



SEPTA's FY 2021-23 Fare Proposal

Equity Impacts for Philadelphia Residents





March 2020

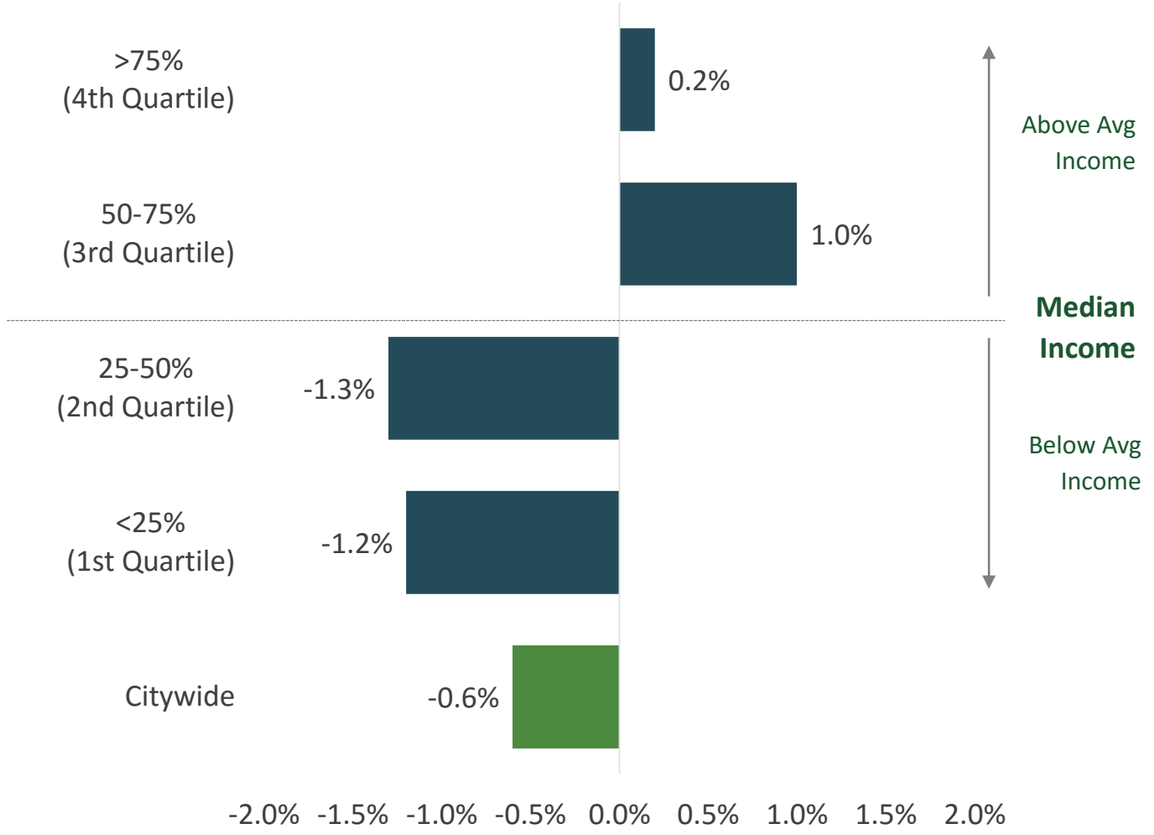
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Study Overview

- This report analyzes the equity implications for Philadelphia residents of SEPTA's proposed fare structure for its city transit division for FY 2021-23
  - The fare proposal includes the elimination of the $1.00 fee for the first transfer, a freeze in the cash / Quick Trip fare, and sub-inflationary growth in pass pricing
  - It also includes an offsetting increase in the base fare paid through the Travel Wallet, yielding overall revenue growth in line with inflationary growth over the next three years
- Analysis of ridership patterns shows that the incidence of changes in fares is significantly progressive in its effects
  - Average fares as a share of income fall for low-income residents, with offsetting increases for some higher income residents
  - Citywide, average fares as a share of income fall by 0.6% on net
- In addition, this policy will unlock long-term benefits to SEPTA and its riders by enabling more efficient system design and use

Change in Average Roundtrip Fare as Share of Daily Income by Block Group Income Quartile

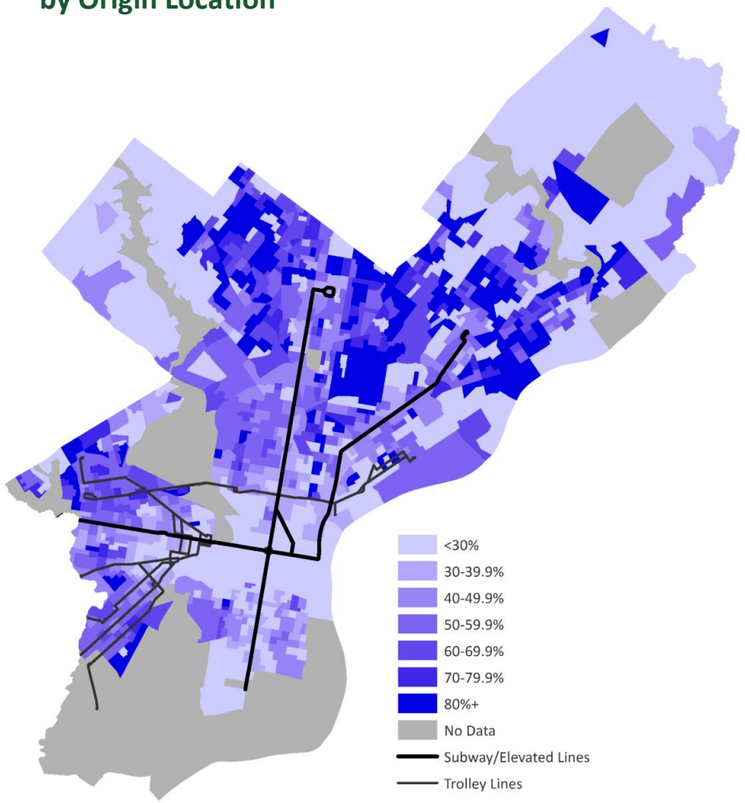


Average fares fall as a share of income in communities with incomes below the city median

Distribution of Ridership by Fare Product

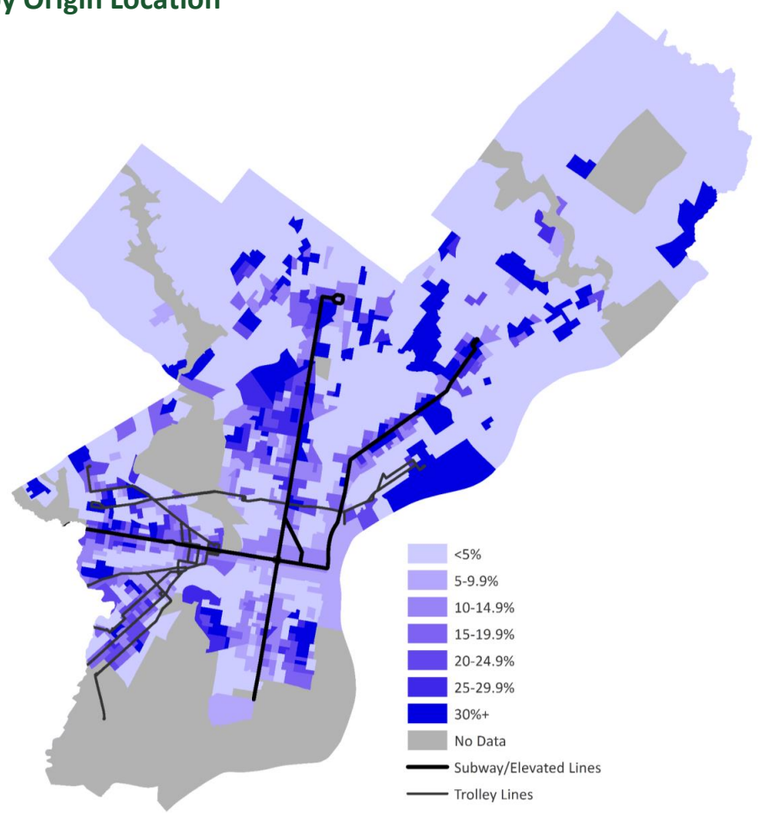
- Modeling of ridership by fare product shows important differences in product utilization by location:
  - Pass riders and transfer who transfer using the Travel Wallet are disproportionately concentrated in communities with incomes below the city median
  - Riders using the Travel Wallet for a base fare without a transfer are overrepresented in communities with above average incomes

Share of Riders using Weekly or Monthly Passes by Origin Location



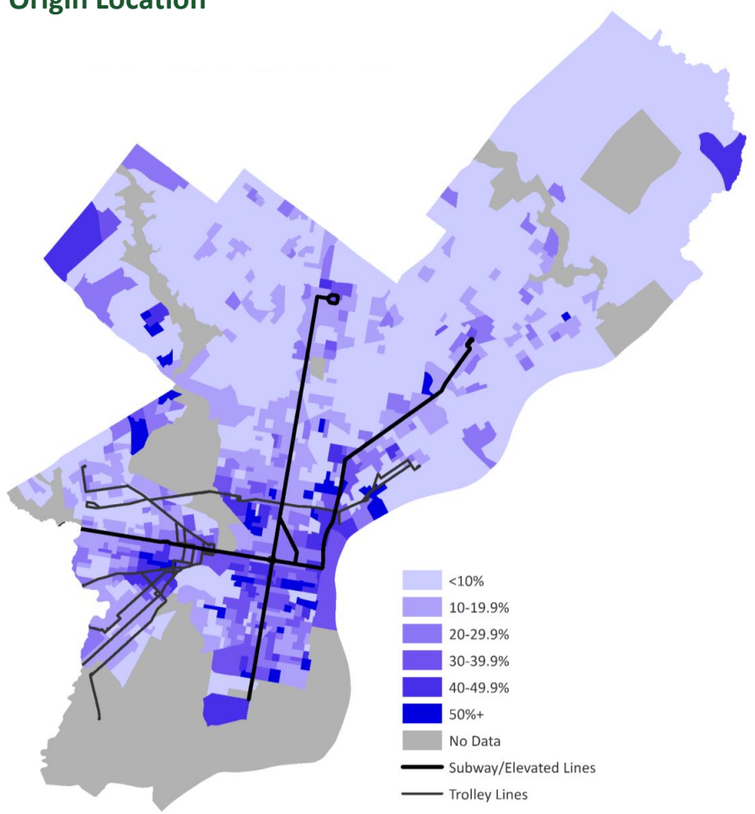
61% of ridership from block groups with below average incomes

