MTI Research Snaps presents:

TODs and Park-and-Rides: Which is Appropriate Where?

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John Niles,
Global Telematics and Research Associate, Mineta Transportation Institute

J. M. Pogodzinski, PhD
San José State University and Research Associate, Mineta Transportation Institute

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MINETA TRANSPORTATION INSTITUTE

PnR –TOD Combination in a Seattle suburb: Redmond, WA

- 322 Housing units
- 377 PnR spaces
- 415 Parking spaces for residents and guests (below the apartments)
- Skateboard park
- Bus transit stops
- Bus staging area
- Livable, walkable urbanism all around

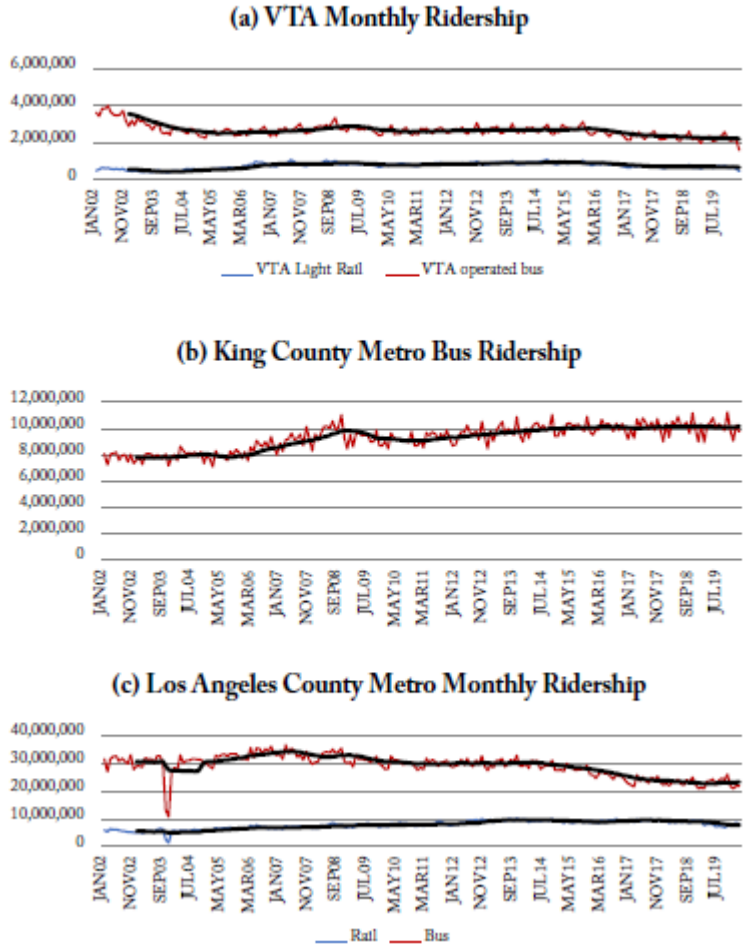
At three transit agencies doing both PnR and TOD, the MTI research statistically compared parking and housing density within ¼ mile of transit stops…

Agency	Population	Annual Transit Boardings	Annual Boardings per Capita	Ratio of PnR Use to Transit Use
Santa Clara VTA: San José	1.9 million	39 million	20	4%
King County Metro: Seattle	2.2 million	128 million	58	5%
LA Metro: Los Angeles	10.2 million	407 million	40	1%

Note: Pre Pandemic data shown throughout this presentation

Transit Ridership Not Growing with Population

Figure 26. Monthly Transit Ridership since 2002 in the Three Studied Agencies



Monthly Transit Ridership in US, 2002–2019

Source: US National Transit Database

Pre Pandemic data shown throughout this presentation

Regional Mode Share Data:
Car commuting exceeds transit commuting for low income households by 7X to 16X

