

**MEDICAID'S NON-EMERGENCY MEDICAL  
TRANSPORTATION:  
The Critical Role of Mobility Services in Accessing Behavioral and  
Preventive Health Care**

**FINAL PROJECT REPORT**

by

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## SI\* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
<b>AREA</b>				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>
ft <sup>2</sup>	square feet	0.093	square meters	m <sup>2</sup>
yd <sup>2</sup>	square yard	0.836	square meters	m <sup>2</sup>
ac	acres	0.405	hectares	ha
mi <sup>2</sup>	square miles	2.59	square kilometers	km <sup>2</sup>
<b>VOLUME</b>				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft <sup>3</sup>	cubic feet	0.028	cubic meters	m <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.765	cubic meters	m <sup>3</sup>
NOTE: volumes greater than 1000 L shall be shown in m <sup>3</sup>				
<b>MASS</b>				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
<b>TEMPERATURE (exact degrees)</b>				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
<b>ILLUMINATION</b>				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m <sup>2</sup>	cd/m <sup>2</sup>
<b>FORCE and PRESSURE or STRESS</b>				
lbf	poundforce	4.45	newtons	N
lbf/in <sup>2</sup>	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
<b>LENGTH</b>				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
<b>AREA</b>				
mm <sup>2</sup>	square millimeters	0.0016	square inches	in <sup>2</sup>
m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
m <sup>2</sup>	square meters	1.195	square yards	yd <sup>2</sup>
ha	hectares	2.47	acres	ac
km <sup>2</sup>	square kilometers	0.386	square miles	mi <sup>2</sup>
<b>VOLUME</b>				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m <sup>3</sup>	cubic meters	35.314	cubic feet	ft <sup>3</sup>
m <sup>3</sup>	cubic meters	1.307	cubic yards	yd <sup>3</sup>
<b>MASS</b>				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
<b>TEMPERATURE (exact degrees)</b>				
°C	Celsius	1.8C+32	Fahrenheit	°F
<b>ILLUMINATION</b>				
lx	lux	0.0929	foot-candles	fc
cd/m <sup>2</sup>	candela/m <sup>2</sup>	0.2919	foot-Lamberts	fl
<b>FORCE and PRESSURE or STRESS</b>				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in <sup>2</sup>
<small>*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)</small>				

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## **LIST OF ABBREVIATIONS**

ACA: Affordable Care Act

CMS: Centers for Medicare and Medicaid Services

FPL: Federal poverty level

HCPCS: Healthcare Common Procedural Coding System

ICD: International Statistical Classification of Diseases and Related Health Problems

NEMT: Non-Emergency Medical Transportation

MAX: Medicaid Analytic eXtract

PacTrans: Pacific Northwest Transportation Consortium

RUCA: Rural-urban commuting area

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## EXECUTIVE SUMMARY

Medicaid's non-emergency medical transportation (NEMT) program facilitates free or low-cost transportation to and from medical appointments for enrollees who experience transportation barriers. The State of Washington incorporated performance incentives and overhauled the data collection system in 2011 for its NEMT program. This research examined cost savings from the 2011 system update and changes to NEMT utilization. Administrative claims data from 2010 through 2013, before the Affordable Care Act's Medicaid expansion in the Washington state, were analyzed. Differences in costs and utilization between metropolitan and non-metropolitan beneficiaries and between children and adult beneficiaries were calculated.

The study found that inclusion of performance incentives and the data collection system update were associated with a 1.3-percentage point increase in NEMT users from 2010 to 2013, with a greater increase in demand among children under fourteen years old and among metropolitan beneficiaries. At the same time, there were substantial cost savings in both metropolitan and non-metropolitan areas, with no significant reduction in the number of rides. The average cost of NEMT rides per day decreased from \$88 to \$21 in metropolitan areas and from \$45 to \$29 in non-metropolitan areas in Washington. Among children, NEMT use for access to preventive care, such as routine health exams and influenza immunizations, increased after 2011. Among adults, NEMT was frequently used to access behavioral health services and care for chronic conditions. In non-metropolitan areas, use of NEMT for prenatal care increased after 2011.



