Transport and Accessibility in Metro Manila
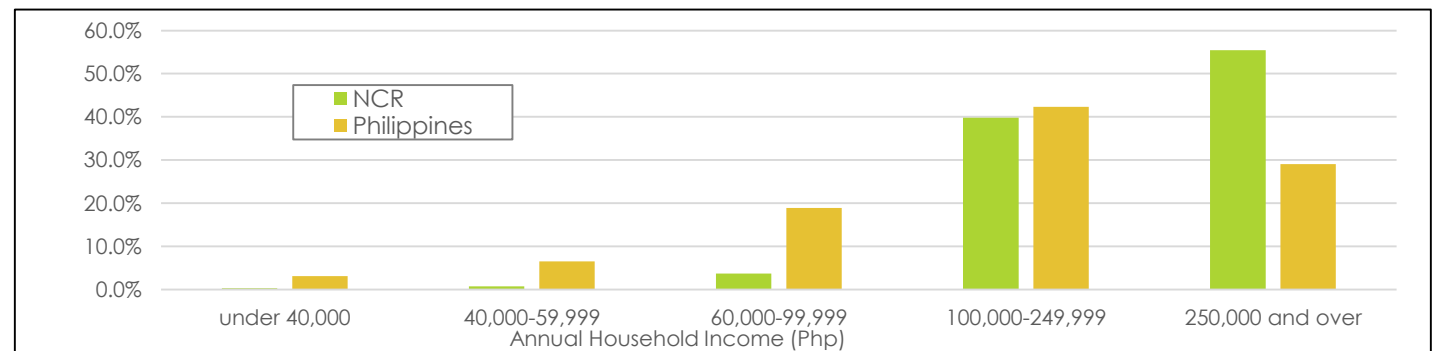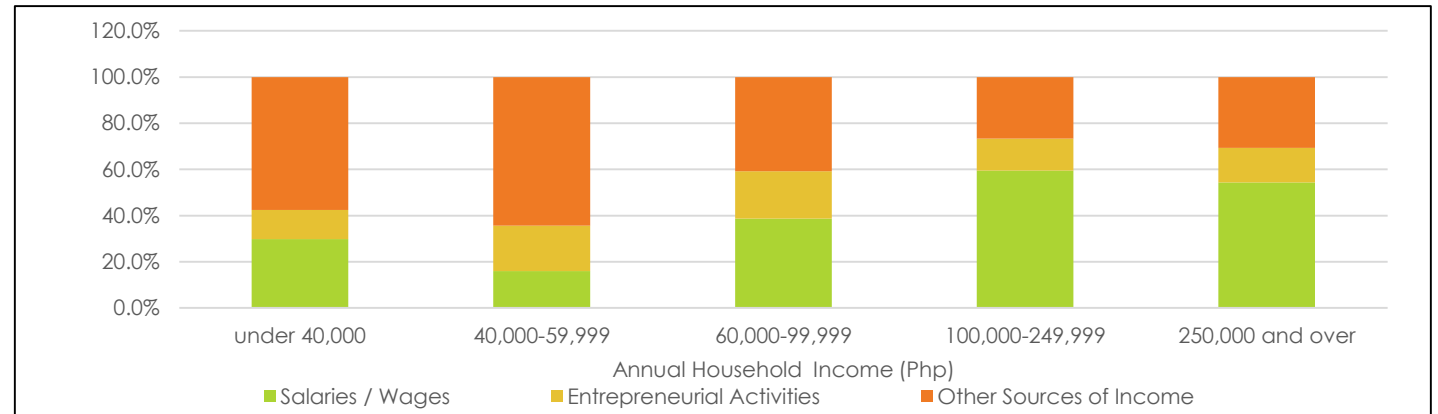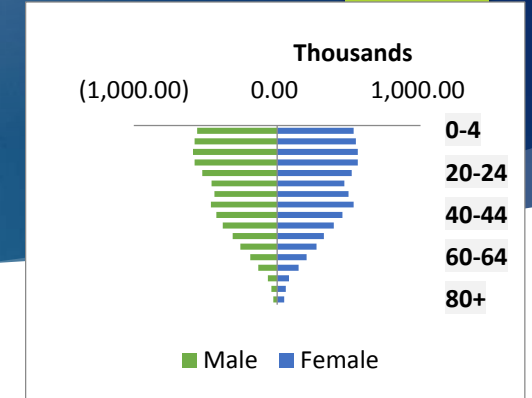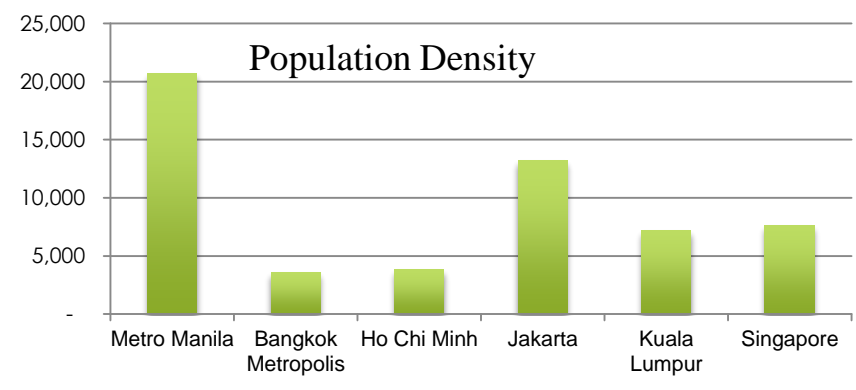
Jose Bienvenido Manuel M. Biona, Ph.D.
Center for Engineering and Sustainable Development
De La Salle University, Manila

GCRF Network Launch
Transport and Mobilities : Meeting the Needs of Vulnerable Population in Developing Cities
 22 - 23 February 2017

