La presencia de la mujer ante la necesidad urbana de la movilidad cotidiana y el impacto en el hogar

The presence of women in the face of the urban need for daily mobility and the impact on the home

A presença da mulher diante da necessidade urbana de mobilidade diária e o impacto no lar

Laura Vázquez Nájera
Instituto Politécnico Nacional, México
lau_vn@yahoo.com
https://orcid.org/0000-0003-3136-976X

Ma. de los Ángeles Martínez Ortega
Instituto Politécnico Nacional, México
mmartinezo@ipn.mx
https://orcid.org/0000-0002-8483-9844

Minerva Martínez Ortega
Dirección General de Educación Tecnológica Industrial, México
cetis76@hotmail.com
https://orcid.org/000-0002-6835-2841

Resumen

El objetivo de este trabajo fue visualizar el involucramiento de la mujer en la apremiante y urgente necesidad del desplazamiento urbano, específicamente consistió en relacionar el género, las características socioeconómicas y el modo de transporte como factores de la movilidad, así como el gasto que representó esta actividad. Se tomaron como referente los datos de viajes de la Encuesta Origen Destino en Hogares de la Zona Metropolitana del Valle de México (EOD) 2017. El tamaño de la muestra fue de 66 625 viviendas y la encuesta se diseñó con un factor que reflejó todos los viajes en toda la Zona Metropolitana del Valle de México (ZMVM), aunque aquí solo se consideraron los hechos entre semana. Los resultados señalan que, en cuanto a género, las mujeres (0.697) realizan más viajes que los hombres (0.668) y también que el modo de solo caminar lo utilizan los estratos bajo (0.327) y medio bajo (0.720), mientras que el transporte público lo utiliza el estrato medio alto (0.771) y el privado (0.875) el estrato alto. En los mapas, los gráficos de barras muestran de manera descriptiva que es en la periferia de la ZMVM donde las mujeres realizan más viajes. En cuanto a los viajes por estratos socioeconómicos, el estrato bajo representa 0.9 %, el medio bajo 54.5 %, el medio alto 31.2 % y el alto 13.4 %. En las conclusiones, se destaca que el rol de la mujer en la dinámica del hogar es muy activo, independientemente del estrato socioeconómico, por el gran número de funciones en las que se involucra.

Palabras clave: estrato socioeconómico, gasto en el hogar, género, movilidad urbana y tipos de transporte.

Abstract

The objective of this work was to visualize the involvement of women in the pressing and urgent need of urban displacement, specifically it consisted of relating gender, socioeconomic characteristics and the mode of transport as factors of mobility, as well as the expense that this represented. activity. The travel data from the Encuesta Origen Destino en Hogares de la Zona Metropolitana del Valle de México (EOD) 2017 were taken as a reference. The sample size was 66 625 homes, but the survey was designed with a factor that reflected all trips in the entire Metropolitan Area of the Valley of Mexico (ZMVM). The survey captured trips made on weekdays and on Saturdays, but for this research only trips made only on weekdays were considered. The results indicate that, in terms of gender, women (0.697) make more trips than men (0.668) and also that the walk-only mode is used by the low strata (0.327) and medium low (0.720), while public

transport is used by the medium high stratum (.771) and private (.875) by the high stratum. In the maps, the bar graphs descriptively show that it is in the periphery of the ZMVM where women make the most trips. Regarding the trips by socioeconomic strata, the low stratum represents 0.9 %, the low medium 54.5 %, the high medium 31.2 % and the high 13.4 %. It is concluded that the role of women in the dynamics of the home is very active, regardless of the socioeconomic stratum, due to the large number of functions in which it is involved.

Keywords: socioeconomic status, household spending, gender, urban mobility and types of transport.

Resumo

O objetivo deste trabalho foi visualizar o envolvimento das mulheres na necessidade premente e urgente de deslocamento urbano, especificamente consistiu em relacionar gênero, características socioeconômicas e o modo de transporte como fatores de mobilidade, bem como o gasto que isso representava. exercício. Foram tomados como referência os dados de viagem da Pesquisa Origem Destino nos Domicílios da Área Metropolitana do Vale do México (EOD) 2017. O tamanho da amostra foi de 66.625 domicílios e a pesquisa foi desenhada com um fator que refletia todas as viagens na Zona Metropolitana de o Vale do México (ZMVM), embora aqui tenham sido considerados apenas os eventos da semana. Os resultados indicam que, em termos de gênero, as mulheres (0,697) fazem mais viagens do que os homens (0,668) e também que o modo de caminhar é utilizado pelos estratos baixo (0,327) e médio-baixo (0,720), enquanto o público o transporte é utilizado pelo estrato médio superior (0,771) e privado (0,875) pelo estrato superior. Nos mapas, os gráficos de barras mostram de forma descritiva que é na periferia da ZMVM onde as mulheres fazem mais viagens. Em relação às viagens por estratos socioeconômicos, o estrato baixo representa 0,9%, o médio baixo 54,5%, o médio alto 31,2% e o alto 13,4%. Nas conclusões, destaca-se que o papel da mulher na dinâmica familiar é muito ativo, independentemente do nível socioeconômico, devido ao grande número de funções em que está envolvida.

Palavras-chave: situação socioeconômica, gastos das famílias, gênero, mobilidade urbana e tipos de transporte.

Introduction

Urban mobility is a human need. It is precisely in large cities where this condition is most evident in their daily dynamics. In Mexico City (CDMX) 16.4 million trips are made daily, according to the 2019 Mobility and Transportation Survey (National Institute of Statistics and Geography [Inegi], 2019). Trips by private car represent 22.1%, those made on foot represent 37.5% and the remaining 40.4% are made in other modes of transport. Of the 16.4 million trips, 55% are made by women (Suárez, Galindo and Reyes, 2019).

Prior to the 2019 Mobility and Transportation Survey, Inegi conducted the 2017 Origin Destination Survey in Households in the Valley of Mexico Metropolitan Area (EOD). It should be noted that the Valley of Mexico Metropolitan Area (ZMVM) is made up of CDMX and 59 conurbation municipalities of the State of Mexico, in addition to a municipality of the state of Hidalgo. Now yes, the EOD 2017 indicates that 34.56 million trips were made on a weekday, of which 20.6% were in private transport, 32.3% were made on foot and 47.1% of the trips were made in other modes of transport (Inegi , 2017).

For its part, the National Survey of Household Income and Expenditure 2020 [Enigh] carried out by Inegi (2020) indicates that in the current quarterly monetary expenditure in households in Mexico in the category of "Transportation and communications" it was 18.6 %. In 2018, the same item represented 20%. Here are included the costs of acquisition, maintenance, accessories and services for vehicles; transportation expenses and also communications (Inegi, 2020). Table 1 shows the percentage that this item of "Transportation and communications" represents in the expenses of households in CDMX and the State of Mexico.

The Enigh 2020 indicates that of the quarterly average monetary current expenditure for the 20 main expense items, public transport represented 5.2% in 2018 and 3.3% in 2020 (Inegi, 2020). Table 2 indicates the percentage of the components of this item, among which is public transportation. Table 3 indicates the percentage of households in the ZMVM that have some type of vehicle.

Table 1. Percentage of quarterly average current monetary spending by federal entity, according to major spending items, 2018 and 2020. Item: "Transportation and communications"

Entidad	2018	2020
Nacional	20%	18.6%
Ciudad de México	18.0%	15.2%
Estado de México	19.9%	19.6%

Source: Own elaboration based on Inegi (2020)

Table 2. Percentage of quarterly average monetary current expenditure by federal entity according to components of the category "Transportation and communications", 2018 and 2020

Entidad	2018	2020
Nacional		
Transporte público	5.2 %	3.3 %
Transporte foráneo	0.6 %	0.3 %
Adquisición de vehículos de uso particular	2.5 %	2.4 %
Refacciones, partes, accesorios, mantenimiento, combustibles y servicio para vehículos	7.2 %	6.8 %
Comunicaciones	4.5 %	5.7 %
Ciudad de México		
Transporte público	5.0 %	3.2 %
Transporte foráneo	0.5 %	0.2 %
Adquisición de vehículos de uso particular	2.9 %	0.8 %
Refacciones, partes, accesorios, mantenimiento, combustibles y servicio para vehículos	4.8 %	4.6 %
Comunicaciones	4.8 %	6.2 %
Estado de México		
Transporte público	8.4 %	5.7 %
Transporte foráneo	0.4 %	0.1 %
Adquisición de vehículos de uso particular	0.8 %	2.3 %
Refacciones, partes, accesorios, mantenimiento, combustibles y servicio para vehículos	5.8 %	5.6 %

Revista Iberoamericana para la
Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

Comunicaciones	4.5 %	5.8 %

Source: Own elaboration based on Inegi (2020)

Table 3. Availability of vehicle and type in households in the ZMVM

Condición	Porcentaje
No disponen de vehículos	46.8 %
Si disponen de vehículos	53.2 %
Tipo de vehículo	
Automóviles	77.0 %
Motocicletas	10.0 %
Bicicletas	35.9 %

Source: Own elaboration based on Inegi (2017)

The movement of individuals is determined by factors such as gender, age and ethnicity, among others. Space, time and money alone do not explain mobility and cities, especially where inequality is present; they must observe the interdependence of all factors as an aid to transport policies (Jirón, Carrasco and Rebolledo, 2020). Socioeconomic status, as well as the availability of transportation modes, must also be observed. Jiron et al. (2020) even explain that decisions regarding mobility may depend on people other than the person making the trip, due to the interdependence between family members, employees, etc.