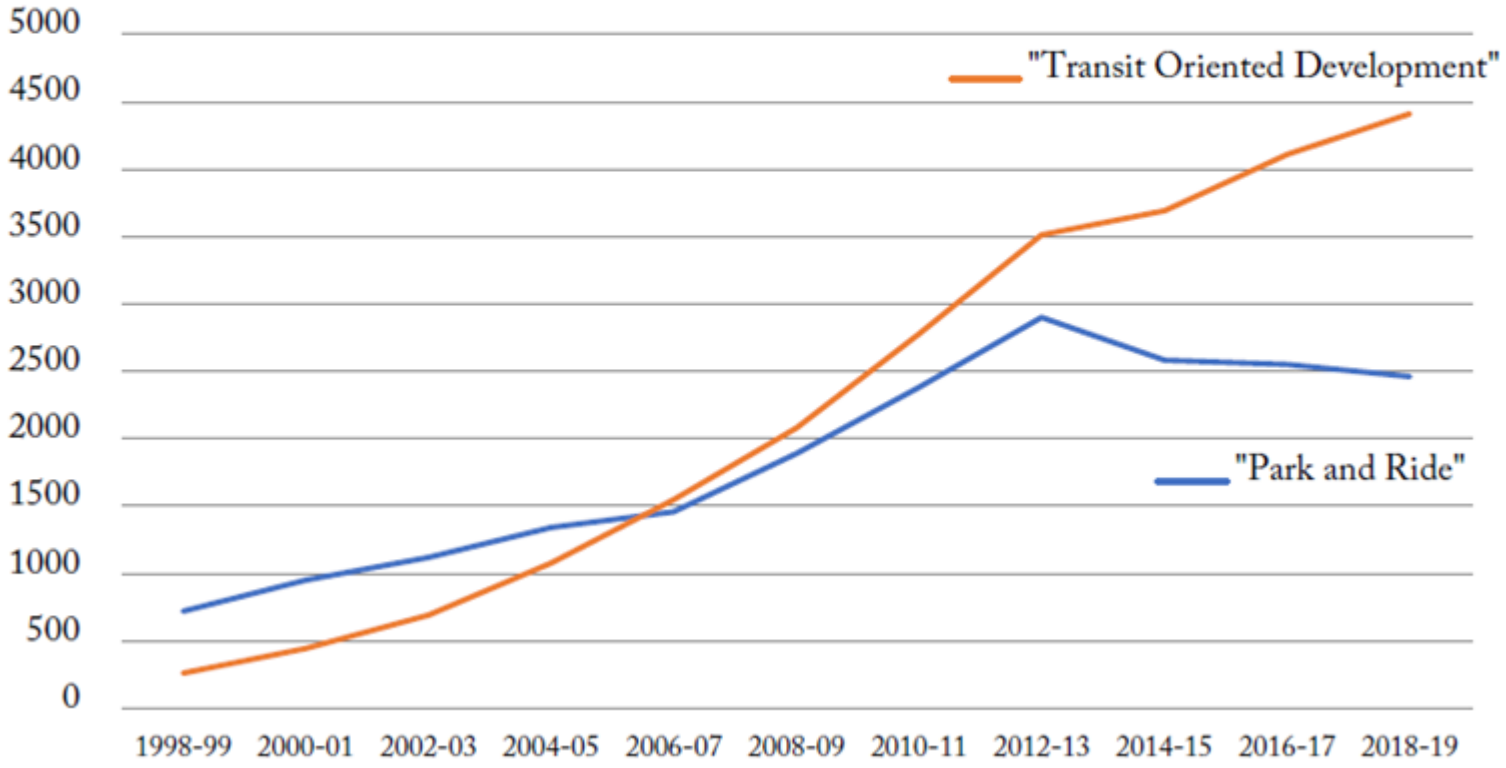
	San José	San José	San José		LA	LA	LA		Seattle	Seattle	Seattle
Household income	$0 to $25K	$25K-$65K	$65K +		$0 to $25K	$25K-$65K	$65K +		$0 to $25K	$25K-$65K	$65K +
Solo driving	67%	77%	78%		66%	79%	81%		63%	71%	68%
Carpool-vanpool	13%	11%	9%		12%	9%	7%		11%	10%	9%
Transit	**5%**	**3%**	**4%**		**9%**	**4%**	**2%**		**10%**	**9%**	**10%**
Other	15%	9%	9%		13%	8%	10%		16%	10%	13%

Source: American Community Survey 2018 Five-Year Estimates

Previous research made us positive about PnR potential

- Previous Niles-Pogodzinski research found loading buses at PnRs in suburban King County improved bus boardings per vehicle hour sufficiently to save 15% in vehicle operating costs.
- In a 2012 TRB research summary, daily transit riders generated per 1000 square feet for PnR estimated to be 5 to 7.
- By comparison, in the same study, every 1000 square feet of residential land use estimated to generate from 1 to 1.5 boardings.
- PnR is usually easier, faster to build, and takes less space than a TOD of one bedroom apartments per rider generated.
- Numerous older studies have found PnR to have a positive benefit to cost ratio.

