Mobility Patterns in Lisbon Metropolitan Area, Portugal – insights to POS-COVID Times

Marques da Costa, N.; Marques da Costa, E.
With collaboration of Mileu, N; Alves, André; Campos, B.

Research framework

COnhecer **M**ais **P**a**R**a **I**ntervir MElhor COMPRIME
To know more to intervene better

FCT - Projetos de implementação rápida para soluções inovadoras - COVID-19

ID: 596685735

COnhecer **M**ais **P**a**R**a **I**ntervir melhor no contexto da **MO**bilidade - COMPRI_MOv
To know more to intervene better in the context of mobility

FCT - Projetos de implementação rápida para soluções inovadoras - COVID-19 - Fase 2

ID: 613765655

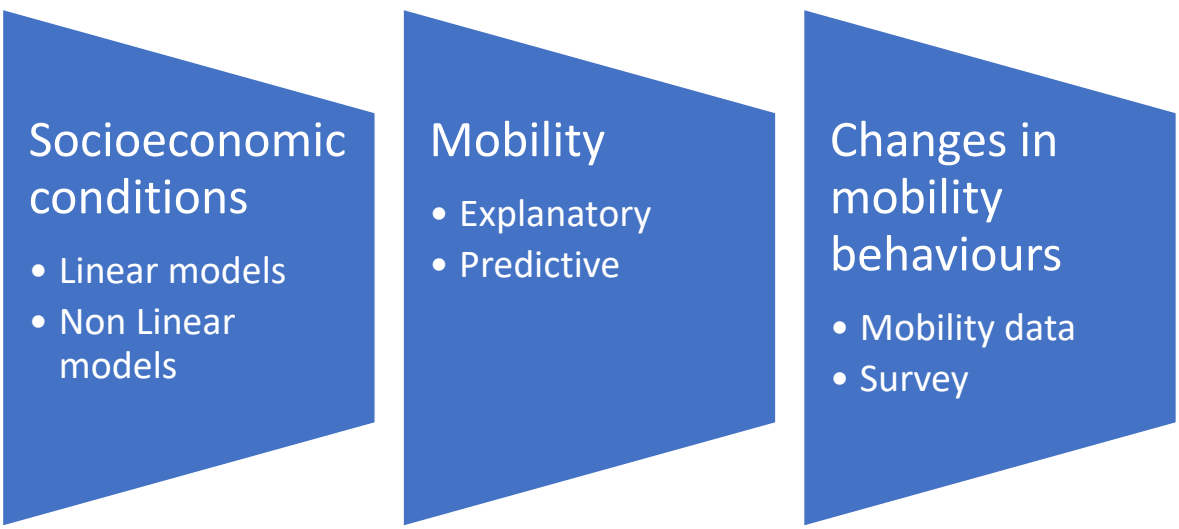
2022 – Mestrado em SIGOT, IGOT de André Alves com o título "Modelação espácio-temporal da propagação da COVID-19 em Portugal Continental: evidências da importância de fatores geográficos". Orientador: Nuno Marques da Costa

2022/… - Mestrado em Ordenamento do Território e Urbanismo, IGOT/UTL/FA Universidade de Lisboa de Brian Campos com o título "Alterações dos padrões de mobilidade na aquisição de bens e serviços de proximidade em tempo de pandemia: Uma análise da Área Metropolitana de Lisboa". Orientadora: Eduarda Marques da Costa

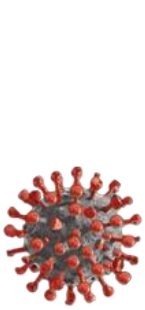
Objetive

The socio-economic and mobility conditions as drivers of Covid-19 spatial diffusion model

Methodological approach's



Main drivers



Population features

- Demographic
- Social
- Economic
- Behavioural
- Health status

Mobility patterns

Accidental outbursts

Statistical data

Dimensions

Population & settlement

Clinical

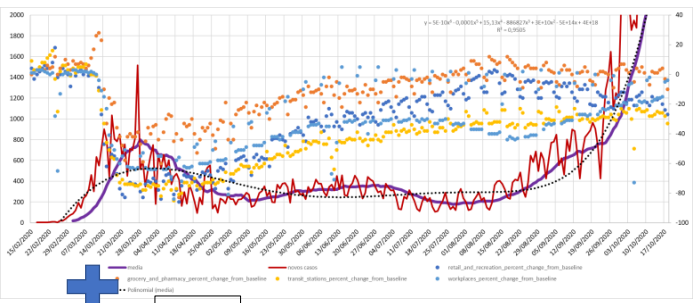
Economy (employment & economic acitivity)

