

# How Close to Home? Deriving Catchment Areas and Estimating Travel Time to Obstetric Facilities in British Columbia

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## Background

Our aim was to describe the availability of timely access to intrapartum services for British Columbians living outside Metro Vancouver. We used geographic tools to:

- 1) Demonstrate the catchment areas serviced by hospitals with planned obstetric services; and
- 2) Estimate how many women travel more than one hour by road to access intrapartum services.

## Methods

We used data from the BC Perinatal Data Registry and included all hospital deliveries to BC residents between April 1, 2012 and March 31, 2013 (n=20,938). Because the primary interest for this study is the availability of timely access to obstetric services for British Columbians living outside Metro Vancouver, we excluded deliveries to residents of Vancouver, North Vancouver, West Vancouver, Richmond, Fraser North, and Fraser South. Deliveries at home were also excluded.

We geocoded 6-character residential postal codes using the Geocoding Self Service [1]. To estimate time-based catchment areas we created a network dataset using the Digital Road Atlas [2] accounting for distance, speed limit, road type, and turn delays. Estimated service areas within 30/60/120 minutes by road from hospitals with planned obstetric services outside Metro Vancouver were created using the Service Area function of the ArcGIS Network Analyst extension. We overlaid the service areas with population distributions at the census dissemination area (DA) level to estimate percentage of BC women aged 15-44 who live outside of the 2-hour driving service areas from the hospitals.

We calculated drive time estimates from residential postal code to the delivery facility using the Origin-Destination Cost Matrix function of the ArcGIS Network Analyst extension. Where a travel time estimate could not be obtained using this method, we used Google Maps driving time without traffic as a proxy. Spot validation of drive times using Google Maps was performed.

## Results

A total of 20,670 (98.7%) delivery records were successfully geocoded, of which 20,611 travel times were calculated (20,631 using ArcGIS and 19 using Google Maps).

Estimated travel time-based service areas for obstetric facilities are shown in Figure 1. Despite noticeable gaps in the availability of inpatient obstetric services within two hour road travel time in coastal and northern BC, these areas are not densely populated (representing approx. 0.6% of BC females aged 15-44 years).