## CHAPTER 1. INTRODUCTION

Medicaid's non-emergency medical transportation (NEMT) program facilitates free or low-cost transportation to and from medical appointments for enrollees who otherwise lack access to reliable and affordable transportation. NEMT has been part of the Medicaid program since 1966 and is a critical service to those who encounter transportation barriers. States are required to offer children from birth until age twenty-one necessary assistance with transportation to and from providers (Musumeci and Rudowitz, 2016). However, states have wide latitude in deciding eligibility among adult Medicaid enrollees. Additionally, states choose the delivery method of Medicaid's NEMT services. Washington state operates a regional broker model. Launched in 1989, it is one of the oldest regional broker systems in the country. It includes six community-based brokers across thirteen regions. According to a 2014 National NEMT survey, the estimated annual NEMT expense in 2013 in Washington was \$70.4 million, with over 2.8 million NEMT trips in the state.

This study examined NEMT utilization in Washington from 2011 through 2013. Following a federal audit, in 2011 Washington incorporated performance incentives and improved the data collection system for its NEMT program to improve overall program efficiency and customer experience. In 2014, Washington state expanded Medicaid under the Affordable Care Act (ACA). It was expected that NEMT utilization would increase substantially with an expansion of the Medicaid-eligible population. Therefore, the primary objective of this study was to analyze pre-ACA data to understand changes in costs and utilization patterns due to the 2011 NEMT data system overhaul. Differences in costs between metropolitan and non-metropolitan areas and in utilization patterns among children and adult beneficiaries were further explored.



## CHAPTER 2. LITERATURE REVIEW

A lack of transportation is often cited as a significant barrier to accessing health care (Silver et al., 2012; Smith et al., 2017; Starbird et al., 2018; Syed et al., 2013; Thomas and Wedel, 2014; Yang et al., 2006), especially among the low-income population (Chaiyachati et al., 2018; Wallace et al., 2005). Medicaid is the primary source of health insurance among low-income individuals in the United States, and federal law requires that state Medicaid programs ensure non-emergency medical transportation to all beneficiaries (MACPAC Report, 2021). However, the NEMT operating system and the scope of its benefits may vary by state. The State of Washington operates a regional broker system to deliver NEMT services to all Medicaid enrolled children and adults (Wallace et al., 2005; Cherrington et al., 2018). Under this system, the state employs six community-based brokers that coordinate trips in thirteen medical transportation regions. Of the NEMT operations in Washington, 28 percent involve the public transit system, and the remaining are operated by private non-profit brokers.

Using data from the 2014 National NEMT Survey, a 2015 National Academies' analysis estimated that 2.5 percent of all Medicaid enrollees in Washington used NEMT in 2013, resulting in 2.83 million NEMT trips. The associated costs were \$70.4 million. A 2005 National Academies' report estimated that each year approximately 3.6 million Americans miss or delay medical care because of a lack of access to NEMT. That study merged national-level data from two surveys (the National Health Interview Survey and the Medical Expenditures Panel Survey) to identify the critical medical conditions affecting transportation-disadvantaged individuals. The conditions were depression and other mental health problems, hypertension, heart disease, asthma, chronic obstructive pulmonary disease, diabetes, end-stage renal disease, dental problems, cancer, prenatal care, and vaccinations. The report determined that providing transportation was cost effective and that access to NEMT can reduce emergency room and hospital expenditures for transportation-disadvantaged individuals. Recent partnerships between health care agencies and "modern" rideshare NEMT brokers, such as Uber and Lyft, have been found to reduce average per-ride costs by 32.4 percent in comparison to the traditional transportation network (Powers et al., 2016) while also improving patients' experience (Rochlin et al., 2019). However, patients' physical and cognitive limitations and state credentialing requirements could limit the number of NEMT rides that may be delivered by rideshare drivers (Adelberg and Simon, 2017).