Share of Travel Wallet Riders using a Transfer by Origin Location



54% of ridership from block groups with below average incomes

Share of Riders using Travel Wallet Base Fare Only by Origin Location

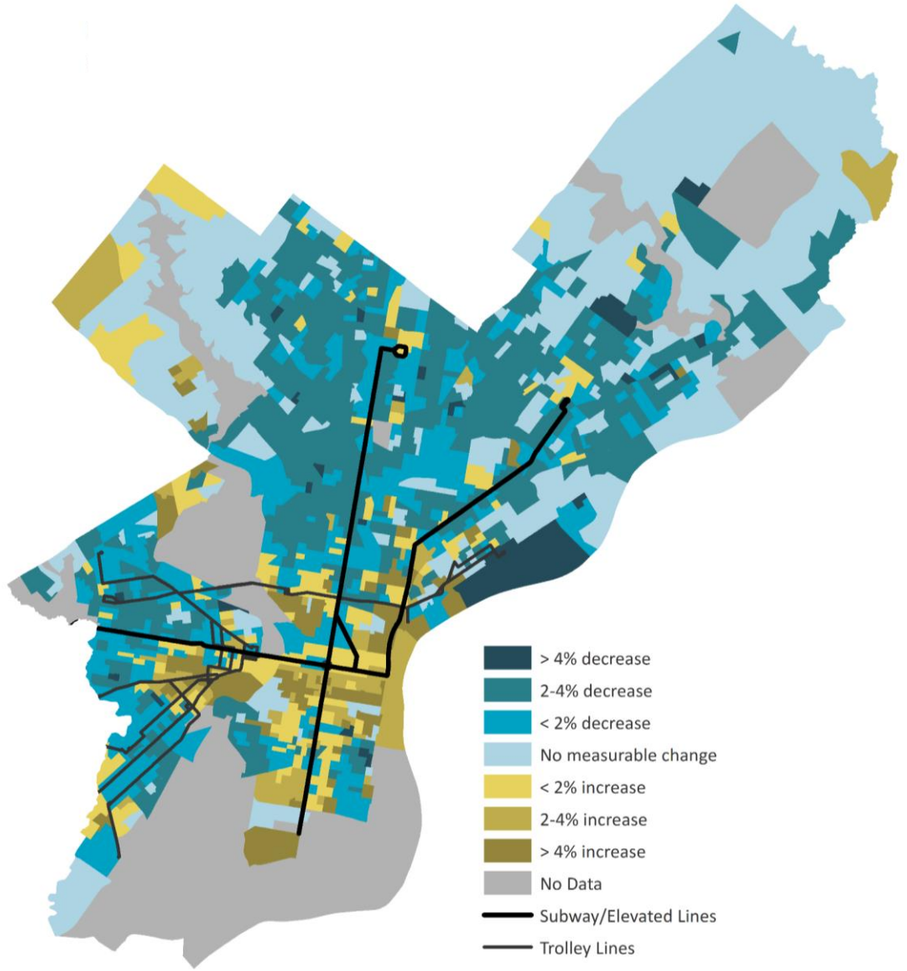


36% of ridership from block groups with below average incomes

Distribution of Change in Costs

- The shift in costs from lower income to higher income residents has significant equity implications
  - Three-quarters of block groups across Philadelphia see a decrease in average fares as a share of income under the fare proposal
  - Decreases in fares as a share of income are also seen in areas with the highest concentrations of poverty, children and minority residents
- Over the long-term, the proposed policy could produce benefits far greater than the direct cost savings modeled in this analysis:
  - Adaptation to the policy change by riders can reduce both commute times and costs
  - Transit network designs that capitalize on transfers can deliver service that is straighter, faster and more frequent

Change in Average Roundtrip Fare as Share of Daily Income by Block Group





Methodology

Analytical Framework

Equity impacts on Philadelphia residents are assessed in this analysis through a sequence of steps:

1. A mix of route and stop-level operational data is used to estimate the current mix of fare instruments by origin stop
2. Stop level estimates are allocated to associated census block groups to estimate the fare mix for residents within specific geographic areas
3. Weighted average fares in each block group under the current (FY 2018-20) and proposed (FY 2021-23) fare policies are calculated and compared to incomes to understand equity implications relative to ability to pay
4. Aggregate equity measures by block group to the neighborhood, council district and citywide level (accounting for relative ridership) to understand the equity implications for communities and populations across Philadelphia

Static vs. Dynamic Analysis

- This analysis estimates equity impacts under a **static** framework, in which each rider's behavior (and fare instrument) is assumed to remain consistent under the proposed new fare policy
- In practice, a change in fare policy will produce **dynamic** effects, with changes in pricing creating incentives for riders to use the SEPTA system and its fare options differently
- Dynamic effects of the elimination of the disincentive to transfer should include more efficient use of the system, with benefits to riders and to SEPTA's operations and system design
- Estimating these dynamic effects on rider behavior and system operations requires further analysis, and is outside the calculation framework of this study

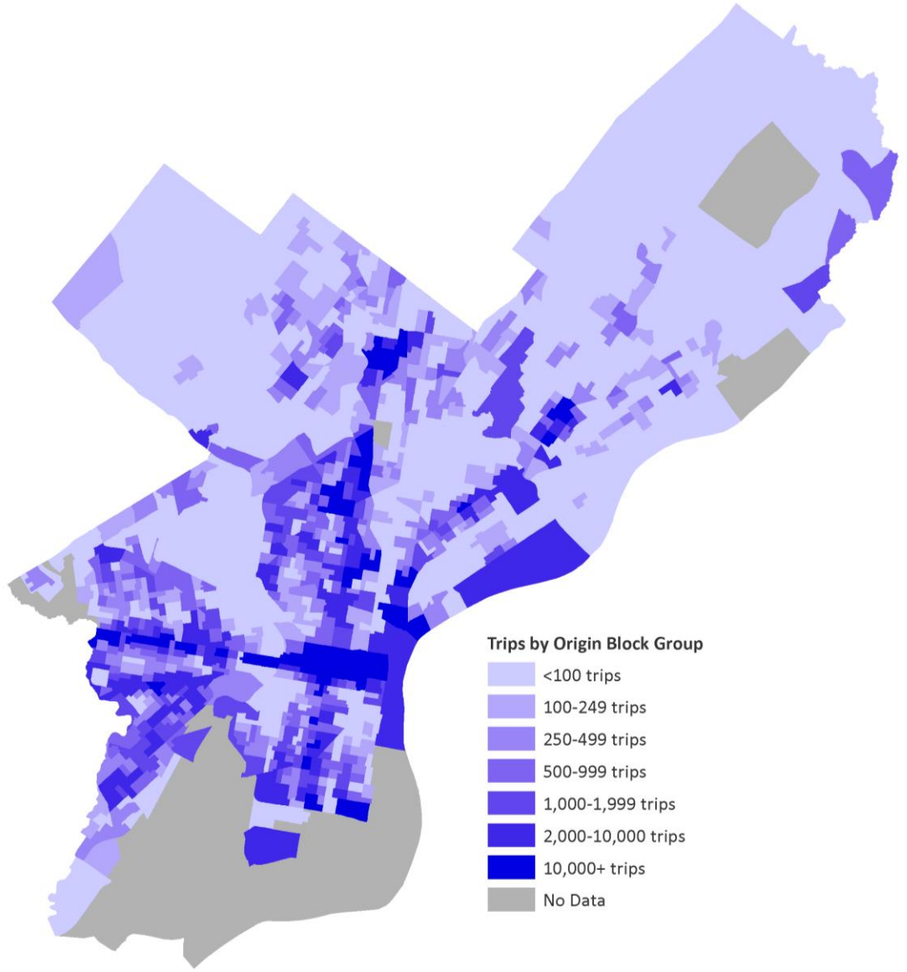
Analytical Framework - Ridership by Origin Stop

- This analysis is focused on identifying fare products used by origin stop
  - Origin stops are modeled through analysis of time of day and locational patterns in SEPTA operating data for fall 2019
- This approach assigns the properties of a full journey to the estimated origin point, meaning that transfers are associated with the origin stop whether the rider began their multi-leg trip, rather than the stop at which the transfer took place
  - The focus on origin stops allows the analysis to associate fare products with residents in different areas of the city and associated demographic patterns
  - In addition, it means that this analysis includes effects on city residents who commute outbound to the region through SEPTA
- Patterns of activity differ somewhat under this analysis from patterns based on full ridership counts, which reflect elevated levels of activity at stations that feature significant transfer activity and significant return trips from employment centers

Estimation Framework by Block Group

- The current mix of fare products is estimated at the stop level for riders originating at that stop
- The fare product mix for each stop is then allocated to nearby Census Block Groups
  - There are 1,336 block groups across Philadelphia (about 1,200 residents per block group)
- The allocation approach factors in the utilization of each stop, the relative distance to nearby block groups (with modeled ridership decaying with distance) and the estimated propensity to use transit of each block group (based on a mix of census variables)
- This process is used to estimate a weighted fare product mix for every block group in Philadelphia based on the estimated mix at nearby stations

