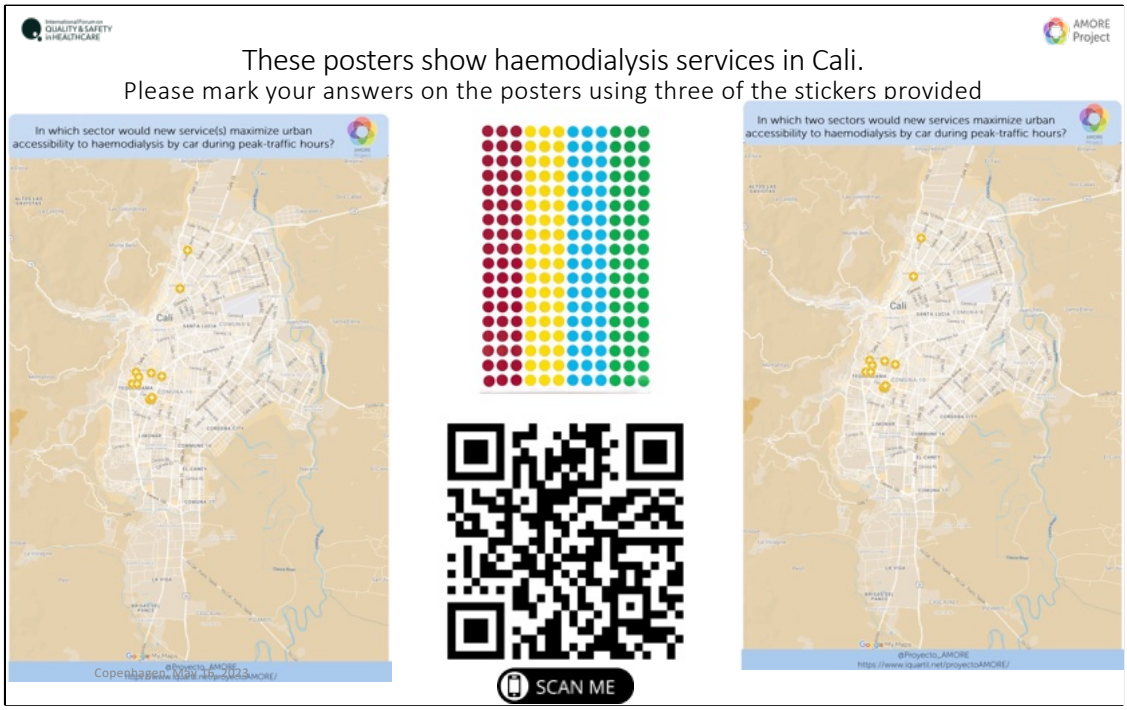

Good afternoon. I am Luis Gabriel Cuervo, your speaker on behalf of the AMORE Collaborative Project.

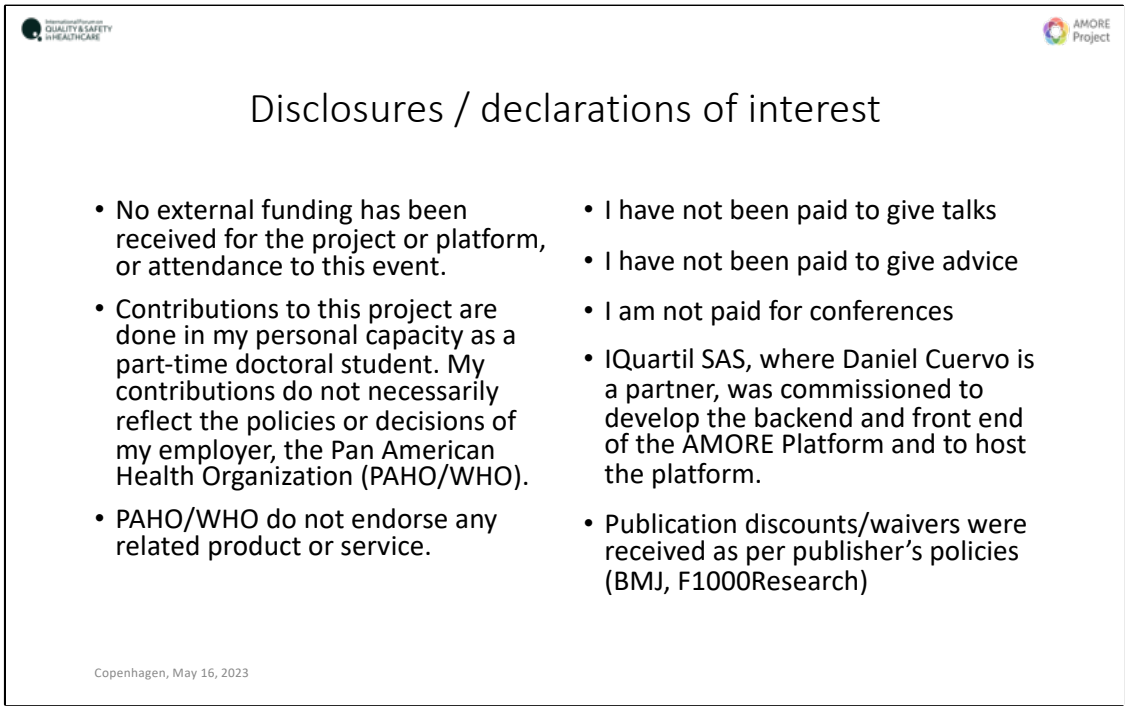
I am delighted to join the International Forum on Quality & Safety in Healthcare and present the project and tool that we developed and tested to address accessibility measurements, with an equity perspective. Adapting to a changing world: equity, sustainability and wellbeing

I want to acknowledge the organizers for their support, the Danish hosts and partners, BMJ and IHI.




You are welcomed to scan the QR Code to access the resources of the project being presented here.

There are two posters at the entrance each with a question that can be answered by placing stickers where you feel new services should be added. They offer an opportunity to reflect on the issues urban and health services planners face when pondering where to place new services and will prepare you for the discussion.



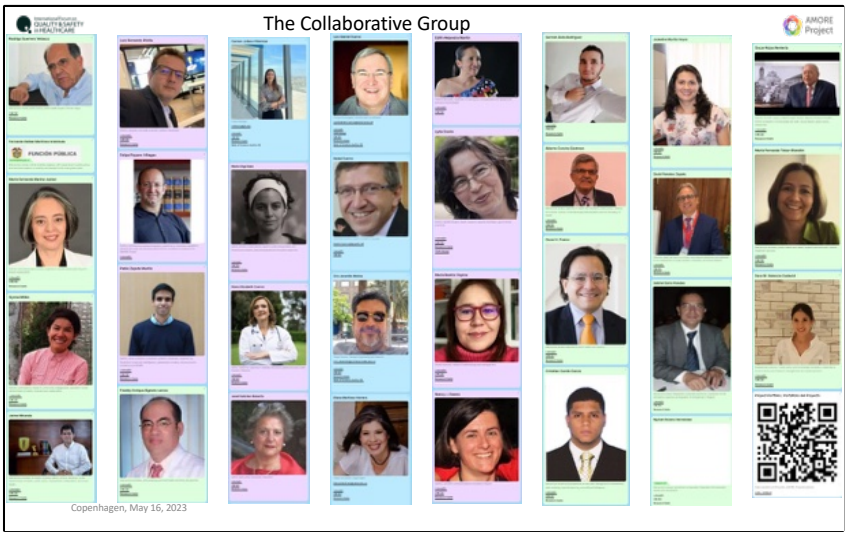

The work I am presenting today has received no external funding. I have contributed to it in my personal time and capacity and does not necessarily reflect the opinions or policies of any author's employers.