Social

Mobility

Nº of cases
Nª of new cases
Nº of cases/10000inhabitants
Nº of new cases/10000inhabitants

Google data



Survey

https://www.comprime-compri-mov.com/dashboards.html

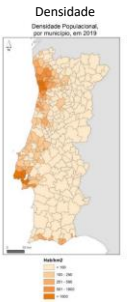
Results

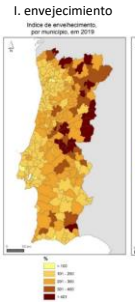
Multiple regression

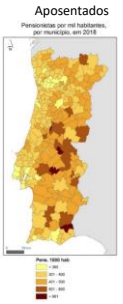
Equation – 23/03/2020

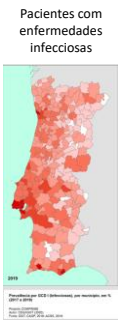
$Casos\ 23-03 = 12{,}006424 + 0{,}000165$ x **Populacion Residente** 2019+ 0,093672 x **Tasa de Educacion Superior** - 0,015045 x **Estudiantes del ensino secundario 1000 habitantes** - 0,161005 x **% de personas que trabajam en outra freguesia del municipio** + 308,554602 x **Tasa de Exportaciones** + 0,002468 x **Densidad Poblacional** + 2,178256 x **Empleo en hoteles, catering, comidas** + 0,382329 x **Pacientes com enfermedades infecciosas** + 0,001179 x **Nº de noches passadas en hotels** + 0,148024 x **% de personas que trabajan fora del municipio**

R = 0,855267 R^2 = 0,731481 R^2 ajustado = 0,721349







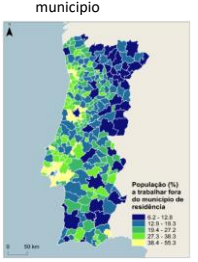


Equation – 08/06/2020

$Casos\ 08-06 = 127{,}037302 + 0{,}005013$ x **Populacion Residente** 2019 + 0,065800 x **Densidad Poblacional** -23,361892 x **Empleos en trabajos de construccion** + 50,512568 x **Saldo Migratório** + 0,278562 x **Retirados por 1000 hab** - 344,019855 **Pacientes com enfermedades infecciosas** + 4,997994 **Pacientes con enfermedad mental o adicción** - 0,038666 **Renda Bruta** + 2,474243 **% Residentes que trabajan fora del municipio** + 0,621731 **Alunos del ensino superior/ 1000hab.**

R = 0,956285 R^2 = 0,914481 R^2 ajustado = 0,910733

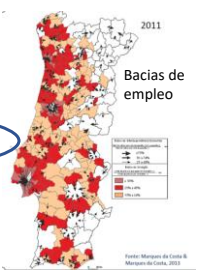
% Trabajan fora del municipio



Equation – 27/06/2020

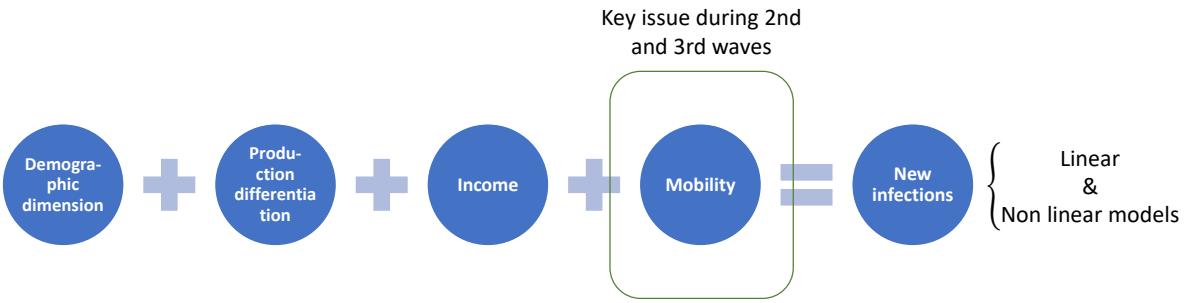
$Casos\ 27-06 = 317{,}434627 + 0{,}006239$ x **Populacion Residente** 2019 + 0,089959 x**Densidad Poblacional**- 0,038043 **Renda Bruta** - 2,334157 **% residentes que trabajan fora del municipio** + 4,133464 **Populacion con mas de 75 anos** -23,140570 **Empleos en trabajos de construccion** -283,435652 **Pacientes com enfermedades infecciosas** + 41,214286 **Saldo Migratório**