Metro Manila at a Glance

Transport Mode Share

Area	Public Mode Share	Private Mode Share
Metro Manila	69.6%	30.4%

Parameter	PUJ				AUV/FX				Non-EDSA bus / EDSA bus		Total
End to end route length	Short (<5km)	Medium (5km-10km)	Long (10km-20km)	Extra Long (20km+)	Short (<10km)	Medium (10km-20km)	Long (20km-50km)	Extra Long (50km+)	Non-EDSA	EDSA bus	
Average pax per one way trip	14.5	20.7	27.6	31	8.2	7.8	10	13	60.5	104.5	-
Average pax distance per trip (km)	1.72	3.49	5.77	11	2.4	5.32	9	19.9	10.6	10.2	-
Average speed (km/h)	11	12.9	15.5	25	14.94	20.77	19	29.45	16.9	19.5	-
Average number of vehicles operating route	92	158	171	170	29	52	52	52	-	-	-
Number of operational routes	150	148	231	41	90	127	119	11	17	40	
Total number of vehicles	13,748	23,376	39,386	6,954	2,592	6,626	6,208	574	1,000	3,000	
Average round trips per vehicle per day	9.6	6.4	4.4	3.3	4.7	3.2	3.0	1.5	3.9	3.0	-
Average number of 'work' days per vehicle week	5.4	5.5	5.3	5.3	5.3	5.3	5.3	5.3	6.2	6.2	
Average number of passengers on a weekday (1,000)	2,975	4,863	7,296	1,060	151	250	288	17	418	1,666	18,985
Total passenger km travelled (1,000km)	5,117	16,973	42,100	11,637	363	1,332	2,566	337	4,430	16,993	101,850

Source: Mega Manila Public Transport Study, 2007

Bus Routes

Jeepney Routes

AUV Routes

LRT Routes
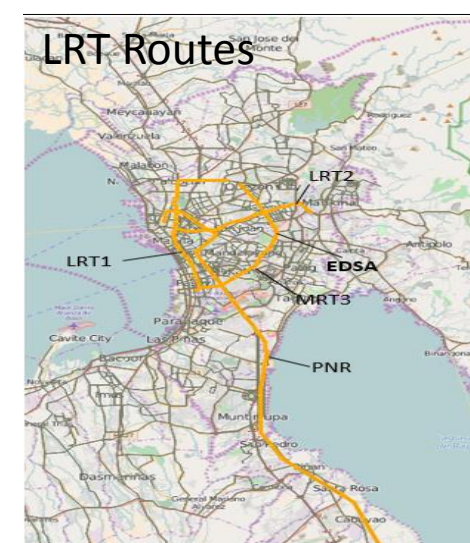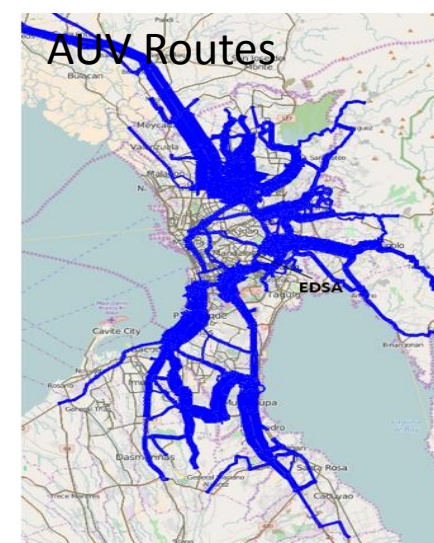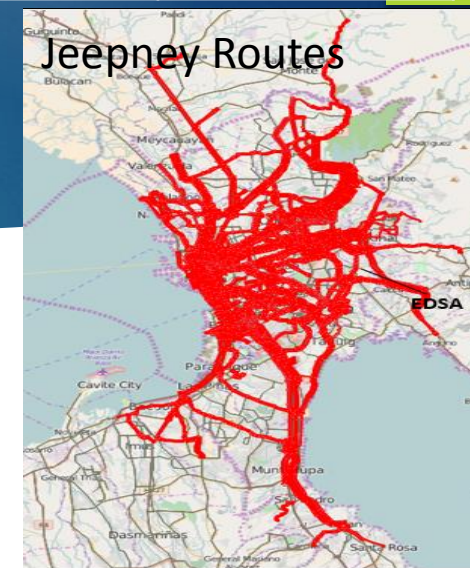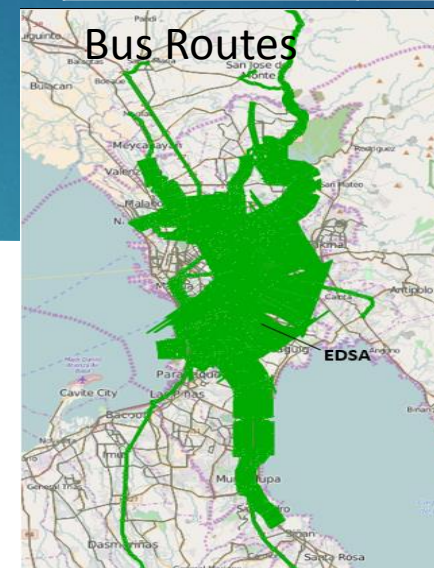
Issues and Concerns

Traffic Congestion

Time Period	Ave. Speed (km/hour)		
	All Public Bus Routes	All Public Utility Jeepney Routes	All Asian Utility Vehicle Routes
0000–0600	19.34	14.70	24.65
0600–0900	18.43	14.65	21.58
0900–1600	16.80	15.13	25.85
1600–1900	16.34	12.86	24.53
1900–2400	16.74	12.74	29.25

Source: MMPTS, DOTC

Area	Road Length (km)	Ave. V/C Ratio	Rd. Section (km) with Speed		PCU (000)		Pax (000)		Modal Share (%)			
			< 10 kph	< 20 kph	kms	hrs.	kms	hrs.	Car	Jeepney	Bus	Total
MM Manila City	135	1.31	102	124	3,870	701	11,023	1,973	32	42	26	100
MM North	404	1.26	236	325	20,041	2,450	62,532	7,509	31	40	29	100
MM Center	135	1.23	85	108	6,976	898	21,192	2,649	38	29	33	100
MM South	131	1.21	73	99	8,380	856	27,600	2,540	34	30	36	100
Sub-Total MM	805	1.25	495	656	39,266	4,905	122,347	14,672	33	36	31	100
Sub-Total Adj. Prov.	1,478	0.53	155	332	27,757	1,804	96,884	6,012	28	28	44	100
Total - Mega Manila	2,284	0.80	651	989	67,024	6,709	219,231	20,683	31	33	35	100

Source: JICA Study Team Estimate.

