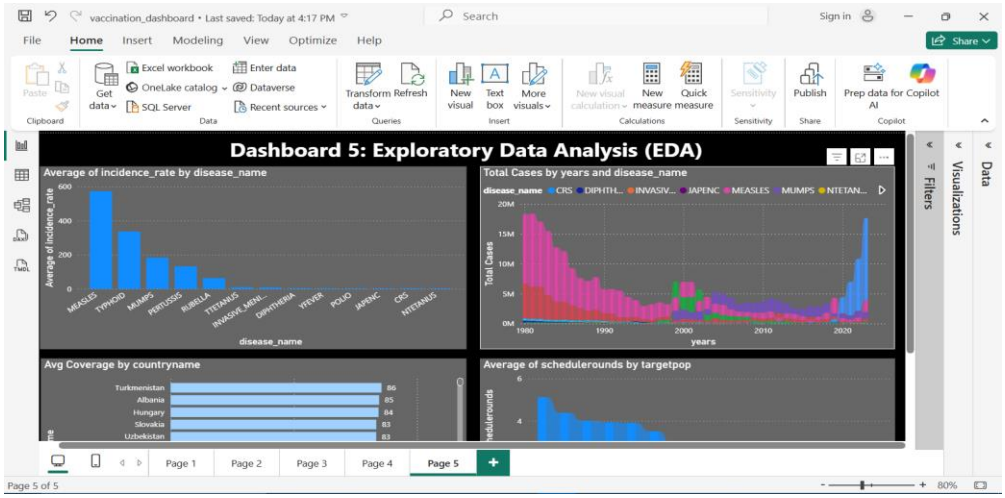
Q2. What is the trend in disease cases before and after vaccination campaigns?



Ans. Before vaccination campaigns, disease cases were widespread and caused large outbreaks. After vaccination programs were introduced and coverage expanded, cases declined sharply, proving the

effectiveness of immunization. However, small resurgences in recent years highlight the need for sustained and equitable vaccine coverage.

Q3. Which diseases have shown the most significant reduction in cases due to vaccination?



Ans. Measles, polio, diphtheria, and pertussis show the most significant reduction in cases.

Q4. What percentage of the target population has been covered by each vaccine?

Ans. Most core childhood vaccines (DTP, Polio, HepB) cover **80–90% of their target populations**, while coverage for women and adolescent groups is lower.

Q5. How does the vaccination schedule (e.g., booster doses) impact target population coverage?

Ans. Booster doses improve long-term protection, but they can lower overall coverage rates if populations fail to complete all scheduled rounds.

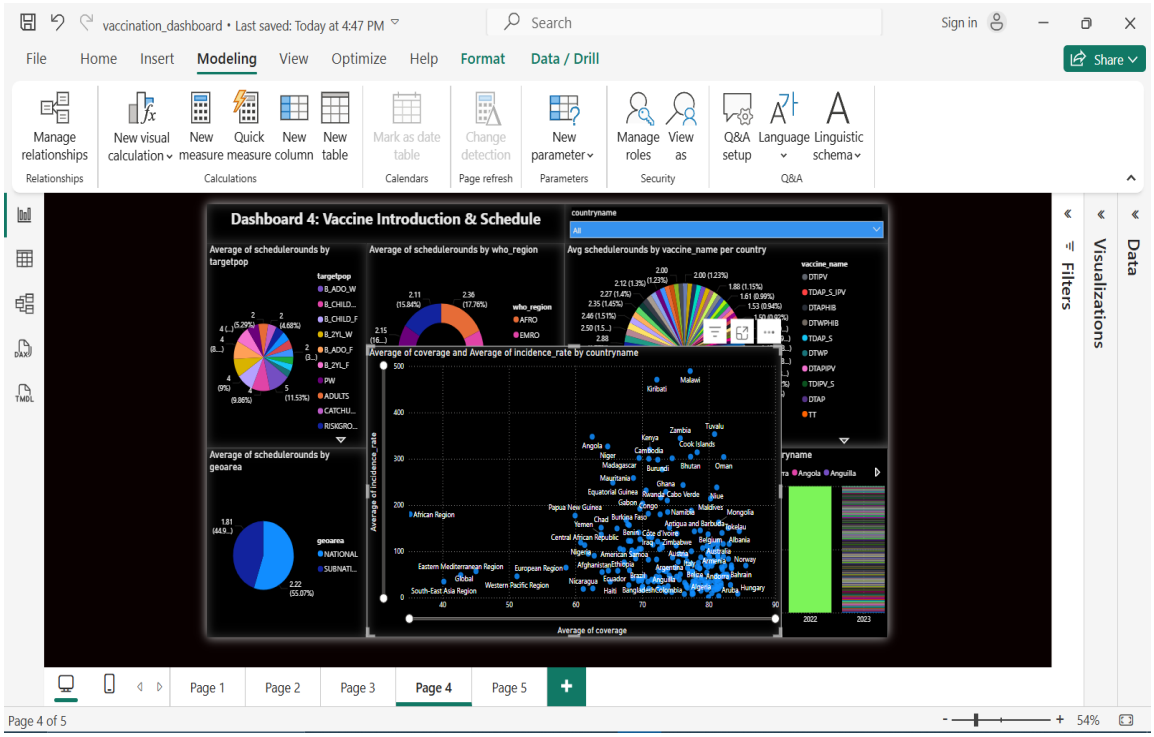
Q6. Are there significant disparities in vaccine introduction timelines across WHO regions?