Women, for example, are in less contact with productive spaces, since they are the ones who mainly dedicate themselves to the "social reproduction of daily life" referring to the home and that is why they move less frequently in the city (Díaz 1989; Fagnani 1977; Ferré and Serra, 2006; Sabaté 1984, all cited in Riquelme, 2016). In addition, the characteristics of the city determine the space and time of women, since they carry out more tasks and more trips when there are children in the home (Jirón et al., 2020; Olivieri and Fageda, 2021; Rodríguez and García, 2012, cited in Riquelme, 2016). Because the sexual division of labor still reigns and the propensity to consider certain activities as related to women, mobility shows patriarchal dominance (Riquelme, 2016). The primordial debate on transport should no longer consider gender mobility as a "women's problem" (Jirón et al., 2020).

In a study in the Metropolitan area of Montevideo, Uruguay, Olivieri and Fageda (2021) perceived a slight difference in travel patterns in terms of gender, since women travel less and at a

shorter distance than men and their workplace is mostly near the place of residence. Daily mobility is shorter, but more frequent if they have children. In addition, women who participate to the same extent in the household income are mobilized in the same way as women in households where men are the main providers. Due to the other factors that must be observed in mobility studies (age, ethnicity, socioeconomic status, etc.), women's trips may differ from each other (Jirón *et al.*, 2020; Olivieri y Fageda, 2021; Riquelme, 2016).

Regarding transportation modes, Etminani and Ardeshiri (2015) indicate that lifestyle, socioeconomic status, and the availability of private cars can determine the choice of transportation mode on non-work-related trips. Li, Lo and Guo (2018), observed, as part of the results of the binary logistic regression applied in their study, that having a car, monthly income and gender are relevantly related to the choice of transport mode in shopping trips.

Returning to Olivieri and Fageda (2021), they point out that families with children are likely to travel by car; women use it to reduce travel times, although women are less likely to travel by car. The predominance of the use of public transport by women affects their mobility in areas where there is less supply of this transport. They also indicate that the socioeconomic has an important weight in mobility. And along these lines, Riquelme (2016) mentions that families with economic precariousness find it necessary to seek "mobility strategies", such as walking, and Suárez et al. (2019) mention that in CDMX walking is the most frequent among those with low income and using the car occurs with greater incidence the higher the income.

In the present work, we started from the hypothetical inference that the presence of women in urban mobility is very representative, since they are directly involved in the administration of the home, where their socioeconomic status and the type of transport used have a direct impact on its dynamics and behavior.

Mobility

Defined as the action of displacement in the territory, it encompasses and manifests objective and subjective factors, in addition to alluding to "trips made, feasible and conceived" (Gutiérrez, 2012, p. 71). In mobility analyses, even those who do not move are studied: inaccessibility (Di Ciommo, 2017; Gutiérrez, 2012; Joshi, Bailey and Datta, 2021; Montezuma, 2003); and it should also be considered that the trip, as a line between origin and destination, does not in itself satisfy the needs that motivate this transfer, since the needs may require several trips, places or times, that is, "travel networks" (Gutiérrez, 2012).

The gender

In mobility studies it becomes important, since mobility needs have been shown to be different (Carta and De Philippis, 2018; Di Ciommo, 2017; Olivieri and Fageda, 2021), even if factors such as differences in employment or access to services are ruled out. private vehicle (Havet, Bayart and Bonnel, 2021). But also between socioeconomic strata the needs or access to transport are different (Li *et al*., 2018; Riquelme, 2016).

Socioeconomic strata

In the present work, the categorization of socioeconomic strata present in the methodological document of the EOD 2017 (Inegi, 2017) was used: 1) low, 2) medium low, 3) medium high and 4) high. This stratification is due to the sociodemographic characteristics of individuals, as well as the quality and equipment within and around the homes they inhabit.

Transportation modes

Whether public (such as concession or mass transport), private (private car) or active (walking), among the factors that encourage the decision to use one or the other are the quality of transport, security (Gori, Silva, Venâncio and Dias, 2020), socioeconomic characteristics (Suárez et al., 2019), even the perceived mobility needs according to the complexity of activities of each individual (Thorhauge, Kassahun, Cherchi and Haustein, 2020) , such as doing activities while traveling to make that time productive (Malokin, Circella y Mokhtarian, 2019).

Mobility spending

This can be public or private, such as the financial costs of travel systems and services, those linked to accidents, congestion costs and the individual costs that each individual spends when traveling (Cabrera, Velásquez and Orozco, 2015; Sánchez, 2011; World Business Council for Sustainable Development [WBCSD], 2004). The classification of modes of transport in this work is also part of the methodology of the EOD 2017 (Inegi, 2017, p. 54).
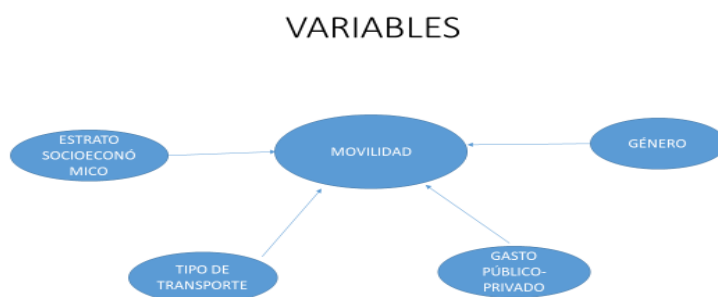
Methodology

With a quantitative approach, thematic maps of the type of choropleths were made, with information from the EOD 2017, to detect the number of trips originating in different areas of the ZMVM according to gender, socioeconomic status and type of transport in the area. that they traveled.

Table 5 describes the variables considered in the model (see also figure 1).

Figure 1. Model variables

Source: self made

Instrument

In its methodology, the 2017 EOD (Inegi, 2017) used the district as the geographic unit to divide the ZMVM. These districts are made up of groups of contiguous blocks and grouped according to socioeconomic characteristics, so they have a different territorial extension. The total number of districts in the survey is 194 (table 4).

Table 1. Number and name of districts per entity

Distritos de Ciudad de México							
001	Centro Histórico	023	Reclusorio Norte	045	Culhuacán CTM	067	Pueblo del Ajusco
002	Buenavista-Reforma	024	Ticomán	046	Campestre Churubusco	068	Tepepan
003	Tlatelolco	025	Nueva Industrial Vallejo	047	Viveros	069	Noria
004	Morelos	026	Instituto Politécnico	048	Pedregal de Santo Domingo	070	Nativitas
005	Moctezuma	027	Tepeyac	049	Xotepingo	071	Milpa Alta
006	Balbuena	028	La Villa	050	Estadio Azteca	072	Tulyehualco
007	Obrera	029	Nueva Atzacoalco	051	Ciudad Universitaria	073	El Molino Tezonco
008	Condesa	030	San Felipe de Jesús	052	Olivar de los Padres-San Jerónimo	074	Tláhuac
009	Nápoles	031	Deportivo los Galeana	053	Las Águilas	075	Mixquic
010	Vertiz Narvarte	032	Bondojito	054	Santa Lucía	076	Santa Catarina
011	Reforma Iztaccihuatl	033	San Juan de Aragón	055	Molinos	077	Reclusorio Oriente
012	Palacio de los Deportes	034	Aeropuerto	056	Santa Fe	078	Desarrollo Urbano Quetzalcoatl
013	San Andrés Tetepilco	035	Pantitlán	057	Observatorio	079	Buenavista Iztapalapa
014	Portales	036	Zaragoza	058	Las Lomas	080	Santa Maria Xalpa
015	Del Valle	037	UPIICSA	059	Cuajimalpa	081	San Miguel Teotongo
016	Chapultepec-Polanco	038	Central de Abastos	060	San Lorenzo Acopilco	082	Santa Martha Acatitla
017	Panteones	039	UAM Iztapalapa	061	San Bartolo-San Mateo	083	Juan Escutia

