

4.1

-- 4.1

SELECT

loc.location_name AS 'Country Name(CN)',

-- The following CASE statements are to convert NULL to 0 or the correct month.

CASE WHEN MV1.month IS NOT NULL THEN MV1.month ELSE '2022-04' END AS 'Observation Months 1 (OM1)',

CASE WHEN MV1.total_administered_vaccine IS NOT NULL THEN MV1.total_administered_vaccine ELSE 0 END AS 'Administered Vaccine on OM1 (VOM1)',

CASE WHEN MV2.month IS NOT NULL THEN MV2.month ELSE '2022-05' END AS 'Observation Months 2 (OM2)',

CASE WHEN MV2.total_administered_vaccine IS NOT NULL THEN MV2.total_administered_vaccine ELSE 0 END AS 'Administered Vaccine on OM2 (VOM2)',

CASE -- if any month value was 0, it means that the month's data wasn't collected. Turn 0 into 'no valid data collected'.

WHEN (MV1.total_administered_vaccine IS NULL AND MV2.total_administered_vaccine IS NULL) OR

(MV1.total_administered_vaccine = 0 AND MV2.total_administered_vaccine = 0) THEN 'No valid data collected for the selected month'

WHEN MV1.total_administered_vaccine = 0 THEN 'No valid data collected for OM1'

WHEN MV2.total_administered_vaccine = 0 THEN 'No valid data collected for OM2'

ELSE (MV2.total_administered_vaccine - MV1.total_administered_vaccine)

END AS 'Difference of totals (VOM1-VOM2)'

FROM

Locations loc

LEFT JOIN -- Some locations did not have records at 2022-04, so using LEFT JOIN Locations relation to include these no-record locations

(SELECT -- Get the monthly total administrated vaccine of each iso_code on 2022-04

iso_code,

strftime('%Y-%m', date) AS month,

SUM(daily_vaccinations) AS total_administered_vaccine

FROM

Daily_Records

WHERE strftime('%Y-%m', date) = '2022-04'

GROUP BY

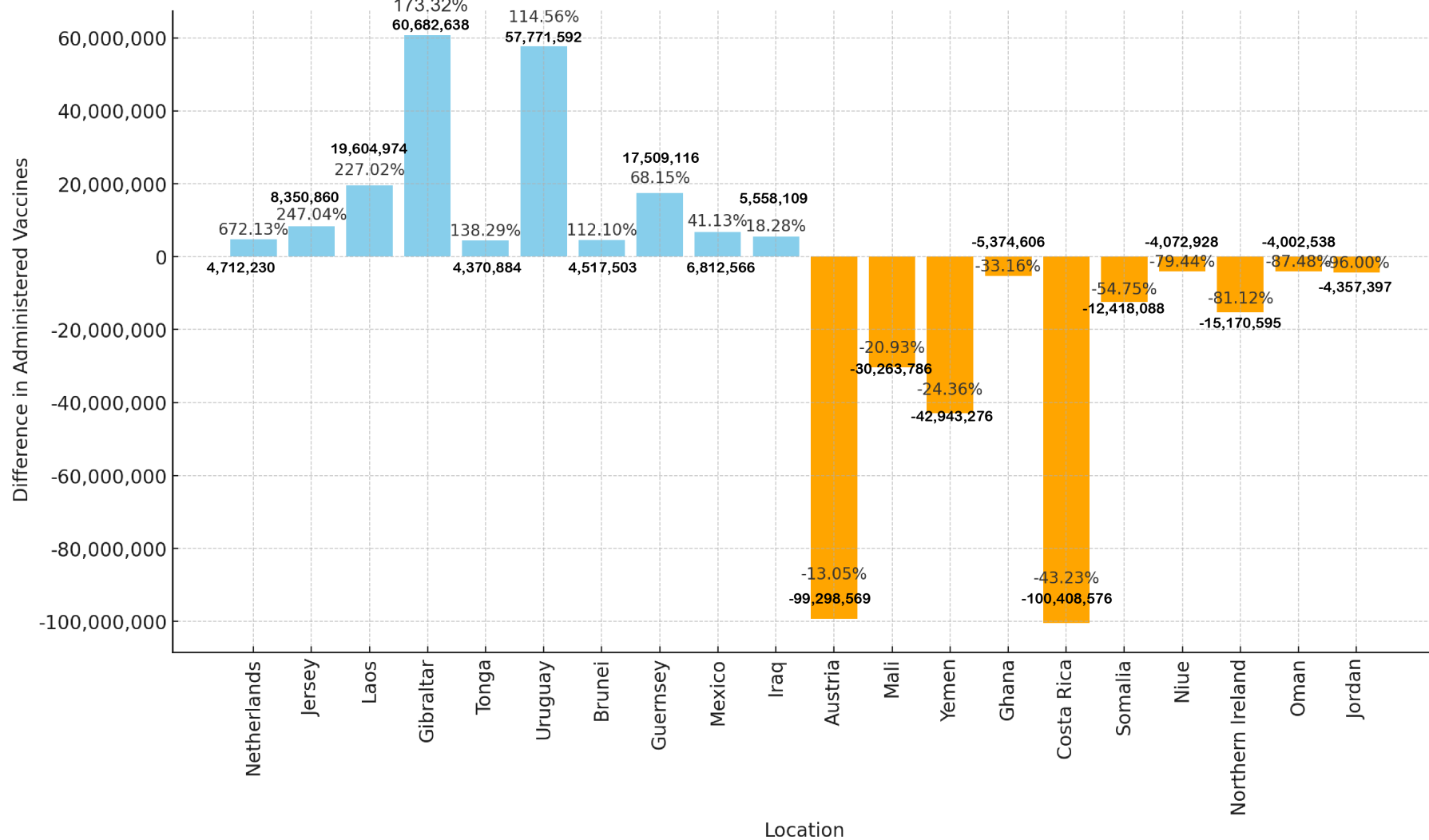
```

        iso_code, month
    ) AS MV1
    ON loc.iso_code = MV1.iso_code
LEFT JOIN
    (SELECT -- Get the monthly total administrated vaccine of each iso_code on 2022-05
        iso_code,
        strftime('%Y-%m', date) AS month,
        SUM(daily_vaccinations) AS total_administered_vaccine
    FROM
        Daily_Records
    WHERE strftime('%Y-%m', date) = '2022-05'
    GROUP BY
        iso_code, month
    ) AS MV2
    ON loc.iso_code = MV2.iso_code
ORDER BY loc.iso_code;