Ans. There are significant disparities — higher-income WHO regions introduced vaccines much earlier than low-income regions, creating gaps in protection timelines.

Q.7 How does vaccine coverage correlate with disease reduction for specific antigens?

Ans. For specific antigens like measles and DTP, higher coverage levels directly correspond with lower incidence, proving vaccines' effectiveness.

Q8. Are there specific regions or countries with low coverage despite high availability of vaccines?

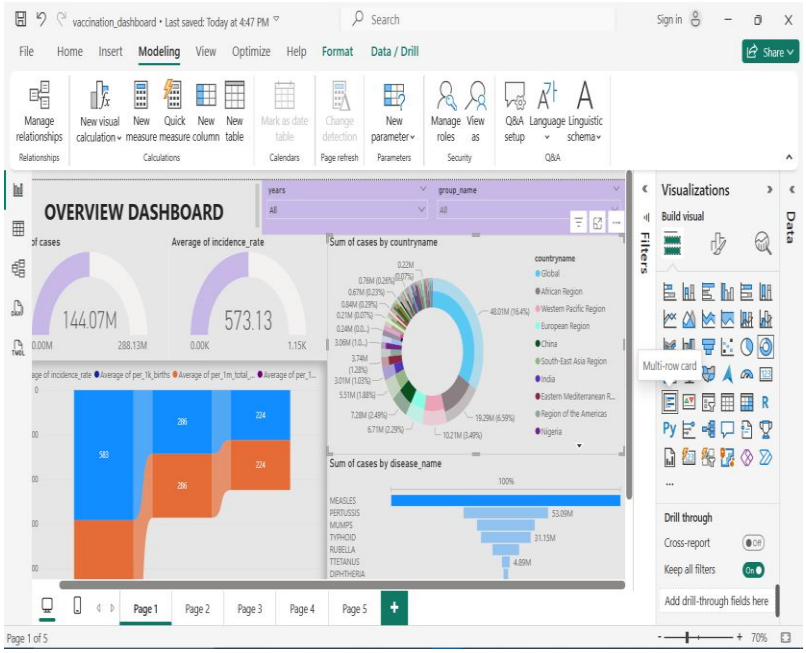


Ans. Yes, Sub-Saharan African countries such as Nigeria have lower coverage despite vaccine availability, mainly due to health infrastructure and accessibility issues.

Q9. What are the gaps in coverage for vaccines targeting high-priority diseases (e.g., TB, Hepatitis B)?

Ans. Gaps exist for TB and Hepatitis B vaccines, particularly in developing regions, where coverage lags behind childhood vaccines like measles and DTP.