Estimated Monthly Trips by Origin Block Group

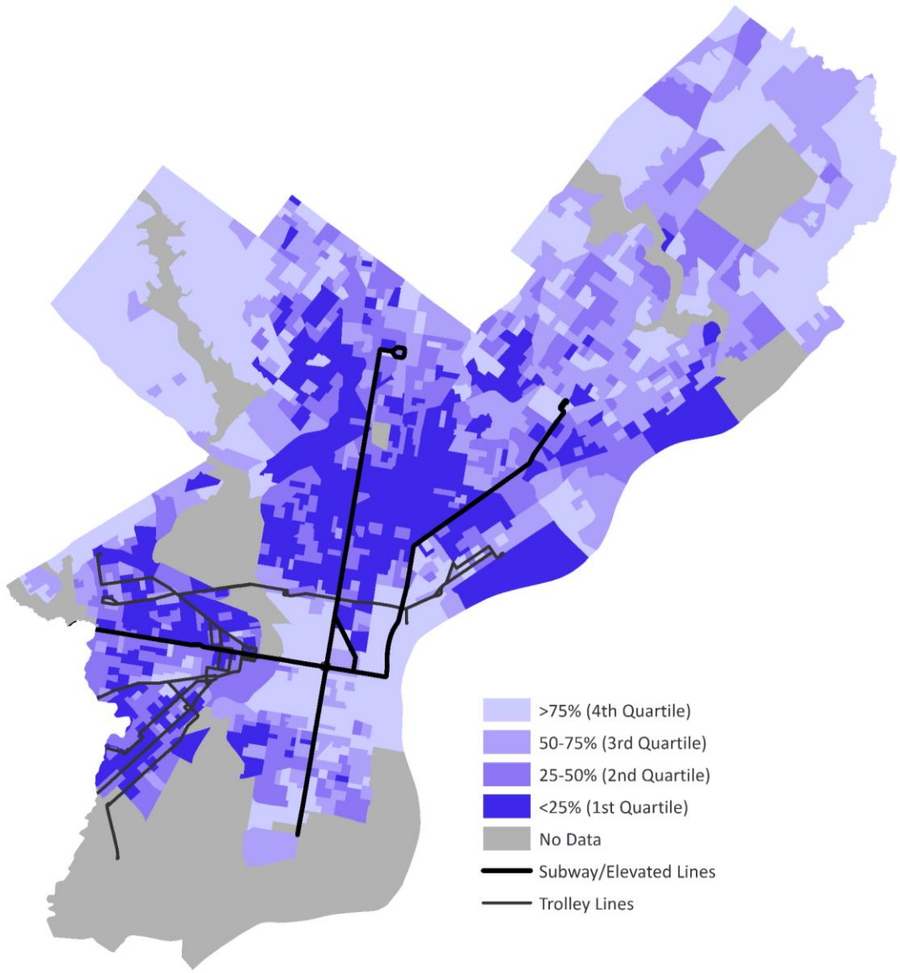


Equity Measures

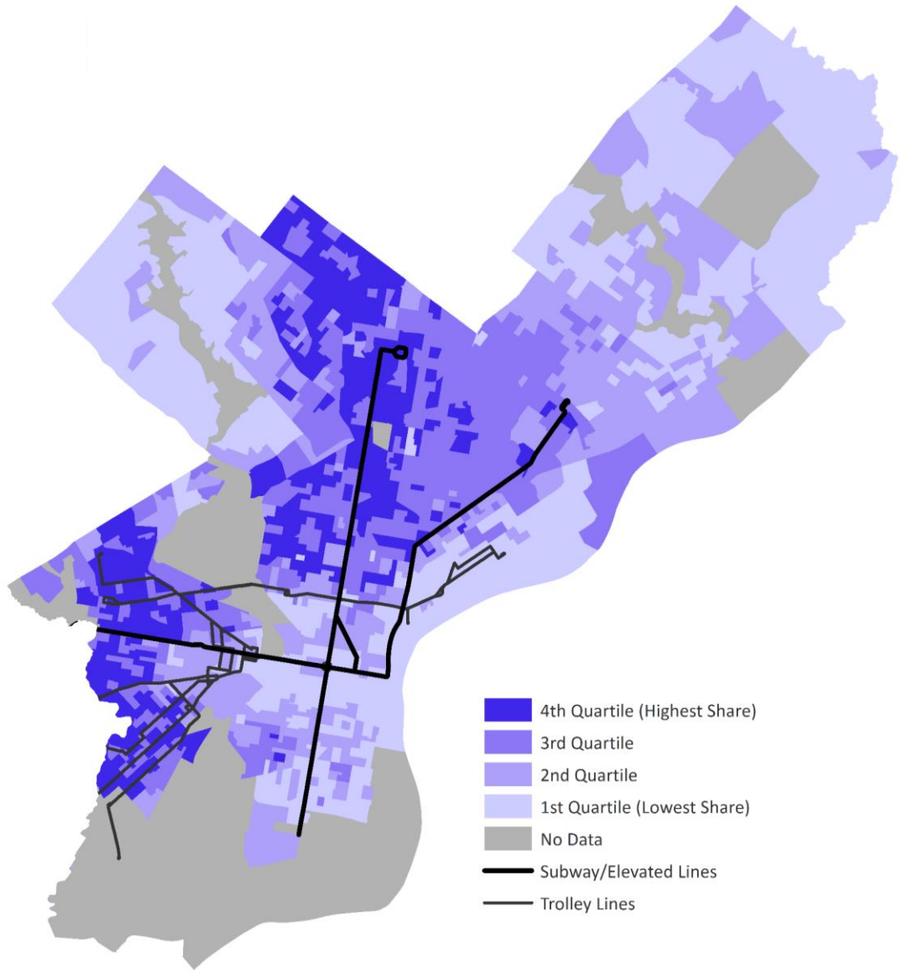
- Cost impacts of the proposed fare policy are evaluated relative to household incomes in every block group in Philadelphia in order to understand its impacts across communities on an equitable basis
    - Costs relative to income are assessed by calculating average roundtrip fares in each block group under the current and proposed fare policies relative to median daily income in each block group
- These block group-level calculations show spatial patterns in impacts, which can be aggregated to larger geographic areas
- Additional equity measures are calculated based on demographic characteristics of block groups (regardless of their location within the city)
    - Block groups are divided into quartiles based on Census data on the prevalence of measures of interest for this purpose
- Through this approach, impacts can be assessed for block groups with above average concentrations of various characteristics
    - The maps on the following page show the relative distributions of low-income and minority residents based on this analysis of block groups by quartile

Methodology

Median Household Income - Quartiles by Block Group



Share of Minority Residents – Quartiles by Block Group





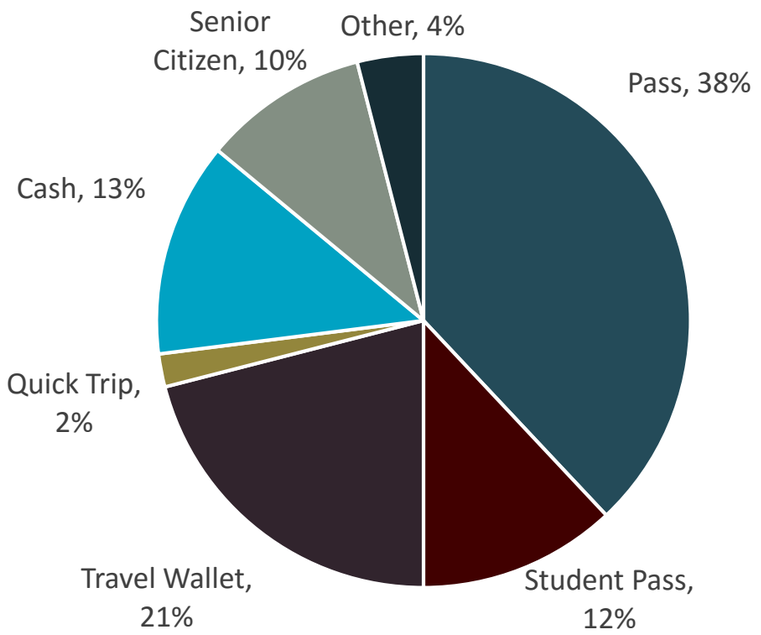
Current Fare Product Mix

Current Fare Product Mix

Major Fare Products

- SEPTA's Transit Division features a variety of fare products:
  - Monthly, Weekly and other Pass products offer users unlimited rides within the duration within no transfer fee
  - Travel Wallet can be used for a base fare, and potentially for subsequent transfers
  - Quick Trips or Cash can be used for an individual ride, with no discounted transfer
  - Senior Citizens have free fares, and a variety of other fare products are available that provide discounts for populations such as students and residents with disabilities

FY 2019 Transit Ridership Fare Mix



Source: SEPTA Revenue and Ridership Report, Fiscal Year-End 2019

Fare Products Included in Cost Analysis

- While ridership origin modeling includes all SEPTA modes and fare products utilized by Philadelphia residents, including Regional Rail, the relative cost analysis within this study is focused on the impact of the fare proposal on paid products within the Transit Division
  - Average cost calculations under the current and proposed fare structures exclude regional rail riders as well as non-paying riders such as seniors
  - The overall distribution of fare products across the city is balanced to the observed FY 2019 revenue distribution for the purpose of assessing the average cost impact of the proposed fare policy change