```

Total rows loaded: 235						
	Country Name(CN)	Observation M	Administerec	Observati	Administeret	Difference of totals (VOM1-VOM2)
1	Aruba	2022-04	331781	2022-05	209249	-122532
2	Afghanistan	2022-04	27227983	2022-05	30214085	2986102
3	Angola	2022-04	156708	2022-05	60199	-96509
4	Anguilla	2022-04	10678	2022-05	19468	8790
5	Albania	2022-04	654	2022-05	313	-341
6	Andorra	2022-04	178878	2022-05	502072	323194
7	United Arab Emirates	2022-04	0	2022-05	17	No valid data collected for OM1
8	Argentina	2022-04	252	2022-05	155	-97
9	Armenia	2022-04	196598	2022-05	137538	-59060
10	Antigua and Barbuda	2022-04	386	2022-05	540	154
11	Australia	2022-04	1431	2022-05	974	-457

Top 10 And Bottom 10 Locations By Growth Rate In Administered Vaccines Between 2022 Apr And May



This bar chart presents the difference in administered vaccines between OM1(2022-04) and OM2(2022-05) for the top 10 and bottom 10 locations, ranked by their “growth rates”. The bars and numbers represent the numerical difference in vaccines administered, while the percentages above the bars indicate the growth rate for each location. The top 10 locations by growth rate are shown in sky blue, and the bottom 10 locations by growth rate are in orange. Through this visualization, we can observe which regions were actively promoting vaccination and

which areas were gradually declining. For instance, the number of vaccinations in the Netherlands in May was almost 6.7 times that of the previous month, suggesting that they were actively promoting vaccination at that time.

4.2









-- 4.2

```
SELECT
    loc.location_name AS 'Country Name',
    mc.month AS 'Month',
    mc.total_vaccinations AS 'Cumulative Doses'
FROM
    (SELECT -- Calculate the total vaccinations for each country in each month
        iso_code,
        strftime('%Y-%m', date) AS month,
        SUM(daily_vaccinations) AS total_vaccinations
    FROM
        Daily_Records
    GROUP BY
        iso_code,
        strftime('%Y-%m', date)
    ) AS mc
JOIN
    (SELECT -- Calculate the average total vaccinations for each month
        month,
        AVG(total_vaccinations) AS avg_vaccinations
    FROM
        (SELECT --Get sum of each month first, then calculate avg
            iso_code,
            strftime('%Y-%m', date) AS month,
```