R = 0,957610 R^2 = 0,917017 R^2 ajustado = 0,914403



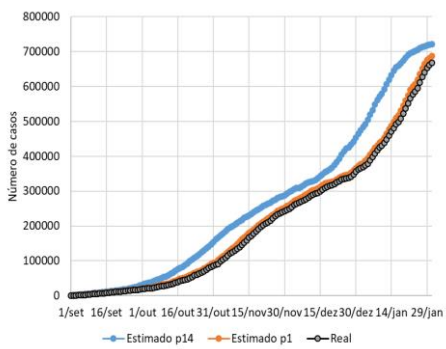
Bacias de empleo

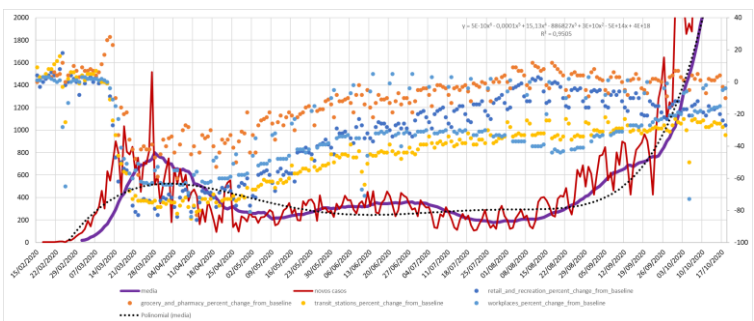
Results - Drivers

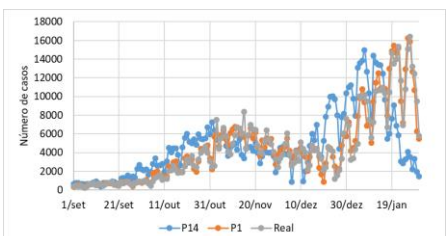


Sousa, P., Marques da Costa, N., Marques da Costa, E., Rocha, J., Peixoto, V. R., Fernandes, A. C., Gaspar, R., Duarte-Ramos, F., Abrantes, P., & Leite, A. (2021). COMPRIME - Conhecer mais para intervir melhor: Preliminary mapping of municipal level determinants of covid-19 transmission in Portugal at different moments of the 1st epidemic wave. *Portuguese Journal of Public Health*. DOI: 10.1159/000514334

Results – 14 days prediction with mobility data







Mileu, N.; Costa, N.M.; Costa, E.M.; Alves, A. Mobility and Dissemination of COVID-19 in Portugal: Correlations and Estimates from Google's Mobility Data. *Data* **2022**, *7*, x. https://doi.org/10.3390/

The surveys

Two different moments

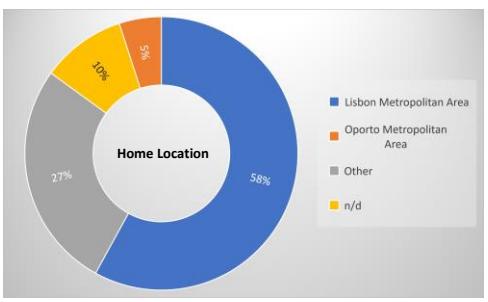
1st survey – from September to December 2020
Post 1st Lockdown and School holydays (around 1800)