Issues and Concerns

PHILIPPINE DAILY INQUIRER

POLLUTION PLAGUE

Fumes kill 16 daily

BY CARLITO PABLO
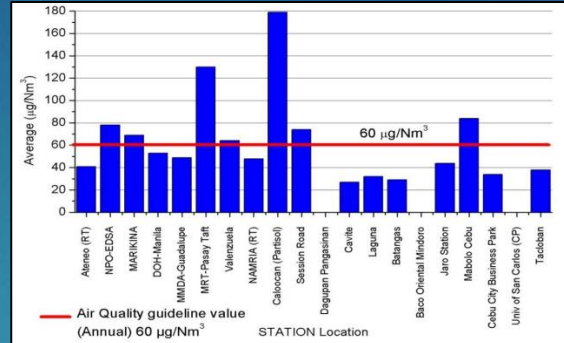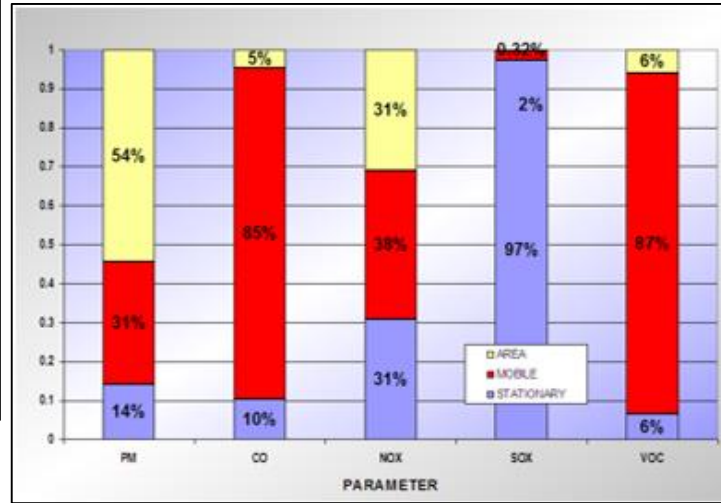
Age	Acute Lower Respiratory Infection (ALRI) (including Pneumonia)*	Acute Bronchitis**
0 to 4	274,112	427,711
5 to 14	60,766	195,812
15 to 19	8,464	10
20 to 29	13,875	16
30 to 64	40,374	41
65 and older	16,844	12
Total	414,437	623,602

Source: Arcenas, Agustin B. 2009. Environmental Health: Economic Costs of Environmental Damage and Suggested Priority Interventions: A Contribution to the Philippines Country Environmental Analysis. Manila: World Bank.
* Hospitalized and non-hospitalized cases.
** Cases in age group 15+ years are hospitalized cases only.

No,	Urban Area Population	Country	Population (Millions)	GDP (USD bn)	Total GHG (MtCO$_2$e)	Total GHG (tCO$_2$e/cap)	GHG per GDP (ktCO$_2$e/USD bn)
1	Tokyo	Japan	35.53	1191	174	4.9	146
2	Mexico City	Mexico	19.24	315	55	2.8	173
3	Mumbai	India	18.84	126	25(est)	1.3(est)	198
4	New York	USA	18.65	1133	196	10.5	173
5	São Paulo	Brazil	18.61	225	26	1.4	116
6	Delhi	India	16	93	24	1.5	258
7	Calcutta	India	14.57	94	16	1.1	171
8	Jakarta	Indonesia	13.67	98	24(est)	1.8(est)	245
9	Buenos Aires	Argentina	13.52	245	52	3.8	211
10	Dhaka	Bangladesh	13.09	52	8	0.6	159
11	Shanghai	China	12.63	139	148	11.7	1063
12	Los Angeles	USA	12.22	639	159	13	249
18	Beijing	China	10.85	99	110	10.1	1107
19	Moscow	Russia	10.82	181	167(est)	15.4(est)	922
20	**Metro Manila**	**Philippines**	**10.8**	**108**	**16(est)**	**1.5(est)**	**147**
21	Istanbul	Turkey	10	133	51(est)	5.1(est)	384
22	Paris	France	9.89	460	51	5.2	112
23	Seoul	South Korea	9.52	218	39	4.1	179
33	Bangkok	Thailand	6.65	89	71	10.7	799
49	Ho Chi Minh City	Vietnam	5.1	38	6(est)	1.2(est)	158
50	Chongqing	China	5.06	35	19	3.7	535

Source: World Bank, Cities and Climate Change: An Urgent Agenda, 2010

	Category	%	CO$_2$	CH$_4$	N$_2$O	Total
Energy	Mobile source	38.72	7,981.12	39.57	121.6	8,142.30
	Road		7,925.32	39.57	121.68	8,086.17
	Railways*		55.8	0.003	0.32	56.13
	Stationary source	61.28	12,855.61	18.45	9.6	12,883.67
	Residential /Commercial		8,475.28	15.41	2.77	8,493.46
	Industrial		4,380.33	3.04	6.83	4,390.21
Total Energy emissions			20,836.73	58.03	131.21	21,025.97
Waste				2,292.67	203.1	2,495.89
Gross Emissions			20,866.94	2,351.44	334.24	23,552.63

Thousand ton CO$_2$eq (CO$_2$ Equivalent)

Source: USAID (2010) Annex 2 Climate Change and Clean Energy Project, Metro Manila Greenhouse Gas Inventory
Note: *Breakdown of the Railways are Direct, diesel emission by PNR, indirect: 2.99, electricity consumption by LRT, 53.14

Issues and Concerns

Road Safety and Comfort

Source : Faustino et al (2015)