Current Fare Product Mix

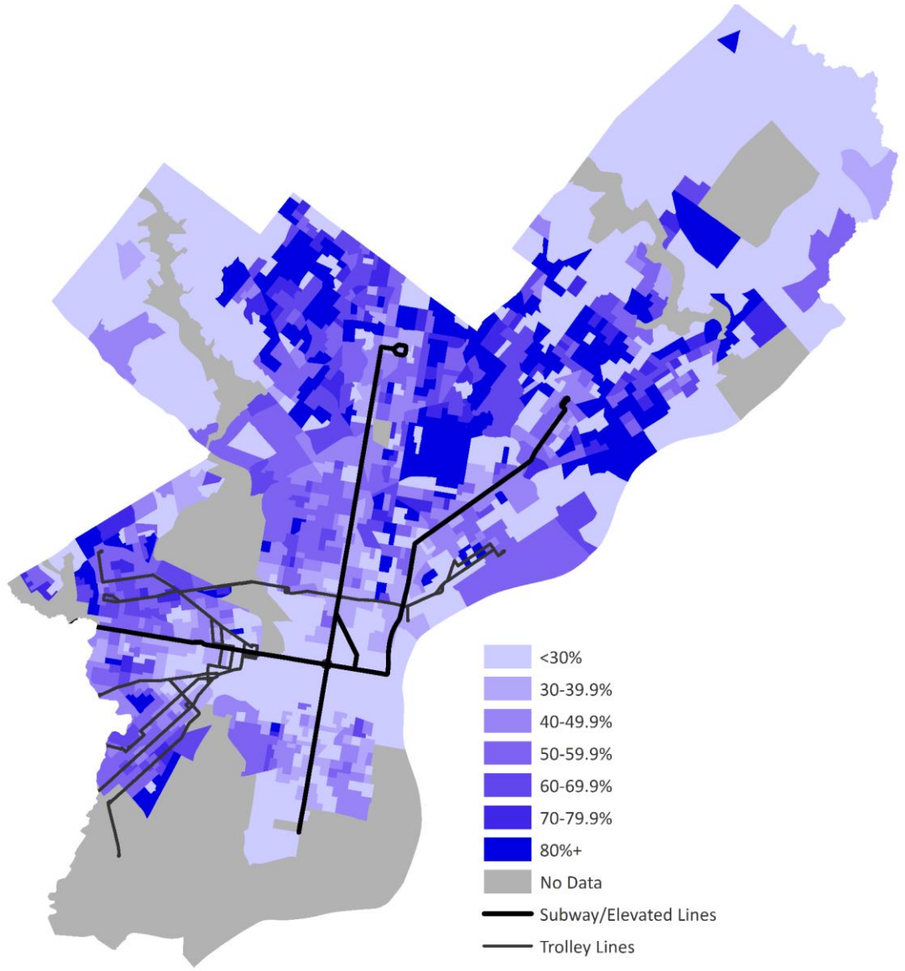
Spatial Distribution by Product Type

- Weekly and monthly pass riders reflect a significant proportion of ridership across large portion of the city
- Pass riders and Transfer riders (using the Travel Wallet) are disproportionately concentrated in communities with incomes below the city median
- Conversely, riders using the Travel Wallet for a base fare without a transfer are disproportionately concentrated in communities with above average incomes

Share of Fare Product Ridership by Block Group Income

Block Group Income	Weekly / Monthly Pass	Travel Wallet – Transfer	Travel Wallet – Base Fare Only
Above Median	39%	46%	64%
Below Median	61%	54%	36%

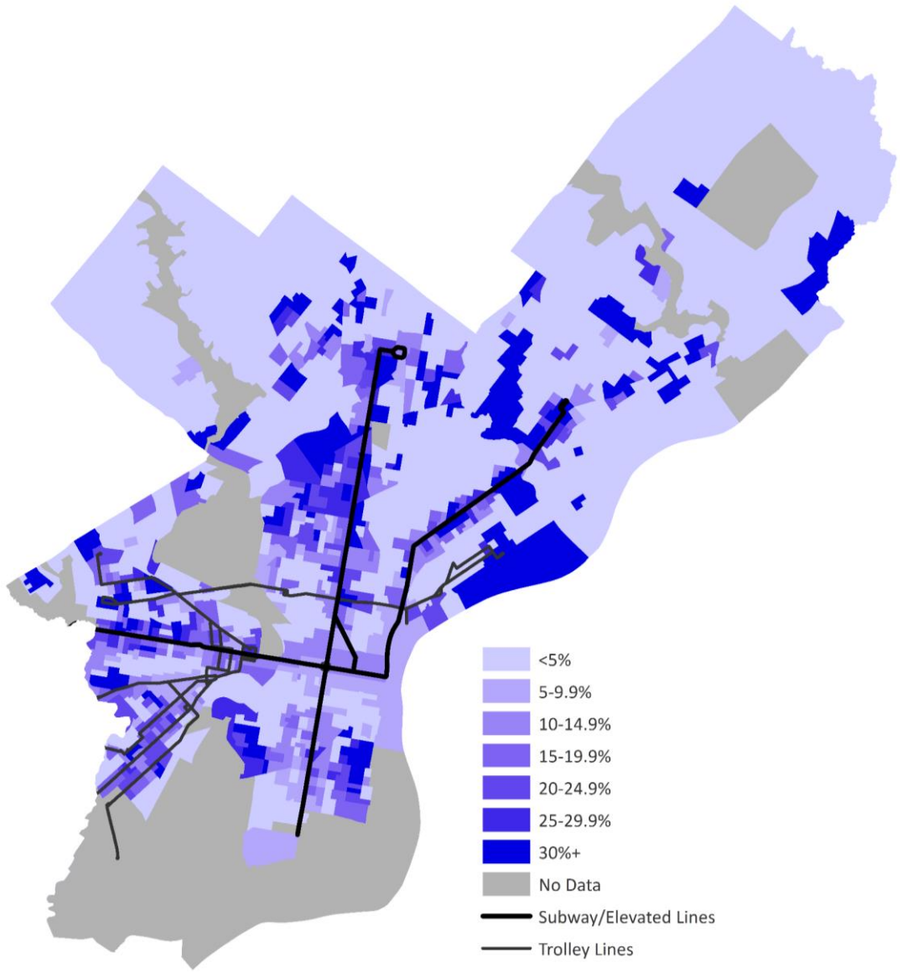
Share of Riders using Weekly or Monthly Passes by Origin Location



61% of ridership from block groups with below average incomes

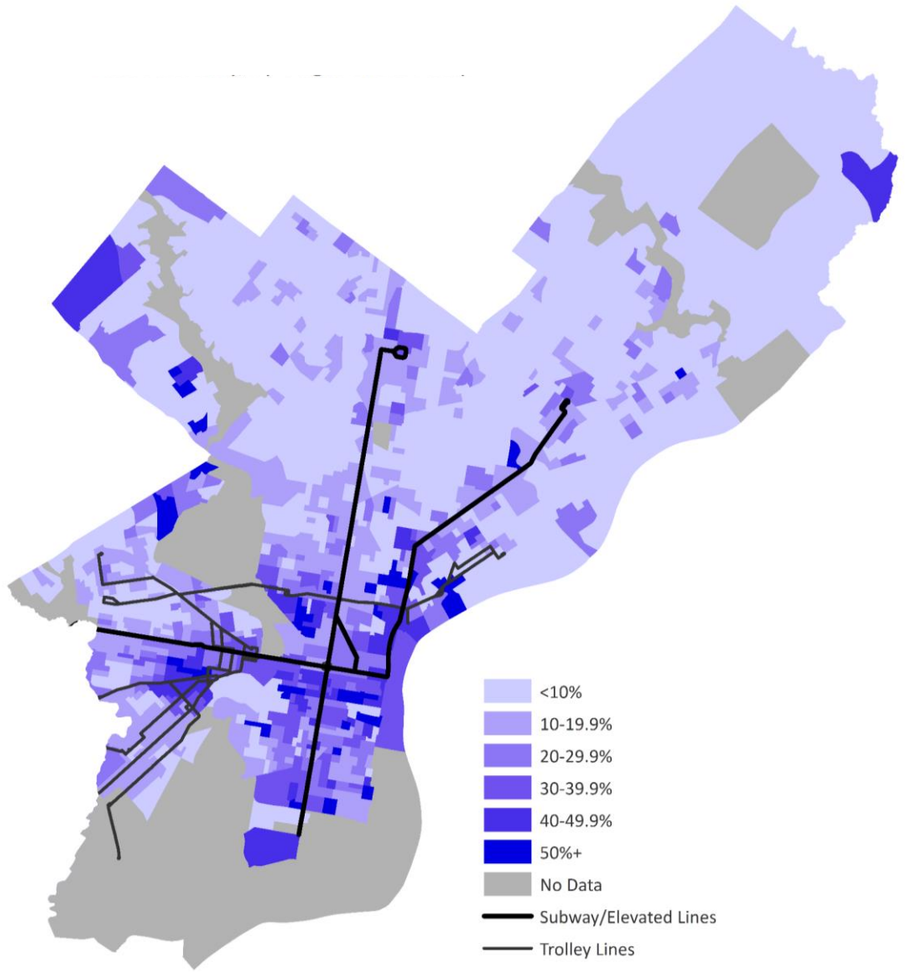
Current Fare Product Mix

Share of Travel Wallet Riders using a Transfer by Origin Location



54% of ridership from block groups with below average incomes

Share of Riders using Travel Wallet Base Fare Only by Origin Location



36% of ridership from block groups with below average incomes



Proposed Fare Policy FY 2021-2023

FY 2021-2023 Fare Proposal

SEPTA's FY 2021-23 fare proposal envisions the following pricing changes from the FY 2018-20 policy:

- Elimination of the $1.00 fee for the first transfer
- Increase in the base fare when using the Travel Wallet from $2.00 to $2.50
  - No change in the cash or Quick Trip base fare of $2.50
- Modest growth (3-4%) in monthly and weekly pass prices
- Additional product / policy changes
  - $1.00 fare for children ages 5-11 riding with parents
  - New 3-day pass for $18.00

FY 2021-23 Fare Proposal: Pricing for Selected Products

	FY 18-20	FY 21-23
Monthly Pass	$96.00	$99.00
Weekly Pass	$25.50	$26.50
Base - Cash / Quick Trip	$2.50	$2.50
Base – Travel Wallet	$2.00	$2.50
Transfer	$1.00	First Free

