Trip Diary 2023 Updates & Preliminary Results

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Modeling and Forecasting

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What is Trip Diary?

- Regional household travel survey covering Metro Vancouver and the Fraser Valley
  - Conducted every 5 to 6 years
  - Multimodal survey for a typical weekday during the fall season (September to December)
  - Largest and most comprehensive regional travel survey with a 1.3% to 2.7% sample rate

- A critical source of information
  - Monitoring of regional travel trends
  - Statistics used in planning studies, investment plans, and funding applications
  - Understand travel behaviors

- In the 2023 Trip Diary, we surveyed
  - 16k households
  - 35k people
  - 96k trips
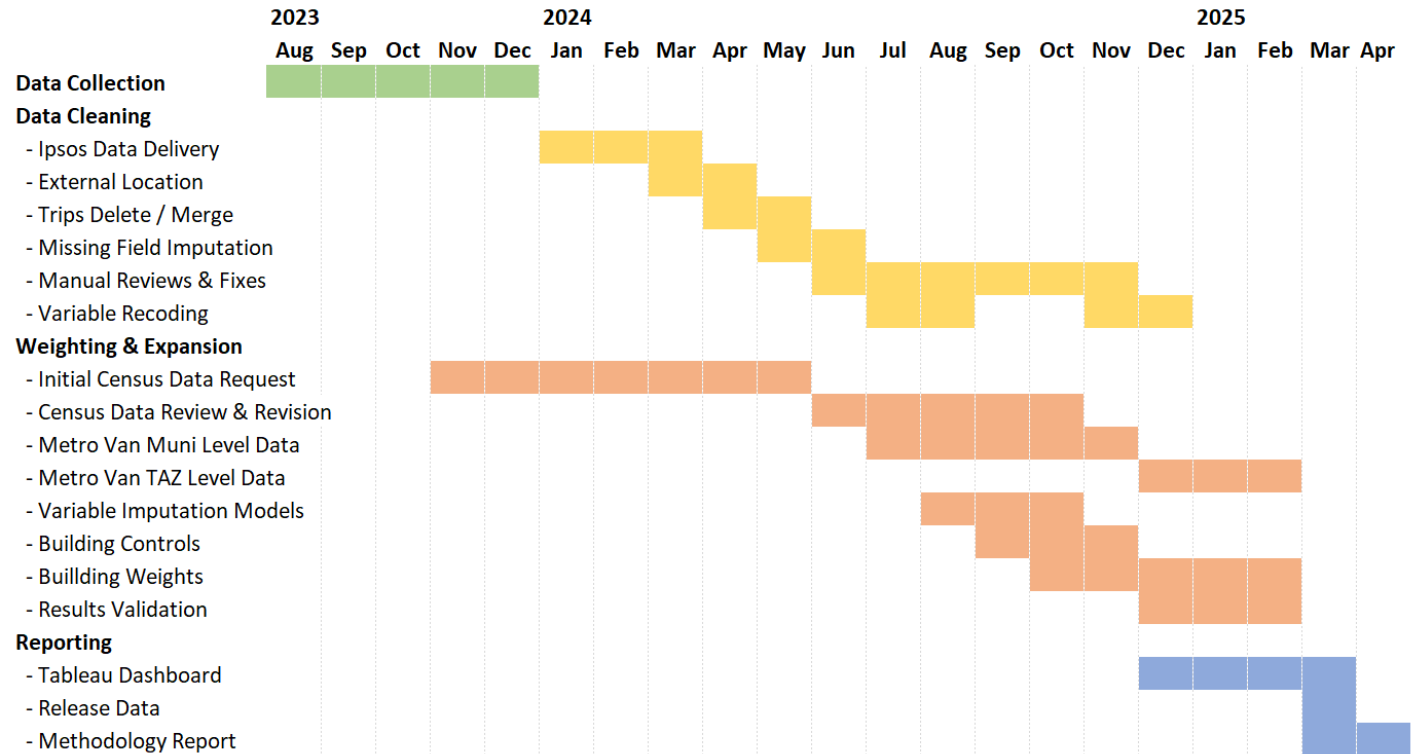
Data Cleaning
Objectives

- Identify and fix data quality issues that affect reporting
  - Missing or miscoded household, person, or trip attributes
  - Unreasonable distance, travel times, or speeds

- Ensure definitional consistency
  - What is the definition of a trip? A loop trip?
  - Distribution of the age of workers, children, retirees, etc.
  - Consistent definition of work from home with census, etc.

- Assess compliance with privacy requirements in the BC Freedom of Information and Protection of Privacy Act (FOIPPA)
  - Text field (Other) with personal identifiable data
  - Processing multiple selection data fields that have low sample counts
  - Combine and recode low-sample-count categories

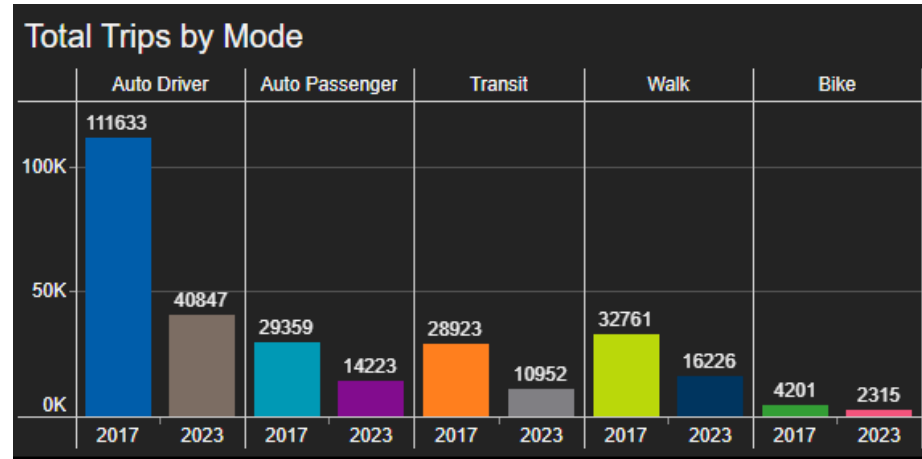TRANS LINK

Data Cleaning
Main approaches

- Scripting procedures to address common cases
  - External trips
  - Trip merging based on purpose/distance/activity duration
  - Missing attributes recategorization with Llama3
  - Variable coding and logic checks for definitional consistency