018	Tezozomoc	040	Escuadrón 201	062	Cerro del Judio	084	Santa Cruz Meyehualco
019	El Rosario	041	Parque Cerro de la Estrella	063	La Magdalena Contreras	085	Ejército Constitucionalista
020	Industrial Vallejo	042	Lomas Estrella	064	Villa Olímpica		
021	La Raza	043	Canal Nacional	065	Padierna		
022	Cuautepec	044	Coapa	066	San Pedro Martir		
Distritos del Estado de México							
100	Localidades Pte Chamapa-Lechería	128	La Quebrada-Parques Industriales	156	CC Center Plazas-Nueva Aragón	184	Parque Industrial Izcalli
101	CC Interlomas-Lomas de Tecamachalco	129	Industrial Sin Nombre-Buenavista 2.ª Secc	157	Héroes de la Independencia-San Agustin	185	San Lorenzo-Xochitenco
102	Club de Golf Lomas-Campo Militar Naucalpan	130	Tultitlán (centro)	158	La Costeña-Olimpica Jajalpa	186	CC Patio Chimalhuacán-Barrio La Rosita
103	San José de los Leones	131	Melchor Ocampo-Joyas de Cuautitlán	159	Jardines de Sta Clara-Super Plaza Ecatepec	187	Barrio Labradores-Jardines Acuitlapilco
104	San Rafael Chamapa	132	Coyotepec-Teoloyucan	160	Multiplaza Aragón-Cd Azteca	188	Talladores-Central de Abastos Chicoloapan
105	Fracc Industrial Naucalpan Poniente	133	Huehuetoca	161	Jardines de Morelos	189	Chicoloapan de Juárez
106	Naucalpan de Juárez -Centro y Lomas-	134	Tequixquiac-Apaxco	162	Central de Abastos Ecatepec	190	Sta Ma Nativitas
107	Las Huertas	135	Zumpango	163	Héroes Tecámac y Ecatepec	191	Lomas de Buena Vista-Sta Rosa

108	CC Lomas Verdes-Cerro de Moctezuma	136	Tultepec (cabecera)	164	Los Héroes Tecámac-Bosques y Jardines-	192	Valle de los Reyes
109	Cd Satélite Poniente	137	Central de Abastos Tultitlán-Santiago Teyahualco	165	Ojo de Agua	193	Metro La Paz-Los Reyes
110	CC Cd Satélite-Industrial Alce Blanco	138	Chilpan-Buenavista Tultitlán	166	Base Aérea Sta Lucía-Cuautlalpan	194	CEDIS San Gregorio-Cerro El Elefante
111	Condados de Atizapán-México Nuevo	139	TAD San Juan Ixhuatepec	167	Tecámac (cabecera)	195	Geovillas de Ayotla-Unión Antorchista
112	Periférico Barrientos-Mundo E	140	Lázaro Cárdenas-Lomas de Tepeolulco	168	Ciudad Cuauhtémoc	196	Ixtapaluca centro-Acozac
113	Zonas Industriales Tlalnepantla	141	Coacalco (cabecera)	169	Termoeléctrica del Valle de Méx	197	Pueblos de Ixtapaluca
114	Zona Industrial Tabla Honda y San Pablo Xalpa	142	Villa de las Flores-Héroes Coacalco	170	San Salvador Atenco-Peaje Pirámides	198	CC Sendero y Galerías Ixtapaluca
115	Fracc Industrial Barrientos	143	Potrero-La Laguna	171	Carr Pirámides-Tulancingo	199	CC Sendero Valle de Chalco-Santiago
116	Club de Golf Hacienda	144	Pueblo San Pablo de las Salinas	172	Texcoco Norte-Tepexpan	200	Alfredo Baranda
117	U.H. Adolfo López Mateos-Cental de Abastos Atizapán	145	U.H. de San Pablo de las Salinas	173	Nuevo AICM	201	Xico

118	Emiliano Zapata-Lomas de San Miguel	146	Guadalupe Victoria-Recursos Hidráulicos	174	Texcoco Centro-Chapingo	202	San Miguel Jacalones
119	Vista Hermosa	147	San Cristóbal Ecatepec	175	San Miguel Tlaixpan	203	Chalco de Díaz Covarrubias
120	Villa Nicolás Romero	148	La Presa-Tulpetlac	176	El Sol	204	San Martín Cuautlalpan
121	Cahuacán-Himno Nacional	149	Teleférico Ecatepec	177	Juárez Pantitlán-Mercado de Carne	205	San Gregorio-Tlalmanalco
122	Tepotzotlán-Villa del Carbón	150	Parques Industriales Ecatepec	178	Mercado Pirules	206	Industrial Chalco-Tenango del Aire
123	Lago de Guadalupe	151	Villa de Guadalupe Xalostoc	179	Ayuntamiento de Nezahualcóyotl	207	Tramo Amecameca-Cuautla
124	Industrial Cuamatla-San Francisco Tepojaco	152	Valle de Aragón	180	Benito Juárez		
125	Industrial Tres Ríos-Infonavit Norte	153	Bosques de Aragón	181	Metropolitana		
126	Centro Urbano-CC Cuautitlán Izcalli	154	Granjas Independencia	182	La Perla		
127	San Martín Obispo	155	Valle de Aragón 3.ª Secc	183	CC Plaza Neza		
Distritos de Hidalgo							
300	Tizayuca						

Source: Own elaboration based on Inegi (2017)

The travel data tables of the EOD 2017, which include the districts of origin and destination of these trips, gender, socioeconomic status and type of transport, were obtained from the Inegi website and the files containing the maps. of the ZMVM were obtained from the website of the Transport and Logistics Engineering Research Group of the National Autonomous University of Mexico (UNAM).

With the data obtained from the 2017 EOD, the data tables were prepared for each variable: dependent = Mobility; independent = Trips by gender, Trips by socioeconomic stratum and Trips by type of transport, as shown in table 5.

Table 5. Variables

Variable	Conceptualización	Dimensión	Indicador	Parámetro de Medición
Movilidad	Variable dependiente (desplazamiento)	CDMX-ZMVM	Desplazamiento	EOD 2017
Gasto	Variable independiente (inversión monetaria)	Ídem	Público Privado	Ídem
Género	Variable independiente (género humano)	Ídem	Hombre Mujer	Ídem
Estrato socioeconómico	Variable independiente (clasificación estratificada)	Ídem	Bajo Medio-bajo Medio-alto Alto	Ídem
Tipo de transporte	Variable independiente (Modalidad Vehicular))	Ídem	Público Privado Mixto Bicicleta	Ídem

Source: self made

Results

Pearson's correlational analysis was used with the help of IBM SPSS version 22 software.

The result obtained is shown in table 6.

Table 6. Correlation of variables: Pearson coefficient

		Transporte público	Transporte privado	Mixto	Bicicleta	Otro	Caminar	Hombre	Mujer
Bajo	Correlación de Pearson	0.029	-0.072	-0.036	0.120	0.162	0.327^{**}	0.057	0.080
	Sig. (bilateral)	0.731	0.394	0.672	0.156	0.125	0.000	0.502	0.345
	N	143	143	142	141	91	143	143	143
Medio bajo	Correlación de Pearson	0.629^{**}	0.368^{**}	0.368^{**}	0.504^{**}	0.481^{**}	0.720^{**}	0.668^{**}	0.697^{**}
	Sig. (bilateral)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	196	196	195	192	123	196	196	196
Medio alto	Correlación de Pearson	0.771^{**}	0.703^{**}	0.599^{**}	0.056	0.201^{*}	0.114	0.738^{**}	0.712^{**}
	Sig. (bilateral)	0.000	0.000	0.000	0.443	0.026	0.110	0.000	0.000
	N	196	196	195	192	123	196	196	196
Alto	Correlación de Pearson	0.614^{**}	0.875^{**}	0.569^{**}	0.020	0.192^{*}	-0.092	0.651^{**}	0.625^{**}
	Sig. (bilateral)	0.000	0.000	0.000	0.781	0.035	0.199	0.000	0.000
	N	195	195	194	191	122	195	195	195
Transporte público	Correlación de Pearson	1	0.825^{**}	0.722^{**}	0.255^{**}	0.405^{**}	0.360^{**}	0.982^{**}	0.948^{**}
	Sig. (bilateral)		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	196	196	195	192	123	196	196	196

Transporte privado	Correlación de Pearson	0.825**	1	0.709**	0.184*	0.359**	0.077	0.867**	0.834**
	Sig. (bilateral)	0.000		0.000	0.011	0.000	0.281	0.000	0.000
	N	196	196	195	192	123	196	196	196
Mixto	Correlación de Pearson	0.722**	0.709**	1	0.166*	0.275**	0.090	0.713**	0.688**
	Sig. (bilateral)	0.000	0.000		0.022	0.002	0.209	0.000	0.000
	N	195	195	195	191	122	195	195	195
Bicicleta	Correlación de Pearson	0.255**	0.184*	0.166*	1	0.365**	0.444**	0.329**	0.375**
	Sig. (bilateral)	0.000	0.011	0.022		0.000	0.000	0.000	0.000
	N	192	192	191	192	120	192	192	192
Otro	Correlación de Pearson	0.405**	0.359**	0.275**	0.365**	1	0.349**	0.451**	0.440**
	Sig. (bilateral)	0.000	0.000	0.002	0.000		0.000	0.000	0.000
	N	123	123	122	120	123	123	123	123
Caminar	Correlación de Pearson	0.360**	0.077	0.090	0.444**	0.349**	1	0.427**	0.546**
	Sig. (bilateral)	0.000	0.281	0.209	0.000	0.000		0.000	0.000
	N	196	196	195	192	123	196	196	196
Hombre	Correlación de Pearson	0.982**	0.867**	0.713**	0.329**	0.451**	0.427**	1	0.972**
	Sig. (bilateral)	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	N	196	196	195	192	123	196	196	196
Mujer	Correlación de Pearson	0.948**	0.834**	0.688**	0.375**	0.440**	0.546**	0.972**	1

Sig. (bilateral)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
N	196	196	195	192	123	196	196	196

* The correlation is significant at the 0.05 level (two tails). **Correlation is significant at the 0.01 level (two-tailed).