**We will discuss NEW EVIDENCE TO ENABLE DATA-DRIVEN URBAN AND HEALTH SERVICES PLANNING**: We reveal the links between traffic congestion, accessibility, and equity, using open data, to then point at solutions.

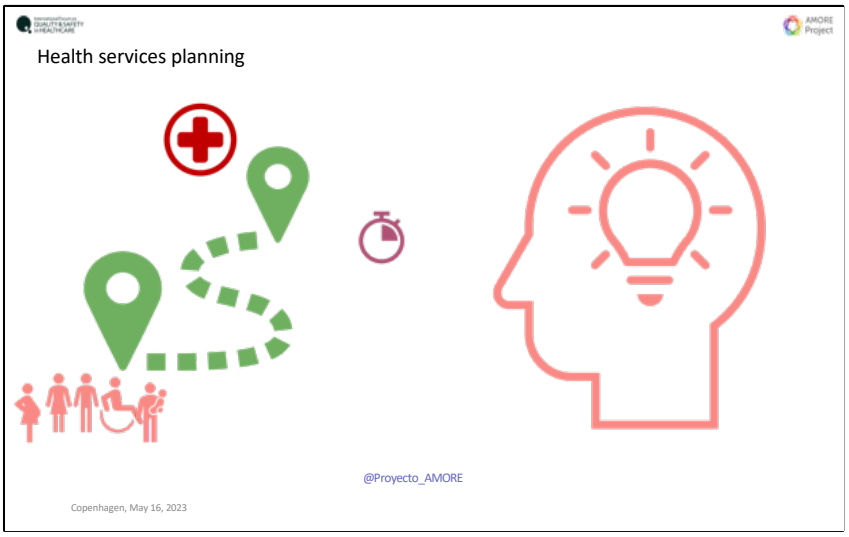
The presented approach offers a consolidated method to assess geographical accessibility to specific health services.
By measuring geographical accessibility, we mean measuring the ability for a healthcare user to reach a service on time.

Our measurements include travel times from the user's residence to the service with the shortest travel time. We tested this approach in Cali, Colombia


The proposed measurements of geographical accessibility enables data-driven urban and health services planning. They support several Sustainable Development Goals, as well as social justice and healthcare quality.



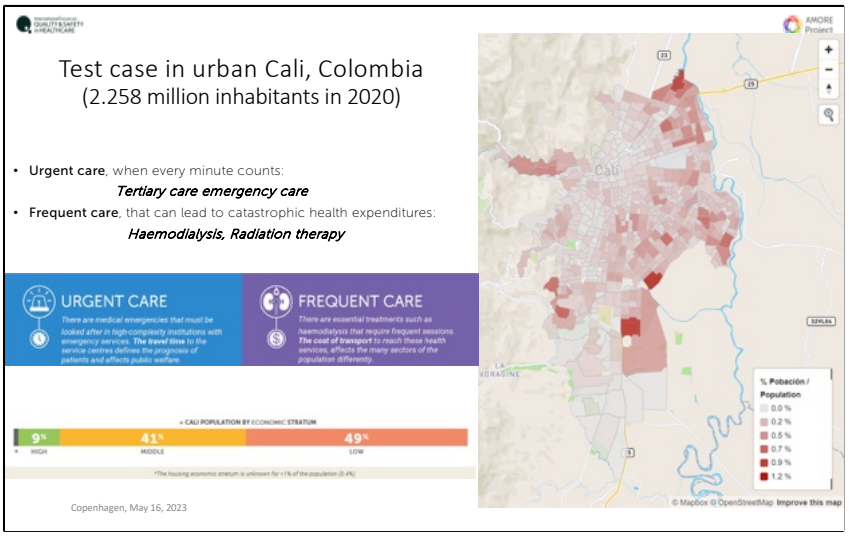

The project is implemented by a collaborative group of three dozen stakeholders and representatives from different sectors, including health services users and providers, authorities, and representatives from communities.




Our approach integrates travel time big data that accounts for traffic congestion, with georeferenced sociodemographic data and health services data.

This approach is about measuring accessibility, learning what population groups can reach a service within a given travel time and traffic conditions, and on different transport means.

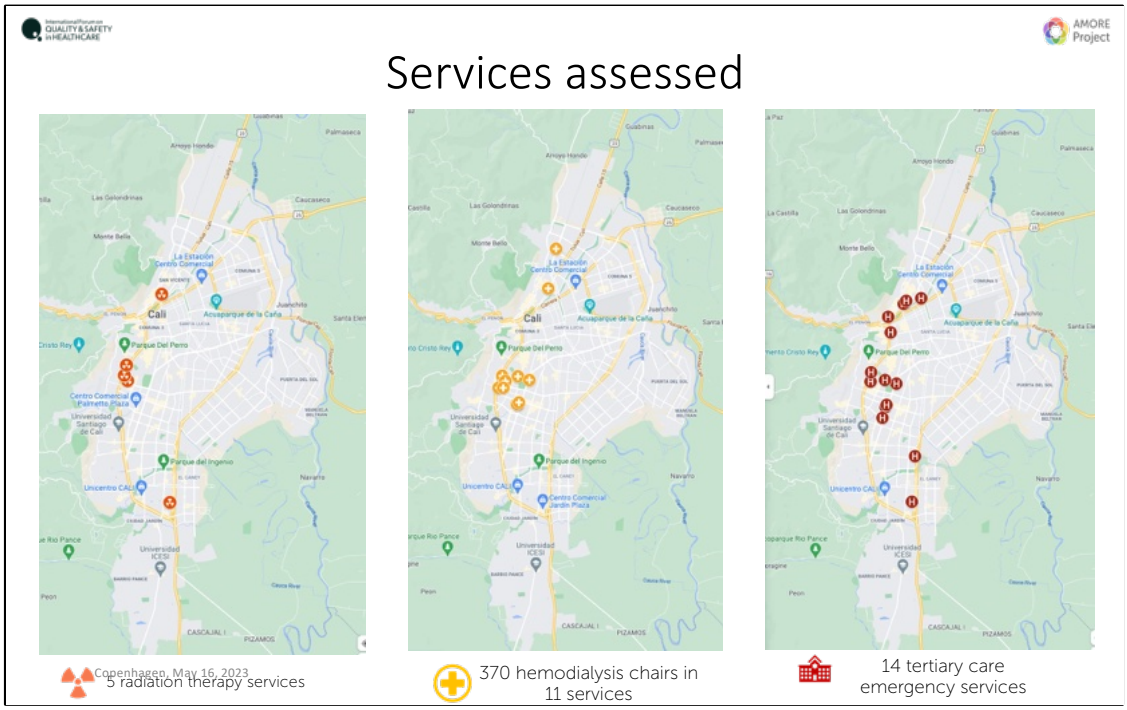
We also learn about locations where new services would optimise accessibility.




The approach was tested during the pandemic in Cali, Colombia's third most populous city.