- Manual review & discussions
  - Loop trip classification
    (misclassified recreational trips fixed)
  - Geocoding problems
  - Problematic text responses
    (i.e.: bus routes, other purposes, or other modes that may not fit in existing categories, or non answers / off topic responses)
  - Edge cases for trip merging ("What is a trip?")
    (i.e.: short consecutive walking shopping trips)

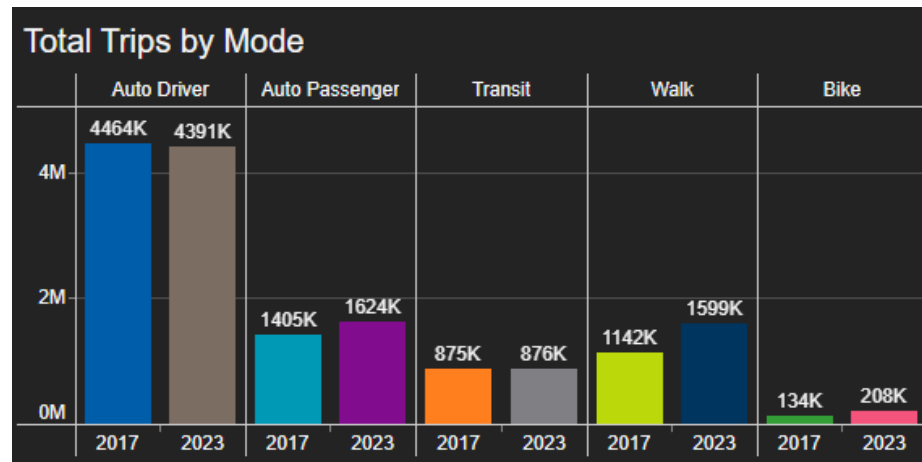TRANS LINK

Weighting & Expansion

- Representative of the region's households & population

- Free of (as much as possible) any known sampling biases

- Closer match to external sources of information

Properly weighted data is more useful and interpretable.

Total Trips by Mode (Unweighted)

Mode	2017	2023
Auto Driver	111633	40847
Auto Passenger	29359	14223
Transit	28923	10952
Walk	32761	16226
Bike	4201	2315

Weighted

Total Trips by Mode (Weighted)

Mode	2017	2023
Auto Driver	4464K	4391K
Auto Passenger	1405K	1624K
Transit	875K	876K
Walk	1142K	1599K
Bike	134K	208K

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Weighting & Expansion
External Data Sources

- Metro Vancouver Land Use

- Census 2016 & 2021

- Labour force surveys
  2022 to 2024
  (Work from home, usual mode
  of commute)

**External datasets are
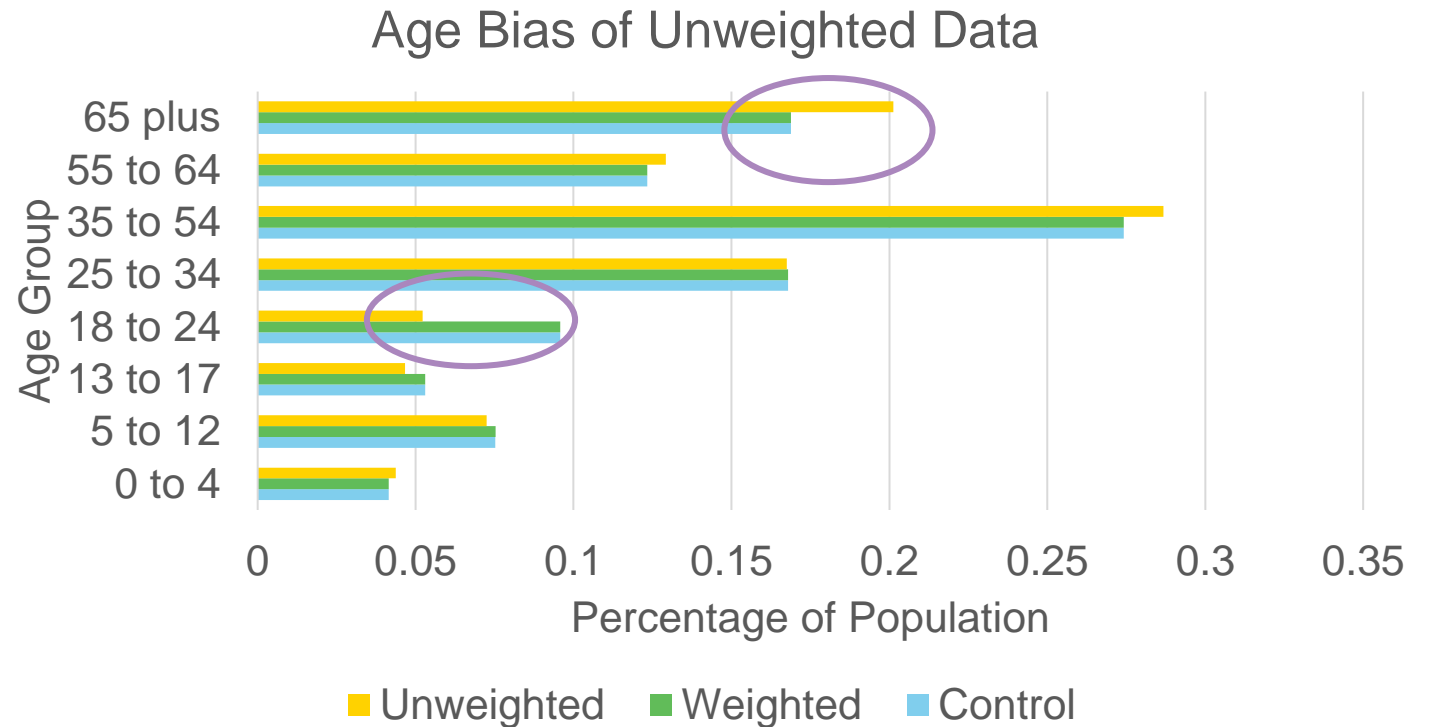foundational to weighting
and expansion.**

CENSUS

metrovancouver

LABOUR FORCE SURVEY

Statistics Canada / Statistique Canada   Canada

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Weighting & Expansion
Building Controls