Common Internal Fittings Issues
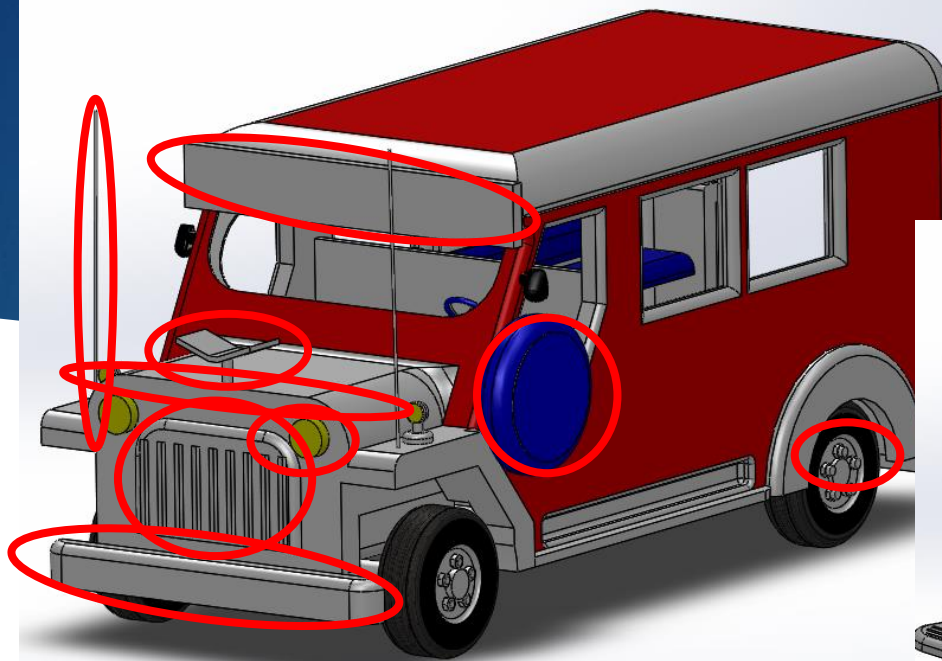
Common External Projection and Pedestrian Safety Issues
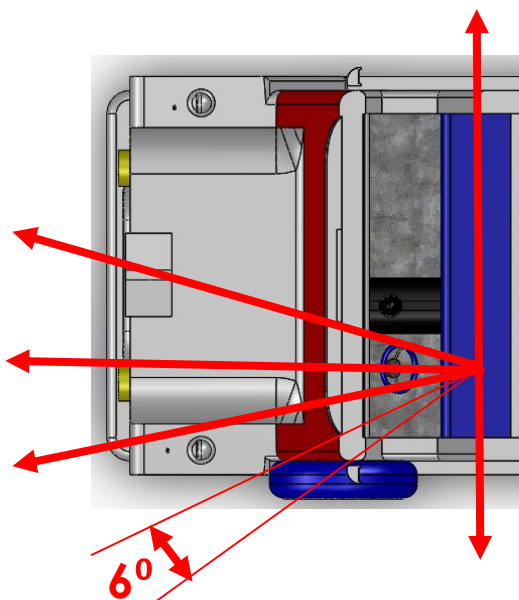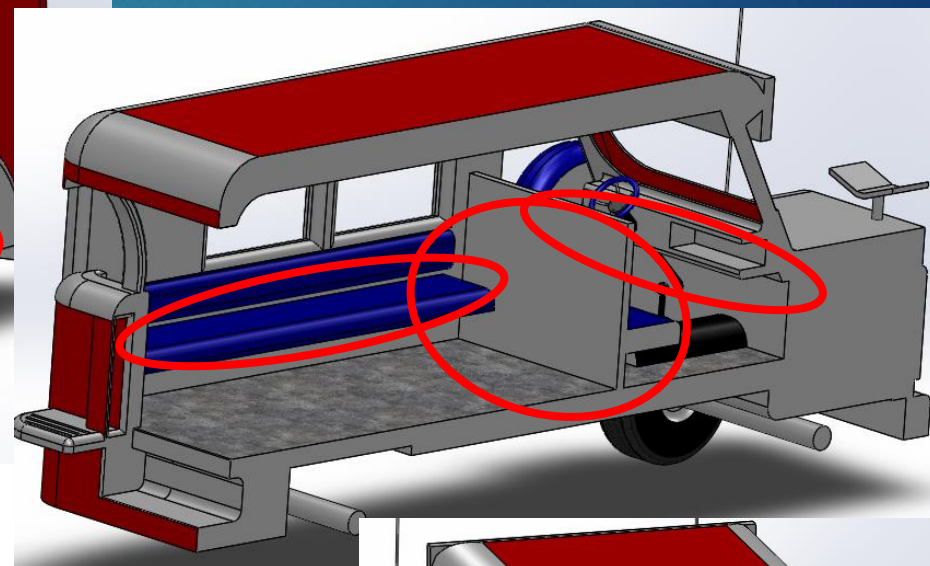
Common Field Vision Issues
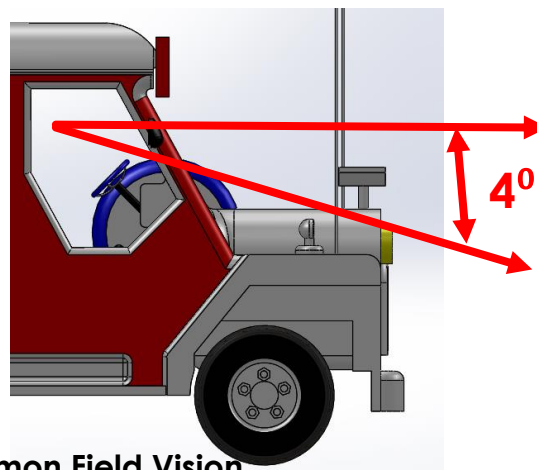
Entry and Exit Issues

4^0

6^0

Issues and Concerns

Road Safety and Comfort

How Manila Is Making Streets Safer for Women

The streets of Manila are a dangerous space for women. The scenes are, unfortunately, recognizable from other urban environments: women get catcalled on sidewalks, elicit wolf-whistles on *eskinitas,* or "alleys," receive lewd stares in public markets, or are groped on public transit. But when women in Manila recently spoke up, the government took notice.

Philippines 2015 Crime and Safety Report

Product of the Research & Information Support Center (RISC)

- Traffic is dense, chaotic and unpredictable and driver are often undisciplined.
- Driving off the national highways and paved roads is dangerous especially at night and d=should be avoided.
- Potholes and unfinished road constructions and diggings poses safety hazards.
- Never share a taxi cab with a stranger and be careful when hailing taxis. Forward to a friend taxi driver name and plate number upon riding taxis
- Etc.

- Chivalry is dead?
- Women sexual harassment vulnerability in public utility vehicles.
  Overcrowding thus physical contact is treated as normal and acceptable . Anonymity and transient nature of occurrence making it hard to report

Issues and Concerns

Public Transport Availability and Reliability

Source : Castro (2012)

LTFRB eyes lifting of franchise moratorium within the year

Like 16   Share 0   Tweet 0   Google + 0   Share 0

Posted on August 29, 2016

DAVAO CITY -- The Land Transportation Franchising and Regulator (LTFRB) is looking at the possible lifting of the moratorium on the i franchises for public utility vehicles (PUVs) within the year to respo growing need for public transportation around the country, accordi

