Data Analysis Project: Telangana Women and Child Development - Number of Pregnant & Lactating Women enrolled in Anganwadi center

About the Dataset

The dataset utilized for this project is sourced from the Open Data Platform of the Government of Telangana. This platform aligns with the 'Open Data Policy' aimed at enhancing transparency and fostering innovative solutions to various challenges faced by the state. The dataset contains information on the number of pregnant and lactating women enrolled in Anganwadi centers across Telangana from January 2018 to February 2024.

Organization: The Telangana Women and Child Development

This dataset provides information about the Number of Pregnant & Lactating Women enrolled in Anganwadi centers in Telangana.

Dataset Columns:

- **Reporting Year, Reporting Month**: Year and month of the report.
- **D_Name**: District Name.
- **Proj_Name**: Project Name.
- **Sec_Name**: Sector Name.
- **AWC_ID**: Anganwadi ID.
- **AWC_Name**: Anganwadi Center Name.
- **Tot_PW**: Total Pregnant Women.
- **Tot_SC_PW, Tot_ST_PW, Tot_BC_PW, Tot_OC_PW**: Total Pregnant Women by caste category (SC, ST, BC, OC).
- **Tot_LW**: Total Lactating Women.
- **Tot_SC_LW, Tot_ST_LW, Tot_BC_LW, Tot_OC_LW**: Total Lactating Women by caste category (SC, ST, BC, OC).

Project Overview

The primary aim of this data analysis project is to examine and interpret the enrollment patterns of pregnant and lactating women in Anganwadi centers across Telangana over six years. The analysis covers a detailed examination of monthly enrollment data categorized by district, project, sector, and caste, providing insights into trends, community distribution, and identifying any anomalies.

Key Objectives

1. **Temporal Trends Analysis:**
    - **Monthly and Quarterly Patterns**: Identify the highest and lowest enrollment months, focusing on significant trends like the spike in February 2021 and the dip in July 2019.
    - **Yearly Growth/Decline**: Examine yearly trends, particularly the surge in 2021 post-COVID and the stabilization in subsequent years.
2. **Community-Based Analysis:**
    - **Enrollment Distribution by Caste**: Investigate the enrollment distribution among different communities (SC, ST, BC, OC) and understand community-specific dynamics.
3. **Project and Sector-Level Analysis:**
    - **Project Performance**: Identify top and bottom projects in terms of enrollments, particularly focusing on urban vs. rural disparities.
    - **Sector Analysis**: Assess sector-level enrollments to spot best practices and areas needing improvement.
4. **Bifurcation Analysis:**
    - **Caste-Based Enrollment Trends**: Analyze the distribution and representation of pregnant and lactating women across different caste categories.
5. **Outliers and Anomalies Detection:**
    - **Identify Outliers**: Detect and investigate sudden spikes or drops in enrollment numbers to ensure data accuracy and identify any underlying issues.

Data Analysis Process

1. Loading and Preparing the Dataset:

- **Import Python Libraries**: Use pandas for data manipulation, NumPy for numerical operations, and DateTime for handling date and time.
- **Path Definition**: Define the path to the CSV files covering data from January 2018 to February 2024.

- **Create an Empty List to Store DataFrames:** Begin by initializing an empty list to temporarily hold individual DataFrames. Each DataFrame will correspond to the data from a single CSV file.
- **Reading CSV Files into DataFrames:** Iterate through the directory containing the CSV files (from January 2018 to February 2024). For each file, read its content into a DataFrame and append this DataFrame to the previously created list.
- **Concatenating DataFrames:** Once all files have been read and stored in the list, concatenate these individual DataFrames to form a single, unified DataFrame. This comprehensive DataFrame will now contain all the enrollment data for pregnant and lactating women across the specified period.

2. Processing and Cleaning the Data:

- **Feature Engineering**: Adding a new column by converting the 'Reporting Month' and 'Reporting Year' into a DateTime object for better trend analysis. This new column will facilitate better sorting and time-series analysis.
- **Data Validation**: Ensure the DateTime conversion is accurate, sort the data chronologically, and standardize the 'Sec_NAme' column by converting all its values to uppercase. This step prevents duplicate entries arising from case sensitivity (e.g., 'sector1' and 'SECTOR1' being treated as different entries)..
- **Null Values Handling**: Identify and manage any null or missing values to maintain data integrity.

Analysis and Insights

1. Monthly Enrollment Peaks and Troughs:

- **February 2021** saw the highest enrollments with 300,590 pregnant women and 201,214 lactating women. The spike in enrollments in February 2021 might be attributed to the post-COVID recovery phase. The COVID-19 pandemic had a significant impact on maternal and child health services globally, including in India. The fear of the virus, lockdowns, and restrictions on movement might have delayed enrollments during 2020, with a catch-up effect seen in 2021.

  The pandemic led to the temporary closure or limited operation of Anganwadi centers, causing disruptions in services. As restrictions eased, there was likely a concerted effort to re-enroll women and resume services, leading to a sharp increase in enrollments.