Google Scholar Count of References to "Park and Ride" and "Transit Oriented Development"



From Niles-Pogodzinski, "TOD and Park-and-Ride: Which is Appropriate Where?"

New issues driving our research:

- Should affordable housing in TODs be a priority strategy for attracting mobility disadvantaged customers to become transit customers?
- Since many low-income workers drive cars to work, should they be supported with PnR?
- For financial sustainability and political support, how should agency strategic emphasis be divided between:
  - Real estate revenue gained through TOD development of affordable housing?
  - PnR that generates efficient boardings by suburban customers who have found affordable, more spacious housing away from the central city?

Three Case Studies: VTA, King County Metro, LA Metro

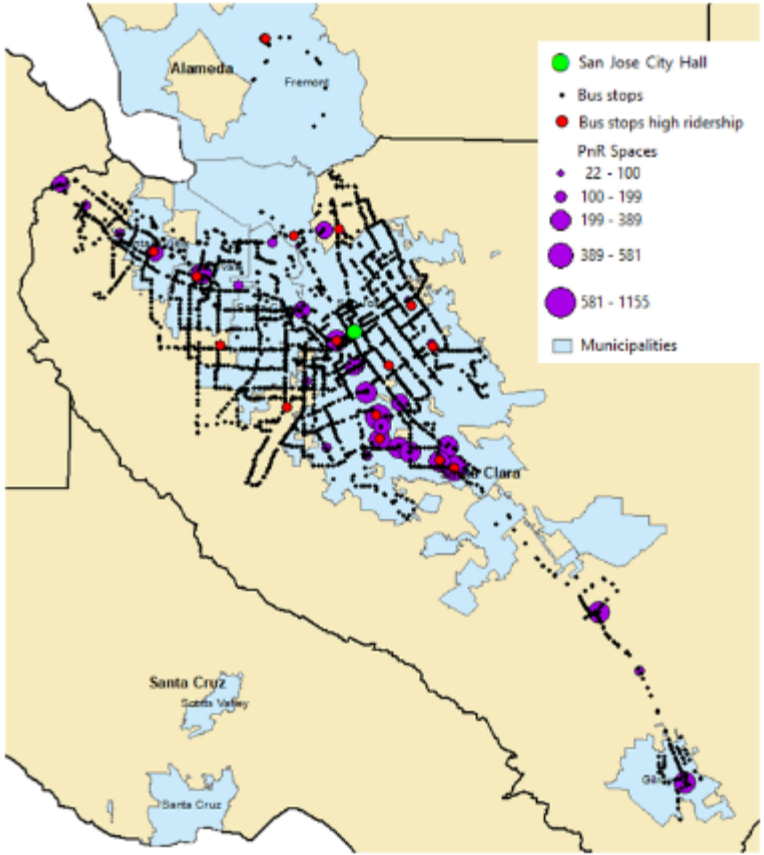
- Cross-sectional analysis – morning boardings at each stop in October 2017

- Boardings are a function of economic, demographic, business, and transit-specific factors in a catchment area of a stop
  - Economic: income
  - Demographic: housing
  - Business: employment
  - Transit specific: bus or rail and park-and-ride proximity and size

Three Case Studies: VTA, King County Metro, LA Metro

- Boardings data of different levels of completeness for the three systems
- Transit-specific variables also of different levels of completeness (e.g., park-and-ride information, light rail information)

VTA Transit Stops and P&R Facilities



Tamien Light Rail P&R – July 2020 (during pandemic)
Photo by Katherine E. Woo

Econometric Models: Three Specifications

- Three alternative econometric specifications demonstrate the robustness of the main conclusions about park-and-ride and housing density.
- Specification 1 employs the size of the nearest PnR to the stop.
- Specification 2 employs size categories of PnR within a quarter mile.
- Specification 3 takes into account both the size of the nearest PnR and the distance to the stop.
- All three specifications include:
  - Absolute values of household income, job sites, and housing units within a quarter mile of transit stops.
  - Influence of the distance of the PnR facility from city hall to assess a suburban effect
  - Effect of the presence of a rail station on ridership.