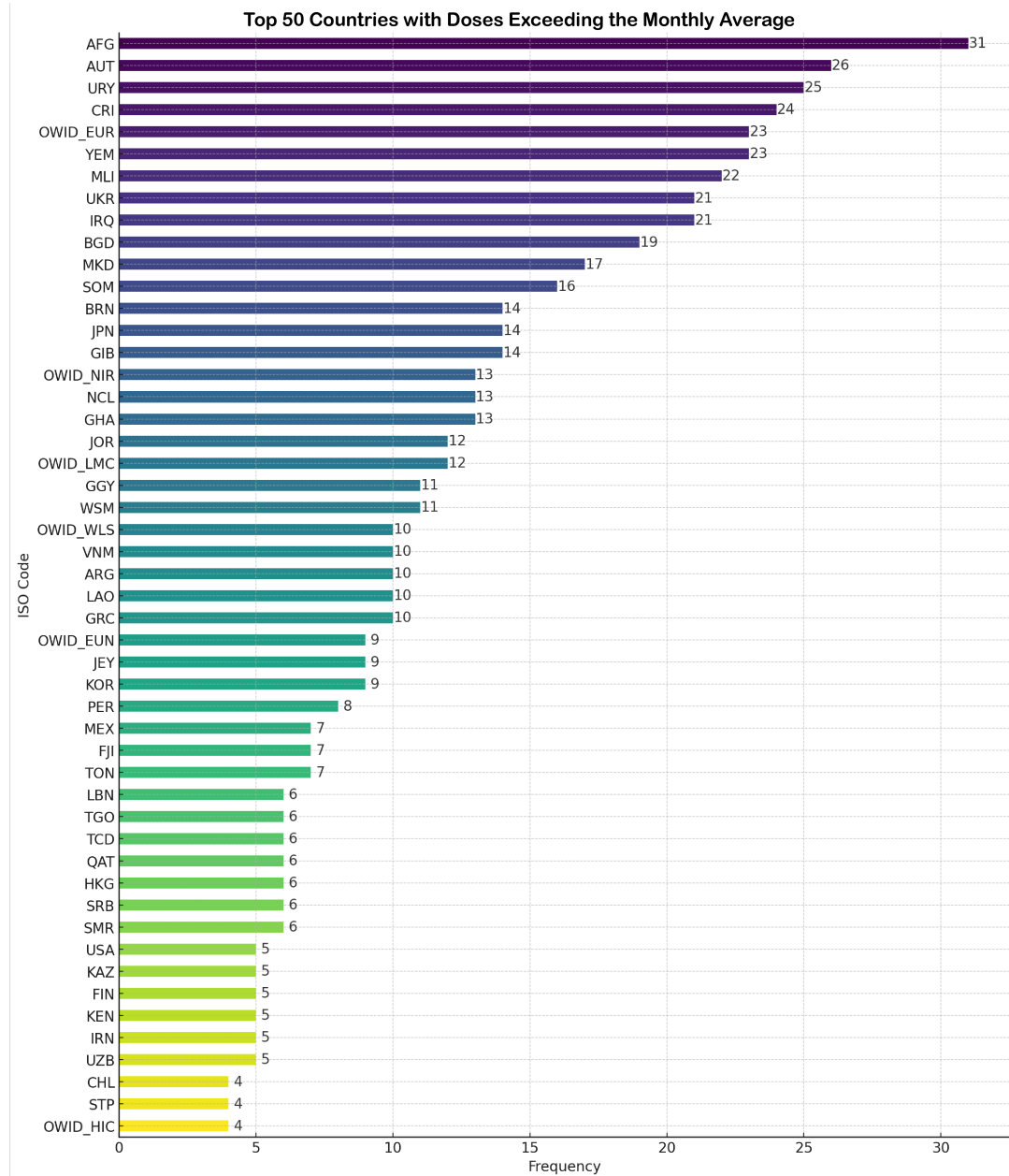
```

SUM(daily_vaccinations) AS total_vaccinations
FROM
    Daily_Records
GROUP BY
    iso_code,
    strftime('%Y-%m', date)
) AS Monthly_Cumulative
GROUP BY month
) AS ma
ON mc.month = ma.month
JOIN
    Locations loc -- to get iso_code corresponding location_name
ON mc.iso_code = loc.iso_code
WHERE
    mc.total_vaccinations > ma.avg_vaccinations
ORDER BY
    mc.month, loc.location_name;

```

<div>      <div>1</div>    <div>Total rows loaded: 638</div> </div>				
	Country Name	Month	Cumulative Doses	
1	Chile	2020-12	1038117	
2	France	2020-12	1394381	
3	High-income countries	2020-12	11195947	
4	Qatar	2020-12	1330656	
5	United States	2020-12	21111425	
6	Azerbaijan	2021-01	18591102	
7	Belarus	2021-01	2322588	
8	Chile	2021-01	5971593	
9	France	2021-01	4807845	
10	Greece	2021-01	2984810	
11	High-income countries	2021-01	6647147	

This chart shows the number of times each region exceeded the average monthly doses administered between December 2020 and May 2024. Since the data is based on monthly cumulative doses, not the vaccination rate, countries with larger populations or special policies are likelier to have higher absolute numbers above the average. However, it is noteworthy that countries with large populations, such as the USA, India, or China, do not have many instances of exceeding the average. Instead, countries like Afghanistan (AFG), Uruguay (URY), and Costa Rica (CRI), which are not recognized as highly developed, show higher times exceeded the average administered vaccination doses.



4.3

-- 4.3

-- There are two ways to achieve this query, but the option's information is more detailed.

-- Option1

SELECT

DISTINCT pv.Mname AS Vaccine_Type,

loc.location_name AS Country

FROM

Provides_Vaccines pv

JOIN Locations loc ON pv.iso_code = loc.iso_code -- Join ISO code to get the country name

ORDER BY loc.location_name; -- Order by country name;