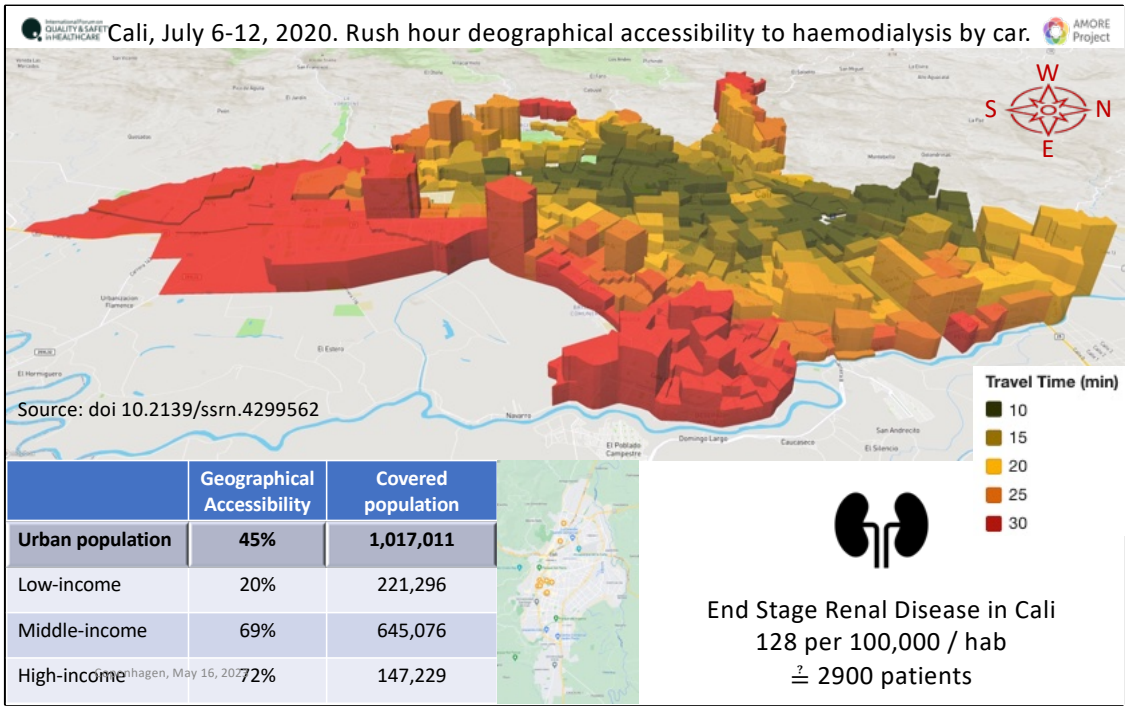
The choropleth maps to the right show population density with darker areas matching also the poorest areas.

Almost half of the population lives in low-income housing and just over 40% in middle income housing. The nine percent living in high-income housing include  domestic workers earning low-wages.




In our test cases, we assessed travel by car to tertiary care emergency services, radiation therapy, and haemodialysis on two weeks of 2020: from 6-12 of July and 23 to 29 of November.

July had traffic as usual while November had reduced traffic congestion due to stay-at-home orders and other restrictions in place.



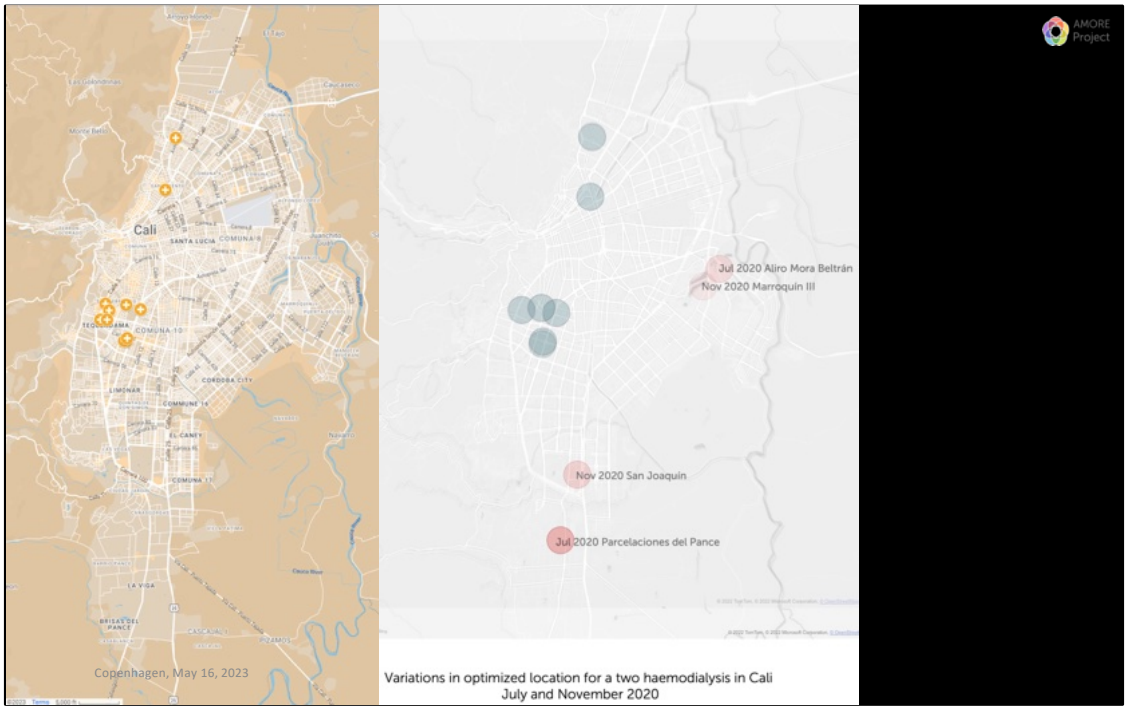

| | Geographical Accessibility | Covered population |
|---|---|---|
| **Urban population** | **45%** | **1,017,011** |
| Low-income | 20% | 221,296 |
| Middle-income | 69% | 645,076 |
| High-income | 72% | 147,229 |

End Stage Renal Disease in Cali
128 per 100,000 / hab
≟ 2900 patients

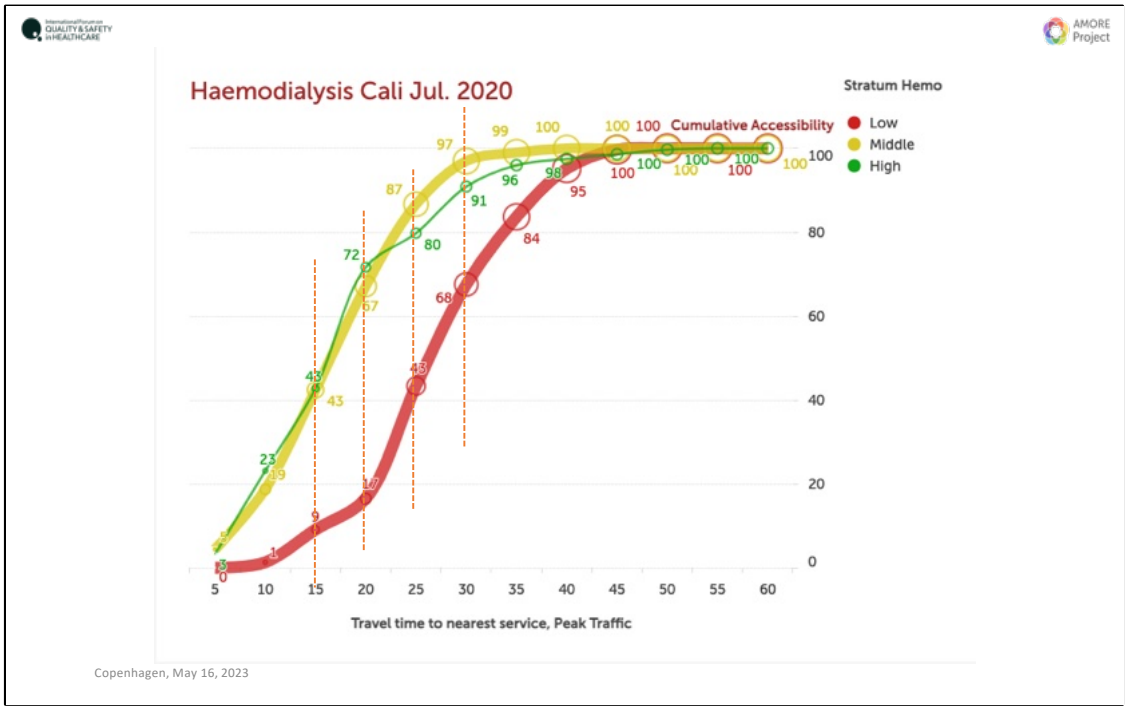
Our measurements showed that services are located far from outlying areas that are home to most of the population, particularly the poorest residents, resulting in higher costs for accessing those services.