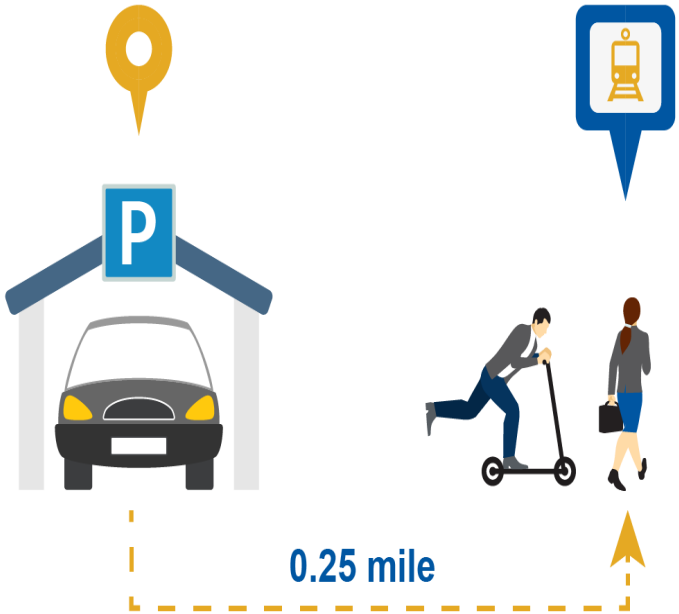
Count Data: Poisson and Negative Binomial Regression

- Count Data
  - Poisson regression
  - Overdispersion
  - Negative binomial regression
- Interpreting coefficient estimates
  - Semi-elasticity interpretation
  - Incidence Rate Ratios

An Example of Econometric Results: Specification 2 Results for VTA

SPECIFICATION 2					
Negative binomial regression	Number of obs	=	3,034		
	LR chi2(9)	=	1726.8		
Dispersion = mean	Prob > chi2	=	0		
Log likelihood = -14931.222	Pseudo R2	=	0.0547		
AM_Boardings_Int	Coef.	IRR	Std. Err.	z	P>z
1.MedHHInc_Lo	0.4016871	1.494344	0.0577647	6.95	0
1.MedHHInc_Hi	-0.3414653	0.7107282	0.0580099	-5.89	0
HU_stop	0.0011622	1.001163	0.0000954	12.18	0
EMP_stop	0.0001237	1.000124	0.0000236	5.23	0
1.LRDummy	2.398476	11.00639	0.1205353	19.9	0
1.PnR_small	1.208337	3.347911	0.1789807	6.75	0
1.PnR_medium	1.314632	3.723381	0.1652427	7.96	0
1.PnR_large	1.839639	6.294268	0.1797722	10.23	0
Dist_City_Hall_QMiDummy	1.79E-06	1.000002	7.47E-06	0.24	0.811
_cons	3.028254	20.66113	0.064011	47.31	0
/lnalpha	0.4563918		0.0224829		
alpha	1.578369		0.0354862		

PnR Near Transit Pushes Ridership Up



Santa Clara County, CA

184%

A large PnR within a quarter-mile of a stop results in a 184% increase in expected boardings at the stop for VTA.

King County, WA

419%

A large PnR within a quarter-mile of a stop results in a 419% increase in expected boardings at the stop for KC Metro.

Los Angeles County, CA

101%

A large PnR within a quarter-mile of a stop results in a 101% increase in expected boardings at the stop for LA Metro.

Adding More Parking Near Transit Pushes Up Ridership

Santa Clara County, CA

26%

Adding 100 spaces to existing PnR facilities results in 26% more morning boardings at a nearby stop in VTA territory.