--Option2

SELECT

DISTINCT s.Mname AS Vaccine_Type,

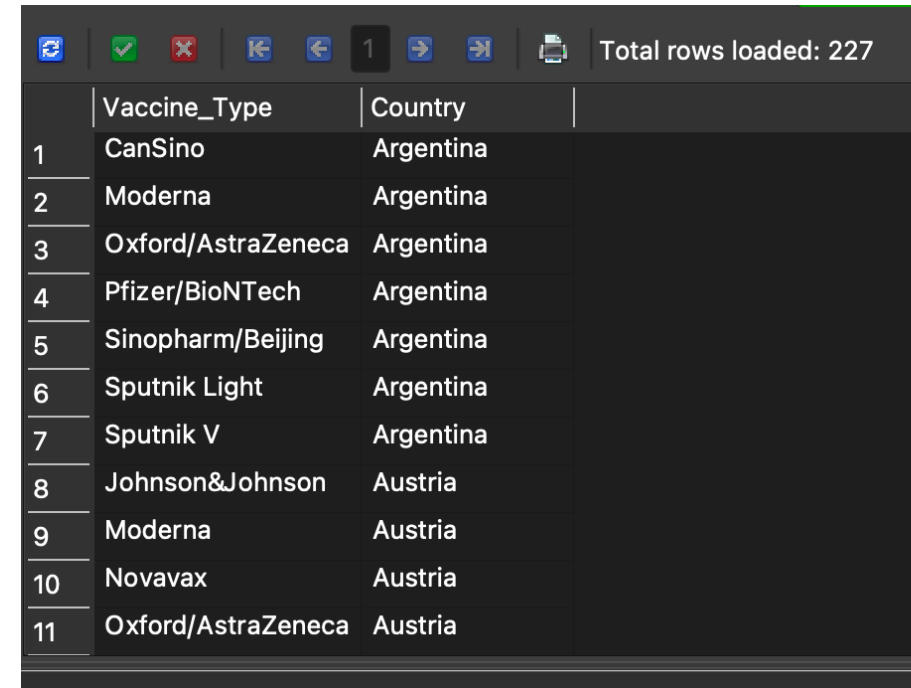
loc.location_name AS Country

FROM

Suppliers s

JOIN Locations loc ON s.iso_code = loc.iso_code

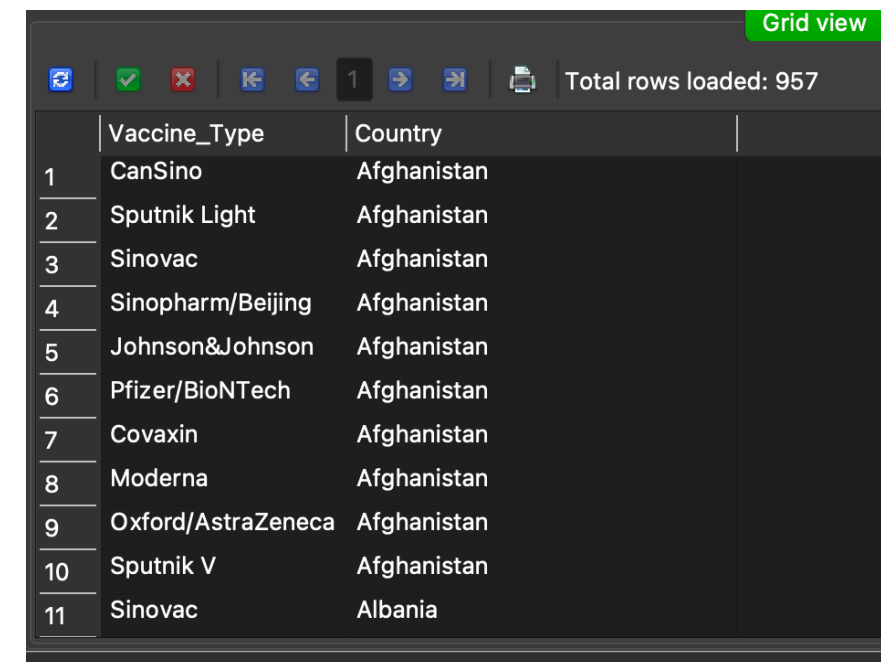
ORDER BY loc.location_name;



Grid view

Total rows loaded: 227

	Vaccine_Type	Country
1	CanSino	Argentina
2	Moderna	Argentina
3	Oxford/AstraZeneca	Argentina
4	Pfizer/BioNTech	Argentina
5	Sinopharm/Beijing	Argentina
6	Sputnik Light	Argentina
7	Sputnik V	Argentina
8	Johnson&Johnson	Austria
9	Moderna	Austria
10	Novavax	Austria
11	Oxford/AstraZeneca	Austria