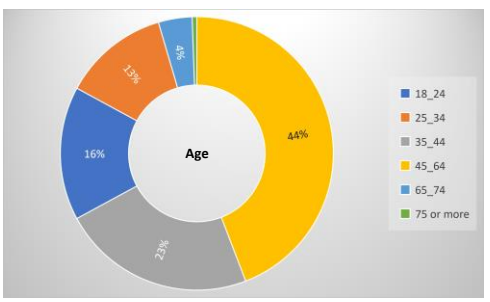
2nd survey – from April to June 2022
Plus normal conditions but still with significant teleworking activity (around 300)

1st Survey

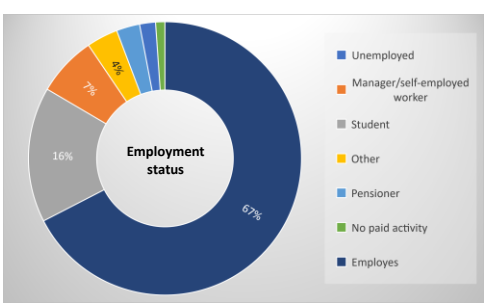
from September to December 2020

1st survey

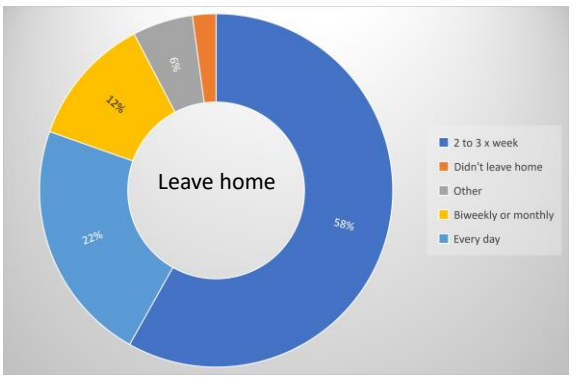




The sample: 1806 inquéritos



1st survey



1st survey

Before Pandemic
Transportation Modes for work and study

	Walking	Private transp	Soft modes	Public Transp.	Other	Total
Lisboa	5,2	39,7	2,6	51,3	1,2	100,0
AML Norte	3,8	51,1	0,0	43,7	1,4	100,0
AML Sul	2,2	51,4	0,5	44,3	1,6	100,0
AML	4,0	47,5	0,9	46,2	1,4	100,0
AMP	6,1	61,2	1,0	31,6	0,0	100,0
Outros	9,8	74,2	0,5	14,4	1,1	100,0
Total	6,1	57,5	0,8	34,4	1,2	100,0

During Pandemic – July 2020
Transportation Modes for work and study

	Walking	Private transp	Soft modes	Public Transp.	Other		Total Geral
Lisboa	11,0	49,0	4,1	23,5	12,5	100,0	345
AML Norte	2,7	61,4	0,2	25,3	10,5	100,0	554
AML Sul	2,2	57,3	1,1	31,4	8,1	100,0	185
AML	5,3	56,7	1,6	25,7	10,7	100,0	1084
AMP	8,2	68,4	1,0	15,3	7,1	100,0	98
Outros	9,3	69,4	0,8	14,4	5,8	100,0	624
Total	6,8	61,7	1,3	21,3	8,8	100,0	1806

Before Pandemic
Transportation Modes for work and study

Before	Walking	Public transportation	Private transp	Mix/Other	Total
18_24	7,1	60,3	14,2	18,4	141
25_34	6,2	52,6	37,1	4,1	97
35_44	2,4	23,5	71,2	2,9	170
45_64	6,2	20,7	66,0	7,1	420
65_74	0,0	13,5	81,1	5,4	37
75_ou_mais	0,0	25,0	25,0	50,0	4
Total Geral	5,2	34,5	57,5	7,9	869

Survey July 2020

During Pandemic – July 2020
Transportation Modes for work and study

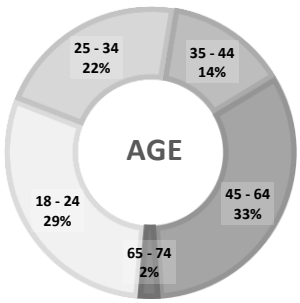
During	Walking	Public transportation	Private transp	Mix/Other	Total
18_24	5,7	56,0	32,6	5,7	141
25_34	9,3	35,1	39,2	16,5	97
35_44	4,1	12,9	78,2	4,7	170
45_64	6,2	11,4	76,2	6,2	420
65_74	2,7	13,5	67,6	16,2	37
75_ou_mais	0,0	25,0	25,0	50,0	4
Total Geral	5,8	21,7	64,8	7,7	869