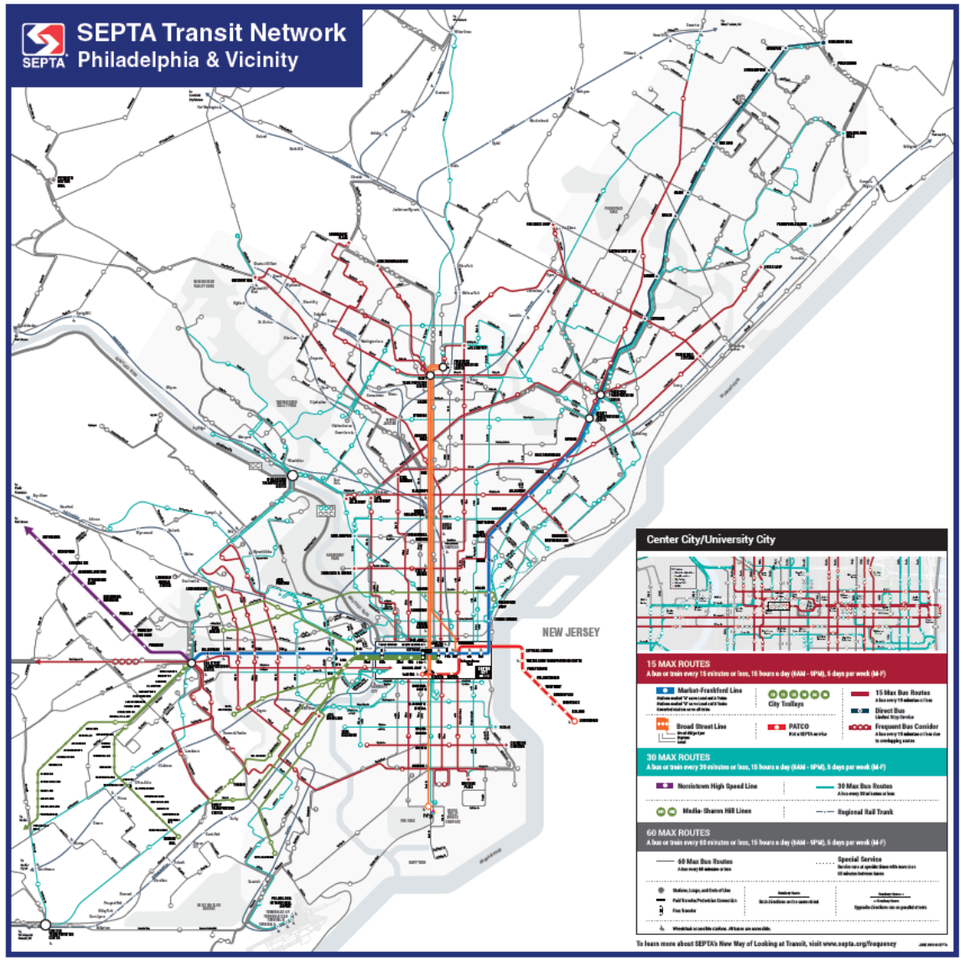
Transfer Elimination Proposal– Potential Equity Implications

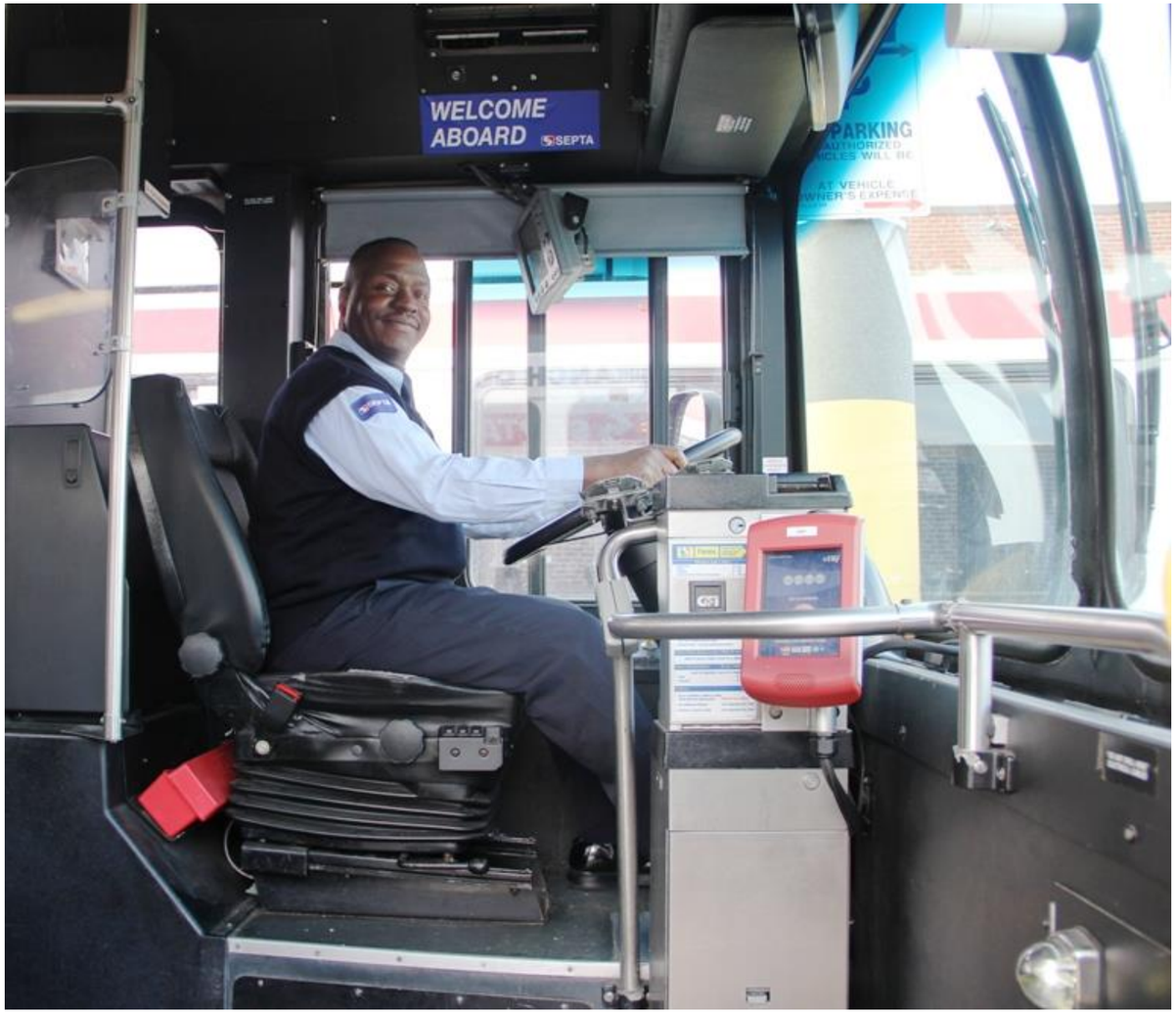
The current $1.00 fee for transfers has a range of inequitable impacts for riders across Philadelphia

- The distribution of transfer rides across the city indicates that transfer costs fall disproportionately on lower income households for a number of structural reasons:
  - “Single seat” rides disproportionately serve workers commuting to Center City, where average incomes are above the citywide average
  - “Single seat” commutes are also more common in neighborhoods that are closer to key employment nodes, where housing prices tend to be higher
  - Low-income riders may not be in a position to purchase transit pass products that do not feature a transfer penalty
- The transfer fee creates a higher price point for riders experiencing inferior service
  - By nature, transfer riders face increase wait times and longer commute times than single seat riders, but pay a higher fee per journey
- The transfer fee discourages optimal use of the system by riders
  - Cost-sensitive riders may choose a one-seat ride for the financial savings when a journey featuring a transfer would deliver them closer to or more rapidly to their destination

Transfer Elimination Proposal – Potential Systemic Benefits

- More efficient use of the system would improve outcomes for riders, which should translate into increased ridership
- Improvements in the distribution of riders across modes and routes has potential benefits for crowding on SEPTA vehicles and for congestion on the roadways
- Reduced demand for one seat rides can allow SEPTA to design and deploy its service in a more coordinated way. Network designs that capitalize on transfer opportunities can deliver:
  - Straighter, faster and more logical service
  - More frequent service
  - Elimination of overlapping service
  - Effective interconnections between modes





Fare Proposal: Equity Measures

Share of Daily Income – Framework

- Calculating costs relative to income is a standard approach to evaluate costs relative to ability to pay
  - This framework is frequently applied to necessities like housing, transportation and medical care
- Normalizing costs to incomes allows for a comparison of costs across households and communities of different types on an equitable basis
- This analysis calculates the average roundtrip fare under the previous and the proposed fare policy as a share of daily income in order to understand the equity implications of the fare proposal for communities and populations across Philadelphia

Share of Daily Income Calculation

(Weighted Average Roundtrip Price) / (Median Daily Income)

Weighted Average Roundtrip Price

- Each fare product is associated with a price per ride
- The mix of fare product used by residents of each block group implies a weighted average price per ride
- Under the new fare proposal, the weighted average price changes (assuming a consistent fare product mix)
- Roundtrip fare is calculated as 2x the average fare