King County, WA

44%

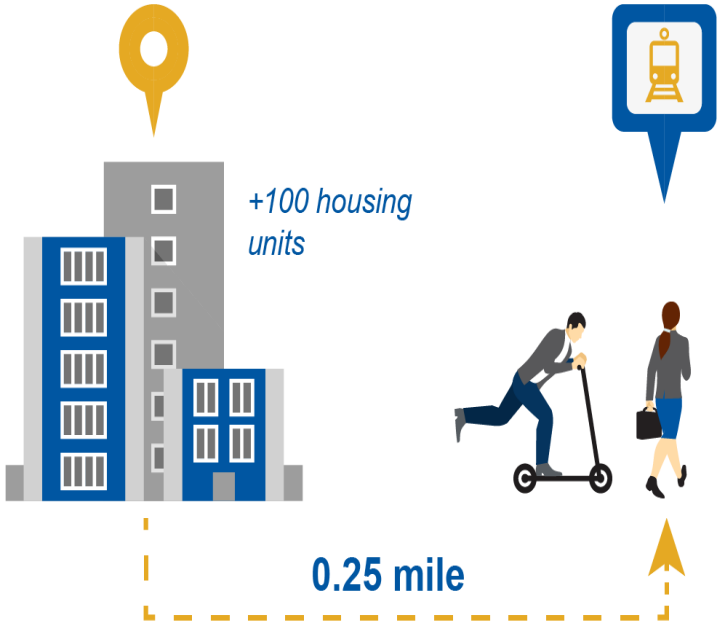
Adding 100 spaces to existing PnR facilities results in 44% more morning boardings at a nearby stop in KC Metro territory.

Los Angeles County, CA

9%

Adding 100 spaces to existing PnR facilities results in 9% more morning boardings at a nearby stop in LA Metro territory.

Adding Housing Units Near Transit Pushes Up Ridership



Santa Clara County, CA

11%

Adding 100 housing units in VTA territory results in 11% more boardings at a nearby stop.

King County, WA

11%

Adding 100 housing units in KC Metro territory results in 11% more boardings at a nearby stop.

Los Angeles County, CA

5%

Adding 100 housing units in LA Metro territory results in 5% more boardings at a nearby stop.

Comparing the three transit agencies

(Pre-pandemic)

	San José (VTA)	LA (Metro)	Seattle (KC Metro)
Parking to Housing Impact Ratio	26% to 11%	9% to 5%	44% to 11%
Transit ridership per capita	20	40	58
PnR space per 1,000 population	6	2.3	12
Usage level of PnR capacity	41%	73%	76%
Ratio of PnR usage to transit ridership	4%	1%	5%
Ratio of car commuters to transit trips	17	9	6

Objectives for Transit Agencies Deciding How to Develop its Station Area Land

Transit Villages (TOD)	Transit Hubs (PnR)
Generate more transit ridership	Generate much more transit ridership
Build transit-using communities	Reduce parking at transit destinations
Limit VMT; promote active modes	Reduce VMT going into center cities
Locations for affordable housing	Transit access for affordable suburbs
Revenue from real estate leases	Revenue from parking fees/franchises
Establish walkable urbanism	Help protect walkable urbanism

Thank you for your attention and interest – Please let's have a discussion!

Thank you

Follow up contacts

john.niles@sjsu.edu
j.m.pogodzinski@sjsu.edu

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Thank you for joining us for:

TODs and Park-and-Rides:
Which is Appropriate Where?

View the full report at:

https://transweb.sjsu.edu/research/1820-TOD-Park-Ride

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Tune in for our next MTI Research Snap "Digital Butts in Seats: Creating Interesting, Engaging Virtual Events" on March 18, 2021 at 10a.m. (PST)! Visit https://transweb.sjsu.edu/events for details and registration.

Have a suggestion for a webinar topic you'd like to see featured? Email irma.garcia@sjsu.edu

EXTRA SLIDES After This Point

May be used in Q&A and discussion.

Further Multi-Modal Research Needed

- Routinely generating better usage data on existing PnR
- Developing coordinated PnR pricing fee levels on that cover the full cost of parking and associated transit at the set subsidy level.

San José and LA TOD Examples

VTA: "First generation TOD project"

194 rental units designed for low-income families on a portion of an underutilized PnR lot at Ohlone Chynoweth light rail station Built in partnership with Eden Housing, an established builder and owner of service-enhanced affordable housing for lower income families, seniors, and persons with disabilities. Includes 4,400 sf of commercial space and on-site child care.