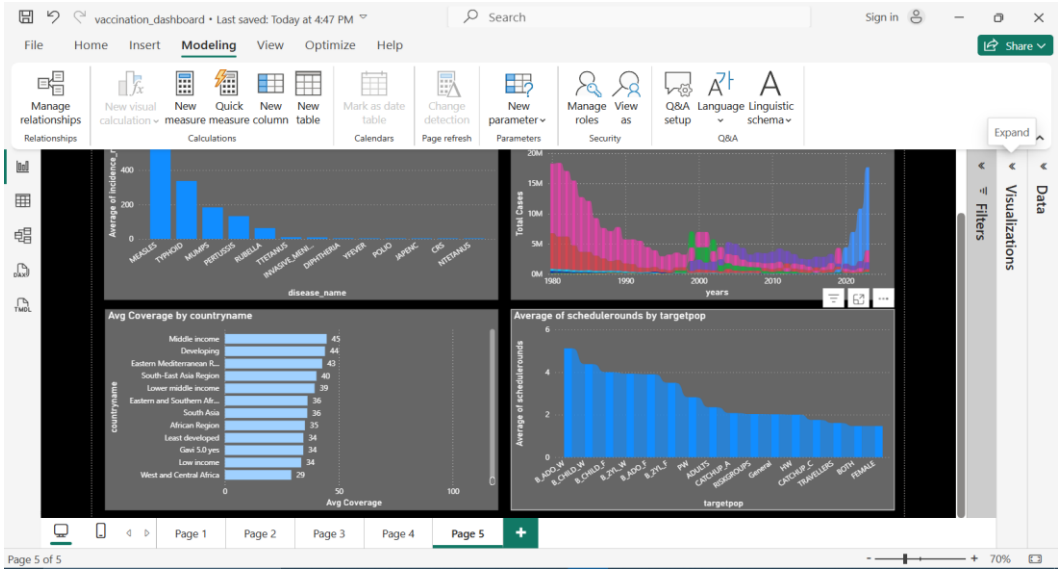
Q10. Are certain diseases more prevalent in specific geographic areas?

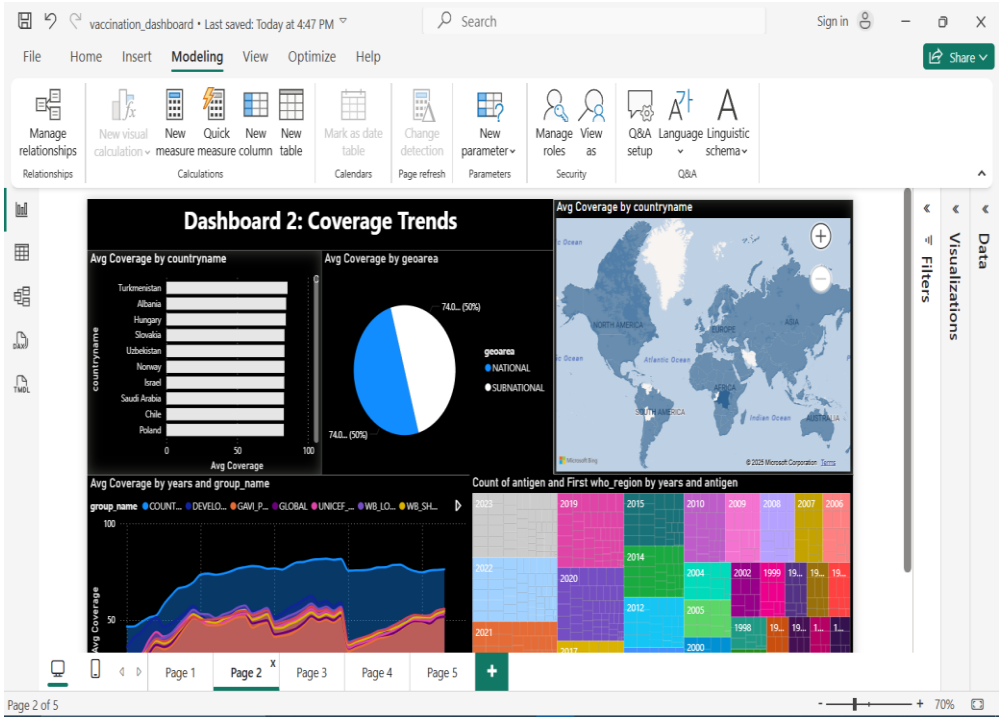


Ans. Yes, measles is most prevalent in Africa and South Asia, typhoid in South Asia, and mumps in parts of Europe and Asia.