### CHAPTER 3. DATA AND METHODS

In this study, Medicaid Analytic eXtract (MAX) outpatient administrative claims data from January 1, 2010, to December 31, 2013, from Washington were analyzed. These data were obtained from the Centers for Medicare and Medicaid Services (CMS). Washington was one of the seven states (including the District of Columbia) to conduct a limited expansion of Medicaid earlier than January 2014 under the Affordable Care Act (ACA) from January 1, 2011, to December 31, 2013. Until 2010, parents with household incomes of up to 71 percent of the federal poverty level (FPL) were eligible for Medicaid in Washington. Adults without dependent children were not eligible for Medicaid benefits. Under the limited expansion, Medicaid funds supported three state-funded programs that provided insurance to working adults with incomes below 200 percent of the FPL, to adult residents with incomes of up to 138 percent of the FPL who were unable to work because of a disability, and to adult residents with incomes of up to 138 percent of the FPL who were incapacitated because of an alcohol or drug addiction. Benefits were provided to up to 43,300 adults annually between 2011 and 2013 with incomes of up to 138 percent of the FPL who had previously received health care through the three state-funded programs but were otherwise ineligible for Medicaid until the implementation of the ACA in January 2014. These programs otherwise would have been eliminated without federal financial support. MAX data did not include claims information from the limited expansion not-yet Medicaid population. In 2014, under the ACA's Medicaid expansion, all eligible populations were transitioned into the Medicaid program. Therefore, administrative claims data from 2010 through 2013 examined one pre-treatment, one transition, and two post-treatment years' information and were appropriate for understanding changes in costs and utilization since the 2011 change in the state NEMT system and before Medicaid-expansion related changes.

In 2010, there were 1.42 million Medicaid beneficiaries (children and adults) in Washington. The number of enrollees in 2011, 2012, and 2013, were, respectively, 1.45 million, 1.46 million, and 1.48 million. One important contribution of this study is the use of claims data from the entire Medicaid population in Washington. Additionally, these were not self-reported data. Precise diagnoses of health conditions and use of medical care during the Medicaid enrollment period were available for each beneficiary. The administrative data included demographic information—age, gender, race-ethnicity, and enrollee's residential zip code. However, the data also had several shortcomings. Socio-economic data, such as income,

education, and labor market status, were not included. There was no information regarding how individuals chose a provider or type of care, measures of satisfaction with medical care provider or prescribed care, or presence of other health-related behaviors (such as substance use and physical activity). The MAX data did not include information on medical care use outside the Medicaid eligibility period.

The overall purpose of this study was to characterize NEMT use for accessing preventive care and treatment of chronic conditions among Medicaid-eligible children and adults, with a focus on examining metropolitan and non-metropolitan differences in NEMT utilization and costs. Enrollees' residential zip codes were merged with rural-urban commuting area (RUCA) codes to determine the rurality of their residence. Micropolitan areas with either high or low commuting flows, small towns, and rural areas were categorized as non-metropolitan areas. MAX data categorized beneficiary age into eight groups, of which the third group included all in the ages of fifteen to twenty. Therefore, because of no clear demarcation between those under and those over eighteen, those under fifteen were considered "children," and others were labeled as "youth and adults."

The MAX administrative data included procedure codes based on the Healthcare Common Procedural Coding System (HCPCS). Procedure codes identify the type of service given to a patient (such as transportation—emergency or non-emergency, surgeries, and medications). Relevant procedure codes for determining the use of NEMT are provided in table 3-1.



**Table 3-1** NEMT Procedure Codes

<b>Code</b>	<b>Code description</b>
A0080	Volunteer vehicle mileage
A0090	Individual vehicle mileage
A0100	Non-emergency transport taxi
A0110	Public or mass transportation
A0120	Non-emergency transport mini-bus
A0130	Non-emergency transport wheelchair van
A0140	Non-emergency transport air
A0160	Case worker NEMT
A0170	Transport parking fees or tolls
A0180	NEMT: lodging recipient
A0190	NEMT: meals recipient
A0200	NEMT: lodging escort
A0210	NEMT: meals escort
S0209	Wheelchair van mileage
S0215	Non-emergency transportation mileage
T2001	Non-emergency transportation: patient attendant or escort
T2002	Non-emergency transportation: per diem
T2003	Non-emergency transportation: encounter or trip
T2004	Non-emergency transportation: commercial carrier pass
T2005	Non-emergency transportation: stretcher van
T2007	Non-emergency transport wait time

The outpatient MAX data analyzed in this study included at most two diagnosis codes per claim to identify and translate diseases, disorders, symptoms, injuries, and any illness into codes using the ICD-9 classification system. MAX data also included information indicating the location type where a service was performed (such as a physician’s office or outpatient hospital). These codes were used to determine visit destination and the primary purpose of a visit.