Source: self made

In the correlation it is visible, regarding gender, that women (0.697) make more trips than men (0.668), mainly in the low (0.327) and medium-low (0.720) strata. In the medium-high (0.703) and high (0.875) strata, private transport is used more.

As can be seen, in the descriptive analysis the relationship was presented with a higher incidence of women, since she performs an active occurrence of mobility, but in a lesser extent of displacement and in the lower middle stratum, where it is more appreciated.

Table 7. Descriptive and inferential analysis

	Media	Desviación Estándar	N
Bajo	2194.23	5392.704	143
Medio-bajo	96143.29	63747.075	196
Medio-alto	54958.26	51835.664	196
Alto	23773.40	33403.027	195
Transporte público	78382.97	62658.501	196
Transporte privado	36260.14	33691.419	196
Mixto	1036.16	1286.494	195
Bicicleta	3647.77	3790.296	192
Otro	341.88	556.181	123
Caminar	56892.68	23030.857	196
Hombre	83141.48	57447.598	196
Mujer	93213.06	46858.641	196

Source: self made

The sample size was 66,625 households, but the survey was designed with a factor that reflects all trips throughout the ZMVM. The survey captured trips made on weekdays and on Saturdays, but only trips made on weekdays were selected for this research.

The Arcmap program was used to link these data tables with the maps containing the polygons of each district. Figure 2 shows the map with the number of trips by district of origin in ranges separated by the natural breaks method.

Figure 2. Trips by district (thousands of trips)
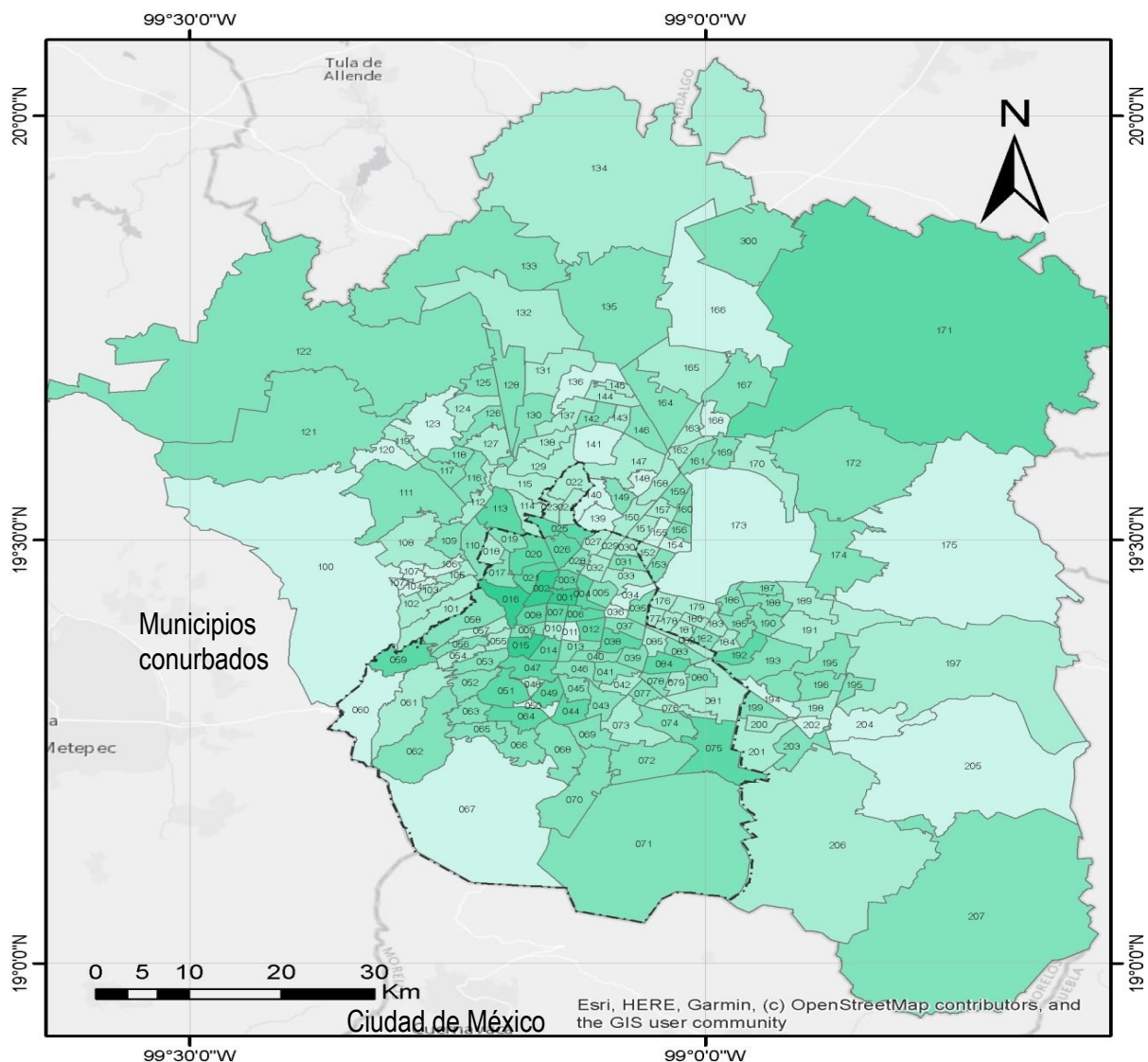
Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

In the maps it was necessary to discard the trips that did not have a specified district. Table 8 shows the amount of the population that made trips in the ZMVM, with or without an assigned district, as well as the number of trips made by gender, and it is observed that women made more trips. Figure 3 shows the map with the trips by district of origin separated by gender and in ranges by natural breaks, which are generally similar in each map.

Table 8. Number of traveling population by gender and by place of residence; and number of trips made by gender (millions)

	Población viajera por género y lugar de residencia			Viajes realizados por género		
Área geográfica	Total	Hombres	Mujeres	Total	Hombres	Mujeres
ZMVM	15.62	7.72	7.91	34.56	16.29	18.26
Ciudad de México	6.93	3.38	3.56			
Municipios conurbados	8.69	4.34	4.35			

Source: Own elaboration based on Inegi (2017)