- **July 2019** recorded the lowest enrollments with 230,221 pregnant women and 120,041 lactating women. The dip in July 2019 could be seasonal, as certain times of the year might see lower participation due to factors like monsoon rains, agricultural activities, or festivals that may affect attendance and enrollment at Anganwadi centers.

2. Quarterly Trends:

- **Q2 2021** had the highest enrollments with 9,46,683 pregnant women and 4,98,870 lactating women. This aligns with the explanation for the February 2021 spike, reflecting the recovery phase after the initial pandemic wave. There might have been targeted government initiatives or awareness campaigns during this period to encourage enrollment.
- **Q1 2024** showed the lowest enrollments with 4,25,372 pregnant women and 3,17,468 lactating women. Since the data for 2024 is partial (up to February), it naturally results in lower totals for Q1. Additionally, the early months of the year might traditionally see lower enrollments due to the seasonal factors mentioned earlier.

3. Yearly Trends:

- **2018-2019** saw a notable increase in pregnant women enrollments and a dip in lactating women enrollments. There is almost a similar trend in 2020-21. The fluctuations between pregnant and lactating women enrollments in these periods could indicate shifting program focus or operational challenges. For example, 2018-2019 might have seen increased efforts to enroll pregnant women due to specific government programs or initiatives.
- **The 2021-2022** period marks the highest enrollment likely due to the full restoration of services post-pandemic, combined with possibly intensified outreach efforts to make up for the previous year's disruptions.
- **Steady Enrollment Post-2022:** After the initial recovery, the system might have stabilized, leading to more consistent enrollment numbers. The spike in lactating women towards the end of 2023 could reflect a demographic change or successful targeting of a previously underserved group.

4. District-Level Insights:

- **Rangareddy District** led in enrollments due to its urbanized and populous nature. Better access to healthcare and more awareness of services might also contribute to this.

Top 5 Districts with Highest Enrollments of Pregnant and Lactating Women: Rangareddy, Medchal-Malkajigiri, Nalgonda, Sangareddy, Khammam

- **Mulugu District** had the lowest enrollments as it is a more remote and tribal-dominated area. It may have lower access to Anganwadi services, or cultural factors might influence lower enrollment rates.

  Bottom 5 Districts with Lowest Enrollments of Pregnant and Lactating Women: Wanaparthy, Kumarambheem-Asifabad, Jangaon, Jayashankar-Bhupalapalli, Mulugu

5. Community Enrollment Distribution:

- In general, the majority of enrollments are from the Backward Class community.
- Only two districts, Adilabad and Bhadradri-Kothagudem, have seen more enrollments from the women of the Scheduled Tribe (ST) community.
- The dominance of the Backward Class (BC) community in enrollments reflects the demographic composition of Telangana. The higher enrollments in certain districts from the ST community could indicate targeted outreach or a higher population concentration of STs in those areas.
- Average community-wise enrollments distribution: SC: 19.8%, ST: 14.2%, BC: 56.3%, OC: 9.5%

6. Project and Sector-Level Insights:

- Projects and sectors in urban areas like Quthbullapur, Alwal, and Serilingampally likely have higher enrollments due to better infrastructure, awareness, and proximity to Anganwadi centers. On the other hand, sectors in more rural or tribal areas might struggle with lower enrollments due to logistical challenges, lower awareness, or cultural barriers.

- **Top 10 Projects with the Highest Number of Pregnant Women Enrollments:** Quthbullapur, Alwal, Zaheerabad, Serilingampally (U), Metpally, Hanamkonda (U), Siricilla, Charminar, Hayathnagar, Patancheru.
- **Bottom 10 Projects with the Lowest Number of Pregnant Women Enrollments:** Tadavi, Wankdi, Cherla, Jainoor, Narnoor, Aswaraopet(T), Eturunagaram(T), Mothkur(R), KodaKandla, Gudur

- **Top 10 Sectors with the Highest Number of Pregnant Women Enrollments:** Nagaram, Mallapur, Jawaharnagar, Ramanthapur, Narsingi, Medipally, 126 Jagathgirigutta, Thirumalagiri, Hyderguda, Uppal
- **Bottom 10 Sectors with the Lowest Number of Pregnant Women Enrollments:** Karaigudem, Kanchanpally, Movad, Kannaigudem, Karanjiwada, Indhani, Chirrakunta, Modi, Chelpaka, Narlapur
- **Top 10 Projects with Highest Number of Lactating Women Enrollments:** Quthbullapur, Alwal, Zaheerabad, Metpally, Serilingampally (U), Hanamkonda (U), Warangal, Medchal, Siricila, Charminar
- **Bottom 10 Projects with Lowest Number of Lactating Women Enrollments:** Wankdi, Tadvai, Cherla, Jainoor, Narnoor, Eturunagaram(T), Aswaraopet(T), Mothkur(R), Venkatapuram, Balmoor
- **Top 10 Sectors with Highest Number of Lactating Women Enrollments:** Nagaram, Jawaharnagar, 126 Jagathgirigutta, Mallapur,125 Gajularamaram, Hasmathpet, Thirumalagiri, Ramanthapur, Hyderguda, Narsingi
- **Bottom 10 Sectors with Lowest Number of Lactating Women Enrollments:** Karaigudem, Goyagaon, Kannaigudem, Modi, Erakpally, Movad, Wadgaom, Kanchanpally, Chelpaka, Ginnedhari

