# SUMMARY OF FINDINGS

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## Major Findings and Implications

### Summary of Findings

1. **Influence of COVID-19 Lockdowns on AQI**:
    - The hypothesis that air quality would improve during the lockdowns due to reduced economic activity, driving, and commerce was only partially supported.
    - **Los Angeles, CA**, **St. Louis, MO**, and **Juneau, AK** were analyzed for trends in AQI six months pre-pandemic, during the pandemic, and six months post-pandemic.
    - Observations revealed no significant direct correlation between lockdowns and AQI improvements across all studied cities.
2. **Seasonal Variations in AQI**:
    - A persistent summertime spike in AQI was noted, aligning with historical data showing AQI typically increases during the summer months.
    - Extraneous factors such as:
        - Pollen levels
        - Increased travel during the summer
        - Specific weather patterns contributing to pollution retention or dispersion
    - Highlighted the importance of addressing these independent variables when assessing lockdown impacts.
3. **City-Specific Observations**:
    - **Los Angeles**:
        - Being highly urbanized, AQI showed minor improvement during the lockdown but spiked post-lockdown due to resumed activity.
    - **St. Louis**:
        - Moderate variations in AQI, with less reliance on heavy industry or transportation-related pollution compared to larger metropolitan areas.
    - **Juneau**:

    - Negligible AQI changes due to its smaller population and limited industrial or vehicular pollution sources.

4. **Need for Further Research**:
    - While lockdowns did reduce human activity, the lack of a strong AQI improvement suggests the influence of external factors, such as persistent natural and regional pollution contributors.

**Implications**

1. **Policy and Urban Planning**:
    - The findings underscore the need for targeted environmental policies beyond reducing vehicle or industrial activity.
    - Cities should focus on mitigating summertime AQI spikes by addressing predictable seasonal contributors like pollen and travel.
2. **Environmental Awareness**:
    - Public education should emphasize the complexities of AQI beyond just human activities, integrating natural and seasonal influences.
3. **Future Research Directions**:
    - Longitudinal studies that analyze AQI with a finer resolution of contributing factors, including economic, geographical, and natural phenomena, could better inform actionable strategies.
    - Research could benefit from integrating real-time data with advanced simulation models to predict AQI changes.
4. **Localized Intervention Strategies**:
    - Urban centers may require distinct interventions, as pollution drivers differ based on geographical, industrial, and demographic characteristics.

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**Question-by-Question Summary**

1. **What is AQI, and what does it measure?**

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- AQI is a numerical scale (0-500 ppm) indicating air quality and its potential effects on human health. It measures six pollutants: ground-level ozone, particle pollution, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead.

2. **How did the AQI change during the study period?**
    - Minimal direct improvements during lockdowns, with significant summertime spikes unrelated to human activity reductions.
3. **What were the external factors influencing AQI?**
    - Seasonal influences, including pollen and weather patterns, and rebound effects post-lockdown due to resumed transportation and industrial activity.
4. **What are the broader environmental implications?**
    - Future environmental policies must address both anthropogenic and natural contributors to pollution.
5. **What further studies are needed?**
    - Examination of natural contributors, long-term impacts of pandemic-related behavioral shifts, and targeted approaches for addressing high-risk periods (e.g., summer).

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