A single visit to a doctor could generate multiple medical claims for each type of service used during the visit. Therefore, during the analyses, a single visit comprised data from all claims originating on the same day of service. NEMT use per visit was measured as the total number of NEMT trips on the same day. Similarly, NEMT costs per visit were calculated as the

total NEMT costs each day NEMT was used. However, in determining the place of service associated with NEMT use, each location was considered because on the same day a NEMT user could go to a doctor's office and then to an independent laboratory at a different location.

## CHAPTER 4. RESULTS AND DISCUSSION

The 2010-2013 administrative claims data are summarized in Table 4-1. There were over 1.4 million Medicaid beneficiaries in each year, with approximately a 4 percent increase in enrollment from 2010 to 2013.

**Table 4-1** Descriptive Statistics

<b>Variables</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<u>Total beneficiaries:</u>	1,420,389	1,453,571	1,460,367	1,483,514
As a % of total:				
0-14 years old	45.40%	45.75%	45.97%	45.53%
15 years and older	54.60%	54.25%	54.03%	54.47%
Metro residents	77.15%	77.71%	78.00%	78.10%
Non-metro residents	23.47%	23.30%	23.23%	23.13%
<u>NEMT users:</u>	726 (0.05%)	680 (0.05%)	9,214 (0.63%)	19,779 (1.33%)
As a % of NEMT users:				
0-14 years old	25.48%	22.50%	56.85%	59.37%
15 years and older	74.52%	77.50%	43.15%	40.63%
Metro residents	91.87%	90.44%	90.29%	91.04%
Non-metro residents	8.13%	9.56%	9.71%	8.96%

Among all beneficiaries, each year approximately 46 percent were children. Around 77 percent of all beneficiaries resided in metropolitan areas. Most Medicaid beneficiaries did not require or use NEMT. In 2011, 0.05 percent of all beneficiaries used NEMT, which increased to 1.33 percent in 2013. In other words, there was an approximately 1.3-percentage point increase in NEMT users from 2011 to 2013. In 2010 and 2011, about a fourth of all NEMT users were children. However, in 2012 and 2013, demand for NEMT increased by almost 8 percentage points among Medicaid children in comparison to youths and adults. NEMT usage by both metropolitan and non-metropolitan riders was consistent across the four years. Approximately 91 percent of NEMT users were from metropolitan areas, while 9 percent were from non-metropolitan areas.

Another way to understand trends in NEMT use is to examine the percentages within each category. Among all 0 to 14-year-olds, NEMT use increased from 0.03 percent to 1.73

percent. Among those ages 15 and older, NEMT use increased from 0.07 to 0.99 percent. Among all metropolitan beneficiaries, NEMT use increased from 0.06 to 1.55 percent. Among all non-metropolitan beneficiaries, NEMT use increased from 0.02 to 0.52 percent. Thus, within each category of interest, demand for NEMT services increased most among children and metropolitan residents.

In table 4-2, the average number of rides per day and associated amounts charged are presented. On average, both metropolitan and non-metropolitan users needed one ride on the day of NEMT utilization. The amount charged was calculated by using all NEMT claims corresponding to a day of NEMT use. In 2010, the average amount charged was \$84.92, ranging from \$47.93 in non-metropolitan claims to \$88.03 in metropolitan claims. The average amount charged in 2013 was \$21.48 overall, with similar averages in metropolitan and non-metropolitan claims. In other words, substantial cost savings began in 2012, with no significant reduction in the number of rides.

**Table 4-2 NEMT Utilization and Costs**

<b>Averages</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Rides/day	1.19	1.09	1.03	1.03
Rides/day: Metro	1.19	1.10	1.03	1.03
Rides/day: Non-metro	1.24	1.03	1.04	1.05
Amount charged	\$84.92	\$55.65	\$15.09	\$21.48
Amount charged: Metro	\$88.03	\$54.11	\$14.45	\$20.76
Amount charged: Non-metro	\$47.93	\$78.45	\$21.34	\$28.65

Approximately 90 percent of the NEMT trips were to a doctor’s office, outpatient hospital, and independent laboratory. The most common health concerns of NEMT users are listed in table 4-3.

