**Data processing for injuries and traffic emissions for ITHIM case study cities**

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|  | **Traffic Injuries** | **PM2.5 concentrations** | **Transport contribution to PM2.5** | **Transport emissions inventory** |
| Santiago | Matrix available for the ‘region’. We do not even have total road deaths counts of the ‘city’. Have searched literature but there is nothing. Provided by Luis and Kavi. Need to ask which year is the data.  **Update:** Matrix of 4-year period sent by Luis. He has confirmed that the data corresponds to 5 million population region of Santiago city. | 29 µg/m3 (2014)  Source: [WHO](http://apps.who.int/gho/data/view.main.AMBIENTCITY2016?lang=en) | 31% in 2004 down from 45% in 2001  Used the value estimated by Shahram -- Mean: 0.2774, 95% CI (0.1351, 0.457)  File location of city-level estimated sent by Shahram: V:\Studies\MOVED\HealthImpact\Data\TIGTHAT\global transport source apportionment\ city-level transport source apportionment estimates shahram.xlsx | EDGAR estimates of transport emission shares across the modes do not seem correct. It reports 4% of transport emissions from passenger cars. This is similar to Brazilian cities where we know ethanol is used. But I checked Chile doesn’t have that. I would use a non-ethanol city such as Bogota to estimate.  **Corrected emission shares:**  Buses (0.0728), heavy duty vehicles (0.0263), light duty vehicles (0.187), motorcycles (0.00565), passenger cars (0.708)  Two estimates in Santiago city transport emission shares—one corrected and one using EDGAR  Code is here: \ITHIM-R\code\transport\_emission\_estimates\_santiago.R |
| Mexico City | Total number of deaths is available (Andrea) but the matrix has a large proportion of unspecified road user categories. We planned to use prediction model.  For now, used GBD-reported road death counts by victim type. In GBD, motor vehicle was a single category which was divided into cars, trucks and buses using their relative share from police data. GBD total deaths is about 1200, and police data is 1700 but has other land transport accidents about 400, therefore, it is possible GBD data may be reporting those (1700 minus 400), but we cannot be sure. For now used GBD reported number, as also easier to defend. Estimation procedure in ITHIM-R\data\local\mexico\mexico city victim death counts estimation.xlsx  Have used Bogota’s injury matrix to apportion victims to striking vehicles: for category of ‘other’ victim type, used sum of all victim types in Bogota data (24 Aug 2020) | 20 µg/m3 (2014)  Source: [WHO](http://apps.who.int/gho/data/view.main.AMBIENTCITY2016?lang=en) | 42% in 2006  Source: WHO source apportionment database | Buses (0.439), heavy duty vehicles (0.257), light duty vehicles (0.176), motorcycles (0.038), passenger cars (0.09)  Corrected version:  Buses (0.0596), heavy duty vehicles (0.0454), light duty vehicles (0.0312), motorcycles (0.00282), passenger cars (0.861)  Two estimates in the Mexico city transport emission shares—one corrected and one using EDGAR  Code is here: \ITHIM-R\code\ transport\_emission\_estimates\_mexico\_city.R |
| Buenos Aires | Same as Santiago, matrix available for region (city is 83% of region’s population), but many unspecified categories. We do not have counts of deaths for the city.  For now, placeholder, using the same data as Mexico city(victim counts only)  Update on 12 aug 2020: Used 24 municipios data in Buenos Aires folder on V drive, and using 2017 year data of victim types, there are no striking vehicles. Unknown victim types assumed as pedestrians, and ‘vehicles’ assumed as cars.  Have used Bogota’s injury matrix to apportion victims to striking vehicles: for category of ‘other’ victim type, used sum of all victim types in Bogota data (24 Aug 2020) | 14 µg/m3 (2014)  Source: [WHO](http://apps.who.int/gho/data/view.main.AMBIENTCITY2016?lang=en) | No data available for Buenos Aires. For now, we are using Cordoba city’s estimate – 32% in 2010. Source: WHO source apportionment database. Since, Buenos Aires is coastal and Cordoba is not, there could be some bias in this number. | As reported in EDGAR database: Buses (0.096), heavy duty vehicles (0.126), light duty vehicles (0.163), motorcycles (0.016), passenger cars (0.6):  The above data used Buenos Aires federal district, which is only a small part of BA metro area: using the metro area, these are the proportions: Buses (0.081), heavy duty vehicles (0.103), light duty vehicles (0.138), motorcycles (0.017), passenger cars (0.66), others (0.0022): updated 13 aug 2020  Code for this update is here: C:\Users\goelr\Work\Projects\TIGTHAT\Workpackage 5 air pollution\EDGAR emissions data\pm25\_transport\_emissions\_edgar\_buenos aires cape town.R |
| Delhi | Methodology and data sources as in WHW matrix paper | Goel’s thesis and publication | Goel’s thesis and publication | Goel’s thesis and publication |
| Accra | Methodology and data sources as in WHW matrix paper | **The processing and data sources explained in Accra manuscript**  **V:\Studies\MOVED\HealthImpact\Data\TIGTHAT\Accra\Paper** | **The processing and data sources explained in Accra manuscript**  **V:\Studies\MOVED\HealthImpact\Data\TIGTHAT\Accra\Paper** | **The processing and data sources explained in Accra manuscript**  **V:\Studies\MOVED\HealthImpact\Data\TIGTHAT\Accra\Paper**  **Spreadsheet here: V:\Studies\MOVED\HealthImpact\Data\TIGTHAT\Accra\Accra report for July 2018 (Rahul)\traffic emissions calculations.xlsx** |
| Bangalore | Methodology and data sources as in WHW matrix paper | [Guttikunda et al (2019)](https://www.sciencedirect.com/science/article/abs/pii/S1309104218304835) | [Guttikunda et al (2019)](https://www.sciencedirect.com/science/article/abs/pii/S1309104218304835) | Used the emission inventory from EDGAR database, the emissions for cars and MTW for bangalore were calculated using the corresponding emissions from Delhi, and multiplying those with fraction of vehicle travelled in bangalore to that of Delhi. This fraction was calculated from the travel surveys of the two cities. Without this correction, Bangalore had much higher proportion of emissions from cars than from MTW, which compared to Delhi, did not make sense.  V:\Studies\MOVED\HealthImpact\Data\TIGTHAT\India\emission inventory estimates model bangalore.xlsx |
| Belo Horizonte | Methodology and data sources as in WHW matrix paper | [WHO](http://apps.who.int/gho/data/view.main.AMBIENTCITY2016?lang=en) database | WHO source apportionment database. The WHO number 18% differs a lot from Shahram’s estimate 38% | EDGAR |
| Sao Paulo |  |  |  |  |
| Port Louis |  | <http://apps.who.int/gho/data/view.sdg.11-6-data-ctry?lang=en> | Will need to use South African estimate from Shahram’s paper, or generally a regional distribution showing large uncertainty | Found an interesting paper: will need Meelen to chase some references cited in there  <https://www.sciencedirect.com/science/article/pii/S1361920914000704#b0130>  If I have information on total fleet size, vehicle ownership, etc I can estimate transport emissions as I did for Accra |
| Bogota | Methodology and data sources as in WHW matrix paper | [WHO](http://apps.who.int/gho/data/view.main.AMBIENTCITY2016?lang=en) database | WHO source apportionment database | EDGAR |
| Visakhapatnam |  | <http://www.urbanemissions.info/wp-content/uploads/apna/docs/2019-07-APnA30city_summary_report.pdf> | <http://www.urbanemissions.info/wp-content/uploads/apna/docs/2019-07-APnA30city_summary_report.pdf> |  |
| Cape Town |  |  |  | EDGAR: used a city boundary shape file using Google earth, and then EDGAR pm2.5 database: code here: C:\Users\goelr\Work\Projects\TIGTHAT\Workpackage 5 air pollution\EDGAR emissions data\pm25\_transport\_emissions\_edgar\_buenos aires cape town.R |