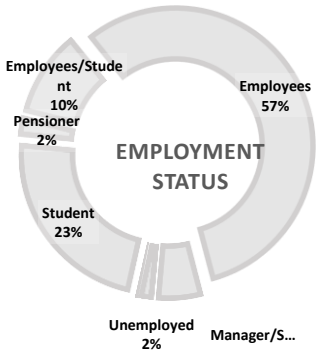
Survey July 2020

2nd Survey

from April to June 2022

2nd survey





Before Pandemic — 1st survey 2020

Transportation Mode

	Walking	Private transp	Byke and electric	Public Transp.	Other	Total	
Lisboa	5,2	39,7	2,6	51,3	1,2	100,0	345
AML N	3,8	51,1	0,0	43,7	1,4	100,0	554
AML Sul	2,2	51,4	0,5	44,3	1,6	100,0	185
AML	4,0	47,5	0,9	46,2	1,4	100,0	1084
AMP	6,1	61,2	1,0	31,6	0,0	100,0	98
Outros	9,8	74,2	0,5	14,4	1,1	100,0	624
Total	6,1	57,5	0,8	34,4	1,2	100,0	1806

During Pandemic – July 2020

Transportation Mode

	Walking	Private transp	Byke and electric	Public Transp.	Other	Total
Lisboa	**11,0**	**49,0**	**4,1**	**23,5**	**12,5**	**100,0**
AML N	**2,7**	**61,4**	**0,2**	**25,3**	**10,5**	**100,0**
AML Sul	**2,2**	**57,3**	**1,1**	**31,4**	**8,1**	**100,0**
AML	**5,3**	**56,7**	**1,6**	**25,7**	**10,7**	**100,0**
AMP	8,2	68,4	1,0	15,3	7,1	100,0
Outros	9,3	69,4	0,8	14,4	5,8	100,0
Total	6,8	61,7	1,3	21,3	8,8	100,0

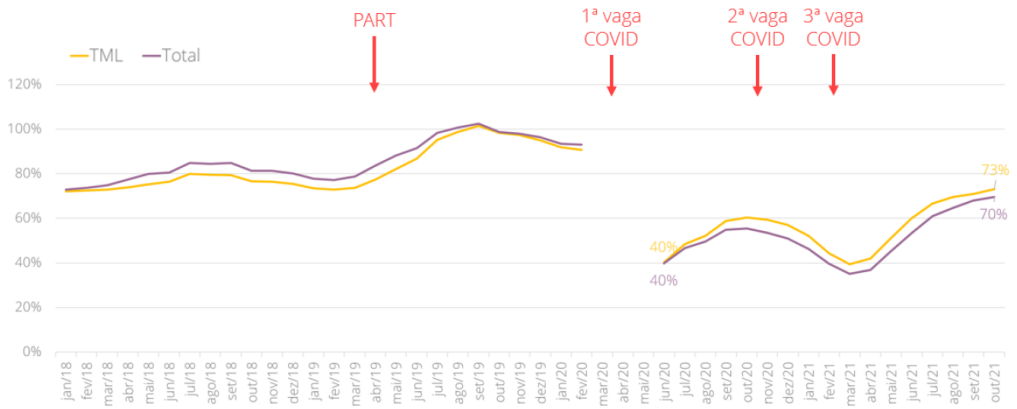
2nd survey

Post Pandemic – June 2022

Transportation Mode

	Walking	Private transp	Public Transp.	Other	Total
Lisboa	**5,6**	**61,1**	**33,3**	**0,0**	**100,0**
AML Norte	**6,1**	**66,7**	**27,3**	**0,0**	**100,0**
AML Sul	**2,8**	**38,9**	**55,6**	**2,8**	**100,0**
AML	**5,1**	**58,0**	**36,2**	**0,7**	**100,0**

Situação pandémica



Fonte: TML

Marques da Costa, N. (2022), Mobilidade na Área Metropolitana de Lisboa, in Periferias Urbanas nas AM de PT e Brasil: os últimos 30 anos, IST