- Combine multiple data sources into *one consistent set of population-level totals* ("controls") at various geographies
    - + Estimate underreporting adjustments
    - + Obtaining additional counts (screenline & transit ridership)

- Repeat for reweighting of 2017 Trip Diary

Unweighted survey results are biased!

Age Bias of Unweighted Data

■ Unweighted ■ Weighted ■ Control

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Weighting & Expansion
Building Controls

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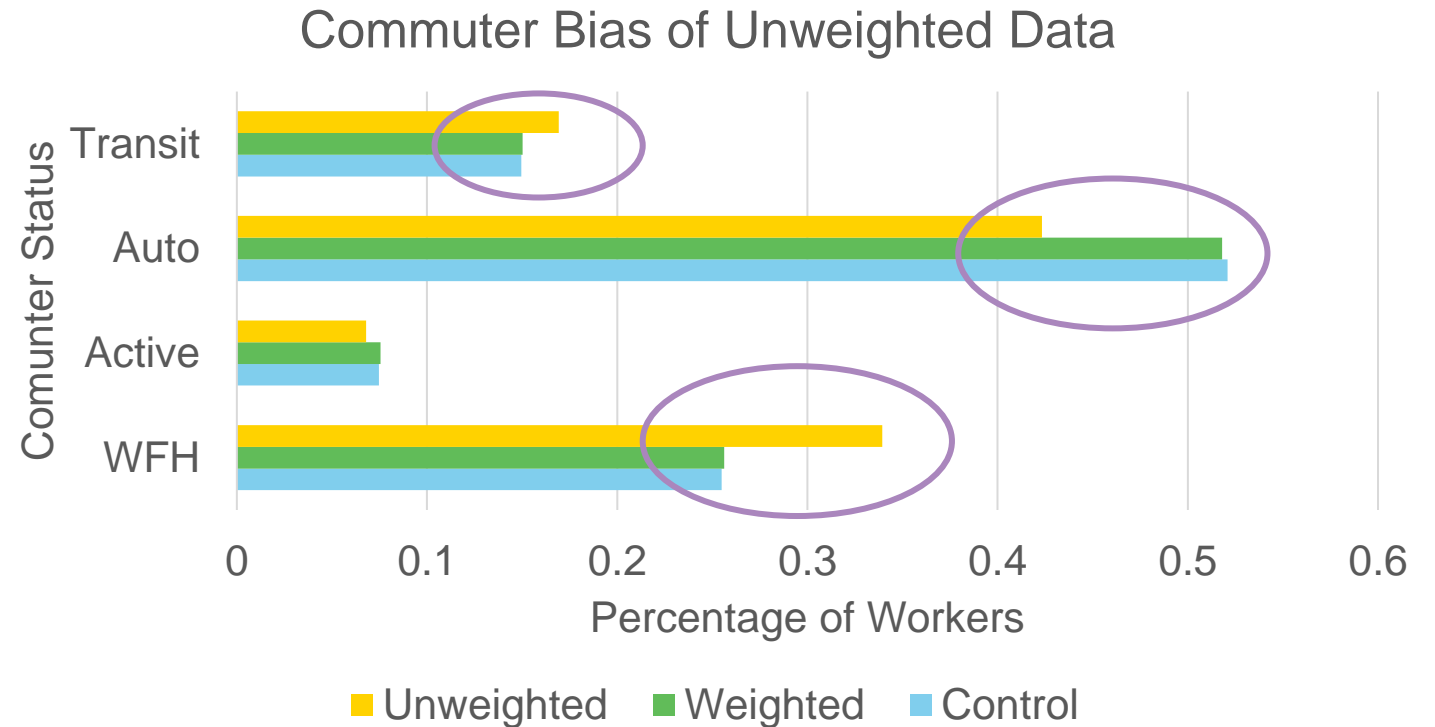
Unweighted survey results are biased!

Commuter Bias of Unweighted Data

Percentage of Workers

Comuter Status: Transit, Auto, Active, WFH

Legend: Unweighted (yellow), Weighted (green), Control (blue)

Weighting & Expansion
Building Controls

Weighted survey should reflect regional transportation trends.

Regional Screenline

Year	Weekday	
2017	3,217,000	
2023	3,141,000	
Δ	-76,000	**(-2.4%)**

Journey is estimated based on assumptions for behind-the-gate transfer rates, tap non-compliance, and inferred bus transfers.