**Transport emission estimates for Mexico City and Santiago using Bogota:** Using travel surveys, calculated the distance travelled (in relative terms also works) by ‘road-based’ motorised modes but excluding LDV and HDV as these are not included in the travel surveys. The distance calculated corresponds to the city population and not just the sample. Using this distance, we calculate emissions per km for each mode, and then estimate emissions for other cities using the corresponding distance travelled by each mode. Once the emissions for different modes are calculated (for LDV and HDV emissions are same as reported in EDGAR database), we calculate the percent contributions by each mode.

**CO2 emissions**

Monica sent EDGAR CO2 emissions data for transport modes for year 2012. Used the geocoordinates of 9 cities from the work that was done by Nelson’s group for Pm2.5 emissions. For two cities, Buenos Aires and Cape Town, created a shapefile of their city boundaries and allocated the geocoordinates for those two cities. All calculations are in this R code: C:\Users\goelr\Work\Projects\TIGTHAT\Workpackage 5 air pollution\EDGAR CO2 Data\ co2\_transport\_mode\_shares\_ITHIM\_cities.R

Email from Monica Crippa: From: Monica.CRIPPA@ec.europa.eu <Monica.CRIPPA@ec.europa.eu>

Sent: 13 July 2020 14:30

To: Rahul Goel <rg574@medschl.cam.ac.uk>; James Woodcock <jw745@medschl.cam.ac.uk>; JRC-EDGAR@ec.europa.eu

Cc: christian.brand@ouce.ox.ac.uk

Subject: Re: JRC-EDGAR --> FW: Estimating city specific PM2.5, NOx and GHG emissions using EDGAR?

Dear Rahul,

please find in attachment the CO2 emission maps for 2012.

Please let me know if everything is fine.

best regards

monica

Monica Crippa

European Commission

Joint Research Centre