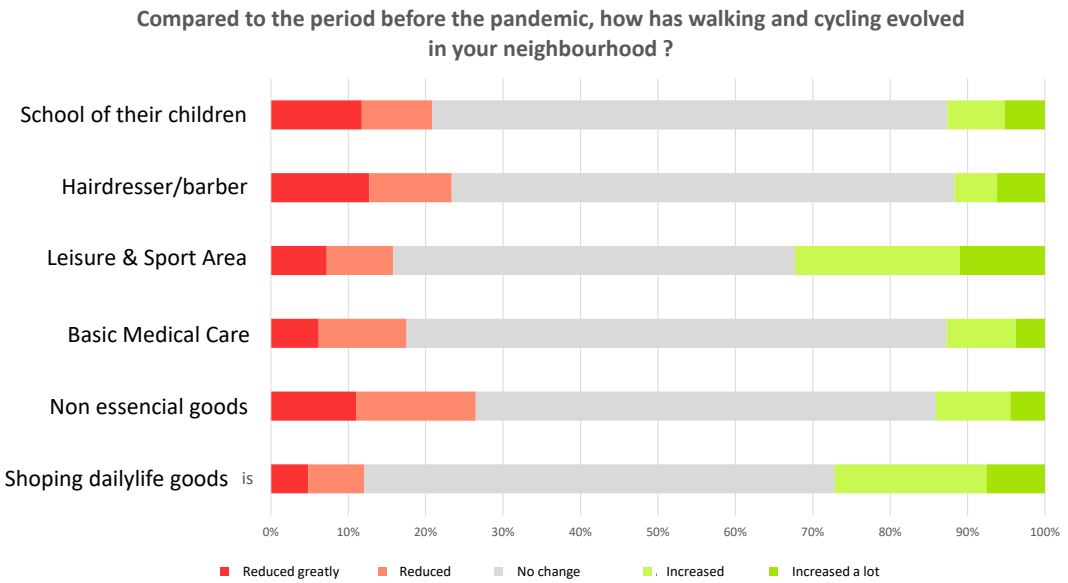
Mode of transportation for daily shopping – July 2020

2020	In the Neighbourhood (less 15 minutes)			In the Parish, municipality (more than 15 minutes)			on_line	Total
	Walking	Walking and car	Walking and Public transp	Walking	Public Transp	Private Transp.		
Lisboa	41,7	0,4	19,2	11,4	6,3	17,7	3,3	100
AML Norte	20,3	0,6	20,9	5,8	9,7	36,2	6,4	100
AML Sul	16,5	0	17,4	4,6	9,2	49,6	2,8	100
AML	27,6	0,4	19,8	7,7	8,4	31,5	4,7	100
AMP	21,4	0	10,7	10,7	12,5	35,8	8,9	100
Outros	22,6	0,4	16,9	7,1	7,9	40,4	4,7	100
Total	22,6	0,4	16,6	7,3	8,1	40,3	4,9	100

Mode of transportation for daily shopping – June 2022

2022	In the Neighbourhood (less 15 minutes)			In the Parish, municipality (more than 15 minutes)			on_line	Total
	Walking	Walking and car	Walking and Public transp	Walking	Public Transp	Private Transp.		
Lisboa	40,0	10,8	23,1	0	3,1	20,0	3,1	100,0
AML Norte	18,7	5,0	41,7	0,7	0,0	33,1	1,4	100,0
AML Sul	15,0	8,8	40,0	0	0,0	33,8	2,5	100,0
Total	22,5	7,4	37,0	0,7	0,7	30,3	2,1	100,0

2nd survey



Conclusions

- Reduction of Public Transport use for all those who were not teleworking;
- Reduction of Public Transport use by students;
- Public transport use reduction for levels before the increasing in 2019, due to tariff reduction programme;
- Important role of walking in the local commerce and the use of local facilities for daily shopping, leisure and sport **but** there is also an increase of private car to daily shopping associated to more sprawl areas

- And the local services access?
- Is it possible to have solutions for different groups (exemple aged population)?
- How to include the perspective of active living in the planning process, with daily movement of 30-45 minutes average?
- How important is an observatory of mobility/daily lives?
- ……

Utopies
Sustainable mobility?
Proximity city as key element for health city?

Thanks you for your attention

Eduarda.costa@campus.ul.pt