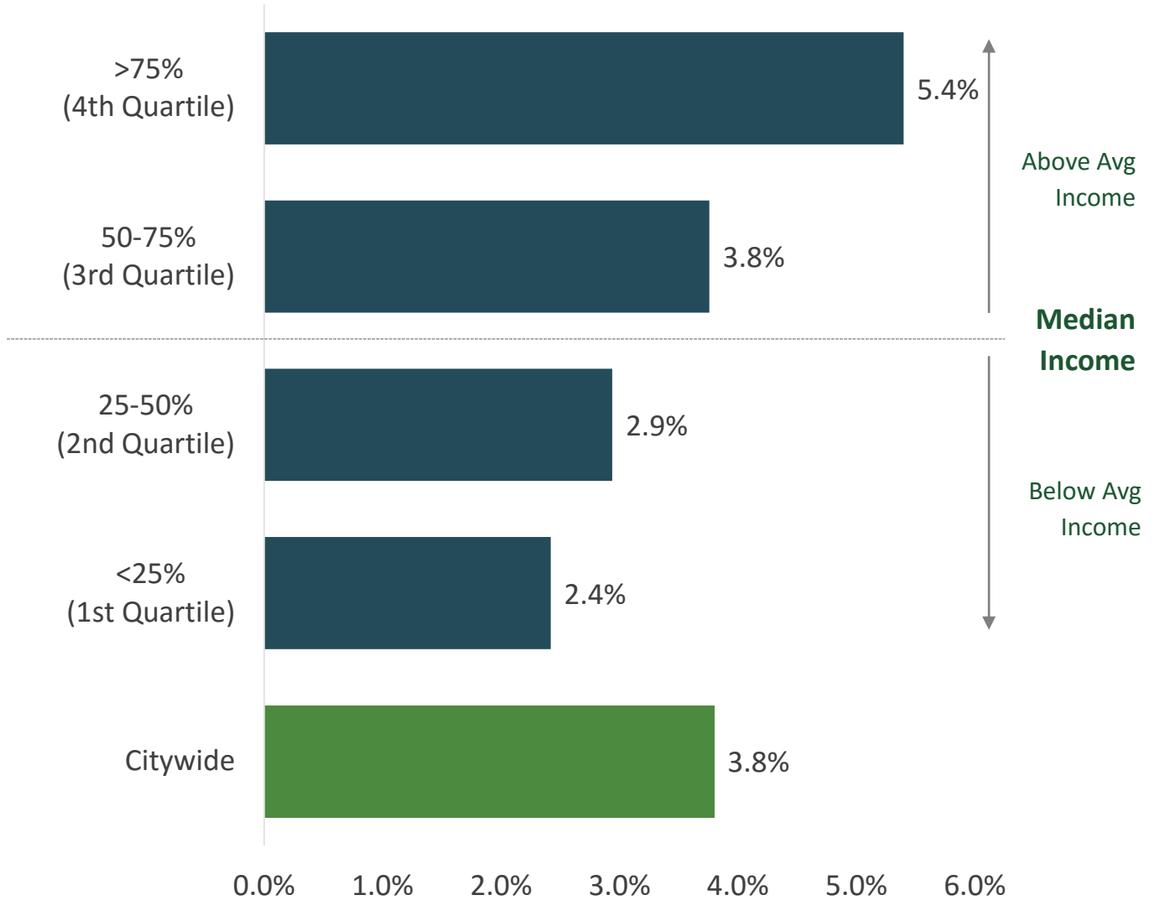
Median Daily Income

- Median household income in each block group is available through the 5-Year 2018 American Community Survey (ACS)
- Median incomes are divided by 365 to yield daily incomes
- Current median incomes are expressed in $2018, which are appropriate to compare to average roundtrip fares under FY 2018-20 pricing
- Median income growth of 2% per year (or 6.1% over three years) is assumed in order to compare FY 2021-23 weighted average fares to anticipated household incomes

Income Growth Assumption

- Estimating costs relative to income over time requires assumptions about the rate of income growth
  - Income change relative to fare pricing over a three-year period will include both inflationary growth as well as any real growth or contraction
- This analysis uses 2.0% as the benchmark for annual income growth (inclusive of inflation)
  - This figure represents a standard economic assumption consistent with long-term inflationary trends, rather than a specific projection of likely conditions in Philadelphia
- Recent income growth in Philadelphia has been above this benchmark
  - For the most recent three-year period available (2015-2018), Philadelphia's median income has grown by more than 11% (or 3.8% per year)
- While recent growth has not been evenly distributed, block groups in each income quartile saw increases in median income of at least 2.4% from 2015-2018
  - To the extent that income growth in areas of the city with incomes above the median continue to exceed these benchmarks, increases in fares as a share of income in some of these locations estimated in this analysis will be overstated

Annual Philadelphia Median Income Growth Rate 2015-2018 by Block Group Income Quartile



Fare Proposal: Equity Measures

Sample Share of Income Calculation for a Block Group

Sample Fare Mix

	Monthly Pass*	Weekly Pass	Student Pass	Cash / Quick Trip	Base Fare	Base + Transfer	Disabled	Disabled + Transfer	Senior Citizen	Regional Rail	Other
Fare Mix	10%	20%	10%	15%	16%	5%	3%	1%	10%	5%	5%
Fare FY 2018-20	$1.60	$1.82	$1.92	$2.50	$2.00	$3.00	$1.25	$1.75	N/A	N/A	N/A
Fare FY 2021-23	$1.65	$1.89	$2.00	$2.50	$2.50	$2.50	$1.25	$1.25	N/A	N/A	N/A

Equity Measures

	Weighted Average Fare	Weighted Avg Roundtrip	Median Household Income	Average Daily Income	Share of Income
FY 2018-20	$2.02	$4.04	$43,744	$119.85	**3.37%**
FY 2021-23	$2.12	$4.24	$46,431	$127.21	**3.33%**
% Chg	4.8%	4.8%	6.1%	6.1%	**(1.3%)**

* For the purpose of this analysis, daily pass prices are calculated by dividing the pass price evenly across the duration of the pass period (for example, 7 days for a weekly pass). While this approach is appropriate for representing the cost of a single roundtrip per day, pass users may in practice utilize the system more frequently, deriving additional benefits

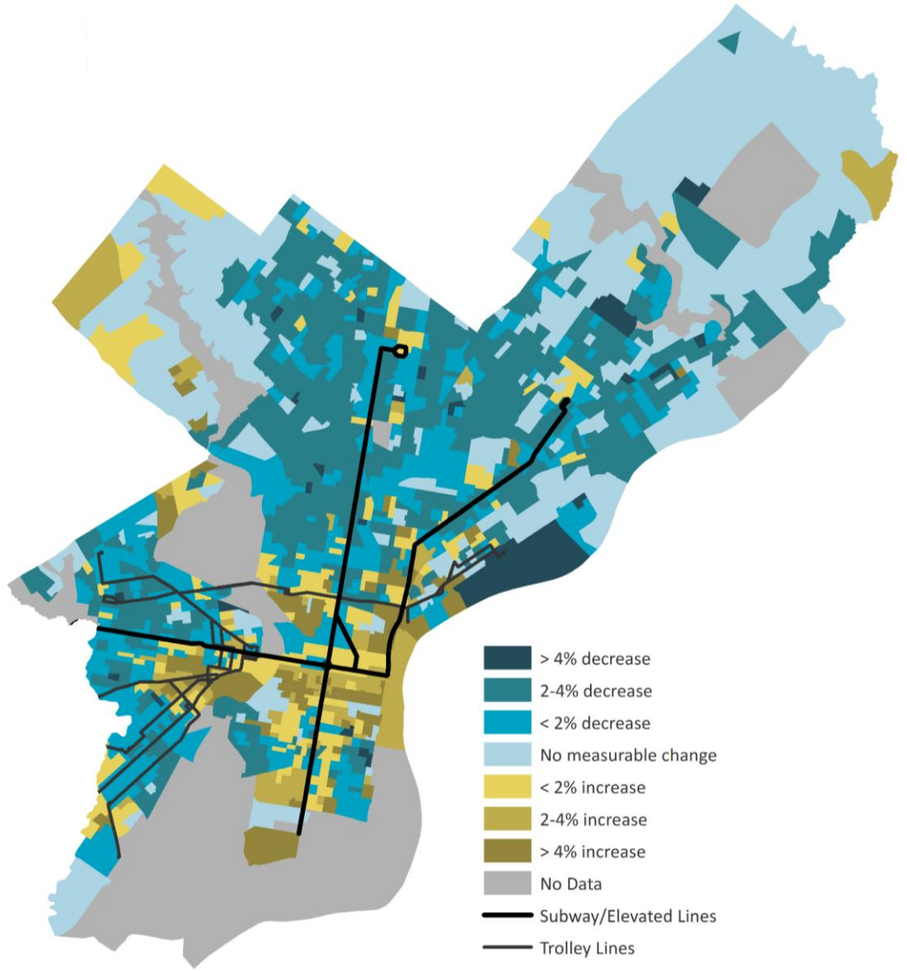
Share of Income = (Roundtrip Fare) / (Daily Income)

Fare Proposal: Equity Measures

Share of Income Results

- Average fares as a share of income are fall under the new fare proposal in about three-quarters of block groups across Philadelphia
- Block level calculations can also be aggregated to larger geographies
    - Aggregate calculations are weighted by the relative ridership in each block group
- **Average fares as a share of income fall by 0.6% citywide** under the proposed fare policy

Change in Average Roundtrip Fare as Share of Daily Income by Block Group



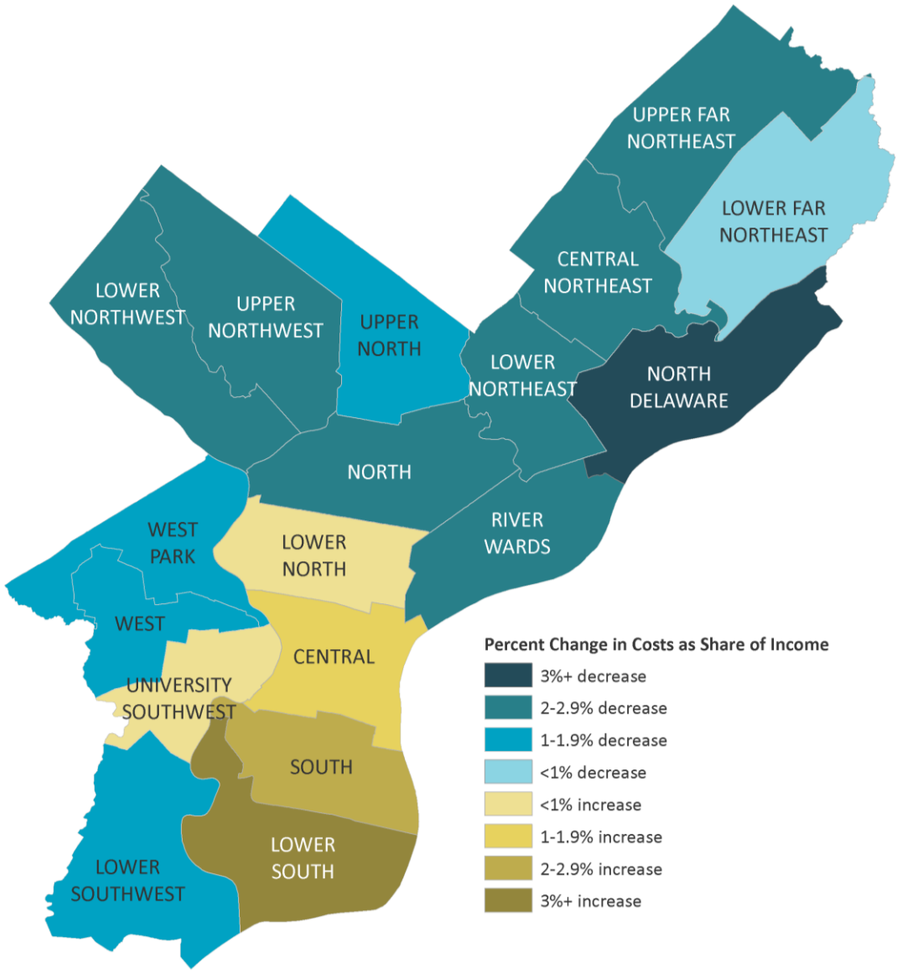
74% of block groups see a decrease in average fare as a share of income