Regional Transit Ridership

Year	Boardings	Boardings rate	Journeys*
2017	1,504,000	1.66	~908,000
2023	1,516,000	1.67	~908,000
Δ	**0.8%**	**0.8%**	**~0.004%**

Sub regional Intersection Volumes

Surrey Total Intersection Volumes

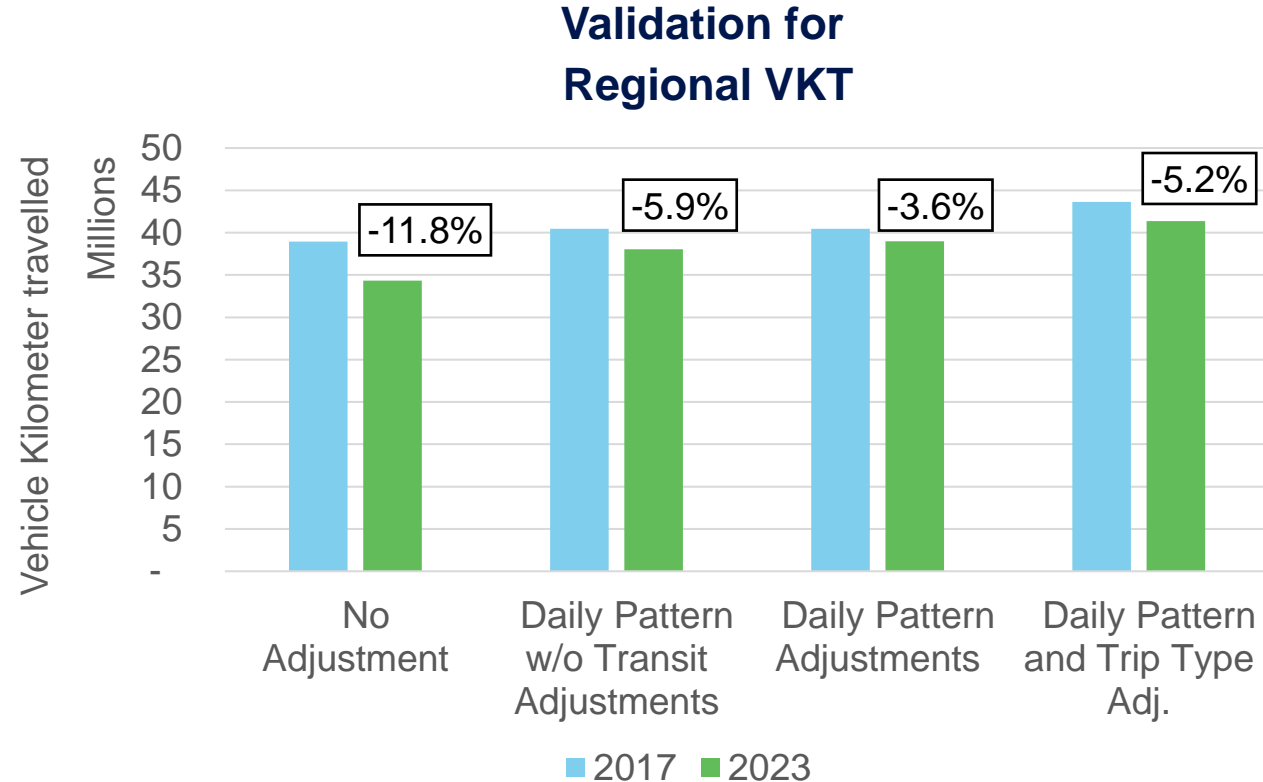
Coquitlam Total Intersection Volumes

Weighting & Expansion
Iterative process to correct biases

- Underreporting adjustment based on the behavioral difference between **Smartphone** and **Web** Surveys

- Types of underreporting bias
  - Daily travel patterns (work/school vs leisure)
  - Trip types (purpose and modes)

- Additional reporting bias
  - Transit adjustment using total transit ridership
  - Municipal level populations

Removing survey bias and verifying results against validation data is an <u>iterative</u> process

Validation for Regional VKT

Vehicle Kilometer travelled Millions

| | -11.8% | -5.9% | -3.6% | -5.2% |

No Adjustment — Daily Pattern w/o Transit Adjustments — Daily Pattern Adjustments — Daily Pattern and Trip Type Adj.

■ 2017 ■ 2023

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Weighting & Expansion
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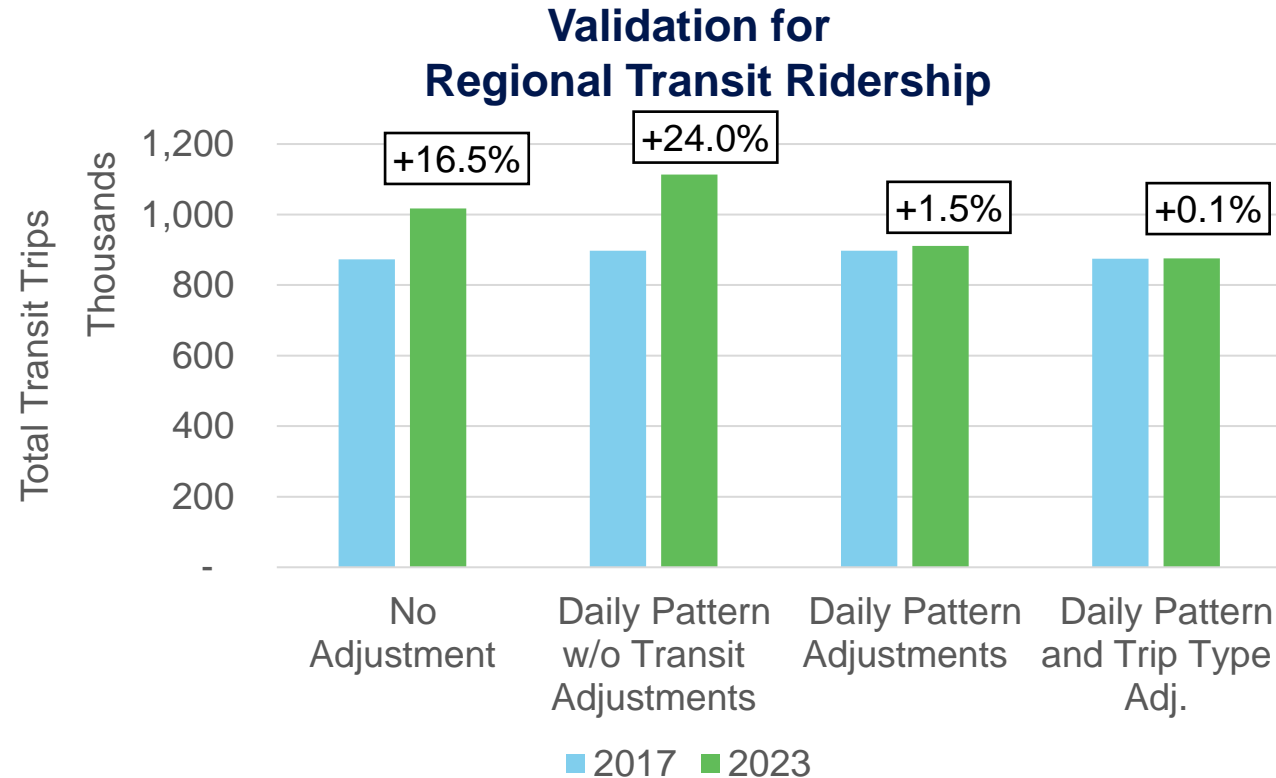**Removing survey bias and verifying results against validation data is an <u>iterative</u> process**