In this choropleth map of Cali, a column's hight represents population density. It shows that most of the population is in the outlying areas and reaching services require long journeys at peak traffic and for most of the day hours.

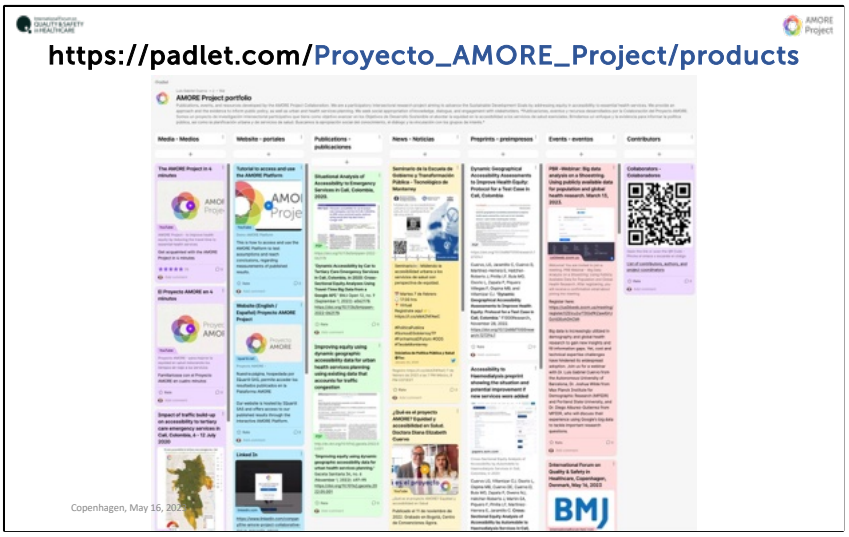
Colours represent travel times. At rush hour, less than half of the population can reach a haemodialysis service within 20 minutes of traveling by car. Although people living in low-income housing represent almost half of the population, just one in five will make it to a haemodialysis service within 20 minutes. End stage renal failure requiring haemodialysis is more prevalent in low-income populations.




The team identified optimal locations for new services and estimated the extent to which accessibility would improve, along with establishing the population they might cover, offering a glimpse of demand for those new services.



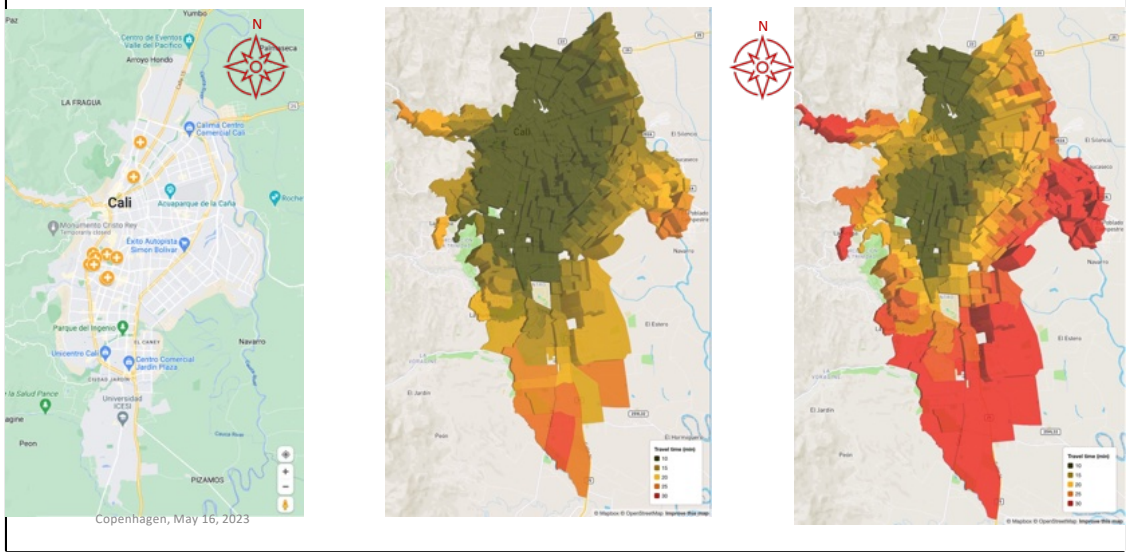

They also quantified the effect of traffic congestion on accessibility for sociodemographic groups and confirmed that traffic congestion hits harder people living in low-income housing and those in outlying areas.




The data and predictions generated by the project are suitable for supporting prioritization actions, ongoing monitoring of accessibility, and data-driven urban and health services planning.

The QR Code provided leads to a Padlet® with publications and international, regional, and local events where the project has been debated and validated with different society sectors and stakeholders.

## We integrated population, services, and travel times




To test our approach, we assessed accessibility to urgent care, and accessibility to ambulatory care that demands frequent visits, and here you can see accessibility to haemodialysis services during free flow and peak traffic congestion.

I mentioned earlier of the importance of assessing where users are located, their characteristics, and the journey the must undertake to reach or be reached by health services.