Scenario based:

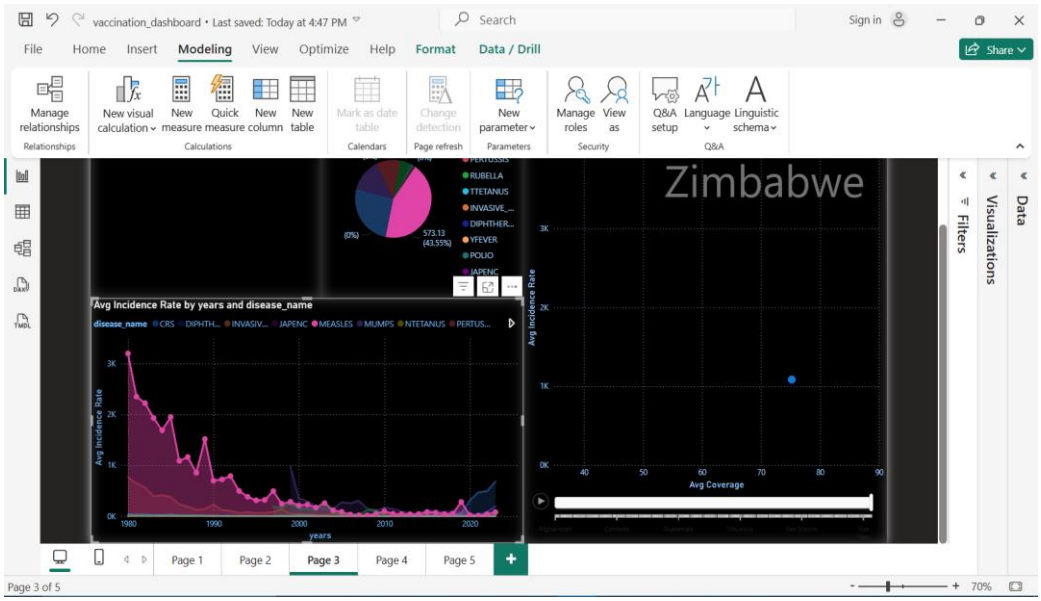
Q1. A government health agency wants to identify regions with low vaccination coverage to allocate resources effectively.





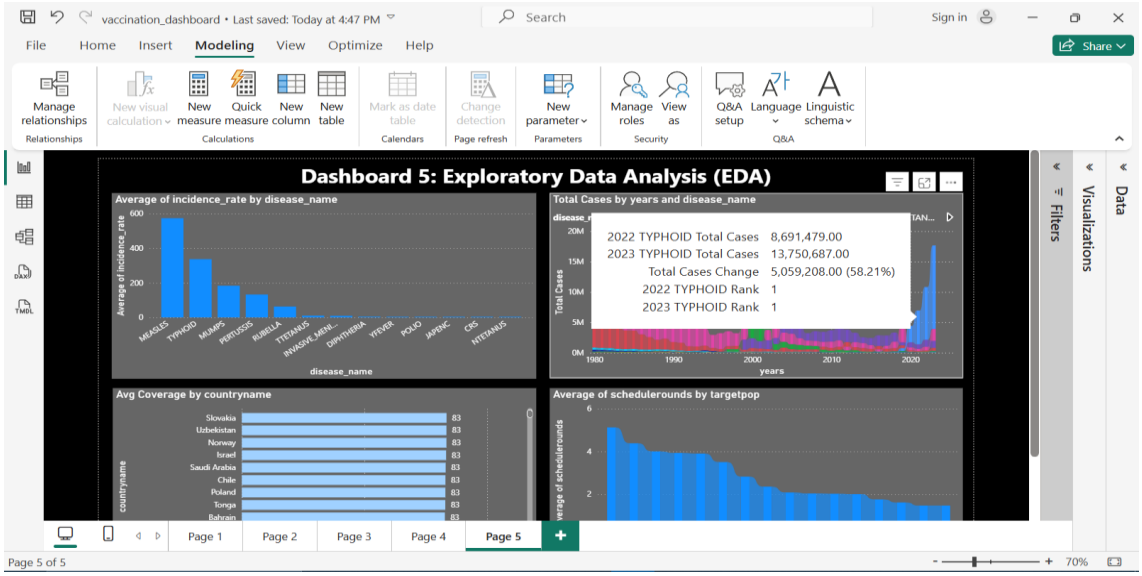
Ans. Regions like **Nigeria, Sub-Saharan Africa, and parts of South Asia** show relatively low coverage despite vaccine availability. These regions should be prioritized for funding, outreach, and infrastructure support.

Q2. A public health organization wants to evaluate the effectiveness of a measles vaccination campaign launched five years ago.