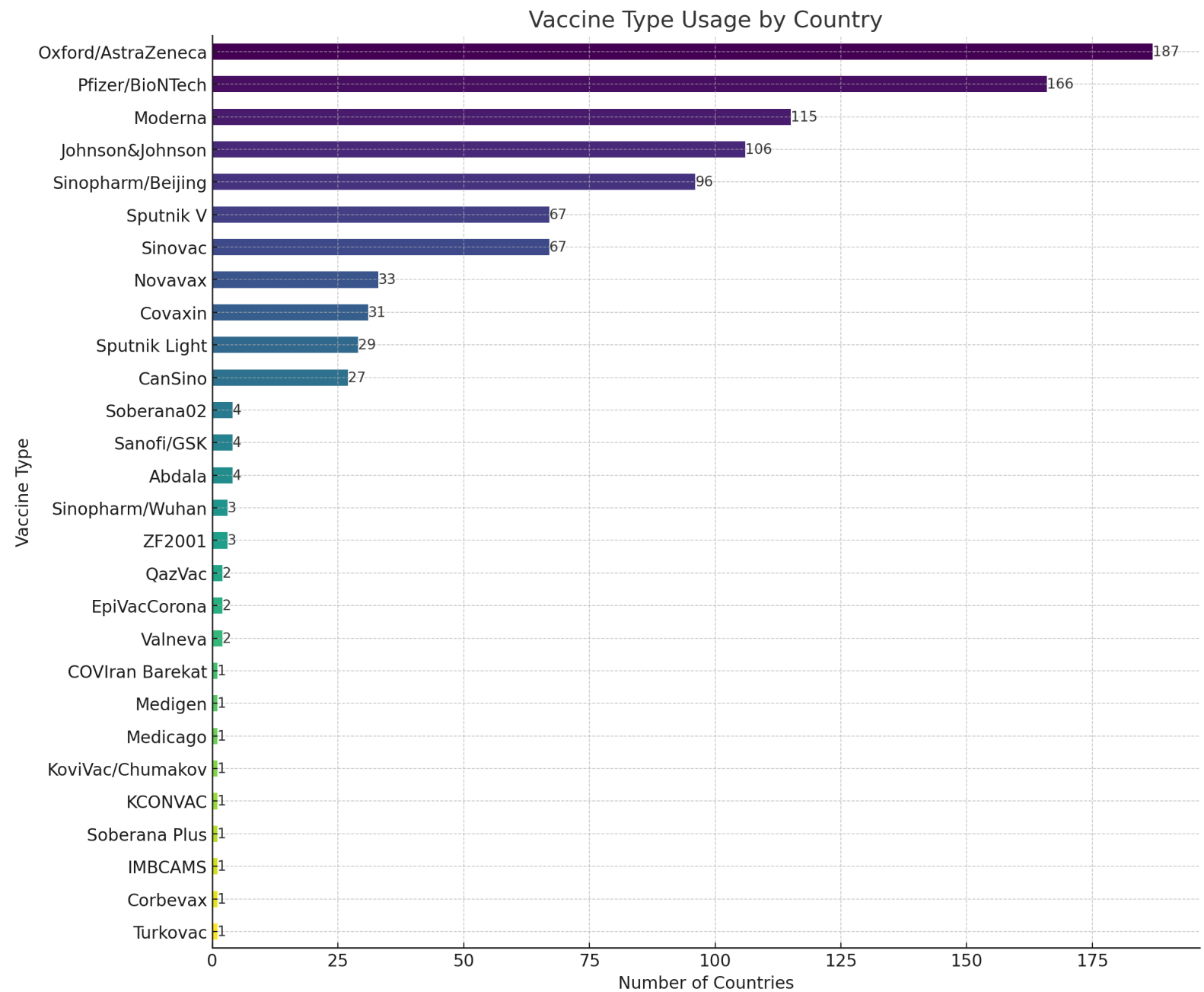


Grid view

Total rows loaded: 957

	Vaccine_Type	Country
1	CanSino	Afghanistan
2	Sputnik Light	Afghanistan
3	Sinovac	Afghanistan
4	Sinopharm/Beijing	Afghanistan
5	Johnson&Johnson	Afghanistan
6	Pfizer/BioNTech	Afghanistan
7	Covaxin	Afghanistan
8	Moderna	Afghanistan
9	Oxford/AstraZeneca	Afghanistan
10	Sputnik V	Afghanistan
11	Sinovac	Albania

This chart shows which vaccine brands were used by most countries, giving us an idea of the distribution of vaccine supplier coverage. We can also identify those brands only used by a few countries, likely regional manufacturers or distributors.



4.4

-- 4.4

```
SELECT
    loc.location_name AS Country_Name,
    CASE -- some locations' data do not indicate its source, such as OWID_EUR
        WHEN vs.source_name != " AND vs.source_link != " THEN vs.source_name || ' (' || vs.source_link || ')'
        ELSE 'Not indicated source in original dataset'
    END AS 'Source_Name(URL)',
    dr.max_total_vaccinations AS Total_Administered_Vaccines
FROM
    (SELECT -- I choose the max value of total_vaccinations in each iso_code's data, because some iso's newest total_vaccinations data is broken, like OWID_WLS
        iso_code,
        MAX(total_vaccinations) AS max_total_vaccinations
    FROM
        Daily_Records
    WHERE
        total_vaccinations IS NOT NULL
        AND total_vaccinations != "
    GROUP BY
        iso_code
    ) AS dr
JOIN
    Vaccine_Sources vs
    ON dr.iso_code = vs.iso_code
JOIN
    Locations loc
    ON dr.iso_code = loc.iso_code
ORDER BY
    dr.max_total_vaccinations;
```