Validation for Regional Transit Ridership

Total Transit Trips Thousands

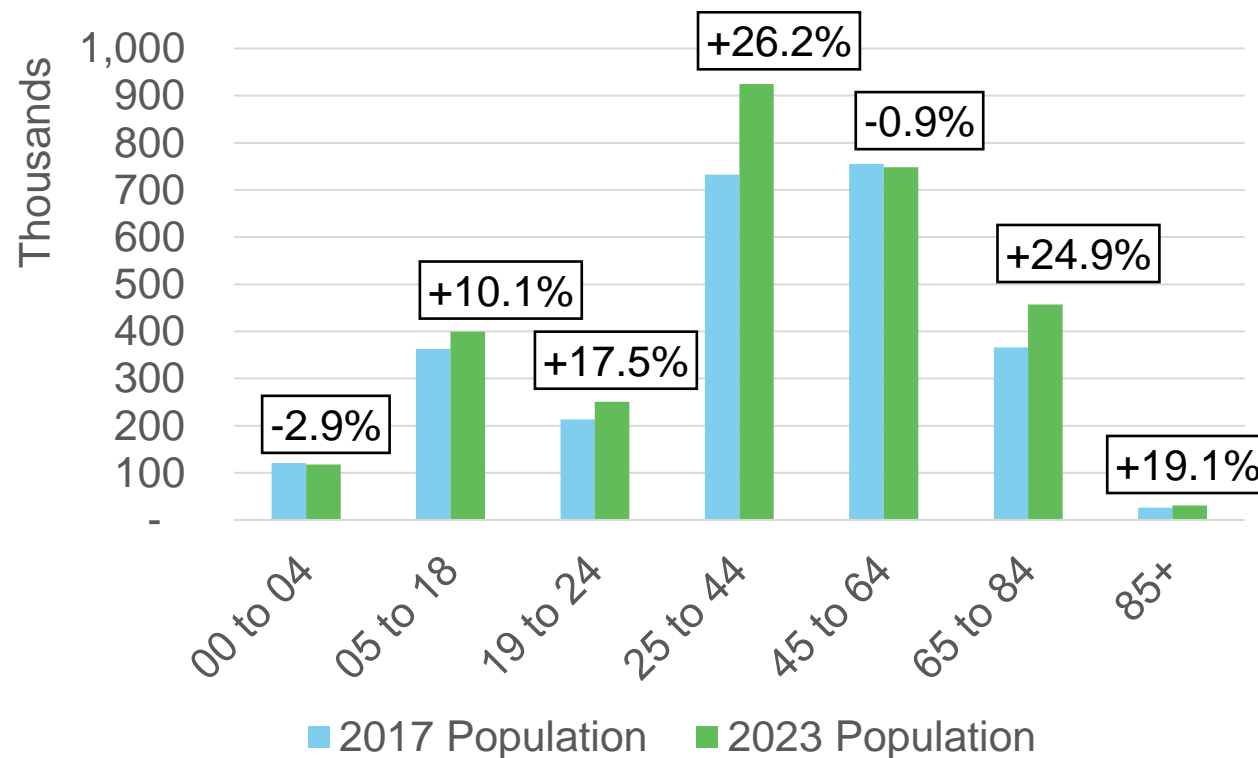| No Adjustment	Daily Pattern w/o Transit Adjustments	Daily Pattern Adjustments	Daily Pattern and Trip Type Adj.
+16.5%	+24.0%	+1.5%	+0.1%