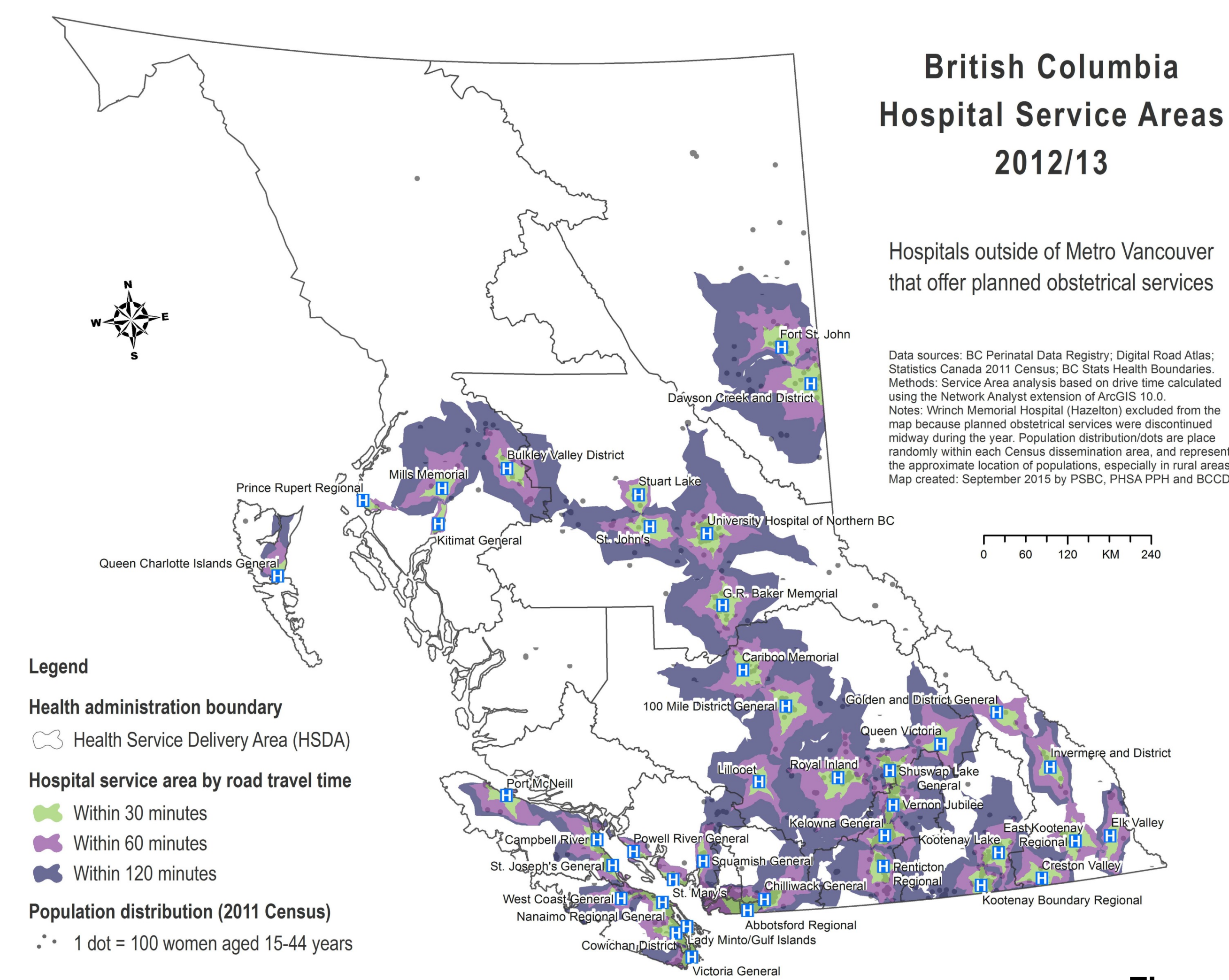


Figure 1

The distribution of estimated road travel time for British Columbians who live outside Metro Vancouver to the acute care facility with planned obstetric services at which the delivery occurred is shown in Figure 2. Most (89.4%) women travelled <60 minutes to their delivery hospital, 5.7% travelled 60-119 minutes, and 4.8% of women travelled ≥120 minutes.

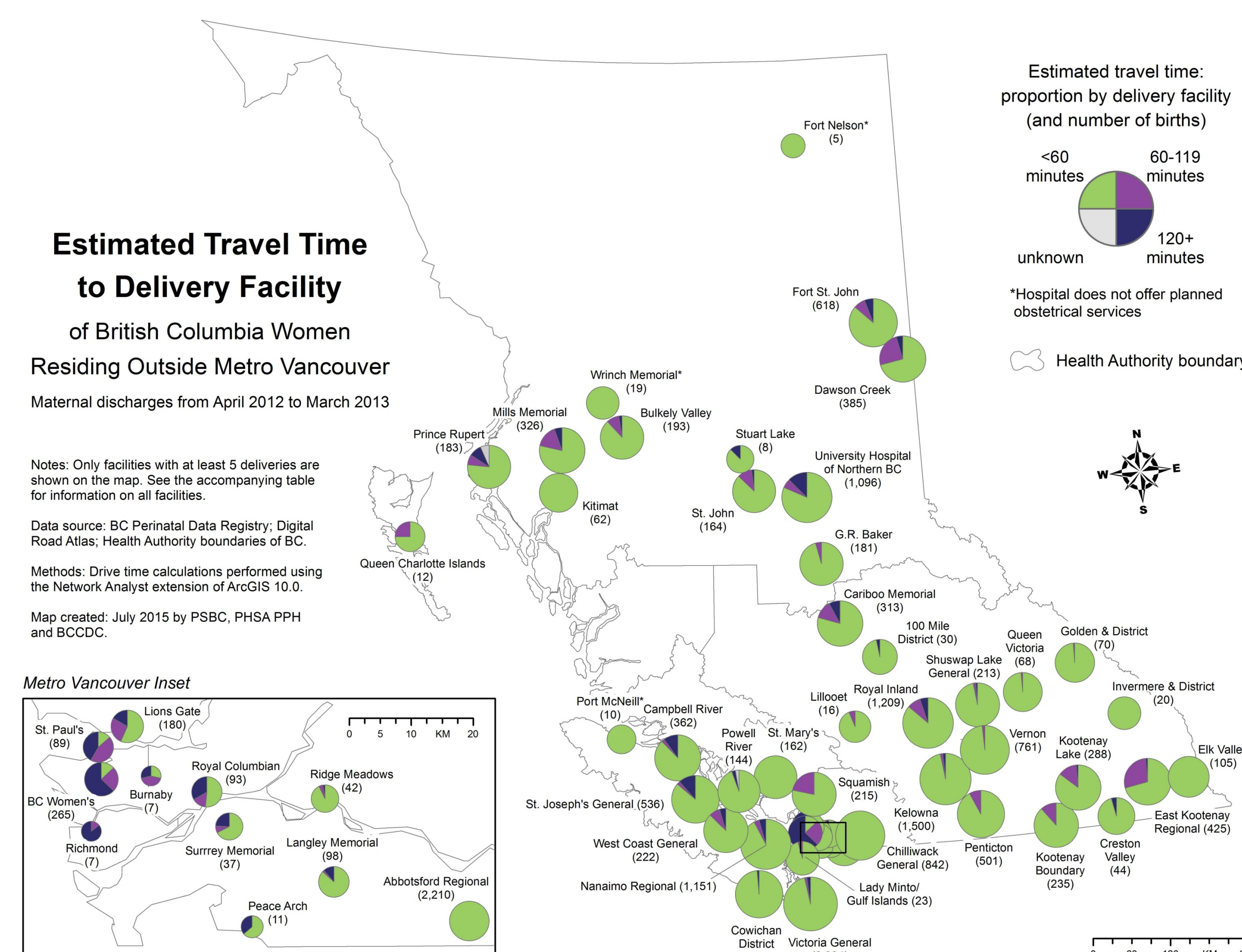


Figure 2

Substantial variation was seen in the percentage of women travelling ≥60 minutes to delivery facility by local health area (LHA; Figure 3).