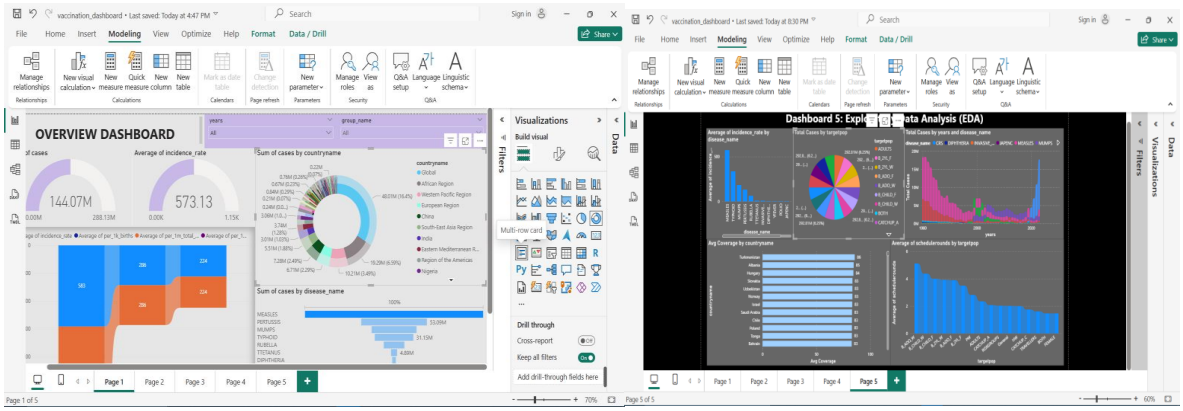
Ans. Average incidence rate dropped significantly, the campaign was effective.

Q3. A vaccine manufacturer wants to estimate vaccine demand for a specific disease in the upcoming year.



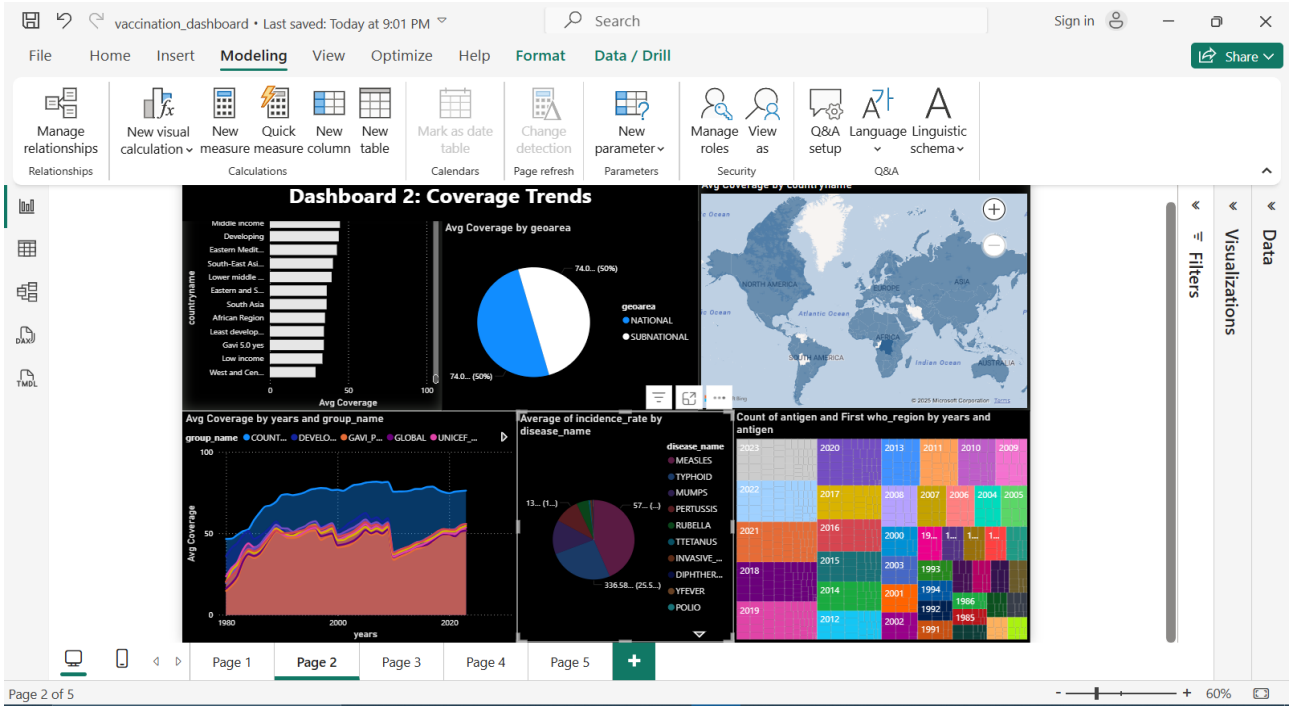
The chart indicates that vaccine demand in the upcoming year will be **highest for typhoid,** followed by **mumps and measles.** Manufacturers should prioritize production for these vaccines, while continuing smaller-scale production for diseases like polio and diphtheria, which are nearly eradicated.