■ 2017 ■ 2023

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Reporting

- Clear, concise, and consistent messaging for the public

- Accessible data to everyone

- Useful data for data experts
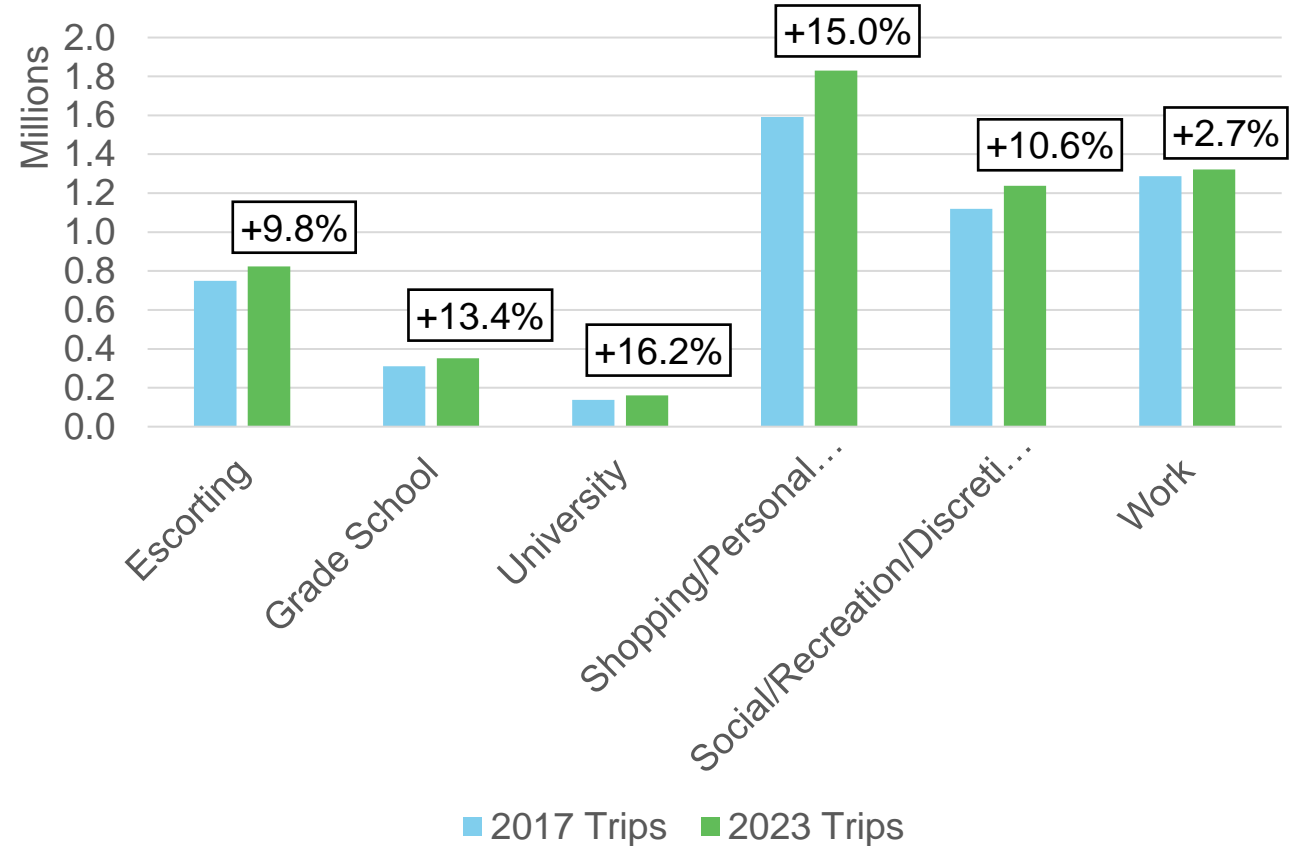
Dashboard is now [live](#)!
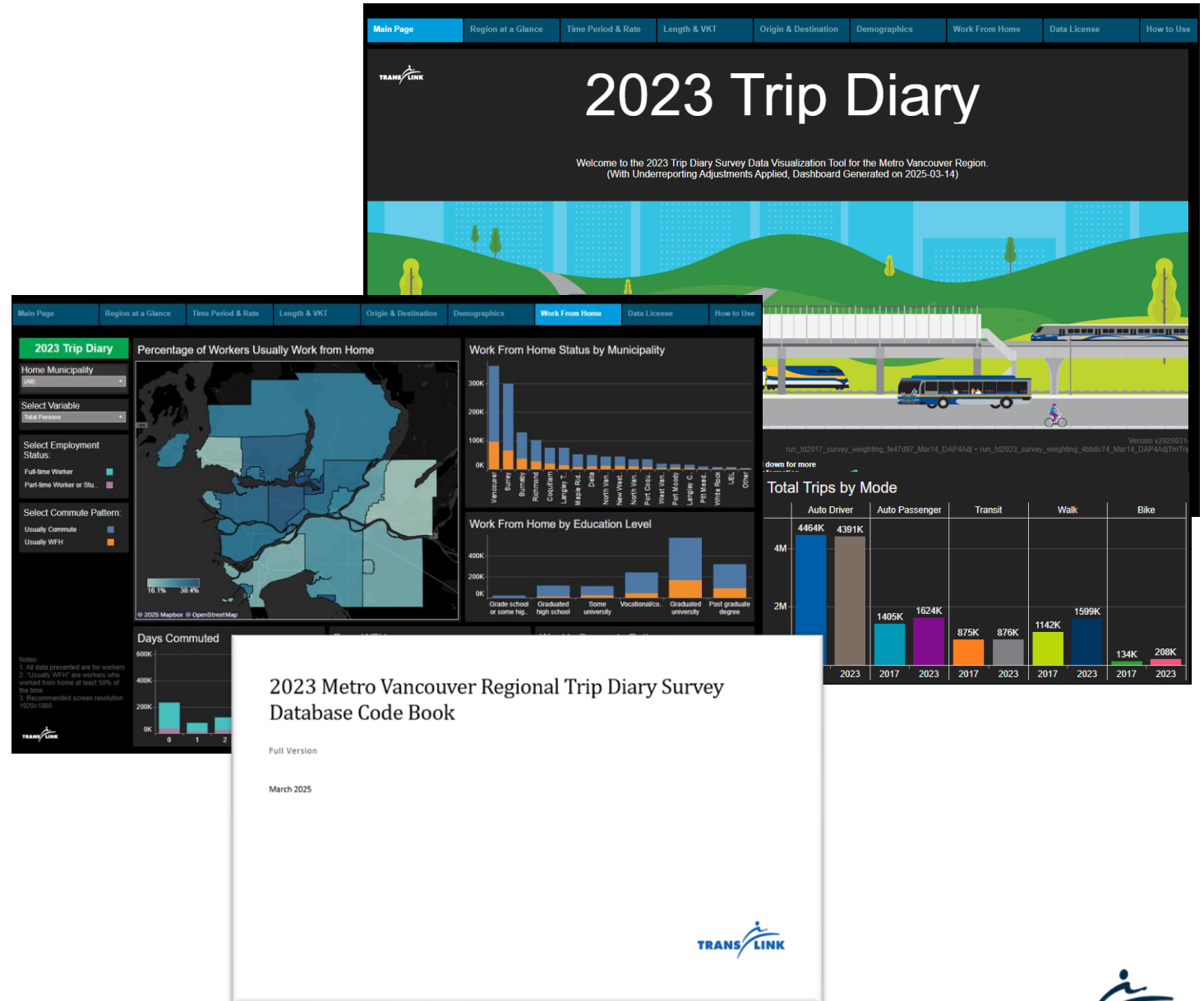
Population growth uneven across age