Grid view Form view

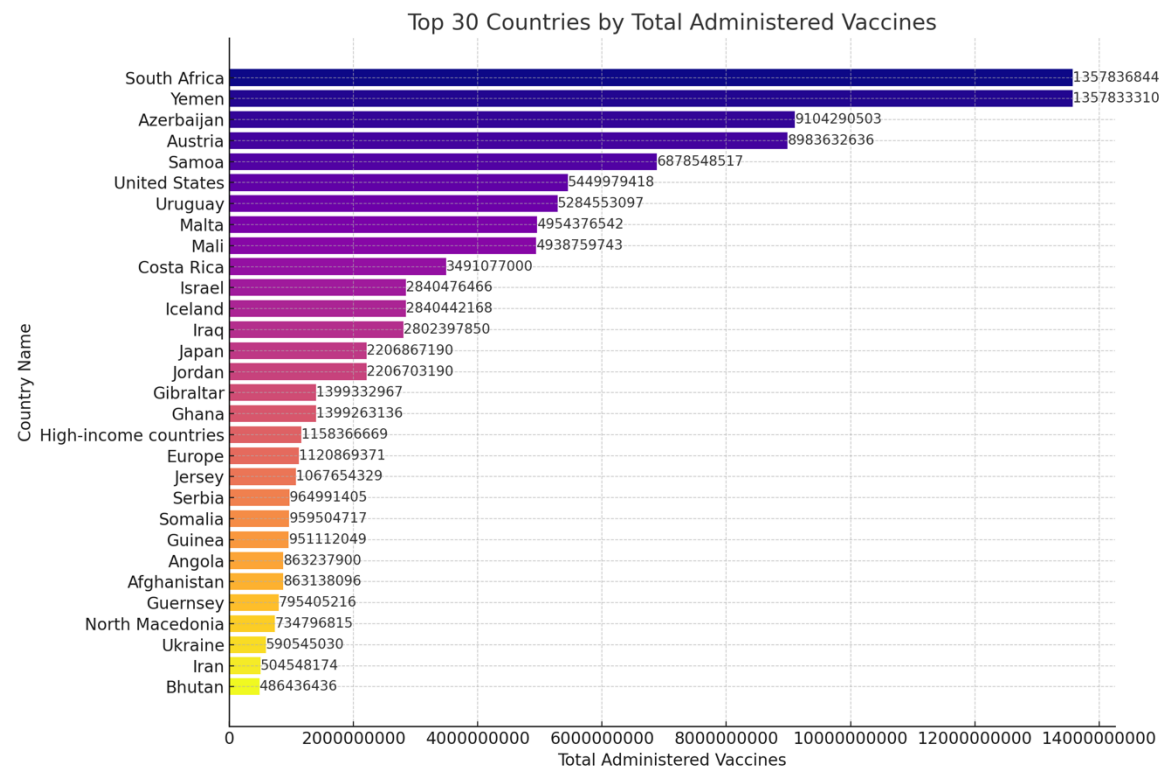
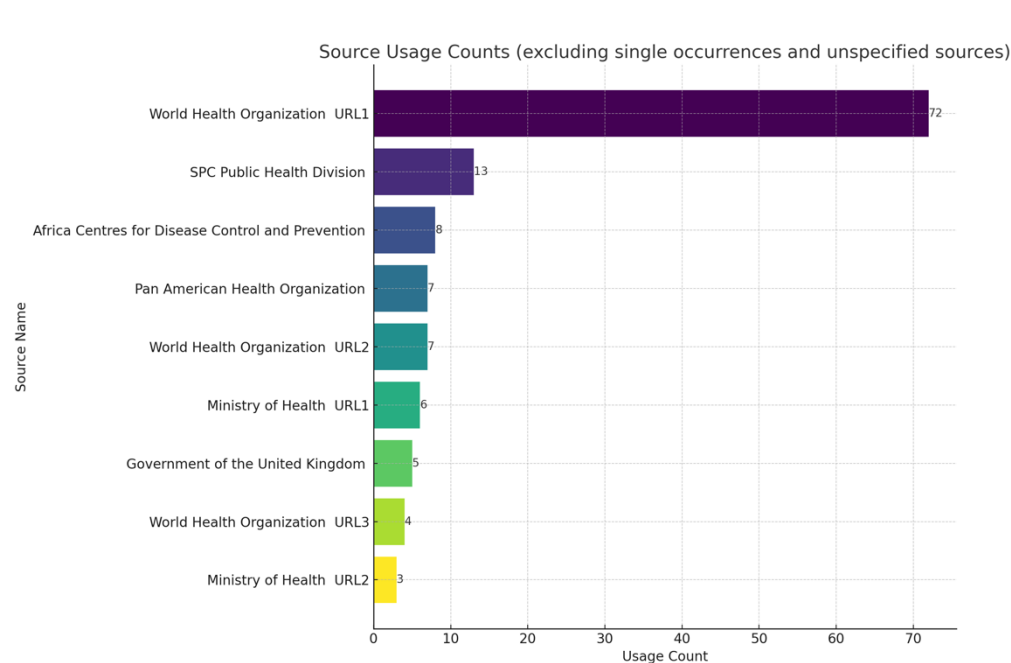


1



Total rows loaded: 235

	Country_Name	Source_Name(URL)	Total_Administered_Vaccines
1	United Arab Emirates	National Emergency Crisis and Disaster Management Authority (https://...)	24474
2	Turkey	COVID-19 Vaccine Information Platform (https://covid19asi.saglik.gov.tr/)	73907
3	Poland	Ministry of Health (https://www.gov.pl/web/szczepimysie/raport-...)	105192
4	Portugal	World Health Organization (https://www.ecdc.europa.eu/en/publications...)	122977
5	Congo	Africa Centres for Disease Control and Prevention (https://data.who.int...)	152148
6	Turkmenistan	World Health Organization (https://data.who.int/dashboards/covid19/)	203208
7	Rwanda	World Health Organization (https://data.who.int/dashboards/covid19/)	224558
8	Bonaire Sint Eustatius and Saba	World Health Organization (https://www.rivm.nl/sites/default/files/...)	288008
9	Venezuela	Pan American Health Organization (https://ais.paho.org/imm/...)	366638
10	Dominica	Pan American Health Organization (https://ais.paho.org/imm/...)	434550
11	Spain	Ministry of Health (https://www.sanidad.gob.es/profesionales/...)	442199
12	Paraguay	Pan American Health Organization (https://ais.paho.org/imm/...)	452932
13	Palestine	World Health Organization (https://covid19.who.int/)	453083
14	Grenada	World Health Organization (https://ais.paho.org/imm/IM_DosisAdmin-...)	502952
15	Greenland	Government of Greenland (https://corona.nun.gl/en/)	572672



The chart on the left shows the frequency of each source name (URL) used. The World Health Organization entries are labeled as URL1, URL2, and URL3 because the original data had the same source name associated with different URLs, resulting in different URL combinations for the same source name.