Figure 3. Trips by district of origin and gender
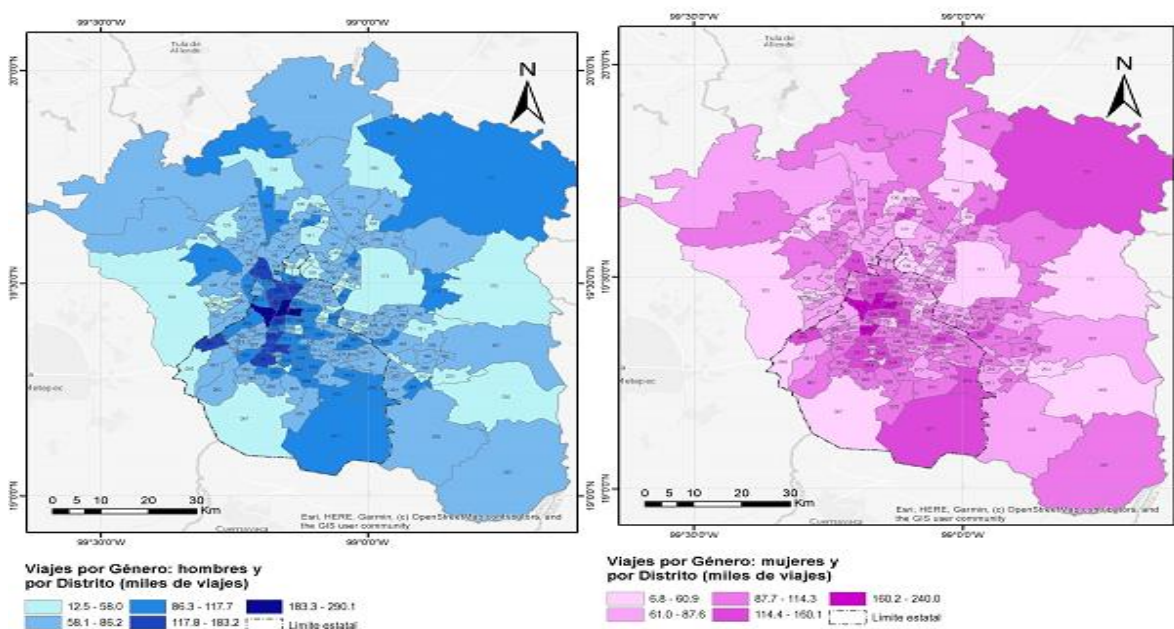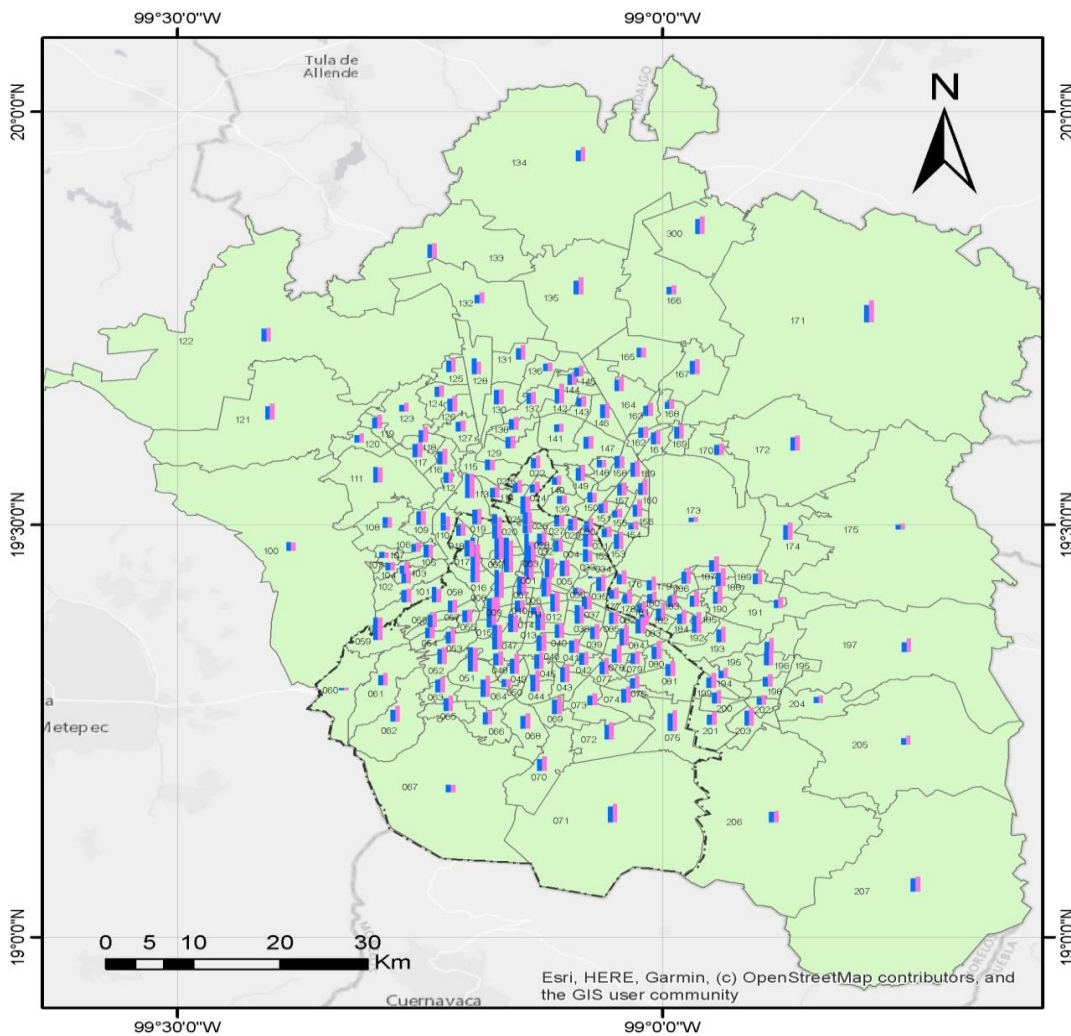

Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

In the map of figure 4, with the gender comparison for each district, it is noticeable that the graphs have mostly the same or more number of trips made by women.

Figure 4. Trips by district of origin and with a comparative graph according to gender
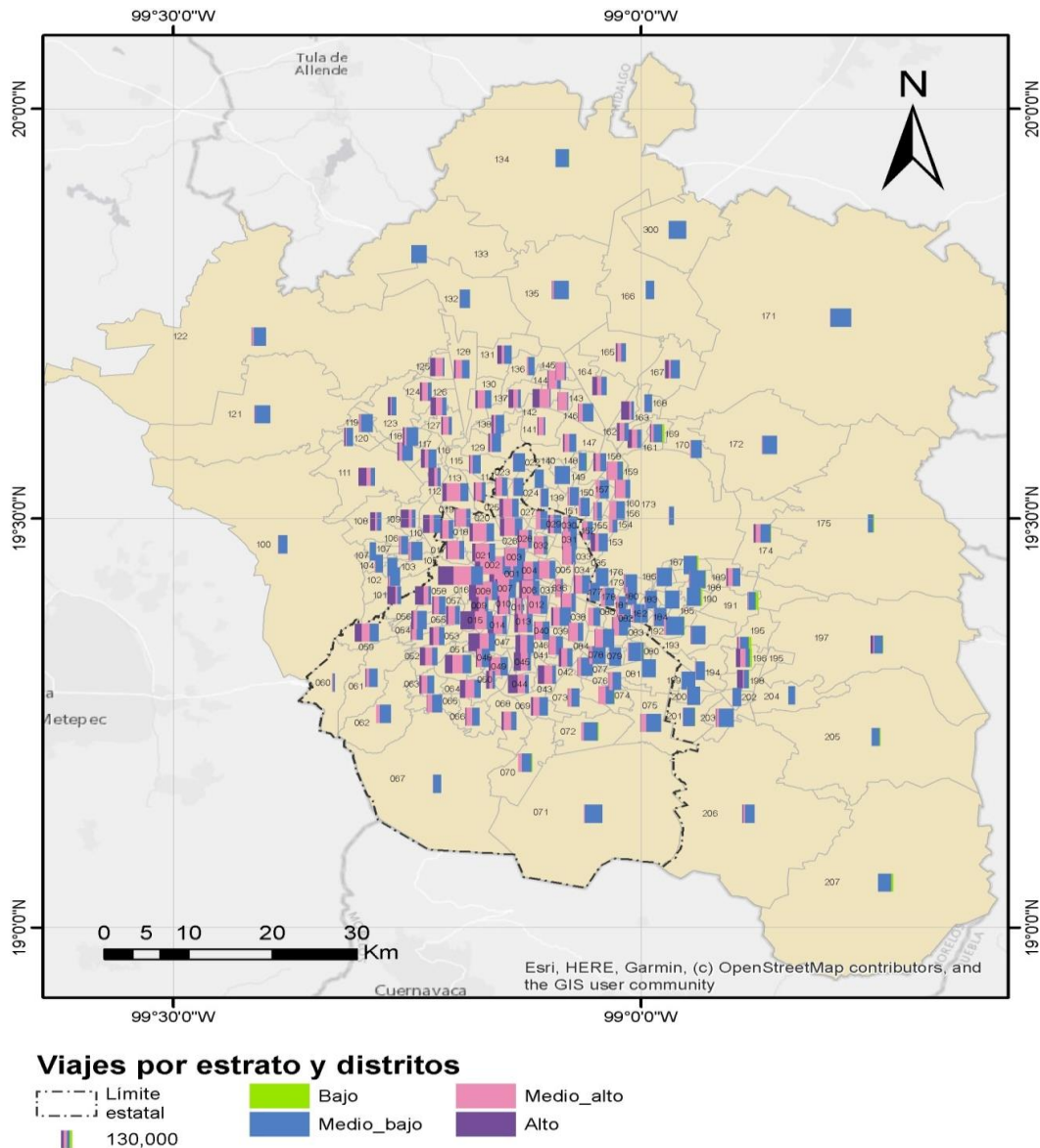

Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

Regarding the socioeconomic strata of the 2017 EOD, the low stratum represents 0.9%, the lower middle 54.5%, the upper middle 31.2% and the high 13.4%. Figure 5 shows a map with the trips by district and by socioeconomic strata, where it is perceived that the low stratum has a much lower number of trips compared to the other strata, although this is explained because it is less than 1% in the ZMVM.