- Overall population growth of 13% across Metro Vancouver

- The growth in children is **below** the population average

- The growth in working-age adults is **above** the population average

- The growth in retirement-age adults is **above** the population average

Chart: Thousands (y-axis) vs age groups (x-axis)

Age group	Growth
00 to 04	-2.9%
05 to 18	+10.1%
19 to 24	+17.5%
25 to 44	+26.2%
45 to 64	-0.9%
65 to 84	+24.9%
85+	+19.1%

Legend: ■ 2017 Population   ■ 2023 Population

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Shifts in trip purposes

- Work trips experienced the slowest growth at 2.7%
  - Share of work trips also declined from 24.8% to 23.1% of all trips

- Shopping and personal business (S.P.B.) experienced highest growth at 15%, slightly above population growth
  - Share of S.P.B. trips increased from 30.6% to 32% of all trips

Bar chart titled "Millions" comparing 2017 Trips (light blue) and 2023 Trips (green) across trip purposes:
- Escorting: +9.8%
- Grade School: +13.4%
- University: +16.2%
- Shopping/Personal...: +15.0%
- Social/Recreation/Discreti...: +10.6%
- Work: +2.7%

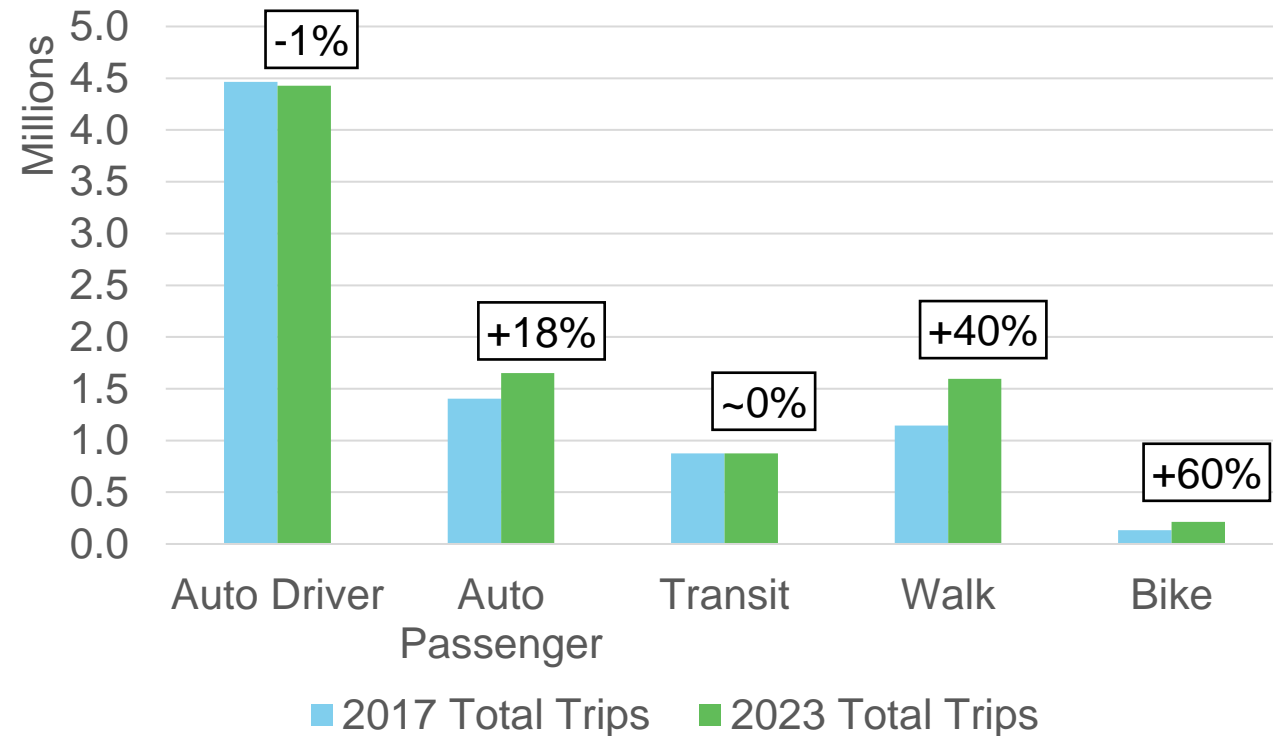Legend: ■ 2017 Trips ■ 2023 Trips

Declines in Auto VKT

- Auto VKT decreased from 43.7M to 41.4M (-5%)