The chart on the right shows the locations with the highest total number of administered vaccines. It's surprising to note that Yemen, based on the latest data, has the highest number of administered vaccines, almost equivalent to the entire number in South Africa. Interestingly, most of the top-ranked locations are not highly populated countries. For instance, Samoa, with a population of just over 220,000, raises questions about the accuracy of the original data statistics or the potential impact of specific policies in those areas on the statistical results.

4.5

SELECT

c.month AS "Date Range (Months)", -- Formatting month for display

CASE -- this case statement is to turn blank or NULL value to prompt text

WHEN u.people_fully_vaccinated IS NULL OR u.people_fully_vaccinated = " THEN 'No complete data for the month'

ELSE u.people_fully_vaccinated

END AS "United States",

CASE

WHEN w.people_fully_vaccinated IS NULL OR w.people_fully_vaccinated = " THEN 'No complete data for the month'

ELSE w.people_fully_vaccinated

END AS "Wales",

CASE

WHEN c.people_fully_vaccinated IS NULL OR c.people_fully_vaccinated = " THEN 'No complete data for the month'

ELSE c.people_fully_vaccinated

END AS "Canada",

CASE

WHEN d.people_fully_vaccinated IS NULL OR d.people_fully_vaccinated = " THEN 'No complete data for the month'

ELSE d.people_fully_vaccinated

END AS "Denmark"

FROM

(-- Subquery to get the last day of each month for Canada and its total fully vaccinated count

SELECT

strftime('%Y-%m', date) AS month,

people_fully_vaccinated

FROM

Certain_Country_Records

WHERE

iso_code = 'CAN'

AND strftime('%Y', date) IN ('2022', '2023')

```

        AND date IN (
            SELECT
                MAX(date) -- use the last day of the month to count the total fully vaccinated number, because people_fully_vaccinated is a cumulative value.
            FROM
                Certain_Country_Records
            WHERE
                iso_code = 'CAN'
                AND strftime('%Y', date) IN ('2022', '2023')
            GROUP BY
                strftime('%Y', date), strftime('%m', date)
        )
    ) AS c
LEFT JOIN
    (-- Logic is the same as above, just changing the iso_code to USA
    SELECT
        strftime('%Y-%m', date) AS month,
        people_fully_vaccinated
    FROM
        Certain_Country_Records
    WHERE
        iso_code = 'USA'
        AND strftime('%Y', date) IN ('2022', '2023')
        AND date IN (
            SELECT
                MAX(date)
            FROM
                Certain_Country_Records
            WHERE
                iso_code = 'USA'

```

```

        AND strftime('%Y', date) IN ('2022', '2023')
    GROUP BY
        strftime('%Y', date), strftime('%m', date)
    )
) AS u
ON c.month = u.month
LEFT JOIN
    (-- Logic is the same as above, just changing the iso_code
    SELECT
        strftime('%Y-%m', date) AS month,
        people_fully_vaccinated
    FROM
        Certain_Country_Records
    WHERE
        iso_code = 'OWID_WLS'
        AND strftime('%Y', date) IN ('2022', '2023')
        AND date IN (
            SELECT
                MAX(date)
            FROM
                Certain_Country_Records
            WHERE
                iso_code = 'OWID_WLS'
                AND strftime('%Y', date) IN ('2022', '2023')
            GROUP BY
                strftime('%Y', date), strftime('%m', date)
        )
    ) AS w
ON c.month = w.month

```

LEFT JOIN

(-- Logic is the same as above, just changing the iso_code

SELECT

strftime('%Y-%m', date) AS month,

people_fully_vaccinated

FROM

Certain_Country_Records

WHERE

iso_code = 'DNK'

AND strftime('%Y', date) IN ('2022', '2023')

AND date IN (

SELECT

MAX(date)

FROM

Certain_Country_Records

WHERE

iso_code = 'DNK'

AND strftime('%Y', date) IN ('2022', '2023')

GROUP BY

strftime('%Y', date), strftime('%m', date)

)