Legend
PT Routes Buffer (250m)
Informal Settlers
Primary Roads
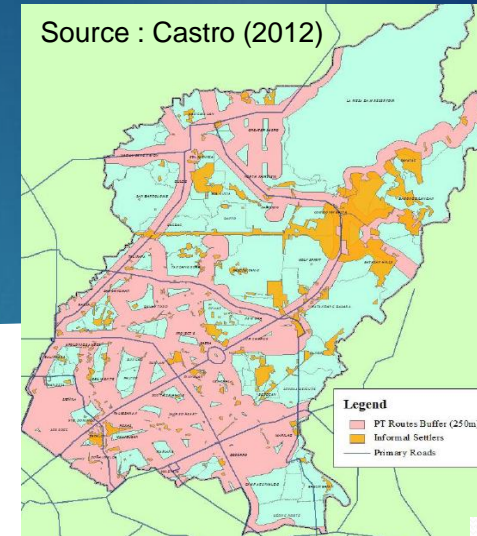
Modal Split	
Transport Mode	**Percentage Share**
Private Vehicle	1.85%
Shuttle Bus	0.93%
Taxi	3.24%
FX	17.13%
MRT	0.93%
Public Utility Bus	8.33%
Public Utility Jeep	34.26%
Tricycle	14.35%
Walk	18.98%
Total	100.00%

Issues and Concerns

Affordability

Fare hike fails to appease striking jeepney drivers

BY FRANCIS EARL CUETO, TMT ON FEBRUARY 7, 2017

TODAY'S HEADLINE PHOTOS, TOP STORIES

JEEPNEY drivers protesting a government phase-out plan stranded commuters in Metro Manila and nearby provinces and forced schools to cancel classes on Monday.

Consumption Items	Estimated Share of Income		Consumption Incidence	
	Non-Poor	Poor	Non-Poor	Poor
Food	36.38%	49.94%	100.00%	100.00%
Alcoholic Beverages	0.58%	0.90%	59.60%	51.59%
Tobacco	0.59%	0.95%	52.82%	49.09%
Fuel, Light & Water	7.53%	9.37%	100.00%	100.00%
Transport & Communication	7.47%	4.96%	99.86%	96.10%
Household Operations	1.86%	1.52%	100.00%	100.00%
Personal Care & Effects	3.49%	4.40%	100.00%	100.00%
Clothing, Footwear & Other Wear	1.92%	2.00%	99.23%	97.27%
Education	3.18%	0.70%	78.65%	57.91%
Recreation	0.39%	0.22%	69.59%	46.68%
Medical Care	1.64%	1.55%	99.39%	97.96%
Non-durable Furnishings	0.13%	0.10%	45.70%	31.85%
Durable Furnishings	1.75%	1.13%	40.36%	22.77%
Taxes Paid	2.33%	0.36%	65.25%	28.36%
Rental Value of Dwelling Unit	15.47%	17.46%	100.00%	100.00%
House Repairs & Maintenance	0.26%	0.16%	14.14%	8.31%
Special Occasions of the Family	1.58%	1.05%	85.25%	65.10%
Gifts & Contributions to Others	1.63%	1.52%	70.57%	68.46%
Other Expenditures	1.94%	0.81%	77.13%	31.33%
Savings	9.89%	0.91%	100.00%	59.37%
Average Household Income	416,002	115,433		
Average Household Expenditure	357,387	117,087		
Per Capita Income	105,362	44,008		
Per Capita Expenditure	90,020	42,521		

Responsiveness of Fare Levels and MRT3 Ridership to Inflation and Diesel Prices

Subsidy for MRT3
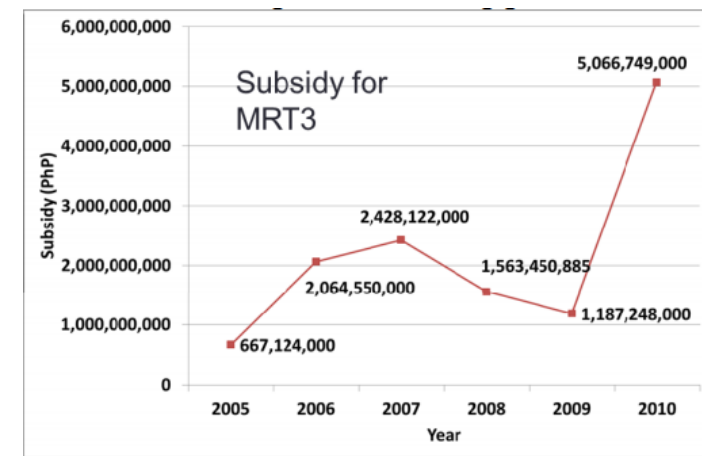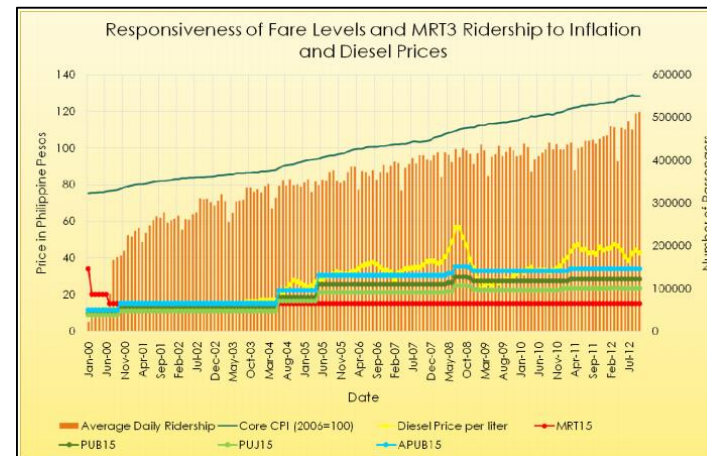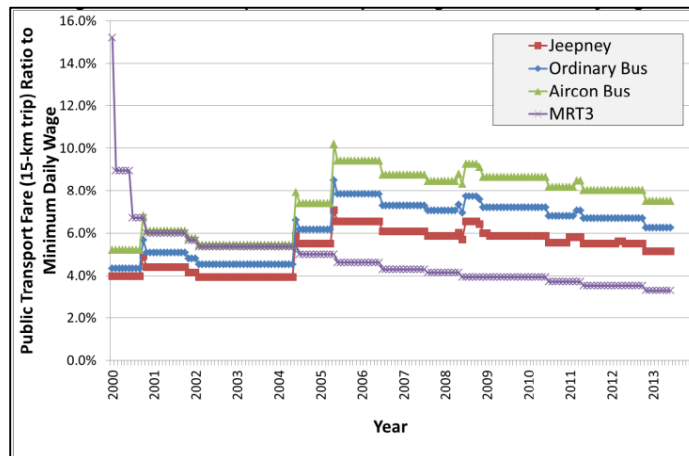
Issues and Concerns