**Table 4-3** Common Health Concerns of NEMT Users

Years	Children		Youth and adults	
	Metro	Non-metro	Metro	Non-metro
2010-2011	Routine child health exam; Asthma; Autism spectrum disorders; Chronic kidney disease; Depression	Attention-deficit hyperactivity disorder; Bipolar disorder; Drug use disorder	Depression; Schizophrenia and other psychotic disorders	Depression; Hypertension; Schizophrenia and other psychotic disorders
2012-2013	Routine child health exam; Learning disabilities; Flu vaccines	Routine child health exam; Asthma; Learning disabilities; Flu vaccines	Depression; Diabetes; Hypertension	Depression; Diabetes; Prenatal care

Medicaid children frequently used NEMT to access preventive care, including routine health check-ups and immunizations. Youth and adult beneficiaries frequently used NEMT to access behavioral health services, and in 2012 to 2013 in non-metropolitan areas, NEMT use for prenatal care was observed.



## CHAPTER 5. CONCLUSIONS

With the integration of substance abuse and mental health treatment clients into the Medicaid managed-care system in Washington state since the program expansion in 2014, the costs of providing NEMT services are likely to increase. This study identified areas of high NEMT demand among children, youth, and adults, and across metropolitan and non-metropolitan beneficiaries. The findings from this study can help to improve healthcare delivery and service for low-income populations who are eligible for NEMT benefits and to develop cost-effective strategies to provide mobility services to target populations. In areas with high demand for NEMT services, initiatives to develop community capacity to offer medical care and prevention programs could be considered.

Medicaid enrollees who use NEMT may be quite different from non-users. It is especially problematic if those who are needy and eligible to use it do not use it. It could indicate an information gap. The MAX data did not have information on whether enrollees lacked knowledge of NEMT. Therefore, it was not possible to calculate the exact rate of or reason for under-utilization. However, if transportation barriers are substantial for rural Medicaid enrollees (Reif et al., 1999; Ricketts, 2000), especially the elderly (Bull et al., 2001; Goins et al., 2005; Nelson et al., 2010), then rates of emergency department visits for non-urgent reasons could increase among rural Medicaid beneficiaries. While MAX inpatient data were not analyzed, future studies are expected to uncover under-utilization of NEMT benefits, as well as whether NEMT under-utilization is associated with the use of expensive health care resources, such as emergency departments for non-emergent health conditions. In that case, initiatives could be designed to raise awareness and educate Medicaid enrollees about eligibility requirements and to assist those unfamiliar with how to register for NEMT.

Lastly, modernizing NEMT through on-demand ridesharing could help states to improve beneficiary experience and reduce costs. However, data on the use of Lyft and Uber for non-emergency transportation are limited. A recent report found that rideshare-based NEMT capabilities are most appropriate for inpatient and out-patient discharges, on-demand rides, and rides requiring minimal assistance or monitoring (Fraade-Blanar et al., 2021). Recently, the Washington State Department of Health partnered with several private ridesharing providers, such as Lyft and Uber, to provide access to free and discounted rides to COVID-19 vaccine

appointments for people with transportation challenges. Utilization of such services could inform opportunities for optimal use of ridesharing technology within the NEMT paradigm.