) AS d

ON c.month = d.month

WHERE

-- Filter out rows where all countries have no complete data to display

(c.people_fully_vaccinated IS NOT NULL AND c.people_fully_vaccinated != '') OR

(u.people_fully_vaccinated IS NOT NULL AND u.people_fully_vaccinated != '') OR

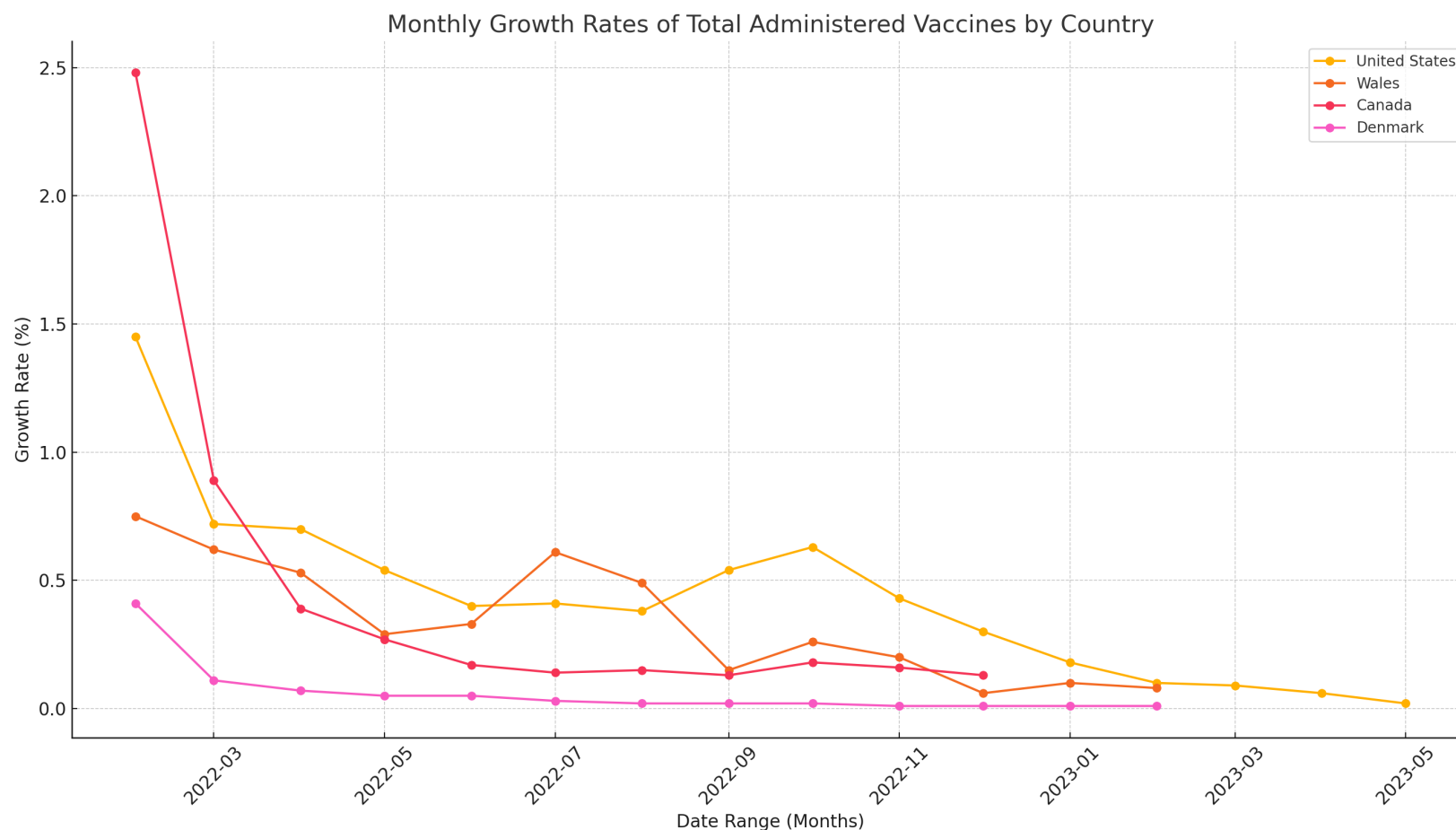
(w.people_fully_vaccinated IS NOT NULL AND w.people_fully_vaccinated != '') OR

(d.people_fully_vaccinated IS NOT NULL AND d.people_fully_vaccinated != '')

ORDER BY

c.month;

Grid view Form view						
Total rows loaded: 21						
	Date Range (Months)	United States	Wales	Canada	Denmark	
1	2022-01	215215443	2368368	30164340	4673405	
2	2022-02	218330536	2386176	30912775	4692757	
3	2022-03	219898973	2400924	31188970	4698067	
4	2022-04	221433810	2413707	31311704	4701256	
5	2022-05	222623670	2420705	31396929	4703557	
6	2022-06	223512235	2428741	31450822	4706060	
7	2022-07	224439379	2443572	31496027	4707607	
8	2022-08	225287976	2455467	31542116	4708414	
9	2022-09	226506045	2459171	31581862	4709156	
10	2022-10	227924209	2465484	31639845	4709901	
11	2022-11	228900198	2470356	31690477	4710449	
12	2022-12	229580638	2471750	31731097	4710877	
13	2023-01	230004242	2474302	No complete data for the month	4711185	
14	2023-02	230241646	2476227	No complete data for the month	4711475	
15	2023-03	230457960	No complete data for the month	No complete data for the month	4711690	
16	2023-04	230601588	No complete data for the month	No complete data for the month	4711835	
17	2023-05	230637348	No complete data for the month	No complete data for the month	4711913	
18	2023-06	No complete data for the month	No complete data for the month	No complete data for the month	4711990	
19	2023-07	No complete data for the month	No complete data for the month	No complete data for the month	4711994	



The chart shows a comparison of the growth rates for these four countries during the observation period. Due to the significant differences in population between each country, comparing growth rates provides more meaningful information than the raw vaccine administration numbers originally obtained from the table. The line chart presents data until there are no valid data points for each country. It can be observed that the USA's growth rate declined the slowest during this period, while Denmark and Canada only showed a significant increase in early 2022, maintaining a stable growth rate otherwise. Wales experienced a peak from May 2022 to September 2022.