Flooding

Flash floods trigger Metro Manila 'carmageddon'

'I left office on Sept. 8; I got home on Sept. 9'

By: Jeannette I. Andrade, Kristine Felisse Mangunay, Maricar B. Brizuela, Ramon H. Royandoyan - @inquirerdotnet
Philippine Daily Inquirer / 01:11 AM September 10, 2015
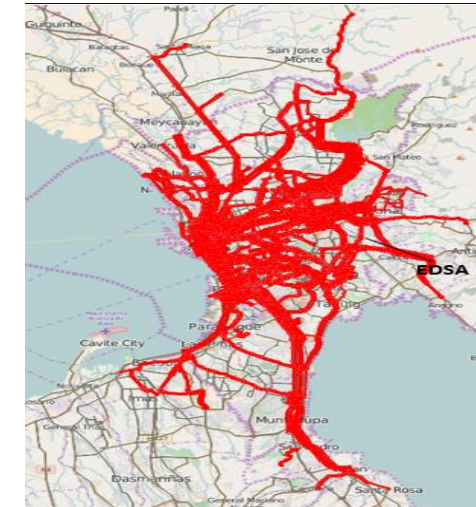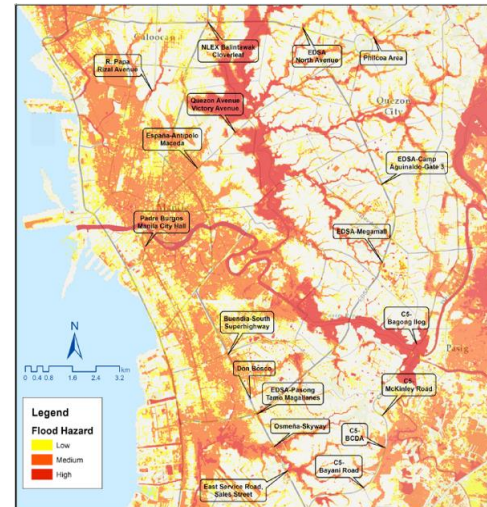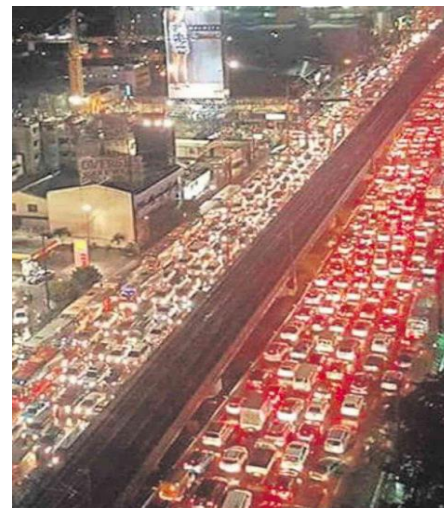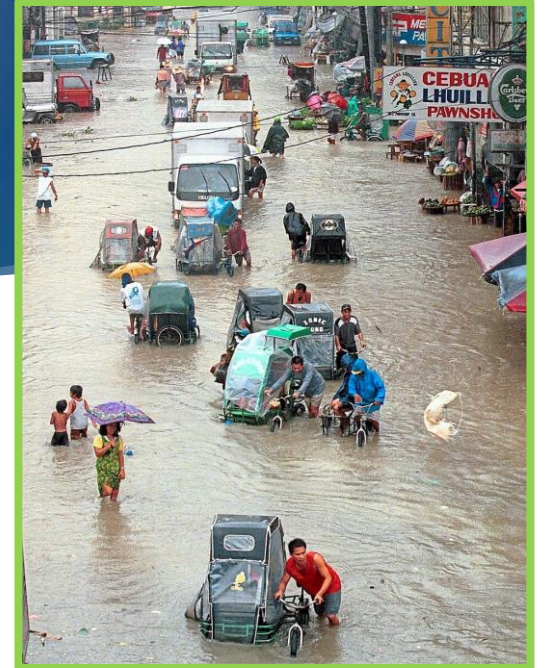
Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers
- "Externally" based workers
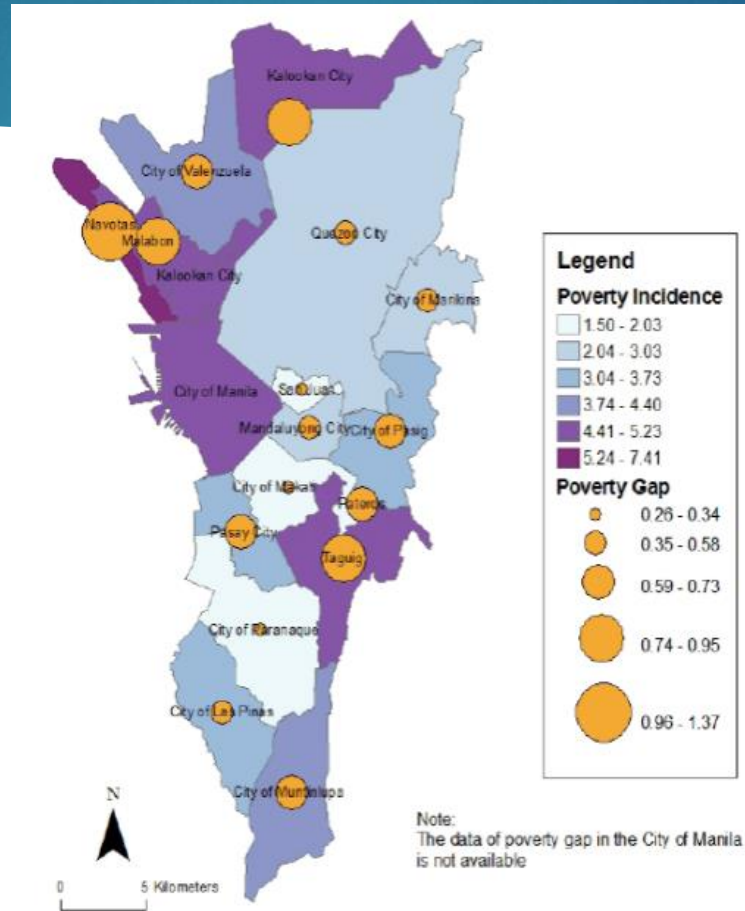
Poverty Status	Vulnerability Level	2000	2003	2006
Poor				
	Highly Vulnerable	77.62	74.66	86.52
	Relatively Vulnerable	17.97	21.07	11.99
	Not Vulnerable	4.41	4.27	1.49
Non Poor				
	Highly Vulnerable	23.62	19.68	33.15
	Relatively Vulnerable	34.04	37.21	39.29
	Not Vulnerable	42.34	43.11	27.57
Total				
	Highly Vulnerable	41.76	36.21	50.70
	Relatively Vulnerable	28.64	32.36	30.31
	Not Vulnerable	29.60	31.44	18.99