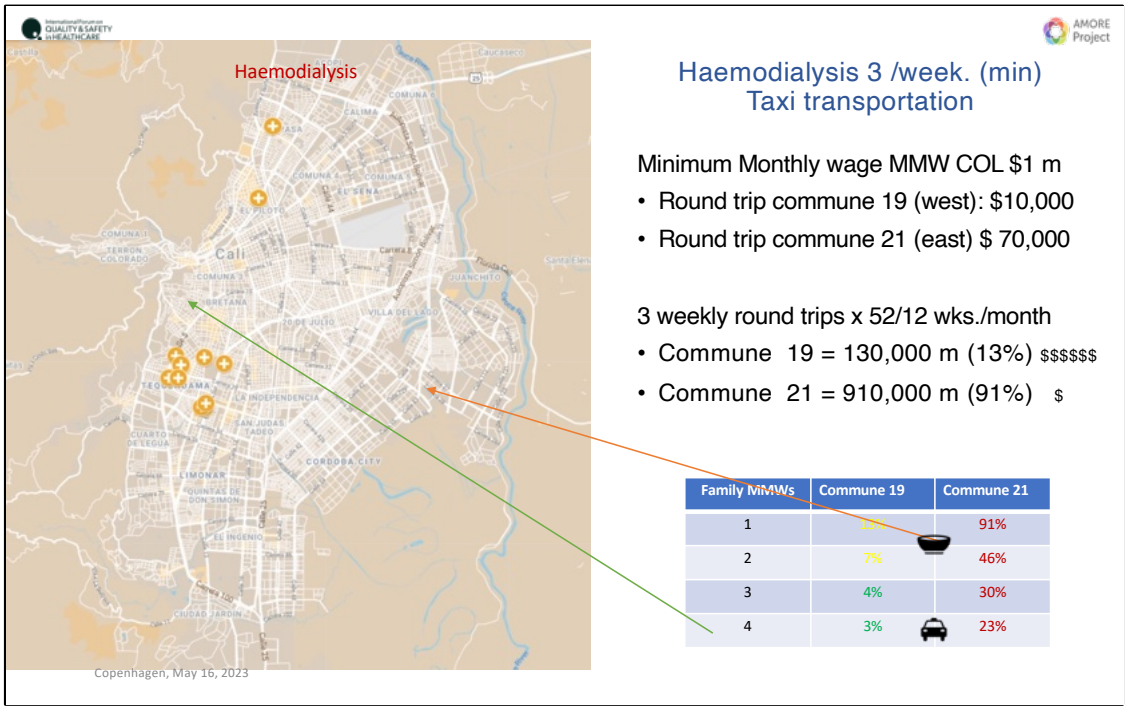

By looking at the services only, we might be missing a key part. Cali is a beautiful city with well-maintained boulevards and picturesque avenues. It has absorbed a large population of migrants in the past quinquennium.


Understanding the physical and logistical journey people face in accessing health services is helpful.

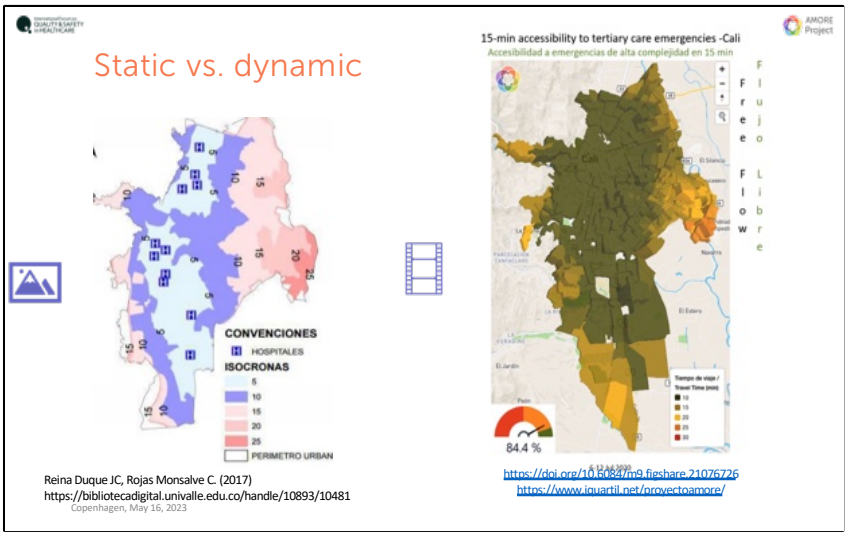
While Cali has some beautiful natural features, such as mountains and parks, for people living in the outlying areas, especially for the poorest people, conditions can be harsh.

Transportation and roads can be in poor condition and some areas are so steep that cable cars are used to reach them.


Cali is now one of the most congested cities in South America.




To illustrate the out-of-pocket cost of attending haemodialysis, which in Colombia typically involves traveling by private or for-hire automobile with a next-of-kin, let's take a closer look.



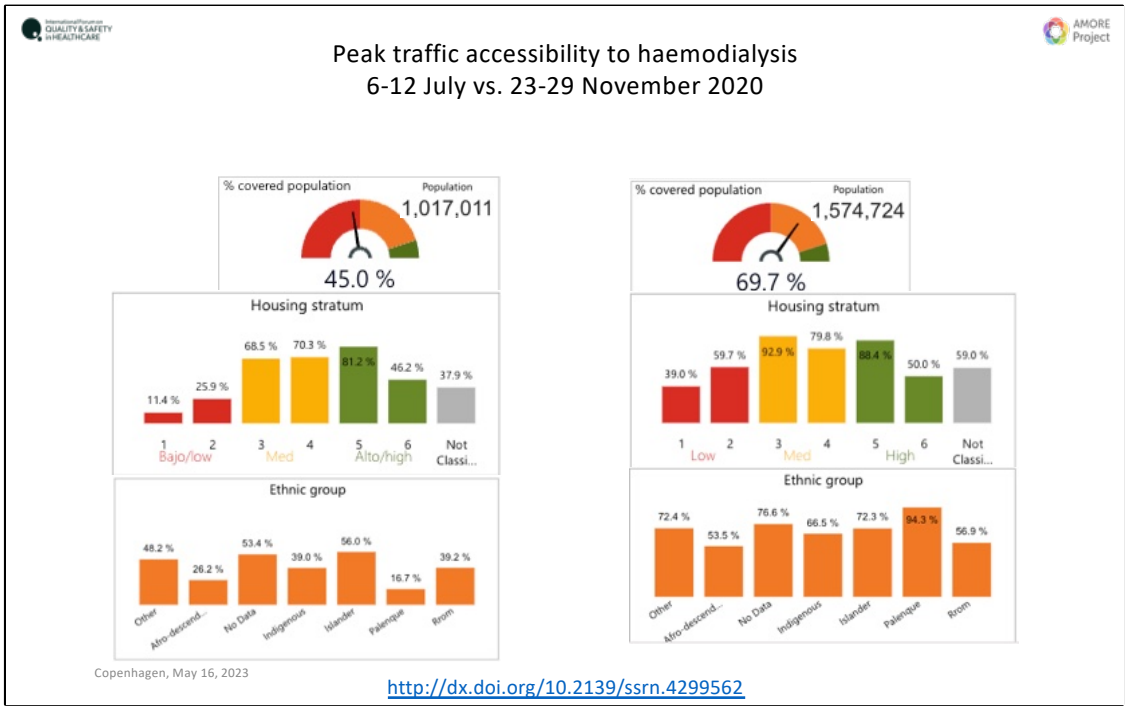

Our work shows we can get accessible new data that accounts for traffic congestion, with an equity perspective.

On your left you have a static assessment of accessibility to tertiary care emergency services, done in 2017.

On your right, a dynamic assessment from our project shows that the static assessment is valid for free-flow or minimal traffic congestion, like what you have before dawn.

The daytime and evening reality is not as rosy. Traffic level 8 is the most common at daytime and traffic level 9 is peak traffic. Accessibility dropped from 84% to under 37%

{The GIF on the right shows how accessibility drops as traffic builds up}



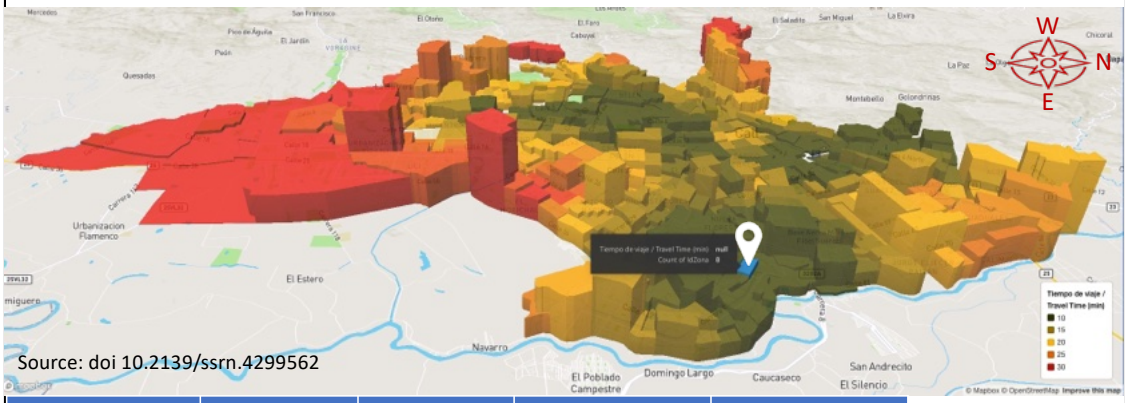

We propose adopting new metrics for accessibility to health services, such as percentage of the population within a travel time threshold at rush hour,

Accessibility data can be updated as traffic conditions, infrastructure, and populations change, allowing for accurate monitoring of accessibility to health services.