Equity Measures from New Fare Structure

Share of Income Results

- Thirteen of the eighteen planning areas see decreases in average fare as a share of income under the proposed fare policy
- Savings tend to be larger for planning areas at a greater distance from Center City

Change in Average Roundtrip Fare as Share of Daily Income by Planning Area

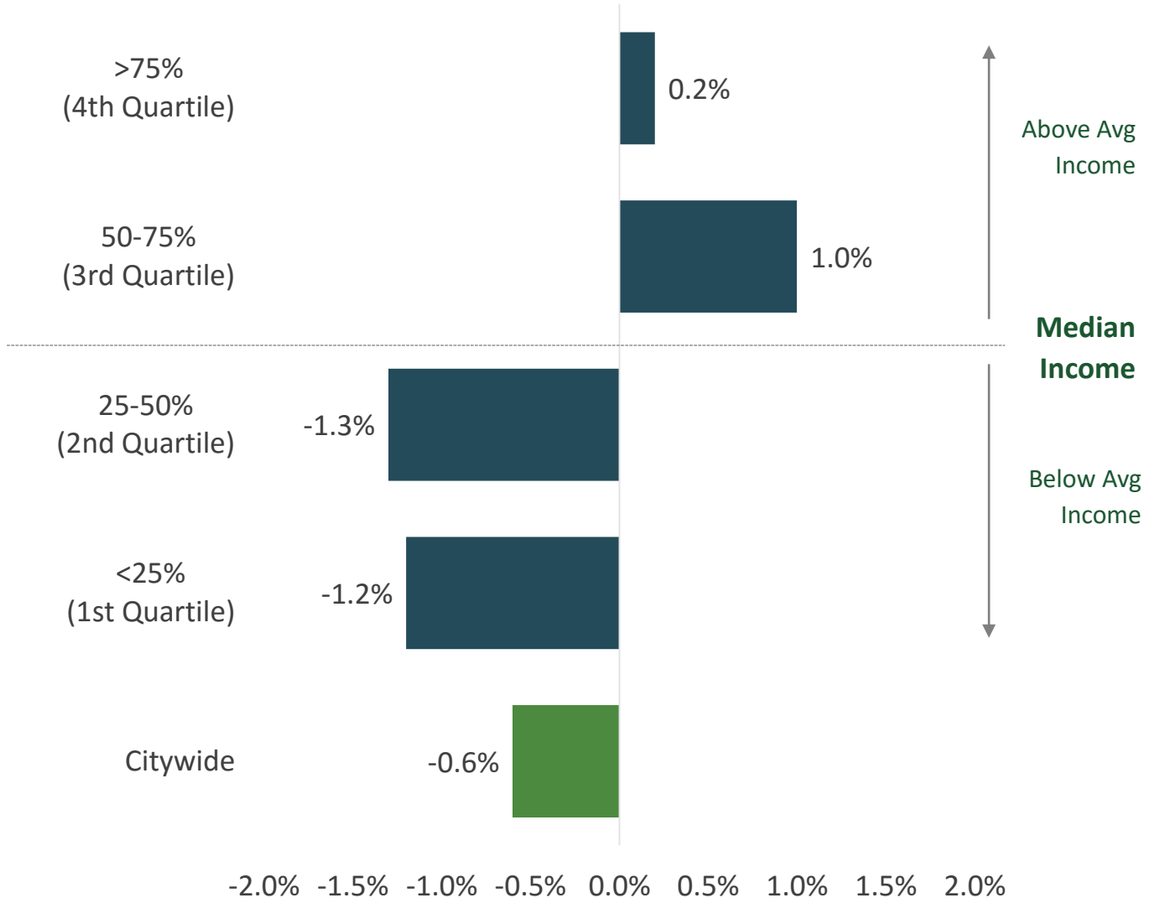


Equity Measures from New Fare Structure

Share of Income Results by Income Level

- Changes in average fares as a share of income can also be aggregated based on the characteristics of block groups (regardless of where they are located within the city)
- **Block groups with median incomes below the city average see decreases of more than 1%** in average fares as a share of daily income under the fare proposal

Change in Average Roundtrip Fare as Share of Daily Income by Block Group Income Quartile

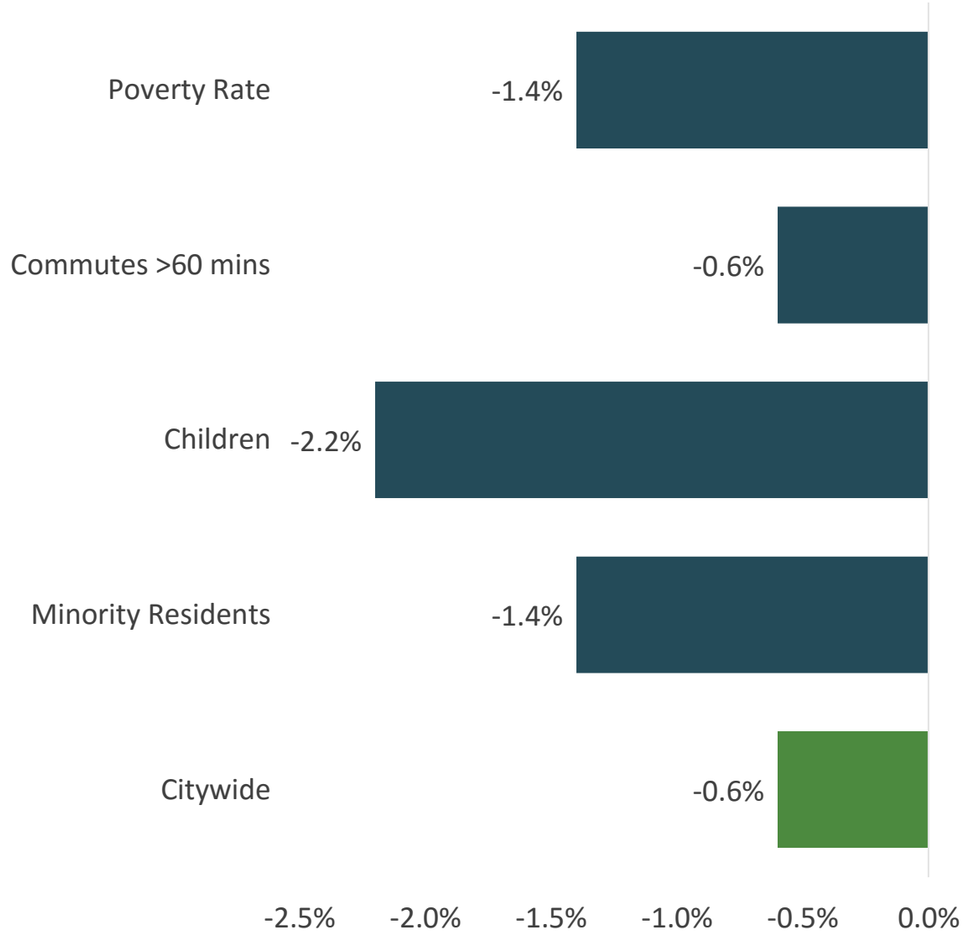


Equity Measures from New Fare Structure

Share of Income – Community Characteristics

- Reductions in average fares as a share of income are also achieved in communities with a range of additional characteristics
  - Impacts by characteristic are assessed by identifying the block groups in the top quartile for each measure (regardless of the where in the city they are located)
- Fares as a share of income fall in communities with the highest concentrations of:
  - Households in poverty
  - Lengthy commutes
  - Children
  - Minority residents

Change in Average Roundtrip Fare as Share of Daily Income – Selected Characteristics



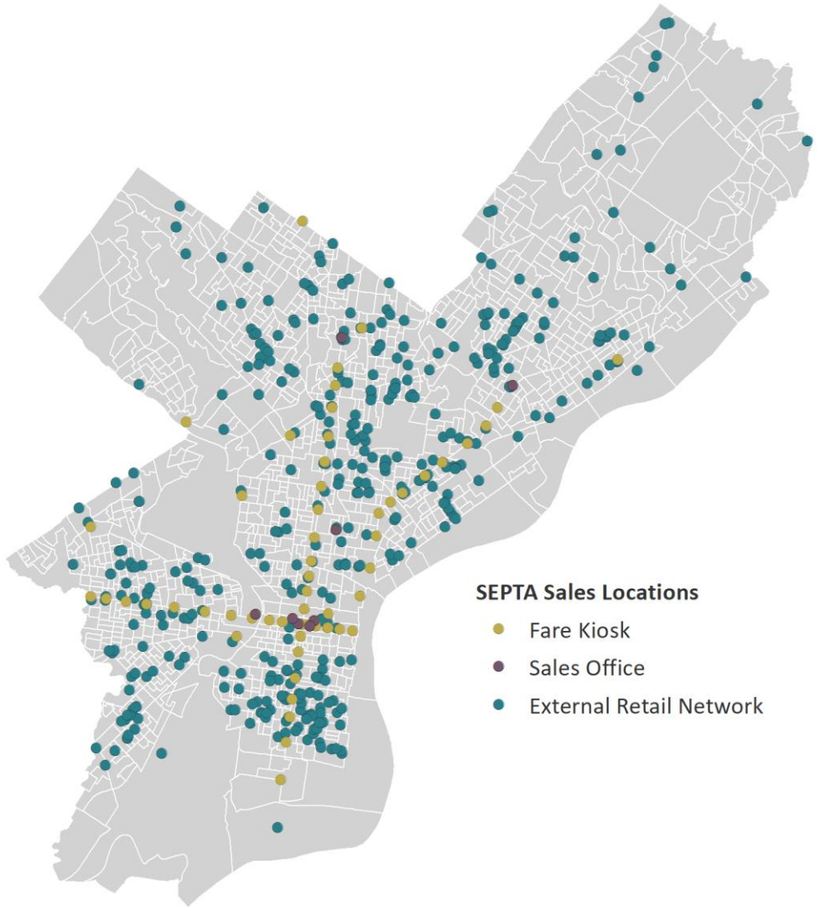
Based on a ridership weighted average of block groups in the top quartile of concentrations of each characteristic