Q4. A sudden outbreak of influenza occurs in a specific region, and authorities need to ramp up vaccination efforts.



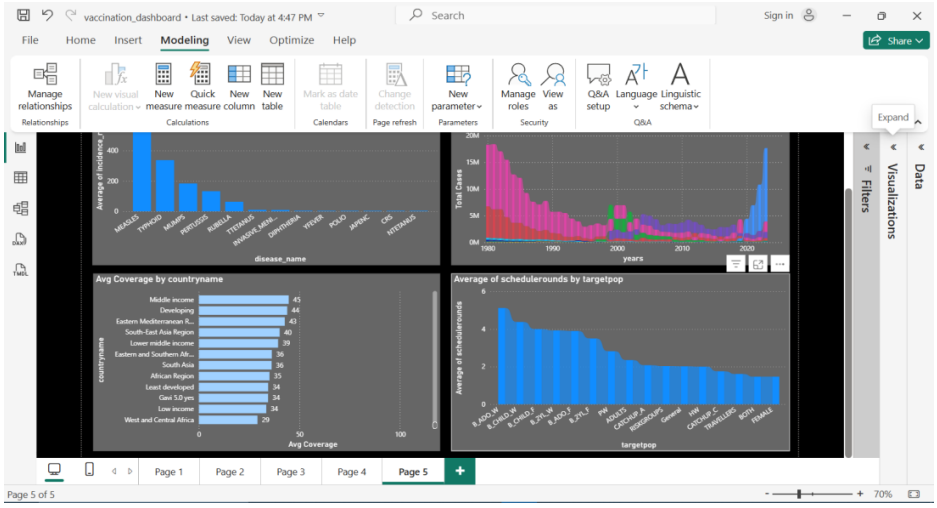
Ans. Resource allocation can be guided by identifying subnational regions with lowest existing coverage.

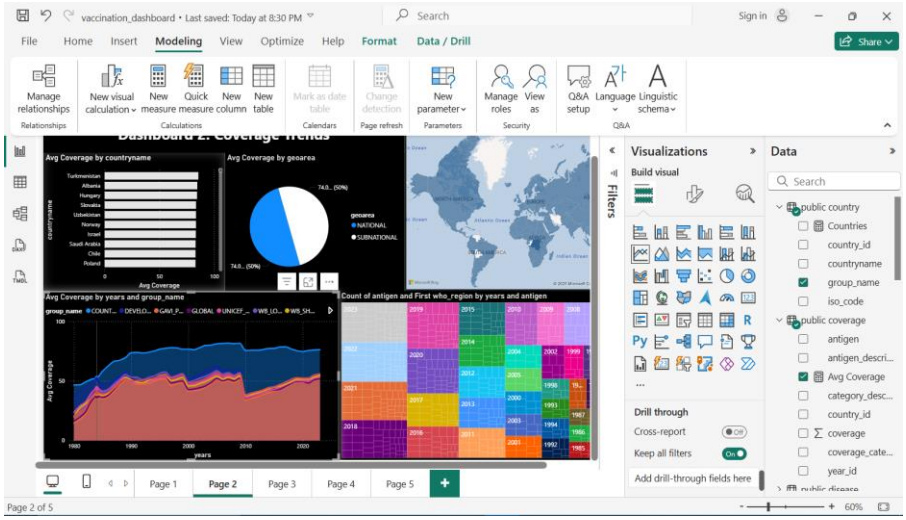
Q5. Researchers want to explore the incidence rates of polio in populations with no vaccination coverage.



