EPH109

Geographic Mapping of Breast Cancer in Denmark: Implications for decentralized Oncology care (HEATMAP-onco-breast)

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INTRODUCTION

Delivering cancer care closer to patients' homes is a key priority in the Danish healthcare system, aiming to improve patient experience and optimize healthcare system capacity.

Breast cancer is one of the most common cancers among women, yet its geographic distribution and implications for care delivery models remain underexplored in a Danish context.

Assessing whether incidence aligns with proximity to treatment centers is essential to inform decentralized care strategies.

OBJECTIVES

To assess the relationship between breast cancer incidence and distance to treatment centers in Denmark, and to identify municipalities where decentralized care models may be most relevant.

METHODS

A nationwide geospatial analysis across 98 municipalities using:

- Breast cancer incidence data[1]
- Demographic data[2]
- Treatment center locations from national hospital registries

Distances calculated using a Haversine-based model (tortuosity factor 1.35). Travel time assumed 64 km/h effective speed.

Linear regression was used to assess the relationship between incidence and distance, with bootstrap resampling (n = 2,000) to estimate confidence intervals.

Municipalities were grouped into quintiles. Those with fewer than 10,000 inhabitants were excluded from the primary analysis.

RESULTS

Breast cancer incidence showed no meaningful association with distance to treatment centers (R^2 = 0.02).

Travel distances ranged from 7 km to 217 km across Denmark

- High incidence was observed in both urban and rural municipalities
- No geographic clustering pattern was identified, as seen in e.g. lung cancer.
- Six priority municipalities were identified with higher-than-expected incidence: Langeland, Hørsholm, Kerteminde, Tønder, Albertslund, Odder (150,000 inhabitants)

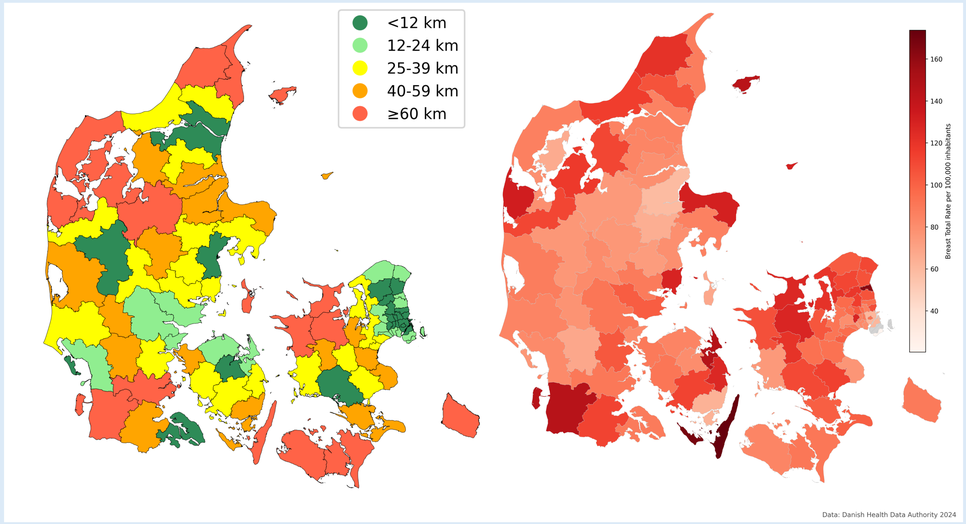

Figure 1. Relationship between municipality distance to treatment centers (left) and cancer incidence (right). [1]