VTA in 2015 Development Review: "Multifamily Residential Near Transit"

"Colonnade" with 167 luxury apartments master leased to Stanford University with 12,000 sf retail inside, and Sherwood Gateway 38 townhomes now priced at around $2 million. Near stops for the VTA Rapid 522 on El Camino Real. Other retail nearby. On site parking with 2 spaces for each unit plus guest parking. Completed 2015.

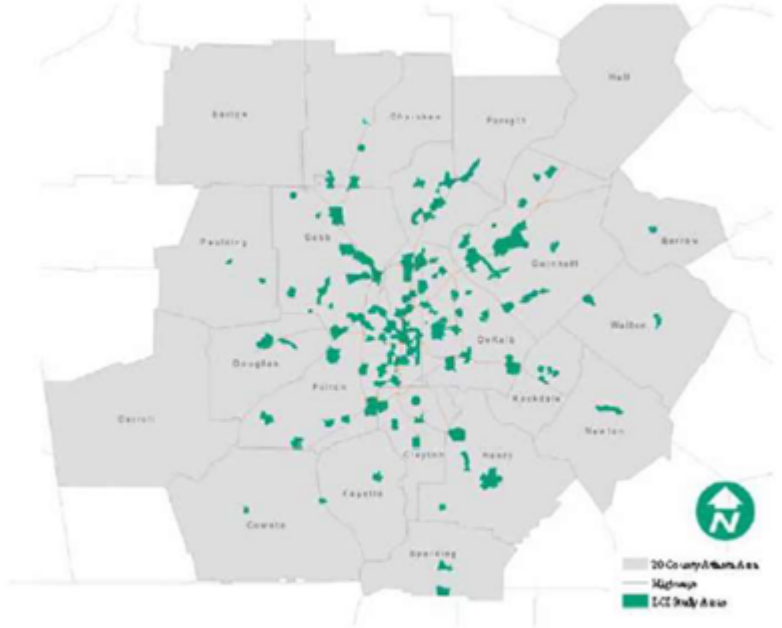
Del Mar Station

- **Line:** Metro Gold Line
- **Site:** 3.6 acres
- **Development:**
  - 347 apartments (21 affordable)
  - 11,000 sq. ft. retail space
  - 600 dedicated transit parking spaces

Westlake/MacArthur Park (Phase A)

- **Line:** Metro Red and Purple Lines
- **Site:** 1.6 acres
- **Development:**
  - 90 affordable apartments
  - 15,540 sq. ft. retail space
  - 100 dedicated transit parking spaces for "commute period" only

Atlanta Metro Region: Widely Spread Livable Centers and Many PnR Hubs for Bus or Train to Downtown



Map of the Atlanta, Georgia metropolitan area showing the location Livable Centers Initiative study areas, which are spread widely across the regional geography. *(Atlanta Regional Commission, 2018).*

Excerpt from the 1820 report, page 92

Table 18. Illustration of Weak Linkages Between Action and Improved Performance

Potential public policy–motivated changes bearing on performance metrics	*Influences not controlled by governments stand in the way of changes bringing about improved performance*	*Improvements sought in these performance metrics that are not easily achieved via public policy*
• Geographic coverage of transit service • Frequency of transit service • Span of transit service • Reduce or increase PnR at boarding points within the service area • Increase or reduce PnR facilities on the service area periphery serving outlying regions • Setting fees for PnR parking • More TOD at boarding points • Supply and price of parking in employment centers • Land use zoning	• Demographic changes • Economic changes • Entrepreneurial innovation • New technology applications • Political dynamics • Unexpected effects of planned changes • Unforeseen events • Misunderstood influences revealed	• Transit mode share in corridors or zones or agency-wide • Economic viability of the transit agency • Travel time and reliability in congested commuter corridors, or generally • VMT in the region or in transit influence zones • Air quality in the region • GHG emissions in the region • Housing affordability • Services to mobility disadvantaged • Private vehicle ownership and use

Source: Created by Niles and Pogodzinski

As one illustration of weak linkages, the three case study agencies have been focusing first on PnR, and then on TOD, for over two decades as of this writing. Yet in Los Angeles and San José, transit ridership has not seen growth, and even in Seattle bus ridership growth has been modest since 2014, as shown in the plots of monthly ridership since 2002 in Figure 26, and before the COVID-19 pandemic.