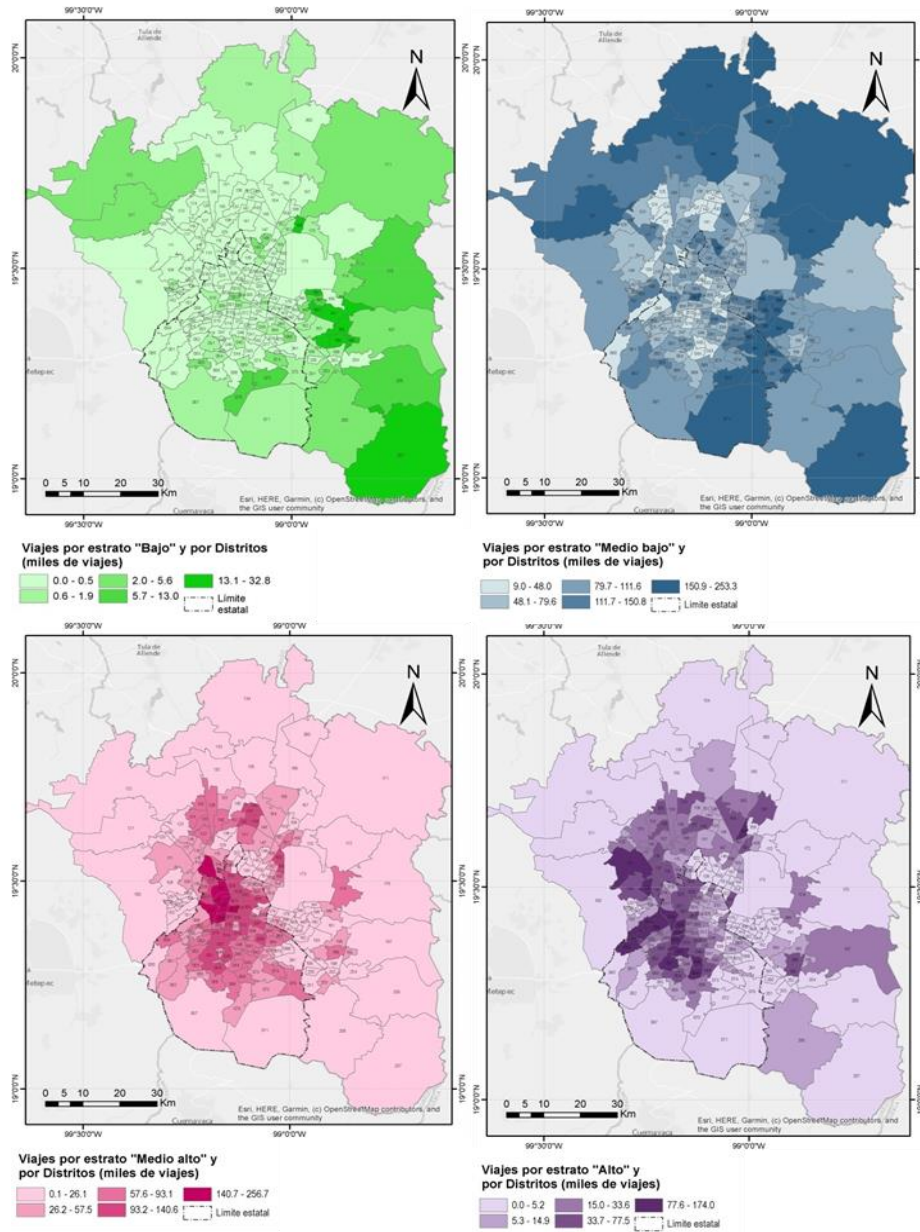**Figure 5**. Trips by district of origin according to socioeconomic status

Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

In figure 6 the maps are separated by stratum and it is notorious that the trips of low and medium-low strata originate mainly in the periphery, while those of medium-high and high stratum have their origin mostly in central districts.

Figure 6. Trips by district of origin according to socioeconomic status (map by status)
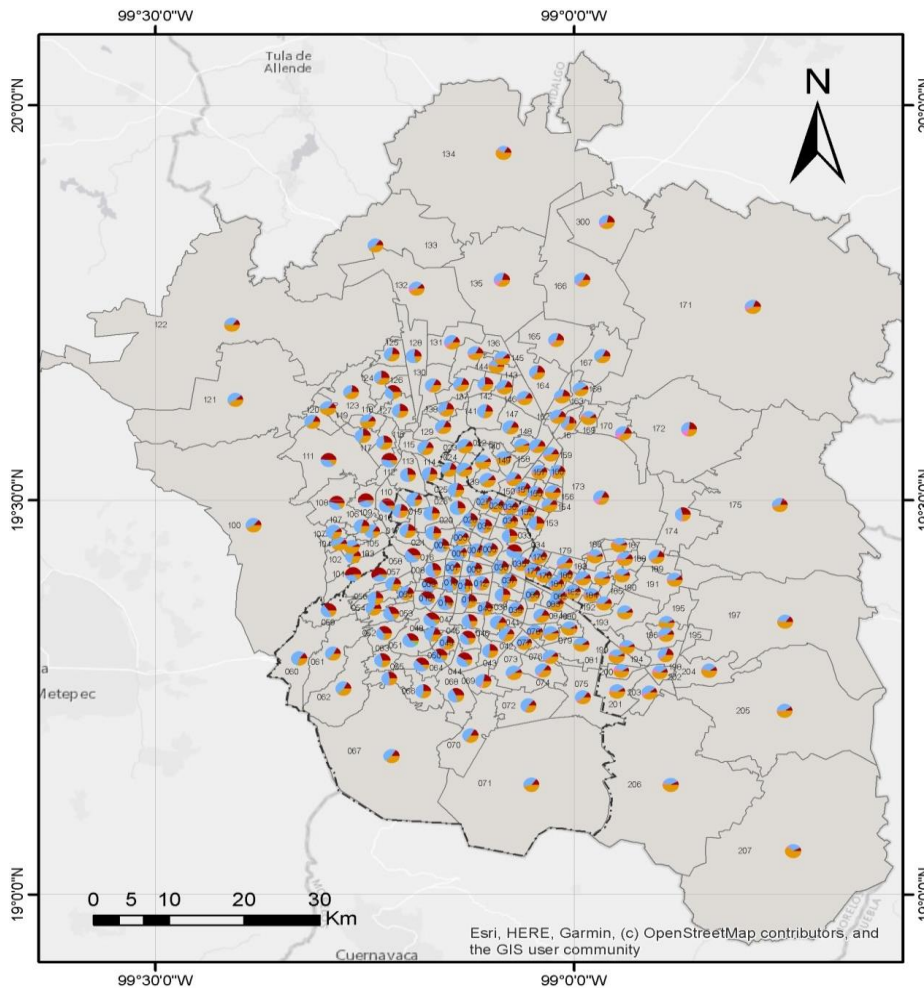

Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

Figure 7 presents a comparative map of transport types by district. Private and public transport have priority use in the central districts, while towards the periphery the mode of walking is used mostly, followed by private (which does not refer only to private cars, since on the map this mode includes motorcycles).

Figure 7. Comparison of types of transport used in each district
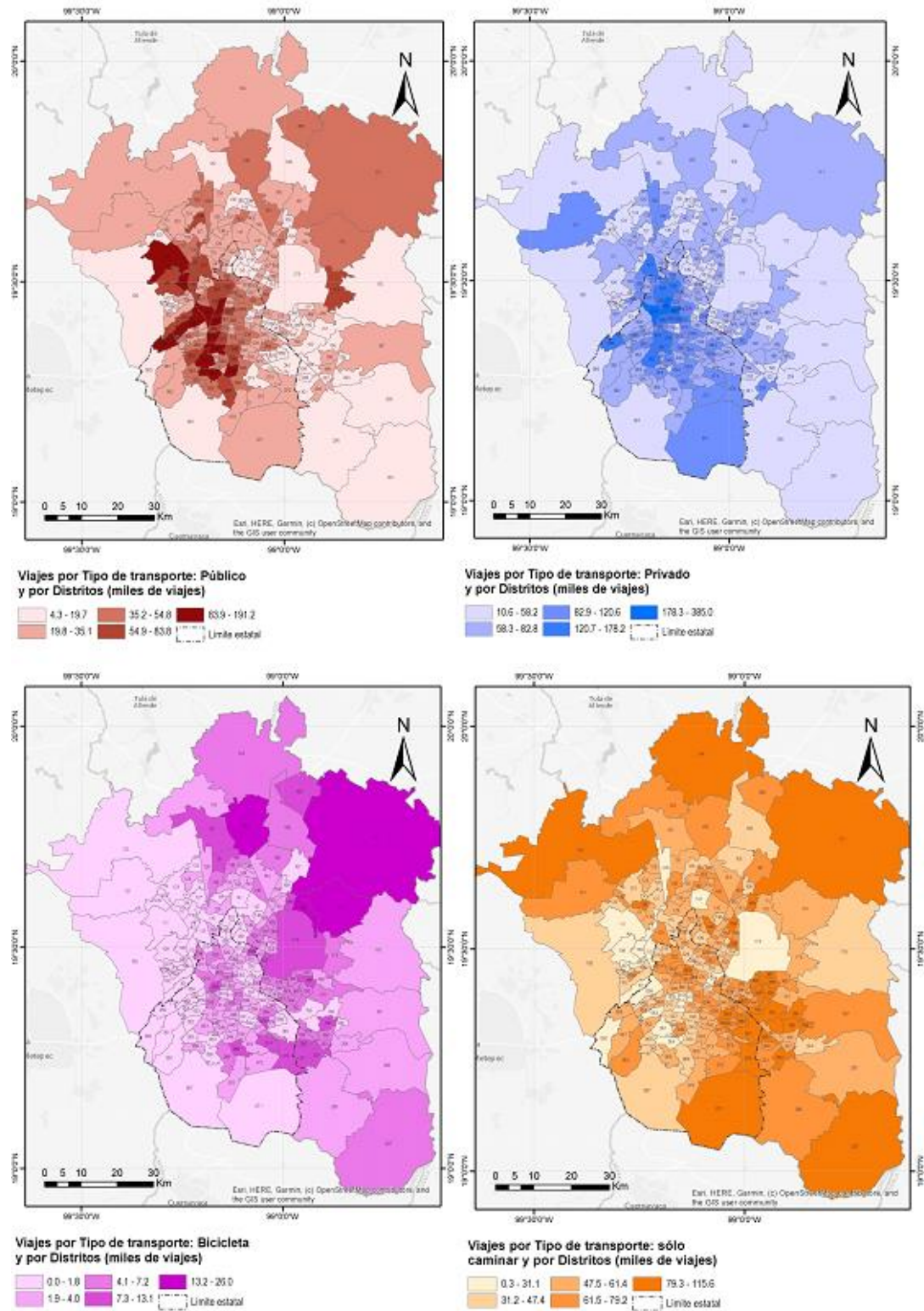

Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

This can also be seen in figure 8 with the maps separated by type of transport (the maps with "Mixed" and "Other" modes are omitted, since the maximum number of trips per district with these modes is 12,600 and 4,600, respectively).

Figure 8. Trips by district of origin according to type of transport

Viajes por Tipo de transporte: Público
y por Distritos (miles de viajes)

4.3 - 19.7	35.2 - 54.8	83.9 - 191.2
19.8 - 35.1	54.9 - 83.8	Límite estatal

Viajes por Tipo de transporte: Privado
y por Distritos (miles de viajes)

10.6 - 58.2	82.9 - 120.6	178.3 - 385.0
58.3 - 82.8	120.7 - 178.2	Límite estatal

Viajes por Tipo de transporte: Bicicleta
y por Distritos (miles de viajes)

0.0 - 1.8	4.1 - 7.2	13.2 - 26.0
1.9 - 4.0	7.3 - 13.1	Límite estatal

Viajes por Tipo de transporte: sólo
caminar y por Distritos (miles de viajes)

0.3 - 31.1	47.5 - 61.4	79.3 - 115.6
31.2 - 47.4	61.5 - 79.2	Límite estatal

Note: the names of the districts are found in table 4.

Source: Own elaboration based on Inegi (2017)

The results observed in the maps and in the statistical analysis show how in the periphery of the ZMVM women make more trips. It was also observed that it is in the periphery where the trips of the low and medium-low strata mainly originate and it is also there where the walking and private modes are mostly used, compared to public transport, which is used to a much lesser extent. In the maps it was necessary to discard the trips that did not have a specified district of origin; If they had been clear, their inclusion would have provided more precise results, however, the correlation analyzes confirm the hypothesis about the representative presence of women in mobility and the relationship with socioeconomic status and mode of transport.

Proposal

Given the responsibility carried out by the woman inherited or awarded in the home, it is recommended, especially for the low and medium-low strata, to carry out immediate and mediate mobility planning in the home.

The use of digital tools that exist in the market and that are also free is suggested. Use applications that directly involve concessioned transport to streamline urban mobility and reduce impact on cost and time. This through government regulation, to reduce and mitigate the abuse of bidders, by the policies applied and that benefit the entrepreneur (see table 9).

Table 9. Home Mobility Management Proposal

Propuesta	Responsable	Acción
Planeación de movilidad cotidiana - Mediano plazo - Corto plazo - Disruptivo (Casos imprevistos)	Mujer	Utilizando las herramientas tecnológicas y aplicaciones comerciales existentes en el mercado: Google Maps, Waze, Mapquest, Maps.me, Apple Maps, entre otras, vinculándolas con el transporte concesionado Uber, Didi, Cabify, Beat, entre otros.
Convenio con el transporte concesionado	Gobierno y transporte concesionado	Firmar acuerdos de respeto y buenas prácticas de movilidad urbana, apoyando a la población (clientes). Señalar políticas específicas para evitar violentar al usuario y evitar malas prácticas de los concesionados.
Talleres de uso y servicio del transporte público vinculado con aplicaciones digitales	Gobierno y empresas dueñas del transporte concesionado	Certificaciones en el uso de las aplicaciones y beneficios como corresponsables de su uso y asegurar una cartera considerable de clientes.

Source: self made

Discussion

In the study by Suárez et al. (2019) on mobility in CDMX, it was observed that 55% of trips were made by women. The results observed in the maps of the present study show how women also make more trips in the periphery of the ZMVM, which suggests that the mobility of women in the periphery is for tasks other than or alternative to going to the work centers located in CDMX, a situation exposed by Fagnani (1977), Sabaté (1984), Díaz (1989) and Ferré and Serra (2006), all of them cited in Riquelme (2016), and something similar to the study in the Montevideo Metropolitan area of Olivieri and Fageda (2021). This would also be explained by the tasks they perform, mainly related to home and family (Carta and De Philippis, 2018), because, despite

changes in recent decades, gender roles and mobility persist. those distinctions still occur (Havet et al., 2021).

It was also observed that it is in the periphery where the trips of the low and medium-low strata mainly originate and it is also there where the modes of walking and private are mostly used compared to public transport, which is used to a much lesser extent. The use of the walking mode agrees with the observation of Suárez et al. (2019): those with low income are the ones who use it the most. But the private mode is also used in the periphery over public transport, which could be explained by what was stated by Rodríguez and García (cited in Riquelme, 2016) about how the characteristics of the city influence the type of transport used, because it is in the periphery where there is less public transport (Olivieri and Fageda, 2021), both mass and concession.

Using the private mode in the periphery between the low and medium-low sectors indicates that these households spend a significant amount of money on mobility, since the category of transportation and communications represented, in the state of Mexico, 19.9% of household spending on mobility. in 2018 and 19.6% in 2020 and includes the acquisition, maintenance, accessories and services for vehicles, in addition to expenses in other types of transportation and expenses in communications (Inegi, 2018, 2020). This can be explained by the fact that transportation is offered where there is more population density, and in the ZMVM the density is ten times greater in the urban centers than towards its limits (Lara, Estrada, Zentella and Guevaram 2017).

The individual expense that involves mobility, and to a greater extent in the conurbation municipalities of the ZMVM (Inegi, 2020), as well as the probability that satisfying the needs requires multiple trips (Gutiérrez, 2012), add to the urgent need that transport policies focus on solving mobility in the periphery. All this agrees with what was stated by Jirón et al. (2020) on the various factors involved in mobility. And the fact that in the classification of the travel purposes of the 2017 EOD is found to "take someone or pick someone up" makes it clear that the interdependence between individuals also influences.

In other studies on mobility and gender, the distinction in mobility between men and women was also observed (Carta and De Philippis, 2018; Di Ciommo, 2017; Havet et al., 2021; Olivieri and Fageda, 2021; Riquelme, 2016), but even among women of different socioeconomic status (Riquelme, 2016), so if the various factors involved may be socioeconomic status, lifestyle, personal decisions about the choice of transport mode, the purpose of the trip (Etminani and Ardeshiri, 2015; Li et al., 2018), the structure of the city, the offer of modes of transport, the relationships between individuals and also the gender of the traveler, agrees with Jirón et al. (2020)

in that transport policies must take into account all these factors and that gender-related transport is not a "women's problem". Because certain gender roles are still reproduced (Riquelme, 2016), mobility affects women differently, so it is suggested that these differences be considered in transport policies, as Di Ciommo (2017) also suggests.), but with a view to education contributing to the reduction of these gender distinctions.

In the maps it was necessary to discard the trips that did not have a specified district of origin; Had they been clear, as already mentioned, their inclusion would have provided more precise results, however, the correlation analyzes confirm the hypothesis about the representative presence of women in mobility and the relationship with socioeconomic status and mode of transport. It is suggested, then, that obtaining mobility data be more precise so that spatial relationships provide information that helps decision-making in these transport policies.