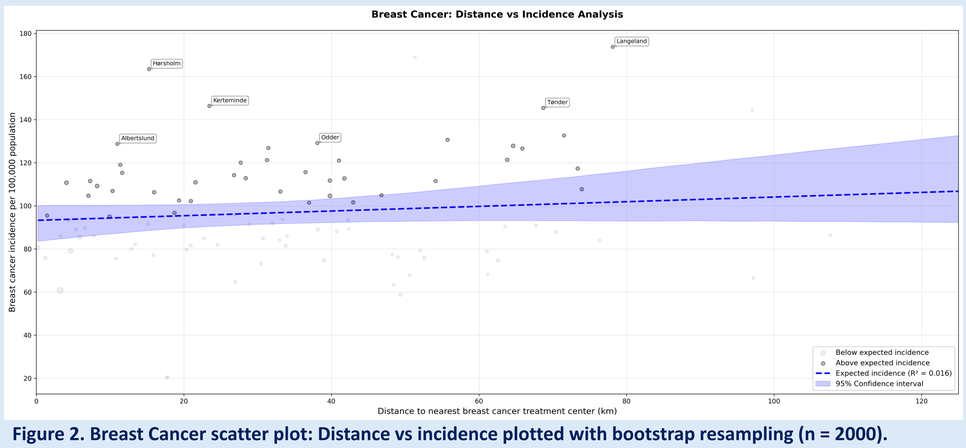

Figure 2. Breast Cancer scatter plot: Distance vs incidence plotted with bootstrap resampling (n = 2000).

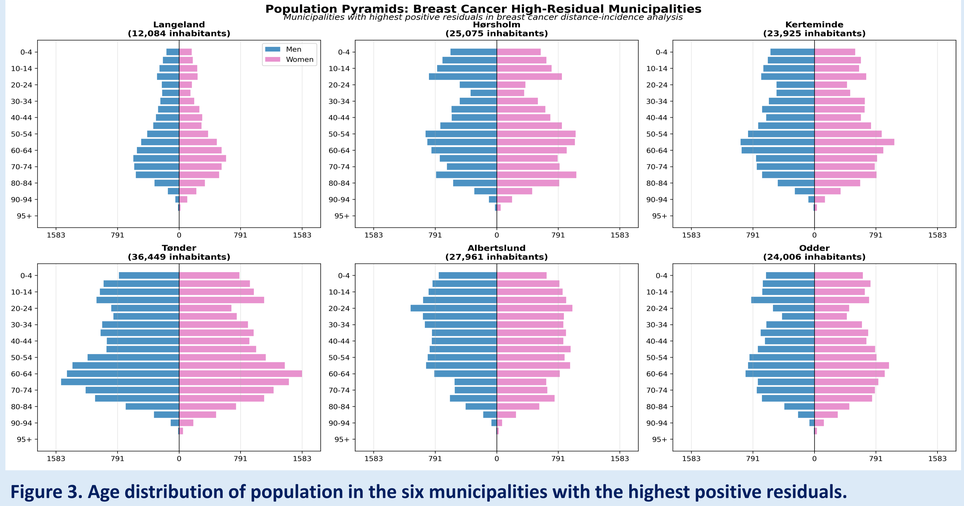

Figure 3. Age distribution of population in the six municipalities with the highest positive residuals.

KEY MESSAGE

Breast cancer incidence in Denmark is not associated with distance to treatment centers (R^2 = 0.02)

- **Decentralization strategies should focus on improving access and optimizing care delivery.**
- **Not geographic incidence patterns.**

DISCUSSION

The lack of association between distance and incidence (R^2 = 0.02) suggests that breast cancer burden is not driven by geographic access factors but reflects broader population-level risk patterns.

Findings contrasts with cancers, such as lung cancer, where geographic and socioeconomic factors play a stronger role, indicating that different disease areas may require different decentralization strategies.

Findings suggest that the current centralized care models may be structurally misaligned with the diffuse distribution of patients, resulting in system-wide travel burden.

The identified municipalities represent relevant settings for piloting decentralization, given their higher-than-expected incidence.

Key limitations of the study include the use of estimated travel distances and non-age-standardized incidence rates, as well as potential variation in detection and registration practices

CONCLUSION

Breast cancer incidence in Denmark is geographically diffuse and independent of proximity to treatment centers. This supports a shift toward a decentralized treatment models.

By combining geospatial insights with treatment innovations that enable administration outside hospital settings, healthcare systems can optimize resource utilization and improve patient outcome.

Targeted implementation in identified municipalities could represents a pragmatic step toward achieving this transition.

CONTACT AND CONFLICT OF INTEREST

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Conflict of interest: All authors are employees of Roche A/S.

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