Note:
The data of poverty gap in the City of Manila is not available

Average Number of Young and Adults, by FIES Year (Urban)

Source : Albert and Ramos (2010)

Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers
- "Externally" based workers

2000   2020

Congestion	Flooding/Mud	Poor Sanitation	Pollution (Air and Noise)
•On hot days, men sleep outside the house for the family to have more space. •Go to nearby malls •The elderly wet the blanket and damp on body •Children dip in polluted water. •The residents or the community agreed to stop the use of gasera or improvised cooking ranges to avoid fire •When there is power interruption, remind neighbors' vigilance in using candles, cooking range, and to keep matches/lighters away from the kids •Children avoid wearing upper clothing •Women take a bath 3 times a day, while men don't wear tops	•On rainy days, households stay in the house and limit outside activities. •To minimize effect of flooding around the house, they usually elevate house using soil and scrap filling materials •To minimize effect of flooding in the house they raise furniture using levers, some build multi-level housing •Use plywood as bridge when it rains •Borrow from informal lenders to buy boots for the household. One pair of boots costs P450 paid for P20 for 25 days. If houshold can afford only one pair, the men is given priority. •Prepares candles, flashlights and medicines for emergency •Raise wood planks to serve as "second floor" •Stay on top of furniture for sleeping/eating •Surround house with slippers to prevent garbage from entering the house	•Limit bowel movement •Bear smell of surroundings •Use plastic bags for human waste •Reduce toilet usage •Children just squat on soil to relieve themselves •Pay for use of public toilet •Use river as toilet	•When finances are tight, households boil water •The residents just bear the smoke •Cover nose with towels •Fanning and use of air freshener •Refer to household association to call attention of neighbors causing noise and to require tricycle drivers to reduce noise from their motor. •Some tricycle owners use silencer or new technology (4-stroke brand) to lessen noise •Use earphones •Bear the noise and watch television

Source : Ballesteros (2010)

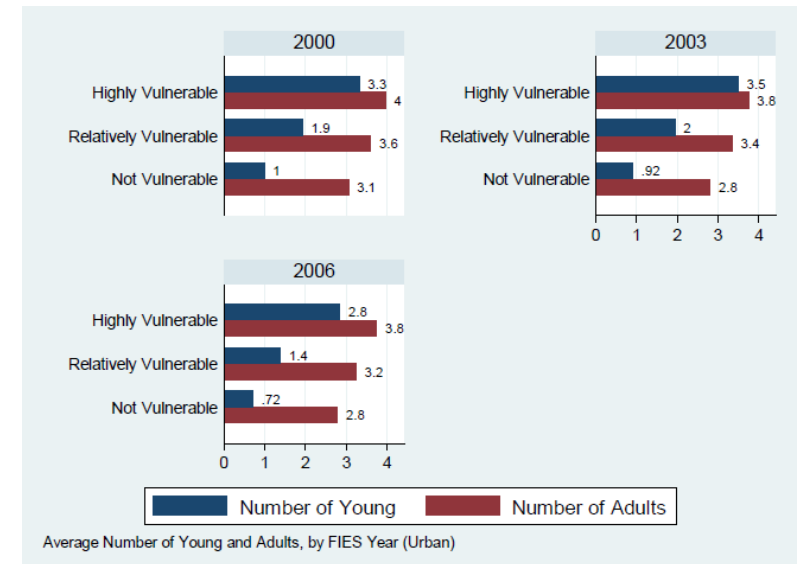# Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers
- "Externally" based workers

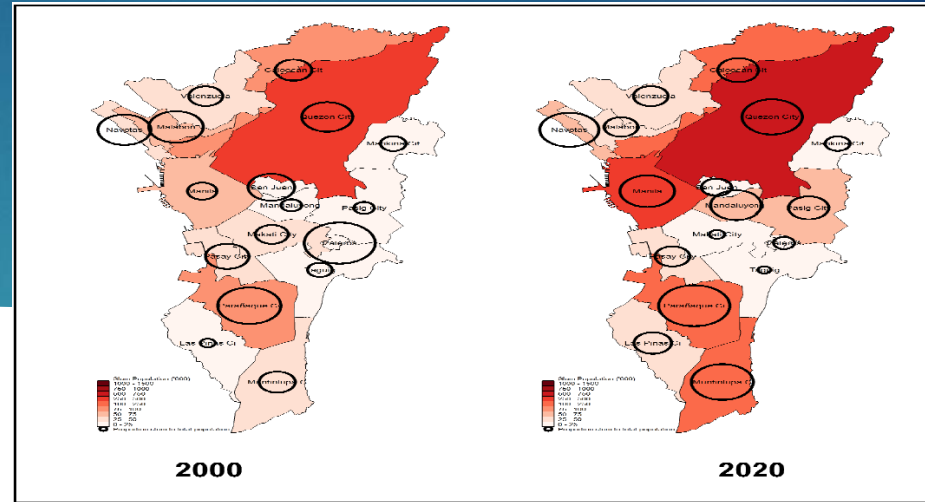## Poor Communities

Primary Mobility Problems

Mobility Problems	Area H	Purok Centro	Purok 13
high transport cost	75.00%	97.35%	74.49%
insufficient supply of public transport/MRT	2.00%	0.00%	2.04%
lack of pedestrian facilities/sidewalks	1.00%	0.00%	1.02%
non-operational stoplights	1.00%	0.00%	1.02%
pollution	1.00%	0.88%	1.02%
poorly maintained vehicles	3.00%	0.00%	3.06%
traffic congestion	10.00%	1.77%	10.20%
undisciplined loading and unloading of passengers	2.00%	0.00%	2.04%
vehicle accidents	5.00%	0.00%	5.10%

Source : Carreon and Carreon (2012)

Vulnerable Groups

- ▶ Poor
- ▶ Women
- ▶ Children
- ▶ Person with Disabilities
- ▶ Senior Citizens
- ▶ BPO Workers