## CHAPTER 6. LIST OF REFERENCES

- Adelberg, M., & Simon, M., 2017. Non-emergency medical transportation: Will reshaping Medicaid sacrifice an important benefit. *Health Affairs Blog (blog)*.
- Bull, C. N., Krout, J. A., Rathbone-McCuan, E., & Shreffler, M. J., 2001. Access and issues of equity in remote/rural areas. *The Journal of Rural Health*, 17(4): 356-359.
- Chaiyachati, K. H., Moore, K., & Adelberg, M., 2018. Too early to cut transportation benefits from Medicaid enrollees. *Health Services Insights*, 12: 1-3.
- Cherrington, L., Edrington, S., Burkhardt, J., Raphael, D., Collette, P. W., Borders, S., Peterson, R., Dalton, J., & Garrity, R., 2018. *Handbook for Examining the Effects of Non-Emergency Medical Transportation Brokerages on Transportation Coordination* (Project No. B-44).
- Fraddde-Blancar, L., Koo, T., & Whaley, C.M., 2021. Going to the doctor. RAND Report. Available at: [https://www.rand.org/pubs/research\\_reports/RRA1019-1.html](https://www.rand.org/pubs/research_reports/RRA1019-1.html)
- Goins, R. T., Williams, K. A., Carter, M. W., Spencer, S. M., & Solovieva, T., 2005. Perceived barriers to health care access among rural older adults: A qualitative study. *The Journal of Rural Health*, 21(3): 206-213.
- Medicaid and CHIP Payment and Access Commission. June 2021 Report to Congress on Medicaid and CHIP: Mandated Report on Non-emergency Medical Transportation. Available at: <https://www.macpac.gov/publication/mandated-report-on-non-emergency-medical-transportation/>
- Musumeci, M., & Rudowitz, R., 2016. Medicaid non-emergency medical transportation: overview and key issues in Medicaid expansion waivers. *Kaiser Family Foundation Issue Brief, February 2016*. Available at: <https://www.kff.org/medicaid/issue-brief/medicaid-non-emergency-medical-transportation-overview-and-key-issues-in-medicaid-expansion-waivers/>
- National Academies of Sciences, Engineering, and Medicine, 2005. *Cost-Benefit Analysis of Providing Non-Emergency Medical Transportation*. The National Academies Press, Washington, DC. Available at: <https://doi.org/10.17226/22055>.
- Nelson, J. A., & Stover Gingerich, B., 2010. Rural health: Access to care and services. *Home Health Care Management & Practice*, 22(5): 339-343.
- Powers, B. W., Rinefort, S., & Jain, S. H., 2016. Nonemergency medical transportation: delivering care in the era of Lyft and Uber. *JAMA*, 316(9): 921-922.

- Reif, S. S., DesHarnais, S., & Bernard, S., 1999. Rural health research community perceptions of the effects of rural hospital closure on access to care. *The Journal of Rural Health*, 15(2): 202-209.
- Ricketts, T. C., 2000. The changing nature of rural health care. *Annual Review of Public Health*, 21(1): 639-657.
- Rochlin, D. H., Lee, C. M., Scheuter, C., Milstein, A., & Kaplan, R. M., 2019. Economic benefit of “Modern” nonemergency medical transportation that utilizes digital transportation networks. *American Journal of Public Health*, 109(3): 472-474.
- Silver, D., Blustein, J., & Weitzman, B. C. (2012). Transportation to clinic: findings from a pilot clinic-based survey of low-income suburbanites. *Journal of Immigrant and Minority Health*, 14(2): 350-355.
- Smith, M., Prohaska, T., MacLeod, K., Ory, M., Eisenstein, A., Ragland, D., Irmiter, C., Towne, S., & Satariano, W., 2017. Non-emergency medical transportation needs of middle-aged and older adults: A rural-urban comparison in Delaware, USA. *International Journal of Environmental Research and Public Health*, 14(2): 174-187.
- Starbird, L. E., DiMaina, C., Sun, C. A., & Han, H. R., 2018. A systematic review of interventions to minimize transportation barriers among people with chronic diseases. *Journal of Community Health*, 1-12.
- Syed, S. T., Gerber, B. S., & Sharp, L. K., 2013. Traveling towards disease: transportation barriers to health care access. *Journal of Community Health*, 38(5): 976-993.
- Thomas, L. V., & Wedel, K. R., 2014. Nonemergency medical transportation and health care visits among chronically ill urban and rural Medicaid beneficiaries. *Social Work in Public Health*, 29(6): 629-639.
- Wallace, R., Hughes-Cromwick, P., Mull, H., Khasnabis, S., 2005. Access to health care and nonemergency medical transportation: two missing links. *Social Research in Transport (SORT)*. Clearing House. 1924:76–84.
- Yang, S., Zarr, R. L., Kass-Hout, T. A., Kouros, A., & Kelly, N. R., 2006. Transportation barriers to accessing health care for urban children. *Journal of Health Care for the Poor and Underserved*, 17(4): 928-943.