# **Intra-Quarter Staffing Pattern Analysis Report**

## **1. Introduction**

This report presents an analysis of daily temporary staffing ratios in nursing homes for both **nursing** and **non-nursing** roles during Q2 2024 (April–June 2024). The objective is to identify short-term (daily and weekly) patterns, highlight differences between nursing and non-nursing roles, and explore potential relationships with resident census levels.

### **Datasets**

* **pbj\_nurse**: Provides daily nursing staff hours (employee vs. contract) for each facility.
* **pbj\_non\_nurse**: Provides daily non-nursing staff hours (employee vs. contract) for each facility.
* **Resident Census** (mdscensus): Used to examine potential correlations between staffing ratios and resident counts.

## **2. Methodology**

1. **Data Aggregation**
   * The analysis computes total employee and contract hours for each facility on each calendar date.
   * A **temporary staffing ratio** is then calculated for nursing and non-nursing roles: Temporary Ratio=Contract HoursEmployee Hours + Contract Hours \text{Temporary Ratio} = \frac{\text{Contract Hours}}{\text{Employee Hours + Contract Hours}}
2. **Daily Averages**
   * Ratios are aggregated across facilities to obtain an overall daily average, forming a time series.
   * A 7-day rolling average is computed to smooth out short-term fluctuations.
3. **Weekly Patterns**
   * Daily average ratios are grouped by **day of week** to identify consistent patterns (e.g., weekends vs. weekdays).
4. **Facility-Level Variation**
   * Standard deviations of daily ratios are computed per facility, revealing how much each facility’s contract usage fluctuates day to day.
5. **Correlation with Census**
   * The daily nursing ratio is merged with average resident census data to measure the global correlation between staffing ratio and resident population.

## **3. Key Findings**

### **3.1 Time Series and Rolling Averages**

* **Nursing Roles**
  + **Daily Average**: Approximately **6%–8%** usage of contract nurses, with modest daily variation.
  + **Rolling Average**: Fairly stable at around **7%**, indicating consistent reliance on contract nursing over Q2 2024.
* **Non-Nursing Roles**
  + **Daily Average**: Generally **25%–28%**, reflecting a significantly higher contract dependence compared to nursing.
  + **Rolling Average**: Around **26%–27%**, with a **noticeable spike around June 1** (above 30%).
  + The spike could stem from data anomalies, payroll cycles, or short-term operational changes.

### **3.2 Day-of-Week Patterns**

* **Nursing**
  + Lowest median ratios on **Tuesdays/Wednesdays** (~6.3–6.5%).
  + Highest on **Saturdays/Sundays** (~8.2–8.3%).
  + Interpretation: Weekend coverage may require more contract staff to cover for employees who prefer weekdays.
* **Non-Nursing**
  + Most weekdays average **25%–27%**.
  + **Sunday** sees a dip to around **23%**.
  + Interpretation: Non-nursing support roles (e.g., therapy, administration) are not needed at full capacity on Sundays.

### **3.3 Facility-Level Variation**

* **Nursing**
  + Many facilities have **near-zero** day-to-day variation (i.e., rarely or never using contract nurses), indicating a stable staffing model.
  + A smaller set of facilities exhibits moderate to high variation, suggesting inconsistent contract usage.
* **Non-Nursing**
  + A broader distribution, with more facilities showing moderate to high standard deviation in daily ratios.
  + Reflects that non-nursing roles are more flexibly or sporadically staffed with contract workers.

### **3.4 Correlation with Resident Census (Nursing)**

* **Correlation Coefficient**: **0.058**
  + Interpretation: This near-zero result suggests **no strong linear relationship** between daily resident census levels and daily changes in the nursing temporary staffing ratio.
  + Possible Explanation: Facilities may not adjust contract nurse usage on a day-to-day basis based on minor census fluctuations, or the effect may be overshadowed by other factors (e.g., scheduling policies, staff preferences, or budget constraints).

## **4. Conclusions**

1. **Nursing vs. Non-Nursing**
   * **Nursing** roles show a relatively low, stable contract staffing ratio, with a slight weekend uptick.
   * **Non-Nursing** roles rely more heavily on contract staff overall, experiencing occasional spikes and greater day-to-day variability.
2. **Weekend vs. Weekday**
   * Nursing contract usage is highest on weekends, likely reflecting employee staff shortages.
   * Non-nursing usage is slightly reduced on Sundays, suggesting decreased demand for certain support functions.
3. **Facility-Level Diversity**
   * Most facilities consistently report minimal or zero contract nursing.
   * A minority uses higher contract nursing, potentially due to local labor shortages or organizational models.
   * Non-nursing contract usage is more broadly distributed across facilities.
4. **Minimal Census Correlation**
   * The near-zero correlation implies that changes in daily resident numbers are not a primary driver of contract staffing changes at the aggregate level.

## **Final Remarks**

This analysis provides a clear view of daily and weekly temporary staffing patterns in nursing homes for both direct care (nursing) and support (non-nursing) roles. The data shows a consistent trend of higher contract usage in non-nursing roles and a modest weekend spike for nursing. These insights form the basis for operational strategies—such as proactive scheduling, targeted recruitment for weekend shifts, and deeper investigations into the causes of short-term spikes. By linking these findings with external cost and quality data, stakeholders can further quantify the impact of contract staffing on both financial and resident care outcomes.