7. Anganwadi Centre-Level Insights:

- **Gandhinagar and Indiranagar** centers reported the highest enrollments, while smaller and remote centers like **Perumandla Sankeesa-II** had the lowest. Centers in more accessible and densely populated areas see higher enrollments. The bottom centers might be in remote areas with smaller populations, leading to lower enrollment figures.

  Top 5 Anganwadi Centers with Highest Enrollment: Gandhinagar, Indiranagar, Kothapally, Ramnagar, Indira Nagar

  Bottom 5 Anganwadi Centers with Lowest Enrollment: Perumandla Sankeesa-II, Pittalapally (Mini), Choppakatlapalem (Mini), Poolnayakthanda (Mini), Mysampally (Mini)

Potential News or Article References

1. **COVID-19 Impact on Maternal Health Services:** Numerous reports and studies have highlighted how the pandemic disrupted healthcare services for pregnant and lactating women.

2. **Government Initiatives in 2021:** News articles from 2021 detail specific government initiatives to bolster maternal health services, which could explain the spikes in enrollment during that year.
3. **Rangareddy District Demographics and Healthcare Access:** Local news or demographic studies explain why certain districts like Rangareddy have higher enrollments.

Key Insights with Contextual Support

1. **Enrollment Spikes in 2021**
   The spike in enrollments during 2021, particularly in February, is consistent with the post-COVID recovery phase. The pandemic severely disrupted services, and as restrictions eased, there was a significant effort to re-enroll beneficiaries and resume full-scale operations at Anganwadi centers. Many centers continued to provide essential services like food and nutritional supplements during lockdowns, but there were logistical challenges and reduced enrollments during 2020 due to fear and mobility restrictions.
   https://telanganatoday.com/telangana-innovative-egg-stamping-system-to-ensure-quality-nutrition-in-anganwadi-centers
   https://www.thenewsminute.com/telangana/how-overburdened-anganwadi-workers-telangana-feed-kids-pregnant-women-amid-lockdown-122664

2. **Impact of COVID-19 on Enrollment Patterns**
   During the lockdowns, Anganwadi workers were overburdened, often delivering rations and essential supplies directly to beneficiaries' homes. This effort was critical but also highlighted the strain on the system, potentially affecting enrollment figures during the height of the pandemic in 2020. The subsequent surge in 2021 enrollments could be seen as a rebound effect as services were ramped up post-lockdown.
   https://www.thenewsminute.com/telangana/how-overburdened-anganwadi-workers-telangana-feed-kids-pregnant-women-amid-lockdown-122664

3. **District-Level Disparities**
   Districts like Rangareddy, which saw the highest enrollments, likely benefited from better infrastructure, higher population density, and more consistent access to healthcare and social services. Conversely, districts like Mulugu with lower enrollments are often more remote and have a higher concentration of tribal populations, where access to Anganwadi services can be more challenging due to logistical and cultural barriers.

https://www.thehansindia.com/telangana/around-35700-anganwadi-centres-in-telangana-supported-by-centre-805091

4. **Government Initiatives and Nutritional Programs**
   The Telangana government's initiatives, such as the Aarogya Lakshmi scheme, which provides one full nutritious meal to pregnant and lactating women, have been pivotal in driving enrollments. The scheme's emphasis on nutrition aligns with the higher enrollments observed in certain periods and districts, particularly where the scheme's implementation has been more robust.
   https://telanganatoday.com/telangana-innovative-egg-stamping-system-to-ensure-quality-nutrition-in-anganwadi-centers

5. **Anganwadi Worker Contributions**
   The significant role of Anganwadi workers, especially during the pandemic, also provides context for enrollment trends. These workers not only facilitated continued access to essential services but also engaged in additional tasks such as health surveillance and community education, which could have influenced the recovery and stability of enrollment figures in the years following the pandemic's peak.
   https://www.thenewsminute.com/telangana/how-overburdened-anganwadi-workers-telangana-feed-kids-pregnant-women-amid-lockdown-122664

Conclusion

The data analysis of pregnant and lactating women enrolled in Anganwadi centers across Telangana from January 2018 to February 2024 provides valuable insights into the temporal and spatial distribution of enrollments. The analysis highlights the significant impact of the COVID-19 pandemic, district-level disparities, and the crucial role of government initiatives in shaping these trends. These insights will help the Telangana Women and Child Development organization in enhancing the effectiveness of their support programs and addressing the specific needs of different communities, ultimately improving the overall outreach and service delivery of Anganwadi centers.