When traffic restrictions and stay at home orders were in place in November, accessibility improved ameliorating inequities.

These intuitive graphs and maps show that more than half a million additional people were covered and differences by housing stratum and ethnicity were reduced.

Predicted haemodialysis accessibility adding services in Alirio Mora Beltrán (AMB)




Source: doi 10.2139/ssrn.4299562

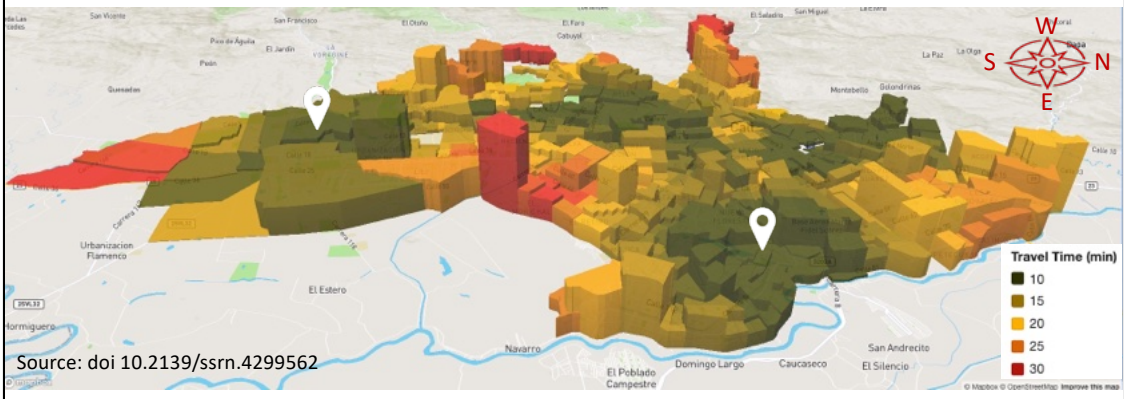
| Accessibility per socioeco. stratum | Geographical Accessibility | Plus services in Alirio Mora | Covered population | Additional covered pop. |
|---|---|---|---|---|
| **Urban population** | **45%** | **70%** | **1,017,011** | **568,426** |
| Low-income | 20% | **62%** | 221,296 | **471,239** |
| Middle-income | 69% | **79%** | 645,076 | **93,891** |
| High-income | 72% | **72%** | 147,229 | **485** |



Using real-time accessibility measurements that consider the impact of traffic congestion, it is also possible to model and predict the optimal location of new health services and evaluate their potential impact on accessibility.

For example, data from July shows that if haemodialysis services were added in the eastern neighbourhood of Alirio Mora Beltrán, accessibility would raise to 70% with 568 thousand more people being covered. Thus, these services will need to be large, to accommodate at least the anticipated 740 patients in the catchment area.

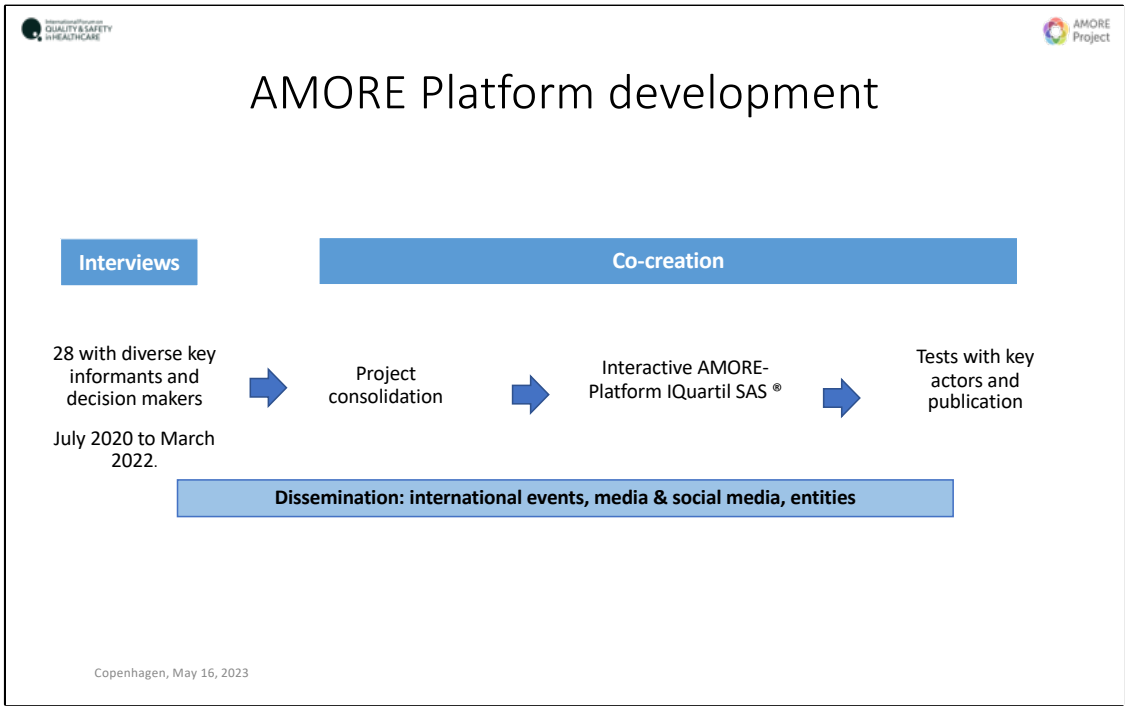
Predicted haemodialysis accessibility adding services in AMB + Parcelaciones Pance




| | Geographical Accessibility | Plus services in AMB | Plus services in AMB & PP | Covered AMB+PP | Additional Pop. Covered AMB | Parcel. Pance added pop. |
|---|---|---|---|---|---|---|
| **Urban population** | **45%** | **70%** | **75%** | **1,017,011** | **568,426** | **131,018** |
| Low-income | 20% | **62%** | 64% | 221,296 | 471,239 | **42,662** |
| Middle-income | 69% | **79%** | 84% | 645,076 | 93,891 | **51,349** |
| High-income | 72% | **72%** | 95% | 147,229 | 485 | **36,563** |



The prediction for adding services in two city sectors, can also be obtained.