Equity Measures from New Fare Structure

Cash Fare Riders

- As noted earlier in the analysis, around 13% of riders in the transit division utilize cash to pay fares
  - This group includes riders who may struggle with the financial and technology resources needed to utilize the Travel Wallet and associated pass products
- Cash rides do not change in price under the fare proposal
  - Maintaining the price of the cash ride at $2.50 over the next three years represents a decrease in the cost of a cash ride in real terms
  - The new fare proposal also achieves equity in the base fare between cash rides and the Travel Wallet
- However, cash riders will not benefit from the free transfer in the new fare proposal
  - Since cash riders are not tracked across legs of their journey, additional rides will continue to count as a second base fare of $2.50
- To address access concerns associated with the Travel Wallet, SEPTA has placed the majority of sales locations within low-income and minority communities
  - Improving access to the Travel Wallet is a crucial component to maximizing the potential equity benefits of the fare proposal

SEPTA Travel Wallet Sales Locations within Philadelphia



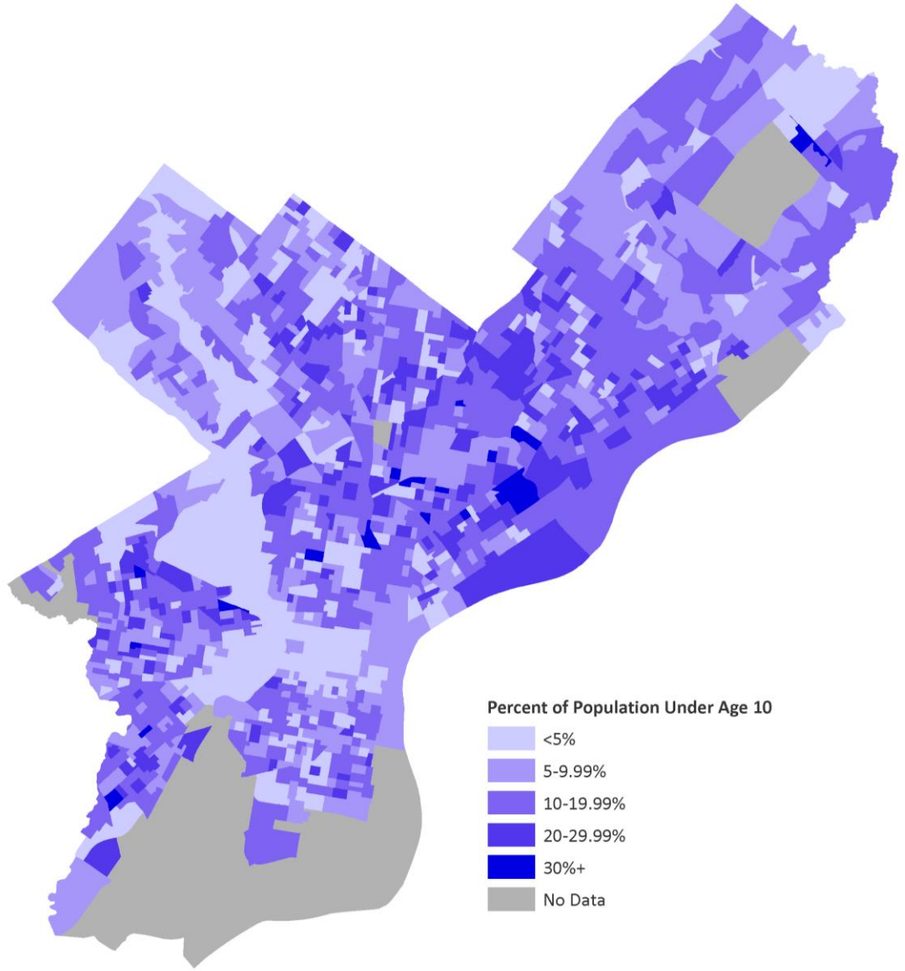


Additional Fare Products and Takeaways

Child Fare Policy

- SEPTA's fare proposal includes a discounted $1.00 fare for up to two children ages 5-11 traveling with adults
  - This policy would supplement the existing policy of free fares for up to two children ages 0-4
- Expansion of the child fare policy would potentially reduce transportation costs for households with children
  - These households face additional travel costs for modes of travel that charge by the person
  - More broadly, households with children face a variety of additional costs, with available household resources divided across a greater number of people and needs
- Mapping of population data indicates that the highest concentrations of children as a share of the population are located in neighborhoods in North and eastern North Philadelphia and in West and Southwest Philadelphia.

Share of Population <10 years old within Philadelphia



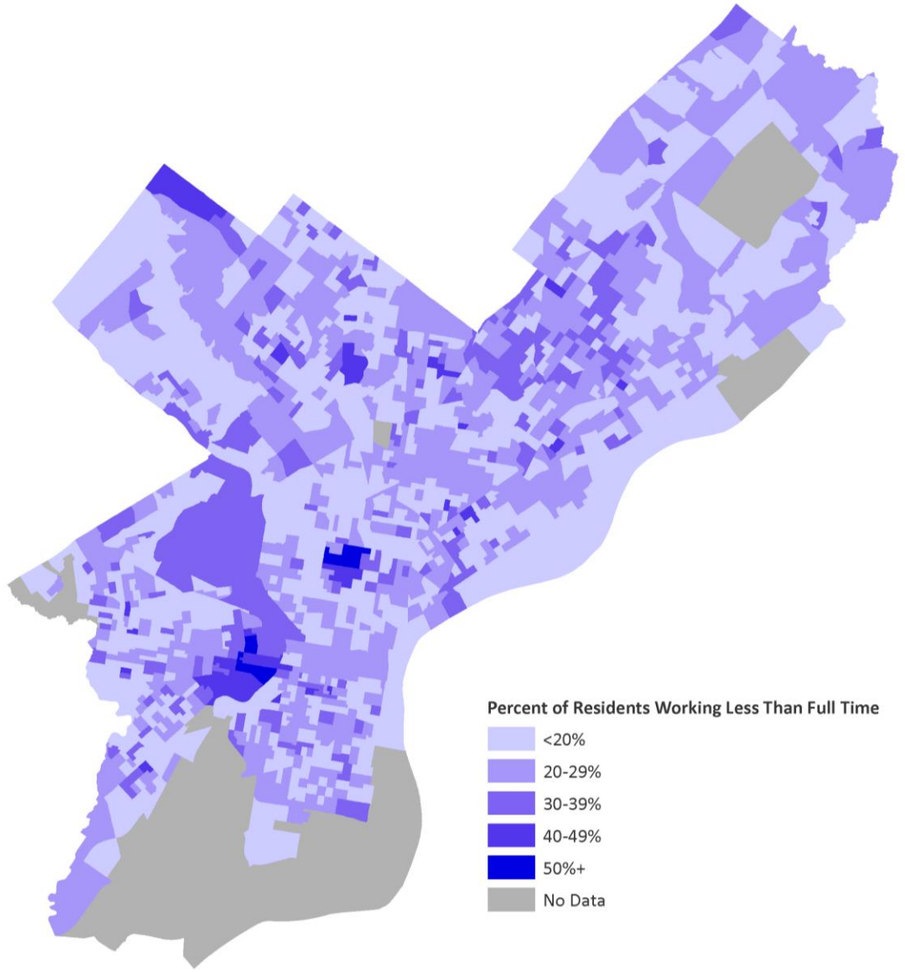
Source: 5-Year American Community Survey, 2018

Equity Measures from New Fare Structure

Three-Day Pass

- SEPTA's fare proposal also introduces a three-day pass at a price of $18.00
  - This provides an intermediate price point between the daily ($9.00) and weekly ($26.50) pass products
  - The three-day pass may be more accessible to low-income riders who use SEPTA for multiple daily trips but struggle to pay the upfront cost of a weekly or monthly pass
- The three-day pass will work within a 72-hour window from first use, providing flexibility for a variety of potential users
  - In addition to short-term visitors, this flexibility may appeal to the increasing share of workers with non-traditional work schedules
  - These include part-time workers, shift workers, those that work partially from home, as well as workers using paid time off in a particular week

Share of Households with Part-Time Workers



Major Findings

- Analysis of existing ridership patterns shows that SEPTA's proposed fare policy is significantly progressive in its effects
  - Elimination of the transfer fee, freezing of the cash fare and modest growth in pass pricing combine to reduce the average cost per ride for low-income households relative to income growth
  - This decrease is compensated for by an increase in the base fare, which contributes to an increase in average fares relative to income growth for some higher income residents
- This shift in costs from lower income to higher income residents has significant equity benefits, which are measured in this analysis by estimating roundtrip costs as a share of daily income
  - Given consistent ridership patterns, the average roundtrip fare as a share of daily income falls by more than 1% in communities with incomes below the city median
  - Fares as a share of daily income also fall in areas of the city with above average concentrations of residents in poverty, residents with lengthy commutes, children, and minority residents
- In addition, SEPTA's new fare policy will unlock long-term benefits
  - Removing the fee for the first transfer will allow riders to access faster trip combinations without penalty
  - Transit network designs that capitalize on transfers can deliver service that is straighter, faster and more frequent
  - Adaptation in rider behavior and system design to the new policy could produce benefits far greater than those modeled in this analysis, which assumes consistent ridership patterns

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1435 Walnut St, 4th Floor, Philadelphia, PA 19102

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