Measuring access and convenience to public transport in the context of first and last mile

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Challenging urban environments

Spatial inequality

Primrose, South Africa © Johnny Miller / Millefoto
Mobility relates to myriad societal challenges and requires holistic and systematic approach.

Planning plays a key part to ensure safe, affordable, accessible, efficient, resilient, and sustainable transport that minimizes carbon and other emissions and environmental impact.
Adoption of the New Urban Agenda

An action-oriented document which sets global standards of achievement in sustainable urban development, by readdressing the way cities and human settlements are planned, designed, financed, developed, governed, and managed, through cooperation with committed partners, relevant stakeholders, and urban actors at all levels of government as well as the private sector and in supporting the implementation of the 2030 Agenda.
Linking the New Urban Agenda to the SDGs

Links between the NUA and the SDGs

- Over 60% of SDGs have a strong urban or land/spatial components
- NUA/SDGs emphasize means of implementing and localizing
- NUA/SDGs provides for a spatial framework for the sectorally-based indicators

- Goal 11
- Other urban-related goals
- Other land related goals
By 2030, provide access to **safe, affordable, accessible and sustainable transport systems for all**, improving road safety, notably by expanding public transport, with **special attention to the needs of those in vulnerable situations, women, and children, persons with disabilities and older persons**.
Monitoring Public Transport

Transport Target emphasizes on:

► Sustainable Mobility: satisfying the needs of the current generation without compromising the ability to satisfy the needs of future generations

► Accessibility and Inclusiveness

Every decision on transport infrastructure determines:

► Cityscape for decades
► Long-term influence on the mobility behavior of residents
► Urban sustainability, productivity, safety
Measuring SDG Target 11.2.1 on accessibility and convenience
Data Sources

- **National Transport Agencies/City Administration/Service providers**
  - Data on location of public transport stops
  - Frequency of service
  - Transport routes

- **National Population and Housing Census**
  - Population data by sex, age, etc
  - Mode of transport
  - Dwelling units

- **Household surveys**
  - Income expenditure on public transport and quality of service

- **GIS Data**
  - City boundary
  - Fieldwork to collect data on PTS where it lacks GPS
  - Buffer-Service areas
Methodology for measuring accessibility

1. Spatial Analysis to delimit the built-up area of the urban agglomeration
2. Inventory of public transport stops in the city/service area
3. Buffer Analysis of 0.5 km public stop (“service area”)
4. Overlay of socio-demographic data
5. Estimation of urban area with access to public transport/out of total population
Computation of the Indicator

To identify the population served the following is observed;
The service area-(buffer) (denoted as i) intersects, either fully or partially, with more than one analysis zone j (j=1.....n). The population served by the public transport service in buffer i, \( P_i \), is thus equal to the sum of the population in each of the intersecting areas, \( P_{ij} \). Hence

\[
P_i = \sum_{j=1}^{n} P_{ij}
\]

Where, \( P_{ij} \) is estimated based on the amount of interaction between service buffer i and analysis zone j.

In estimating \( P_{ij} \) we will assume that the population is uniformly distributed within the analysis zones.

Population with access to public transport out of the entire city population computed as

\[
% \text{ with access to public transport} = 100 \times \frac{\text{Population with convenient access to public transport}}{\text{City population}}
\]
Calculation and observation on limitations

- Convenience measured as distance does not illustrate quality of PT.
- Disaggregation remains difficult and access to information a concern.
- Other factors such as affordability, safety, and universal accessibility.

You might be 0.5 km away from the nearest bus stop, but…

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Total Population with convenient access to public transport = 159,164 with County Population = 691,893/km²

% with access to public transport = \( \frac{159,164}{691,893} \times 100 \approx 23\% \)
Perceptions of convenience and accessibility vary

Accessibility for customers with special needs (physically, visually, hearing impaired, temporary mobility constraints, elderly, children, people in vulnerable situations)

Affordability for the urban poor

Safety concerns at bus stop

Frequency of service during peak travel time
Definitions of formal versus informal public transport

As per the current definition:

“It excludes informal, unregulated modes of transport (paratransit), motorcycle taxis, three-wheelers, etc.”

“The access to public transport is considered convenient when an officially recognized stop is accessible within a distance of 0.5 km.”

Does that mean that Tokyo, Japan can report. While Dhaka, Bangladesh, is unable to report?
Recalibrating the service area

Buffer: Proximity

Realistically configure the street network to recognize the presence of any barriers to PT.

Network analysis: walking distance (based on street network)

Proposal

Longer distances for faster modes: 1 km
Cycling Access: 2 km
Innovative technologies/mobile apps to collect basic data

OpenTripPlannerAnalyst (OTPA) Accessibility Tool.

Developed by World Bank and Conveyal (http://Conveyal.com)

- This open-source web-based tool allows us to combine the spatial distribution of the city (for example, jobs or schools), the transportation network and an individual's travel behavior to calculate the ease with which an individual can access opportunities.

Data collected

- Routes: shapes, names
- Stopping points: location, names
- Boarding and alighting numbers
- Fares and variations
- Frequencies: AM peak, off peak, PM peak, weekends, holidays, nights
- Travel times
The role of public spaces
What is the spatial scale?

- Administrative area
- Urban extent
- Pilot areas

It's crucial to understand the spatial scale of the assessment within cities.
Since 2012, the global public space programme worked in 36 countries. It completed 85 public space upgrading projects and 12 public space assessments. Engaged +20,000 citizens, impacting +1.5 million people.
Ownership of public spaces

Jianghan, Wuhan, China
Network and Spatial Distribution

Bamenda, Cameroon
Areas with green coverage experience low to medium temperatures, while areas with no green cover are prone to high temperatures (central, eastern and southern parts of the city).

Urban heat areas in Nairobi (RED)
Block by Block methodology: Minecraft
ADDRESSING CHALLENGES
Thank you!

www.unhabitat.org
www.fukuoka.unhabitat.org/en
It All Starts at Home: Local Actions for Sustainable Cities and Communities

19,000 participants expected

550 partner-led side events, Dialogues, Assemblies, Roundtables, Special Sessions

Registrations already received from 151 countries globally

The Background Paper is available

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