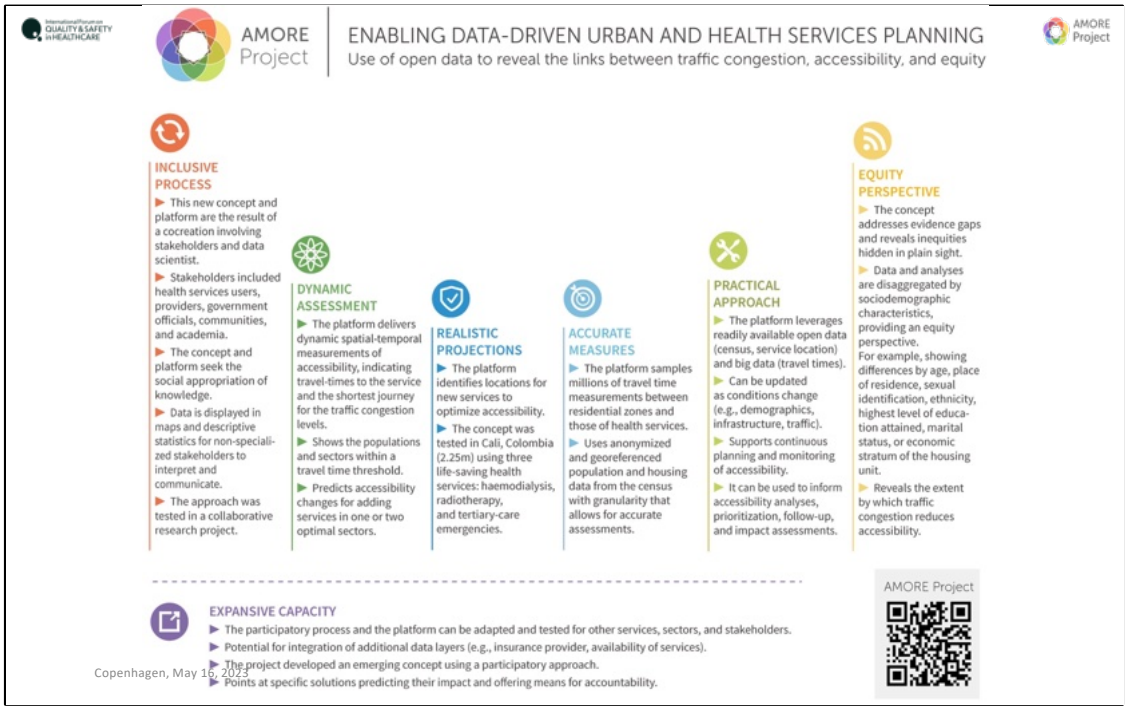



A key issue is that the project and the platform were developed with inputs from stakeholders and data scientists from conceptualization to implementation.

We held 28 consultations following a design-thinking approach in which ideas were explored with participants, and their insights and feedback were used to generate a new proposal, and this followed an iterative cycle of testing, until satisfactory solutions were found.

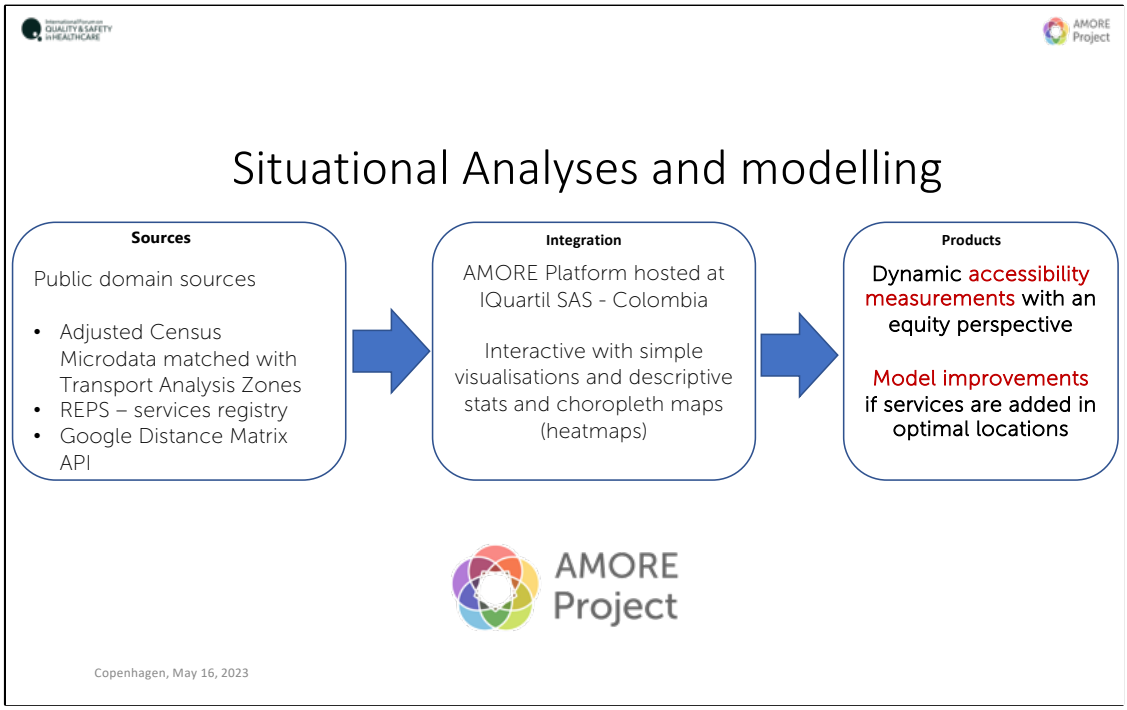

That led to the web-based interactive AMORE platform that delivers data that can be understood and communicated by non-specialists, setting it apart from highly sophisticated studies that only specialists understand.

We had social appropriation of knowledge as an objective, and it is being studied and reported as the capstone study of an MPH student from Johns Hopkins Bloomberg School of Public Health.



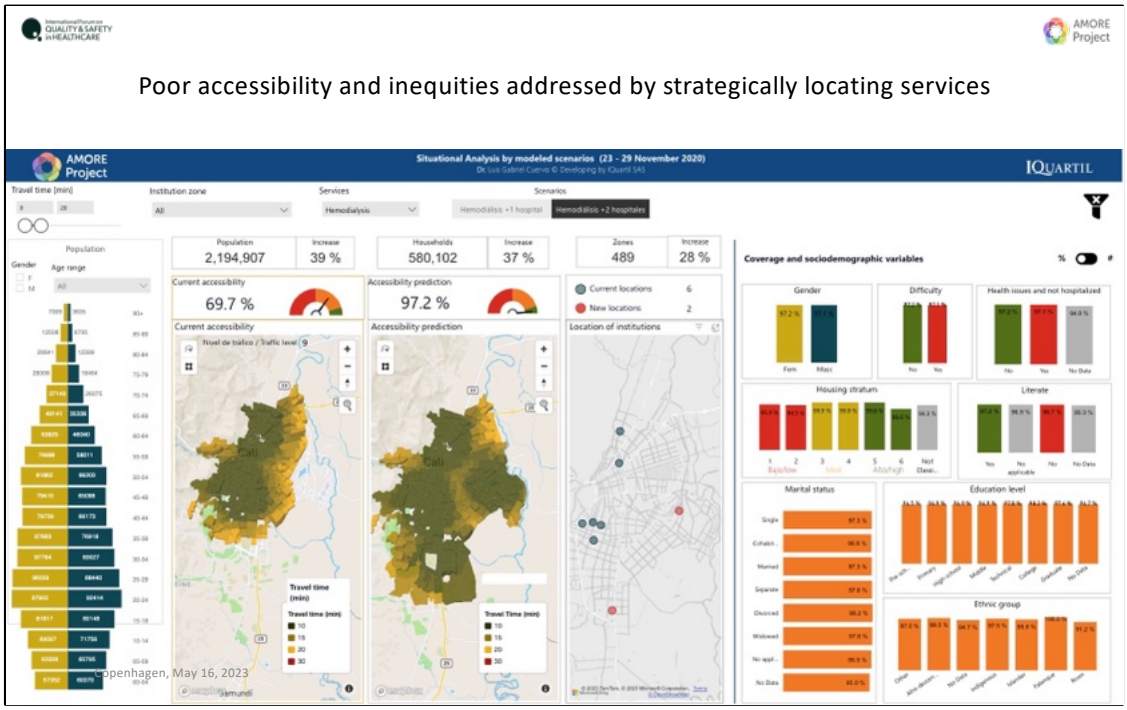

We present you with an inclusive process that provides accurate dynamic assessments and realistic projections. It is a practical approach that delivers an equity perspective, and it can be expanded to other services and sectors.