Conclusions

The present study aimed to relate gender, socioeconomic characteristics and mode of transportation as factors in mobility. The results showed that, in terms of gender, the periphery of the ZMVM is where women make more trips than men, and it is also in the periphery from where the low and medium-low socioeconomic strata make trips, but the use of transport public is minimal. Regarding the socioeconomic strata of the 2017 EOD, the low stratum represents 0.9%, medium low 54.5%, medium high 31.2% and high 13.4%. Considering the trips by district and by socioeconomic strata, it is perceived that the low stratum has a much lower number of trips compared to the other strata, although this is explained because the low is less than 1% in the ZMVM. Something that worries us is the need to use private transport in the periphery of the low and medium-low sectors, for which, it is inferred, these households have to allocate a greater expense to be able to carry out the necessary mobility, including the expense of some supplies. .

Another important aspect to consider is the individual expense to cover the needs of mobility and multiplication of trips that mainly involve women, due to their main role of participating directly in this family activity. It is proposed that women who are heavily involved in urban mobility and home management assertively use existing digital tools on the market and consider them essential to plan their daily activities that require necessary and daily travel and thus seek to reduce costs and optimize time.

Future lines of research

Currently, the life choices of young people and their relationship with the choice of transport modes are analyzed (Zhang and Jiang, 2020), so performing an analysis involving the ages of users can provide data on mobility distinctions between age groups in addition to gender, which would help to carry out a forecast of the needs for the provision of transport services, as well as dissemination and education on mobility issues in search of the quality of life of the population.

References

Cabrera, G., Velásquez, N. y Orozco, A. (2015). Movilidad: Aporte para su discusión. *Revista Facultad Nacional de Salud Pública*, *33*(3). Recuperado de https://doi.org/10.17533/udea.rfnsp.v33n3a13.

Carta, F. and De Philippis, M. (2018). You've come a long way, baby. Husbands' commuting time and family labour supply. *Regional Science and Urban Economics*, *69*, 25-37. Retrieved from https://doi.org/10.1016/j.regsciurbeco.2017.12.004.

Di Ciommo, F. (2017). Derecho a la ciudad, necesidades de movilidad: un nuevo enfoque para la evaluación de las políticas de transporte. *Papers: Regió Metropolitana de Barcelona: Territori, Estratègies, Planejament*, (59), 46-56.

Etminani, R. and Ardeshiri, M. (2015). Modeling travel behavior by the structural relationships between lifestyle, built environment and non-working trips. *Transportation Research Part A: Policy and Practice*, *78*, 506-518. Retrieved from https://doi.org/10.1016/j.tra.2015.06.016.

Gori, A., Silva, C., Venâncio, L. C. and Dias, E. (2020). The Motives Behind Transport Mode Choice: a Study with University Students in Brazil. *Ambiente & Sociedade*, 23. Retrieved from https://doi.org/10.1590/1809-4422asoc20170188r4vu2020l5ao.

Gutiérrez, A. (2012). ¿Qué es la movilidad? Elementos para (re)construir las definiciones básicas del campo del transporte. *Bitácora Urbano Territorial*, *21*(2), 61-74.

Havet, N., Bayart, C. and Bonnel, P. (2021). Why do Gender Differences in Daily Mobility Behaviours persist among workers? *Transportation Research Part A: Policy and Practice*, *145*, 34-48. Retrieved from https://doi.org/10.1016/j.tra.2020.12.016.

Instituto Nacional de Estadística y Geografía [Inegi]. (2017). Encuesta Origen Destino en Hogares de la Zona Metropolitana del Valle de México. México: Instituto Nacional de Estadística y Geografía. Recuperado de https://www.inegi.org.mx/programas/eod/2017/.

Instituto Nacional de Estadística y Geografía [Inegi]. (2018). Encuesta Nacional de Ingresos y Gastos de los Hogares 2018. México: Instituto Nacional de Estadística y Geografía. Recuperado de https://www.inegi.org.mx/temas/ingresoshog/.

Instituto Nacional de Estadística y Geografía [Inegi]. (2019). Encuesta Anual de Transportes 2019. México: Instituto Nacional de Estadística y Geografía. Recuperado de https://www.inegi.org.mx/rnm/index.php/catalog/549.

Instituto Nacional de Estadística y Geografía [Inegi]. (2020). Encuesta Nacional de Ingresos y Gastos de los Hogares 2020 (ENIGH). México: Instituto Nacional de Estadística y Geografía.

Jirón, P., Carrasco, J. A. and Rebolledo, M. (2020). Observing gendered interdependent mobility barriers using an ethnographic and time use approach. *Transportation Research Part A: Policy and Practice*, *140*, 204-214. Retrieved from https://doi.org/10.1016/j.tra.2020.08.018.

Joshi, S., Bailey, A. and Datta, A. (2021). On the move? Exploring constraints to accessing urban mobility infrastructures. *Transport Policy*, *102*, 61-74. Retrieved from https://doi.org/10.1016/J.TRANPOL.2020.11.005.

Lara, J. A., Estrada, G., Zentella, J. C. y Guevara, A. (2017). Los costos de la expansión urbana: aproximación a partir de un modelo de precios hedónicos en la Zona Metropolitana del Valle de México. *Estudios Demográficos y Urbanos*, *32*(1), 37. Recuperado de https://doi.org/10.24201/edu.v32i1.1615.

Li, J., Lo, K. and Guo, M. (2018). Do Socio-Economic Characteristics Affect Travel Behavior? A Comparative Study of Low-Carbon and Non-Low-Carbon Shopping Travel in Shenyang City, China. *International Journal of Environmental Research and Public Health*, *15*(7), 1346. Retrieved from https://doi.org/10.3390/ijerph15071346.

Malokin, A., Circella, G. and Mokhtarian, P. L. (2019). How do activities conducted while commuting influence mode choice? Using revealed preference models to inform public transportation advantage and autonomous vehicle scenarios. *Transportation Research Part A: Policy and Practice*, *124*, 82-114. Retrieved from https://doi.org/10.1016/j.tra.2018.12.015.

Montezuma, R. (2003). Ciudad y transporte: la movilidad urbana. En Balbo, M., Jordán, R. y Simioni, D. (eds.), *La ciudad inclusiva*, (175-192). Santiago, Chile: Comisión Económica para América Latina y el Caribe.

Olivieri, C. and Fageda, X. (2021). Urban mobility with a focus on gender: The case of a middle-income Latin American city. *Journal of Transport Geography*, *91*. Retrieved from https://doi.org/10.1016/J.JTRANGEO.2021.102996.

Riquelme, H. (2016). Movilidad cotidiana: entre la producción y reproducción social. Una exploración a las prácticas de desplazamiento de dos mujeres en Temuco. *Revista Pilquen. Sección Ciencias Sociales*, *19*(4), 8. Recuperado de http://revele.uncoma.edu.ar/htdoc/revele/index.php/Sociales/article/view/1447.

Sánchez, B. (2011). *Desarrollo de una metodología y su modelo matemático para determinar las bases técnico – económicas en el cálculo de tarifas del transporte público urbano. "El caso de la Ciudad de Puebla".* (Tesina de especialidad). Instituto Politécnico Nacional, Ciudad de México.

Suárez, M., Galindo, M. C. y Reyes, V. (2019). Cómo nos movemos en la Ciudad de México. En Flores, J. I. (ed.), *Inventario de la Ciudad de México: presente y futuro de su gente* (pp. 255–293). Ciudad de México, México: Instituto de Investigaciones Jurídicas, UNAM. Recuperado de https://archivos.juridicas.unam.mx/www/bjv/libros/12/5965/3.pdf.

Thorhauge, M., Kassahun, H. T., Cherchi, E. and Haustein, S. (2020). Mobility needs, activity patterns and activity flexibility: How subjective and objective constraints influence mode choice. *Transportation Research Part A: Policy and Practice*, 139, 255-272. Retrieved from https://doi.org/10.1016/j.tra.2020.06.016.

World Business Council for Sustainable Development [WBCSD]. (2004). *Mobility 2030: Meeting the Challenges to Sustainability*. Geneva, Switzerland: World Business Council for Sustainable Development.

Zhang, J. and Jiang, Y. (2020). An introduction to the special issue of young people's life choices and travel behavior. *Transportation Research Part D: Transport and Environment*, *85*. Retrieved from https://doi.org/10.1016/j.trd.2020.102477.

Rol de Contribución	Autor (es)
Conceptualización	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Metodología	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Software	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Validación	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Análisis Formal	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>.
Investigación	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Recursos	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez

	Nájera <igual>, Minerva Martínez Ortega<igual>
Curación de datos	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Escritura - Preparación del borrador original	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Escritura - Revisión y edición	Ma. de los Ángeles Martínez Ortega <igual>, Laura Vázquez Nájera <igual>, Minerva Martínez Ortega<igual>
Visualización	Ma. de los Ángeles Martínez Ortega
Supervisión	Ma. de los Ángeles Martínez Ortega
Administración de Proyectos	Ma. de los Ángeles Martínez Ortega
Adquisición de fondos	Ma. de los Ángeles Martínez Ortega