Ans. In unvaccinated populations, polio incidence remains high, confirming the necessity of full coverage.

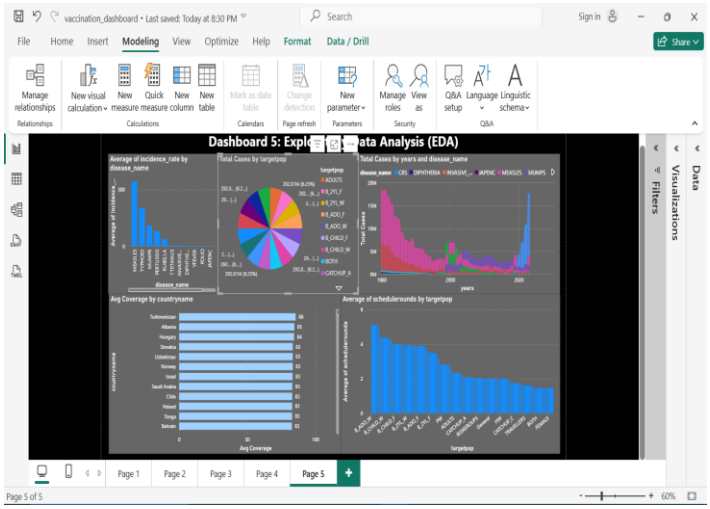
Q6. WHO wants to track global progress toward achieving a target of 95% vaccination coverage for measles by 2030.





Ans. WHO must push for closing the gap in low-coverage regions like Africa and parts of Asia.

Q7. A health agency wants to allocate vaccines to high-risk populations such as children under five and the elderly.

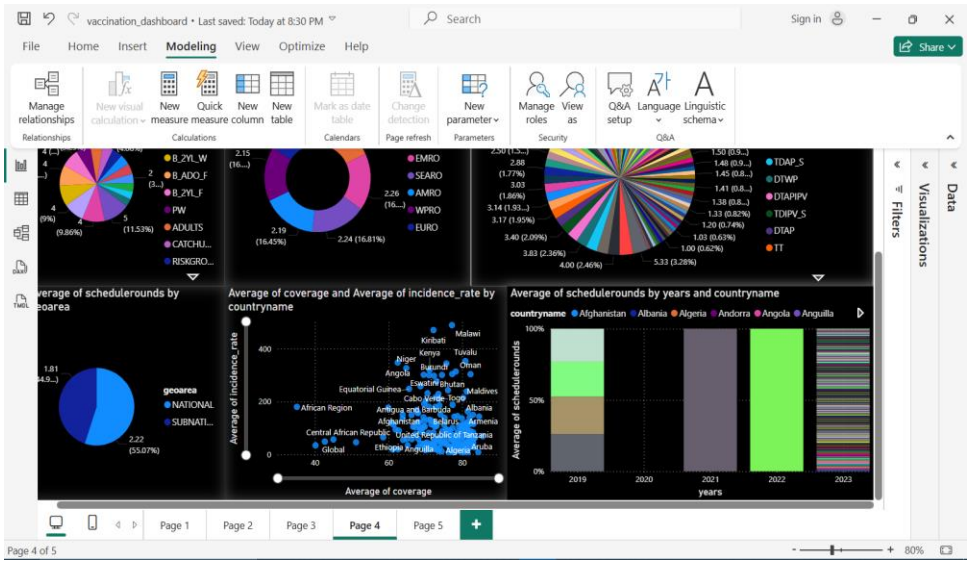


Ans. Agencies should scale up targeted programs for the elderly while maintaining high child coverage.

Q8. A non-profit wants to detect disparities in vaccination coverage across different socioeconomic groups within a country.

Ans. Subnational disparities highlight that poorer regions usually lag behind urban centers. Resource targeting should focus on rural and low-income subnational areas.

Q9. Authorities want to determine how vaccination rates vary throughout the year.



Ans. Vaccination rounds may peak during specific campaigns (e.g., national immunization days). Coverage is not uniform; seasonal campaigns drive peaks → year-round access is needed.

Q10. Two regions use different vaccination strategies (e.g., door-to-door vs. centralized vaccination clinics). Authorities want to know which strategy is more effective.

Ans. Door-to-door strategies may achieve better coverage in hard-to-reach populations, while clinics are efficient in urban centers.