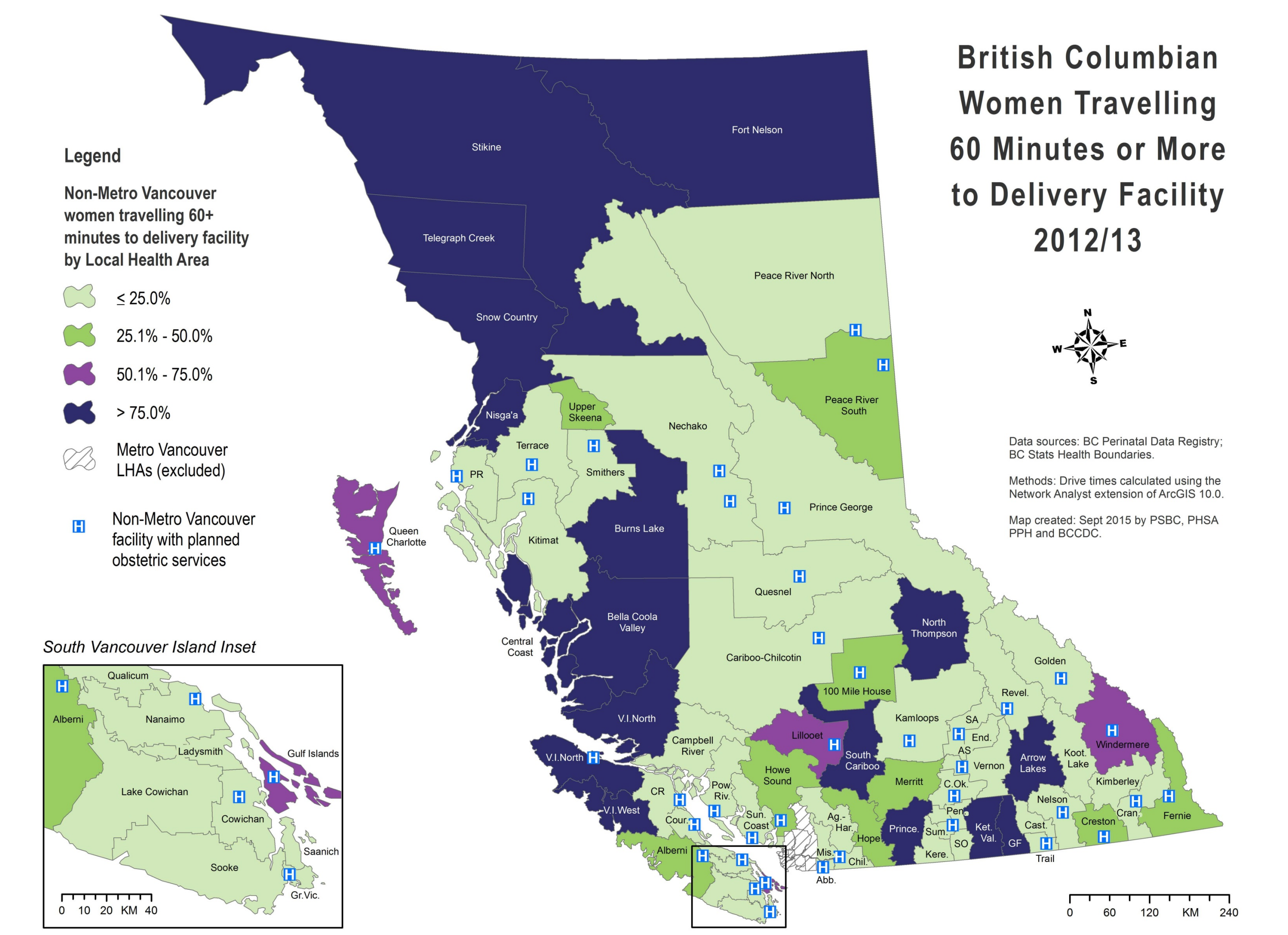


Figure 3

## Limitations

The network dataset used for both service area and travel time calculations did not account for road surface type, elevation, or traffic patterns. Estimated travel time was calculated using the centroid of postal codes, not specific residential addresses. All calculations assumed travel by ground and/or ferry. We may have underestimated the percentage of women living more than two hours from an obstetric facility as women living in DAs that partially overlap with the service areas were not included in the estimate.

## Conclusion

Few (approx. 0.6%) BC women aged 15-44 years live outside of the 2-hour driving service area from hospitals offering planned obstetric services. Approximately one in 10 women living outside Metro Vancouver were estimated to have travelled at least 60 minutes to their delivery facility in 2012/13. Substantial variation seen in the percentage of women travelling 60min+ to delivery facility by LHA.

## References:

- [1] BC Stats. (2015) Geocoding Self Service.
- [2] GeoBC. (2014) Integrated Transportation Network aka. Digital Road Atlas.



**Perinatal Services BC**

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