City	Population		Age		Gender	Education
	Total Population	Annual Growth Rate	5 years and below	65 years and above	% Female	Less Than High School
Marikina	424150	0.81%	10.0%	3.8%	51.3%	27.7%
Pasig	669773	2.86%	10.8%	3.0%	51.4%	27.1%
Caloocan	1489040	2.37%	11.3%	2.8%	50.1%	31.0%
Malabon	353337	0.42%	11.4%	3.2%	49.9%	33.8%
Navotas	249131	0.78%	12.2%	2.9%	50.7%	40.5%
Valenzuela	575356	1.71%	11.7%	2.6%	49.8%	30.1%
Pateros	64147	1.12%	10.6%	4.1%	50.9%	28.3%
Taguig	644473	3.26%	12.2%	2.1%	50.4%	28.7%
Manila	1652171	0.44%	10.4%	3.5%	50.9%	27.5%
Quezon	2761720	2.42%	10.7%	3.2%	51.3%	27.8%
Paranaque	588126	2.72%	10.5%	3.0%	51.7%	28.0%

Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers
- "Externally" based workers

Vulnerable Groups – Women

- Preferred Public Transport Modes: Tricycle, PUJs, and walking
- Women are subject to the same cost of transport as any other regular commuter
- Issues on pedestrian facilities especially overpasses:
  - height and steepness,
  - location,
  - condition and need for repair,
  - lack of cover, and
  - lack of lights at night

Source : Carreon and Carreon (2012)

Vulnerable Groups

- ▶ Poor
- ▶ Women
- ▶ Children
- ▶ Person with Disabilities
- ▶ Senior Citizens
- ▶ BPO Workers

City	Size	Disability	Poverty	Housing Tenure			
	Ave. Household Size	Poor Household With Disabled	Incidence	Owned	Rented	Free with Owner Consent	Free without Owner Consent
Marikina	4.71	7.5%	2.2%	66.2%	23.8%	8.9%	0.4%
Pasig	4.45	7.6%	2.2%	54.3%	34.5%	7.5%	1.4%
Caloocan	4.46	8.6%	3.1%	59.3%	28.0%	10.3%	1.5%
Malabon	4.59	7.7%	4.0%	54.5%	28.6%	9.4%	7.0%
Navotas	4.46	8.0%	3.8%	59.8%	20.9%	12.9%	5.8%
Valenzuela	4.42	7.1%	3.7%	43.2%	43.5%	2.5%	1.2%
Pateros	4.78	8.3%	3.0%	61.3%	28.2%	8.2%	0.8%
Taguig	4.46	7.4%	2.7%	53.6%	35.5%	8.8%	0.6%
Manila	4.32	8.7%	3.7%	40.2%	40.1%	13.3%	5.4%
Quezon	4.48	6.1%	2.0%	43.0%	29.8%	12.2%	10.9%
Paranaque	4.38	8.3%	2.4%	49.8%	26.6%	12.5%	8.2%

Vulnerable Groups

- Poor
- Women
- Children
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- "Externally" based workers

Highest Educational Attainment	Type of Impairment				
	Mobility	Visual	Hearing	Multiple	Total
Never attended school	3.6	13.2	4.6	23.1	7.9
Kindergarten/preparatory school	0.0	0.0	1.8	0.0	0.5
Grades I to V	8.7	15.3	25.9	15.4	15.9
Elementary school graduate	8.0	9.7	5.6	0.0	7.7
1 to 3 years of high school	18.1	8.3	18.5	0.0	14.1
High school graduate	18.8	16.7	22.2	38.5	19.6
Vocational school	14.5	9.0	0.9	7.7	8.7
Post-secondary	1.4	0.0	0.0	0.0	0.5
Some college	18.8	15.3	15.7	7.7	16.4
College or university graduate	8.0	10.4	4.6	7.7	7.9
Masters education or higher	0.0	2.1	0.0	0.0	0.7
Total					

Source: Yap et al. [2009], Table 21

Impairment	Status			
	Without	With	No answer	Total
Mobility	76	61	1	138
Visual	41	103	0	144
Hearing	73	34	1	108
Multiple	8	5	0	13
Total	198	203	2	403
Percentage				
Mobility	55.1	44.2	0.7	100
Visual	28.5	71.5	0.0	100
Hearing	67.6	31.5	0.9	100
Multiple	61.5	38.5	0.0	100
Total	49.1	50.4	0.5	100

Source: Yap et al. [2009], Table 108.

Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers
- "Externally" based workers

Vulnerable Groups – PWDs

- PWDs view pedestrian facilities as inadequate in responding to their needs.
- On overpasses, PWDs think that:
  - the locations are inappropriate and were selected mainly for the benefit of private establishments;
  - the steps are too high making it difficult for them to climb;
  - it needs cover; and
  - the location is too distant.
- Preferred Public Transport Modes: Tricycle, Taxis
- Tricycles and Taxis provide door-to-door service

Source : Carreon and Carreon (2012)

Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers

Travel Characterstics of Older People

- 1% Live alone
- Use public transport less compared to London
- Desire to live near recreational areas and shopping malls
- Trips by car of older people are expected to increase in the future

Source: Petterson and Schmocker (2010)

Vulnerable Groups

- Poor
- Women
- Children
- Person with Disabilities
- Senior Citizens
- BPO Workers
- "Externally" based workers

Vulnerable Groups – Senior Citizens

- They stated that it is hard to go up overpasses and it is not easy to walk along narrow sidewalks
- The law providing 20% discount to senior citizens is highly appreciated.
- However, concerns are raised on the implementation of the discount as some drivers refuse to accept the discounted fare.
- Preferred Public Transport Modes: Tricycle, Taxis
- Tricycles and Taxis provide door-to-door service

Source : Carreon and Carreon (2012)

Research Institutions

- Center for Engineering and Sustainable Development-De La Salle University
- National Center for Transportation Studies – University of the Philippines
- School of Urban and Regional Planning – University of the Philippines
- Transportation Studies Society of the Philippines
- Clean Air Asia
- Freelance Transport Planners and Consultants

Summary

▶ Vulnerable groups in Metro Manila include the Poor, Children, Seniors, PWDs, Women, BPO Workers and Externally based workers

▶ Transport and Accessibility are consist of public transport availability and reliability, Traffic Congestion, Road Safety and Comfort, Affordability and Flooding

▶ Limited studies have looked at accessibility of vulnerable groups. Most studies have focused on sustainability.

Thank you very much for your attention!

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