It opens opportunities to integrate these data with administrative processes or logistics data, such as insurers, available service openings, or a fair allocation of subsidies. It enables identifying service gaps, prioritizing solutions, and monitoring.




Open data and big data are now available for many cities with traffic congestion, in low-, middle-, and high-income settings.

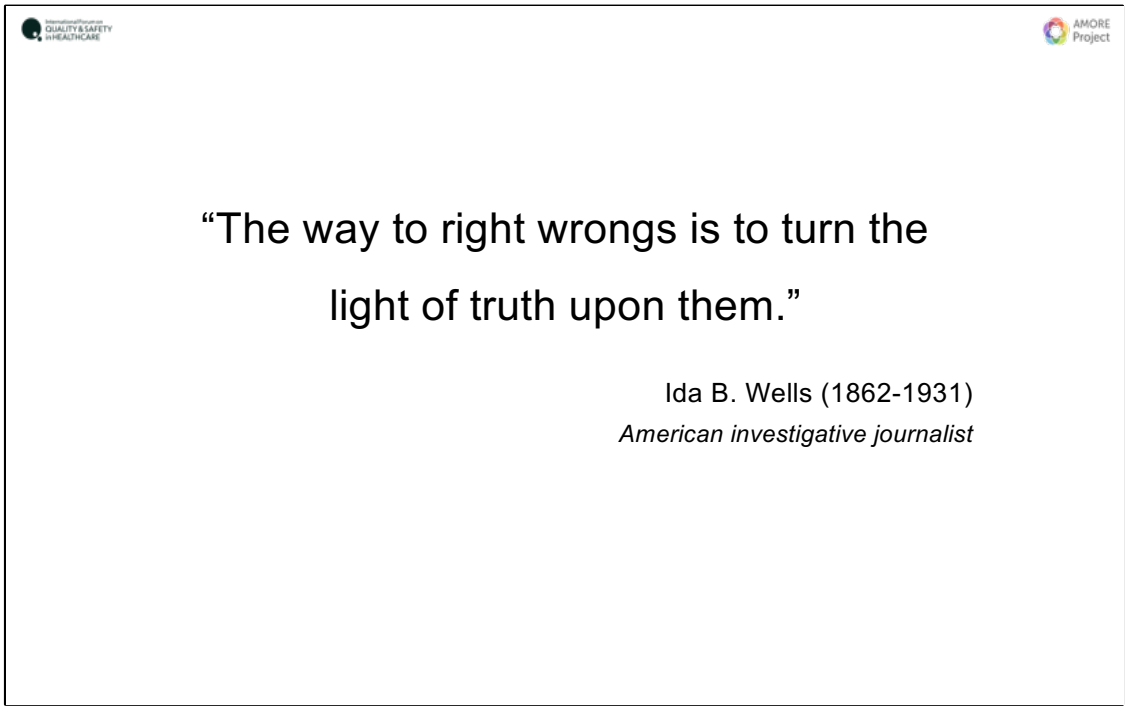
For example, what we have shown you today integrated georeferenced microdata from Colombia's census and official health services registry, traffic analysis zones and travel time big data.



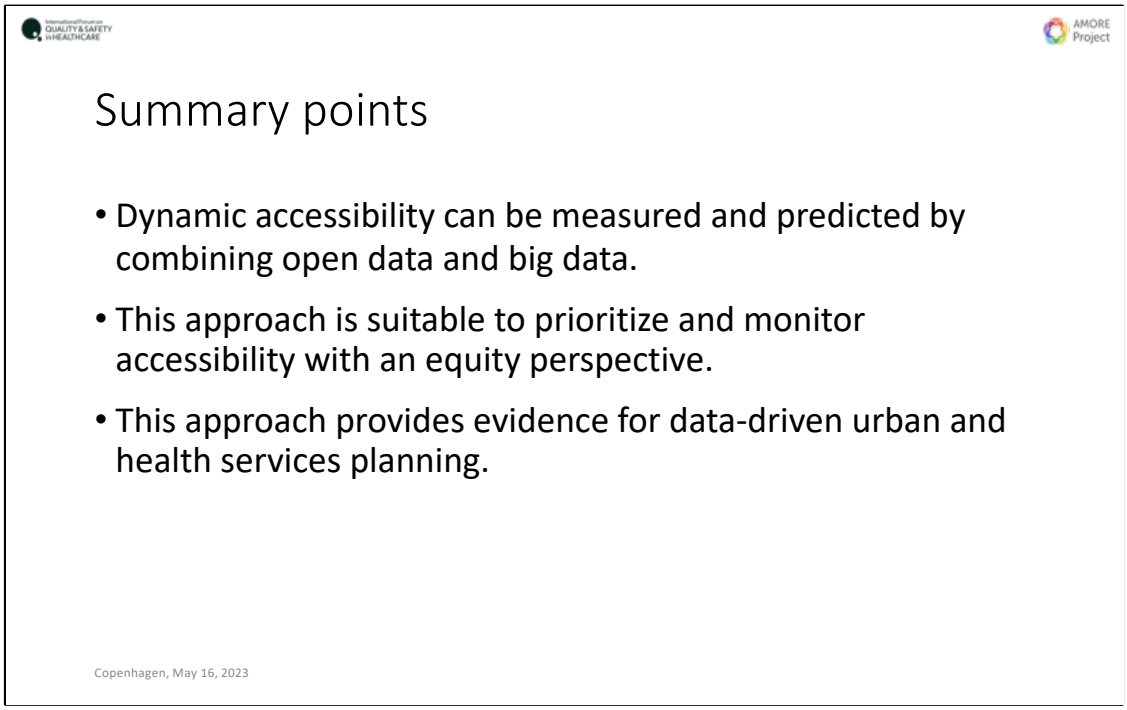

The project revealed a problem that was hiding in plain sight. It provides a practical approach to guide health services planning, with an equity perspective.

It links health services to populations and journeys.

In the same way that the platform integrates data, the process integrated disciplines and stakeholders.




I will now wrap up with this quote from Ida B. Wells that stresses the importance of measuring accessibility with an equity perspective. Dynamic spatial-temporal accessibility measurements like the ones presented here reveal accessibility with an equity perspective.




We have demonstrated that data can be obtained using readily available sources, to prioritize actions that improve accessibility to health services, to monitor accessibility with an equity perspective, and to enhance data-driven urban and health services planning.

We tested this in an unfunded project. Colombian data scientists developed the prototypes of our web-based AMORE Platform within two months.

Effective Universal Healthcare Coverage implementation requires having effective access.


Our Project is summarized in a 4-minute animation available in English [https://youtu.be/_cDMAULJMTc ]

I'd like to invite your insights, questions and comments.