- Auto driver trips decreased by 0.8%, but auto passenger trips increased by 17.6%
    - Shares of auto driver trips dropped from 55.3% to 50.1%
    - Shares of auto passenger trips increased from 17.4% to 18.7%
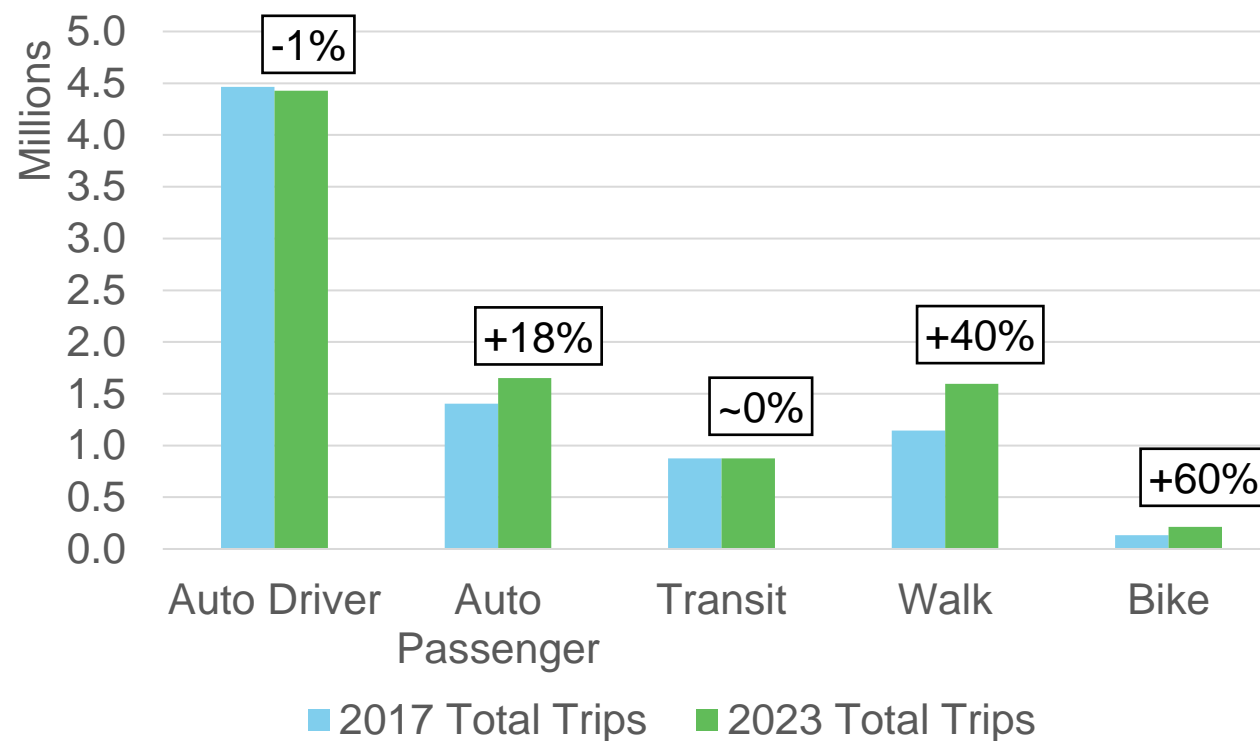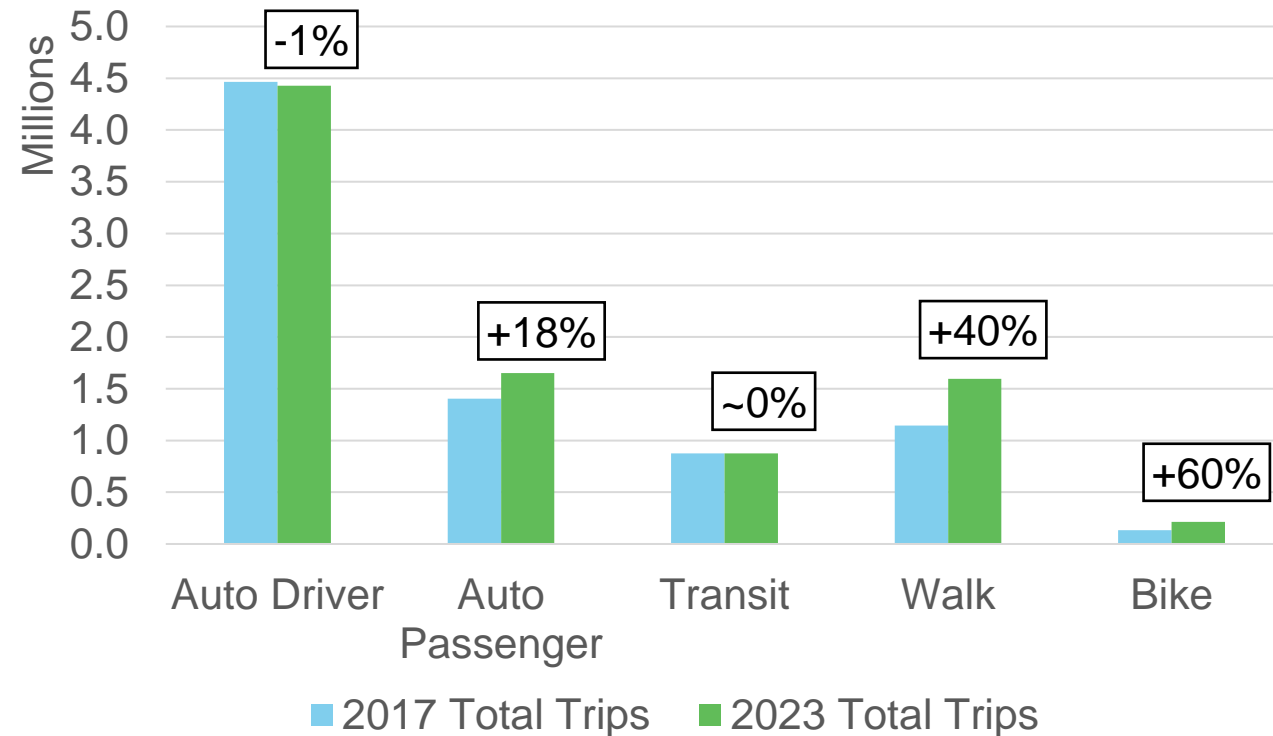
Transit ridership growth is slow

- Total transit trip growth remains flat (<10,000), and the share of transit trips declined from 10.8% to 9.9%

- Post pandemic shift in work from home (24.2% in 2023 vs. 10.7% in 2017, according to Labour Force Surveys)

Millions

	Auto Driver	Auto Passenger	Transit	Walk	Bike
	-1%	+18%	~0%	+40%	+60%

■ 2017 Total Trips ■ 2023 Total Trips

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Increasing active trips

- Active trips increased significantly – 81k increase in Bike (+60%), and 453k increase in Walk (+40%)

- Increase in smartphone surveys – 40% of households used smartphones or mixed in 2023, versus 18% in 2017

- Introduction of recreational loop trip to survey respondents, previously not a valid purpose.

  (Note that loop trips are not included in this presentation)

Thank you!