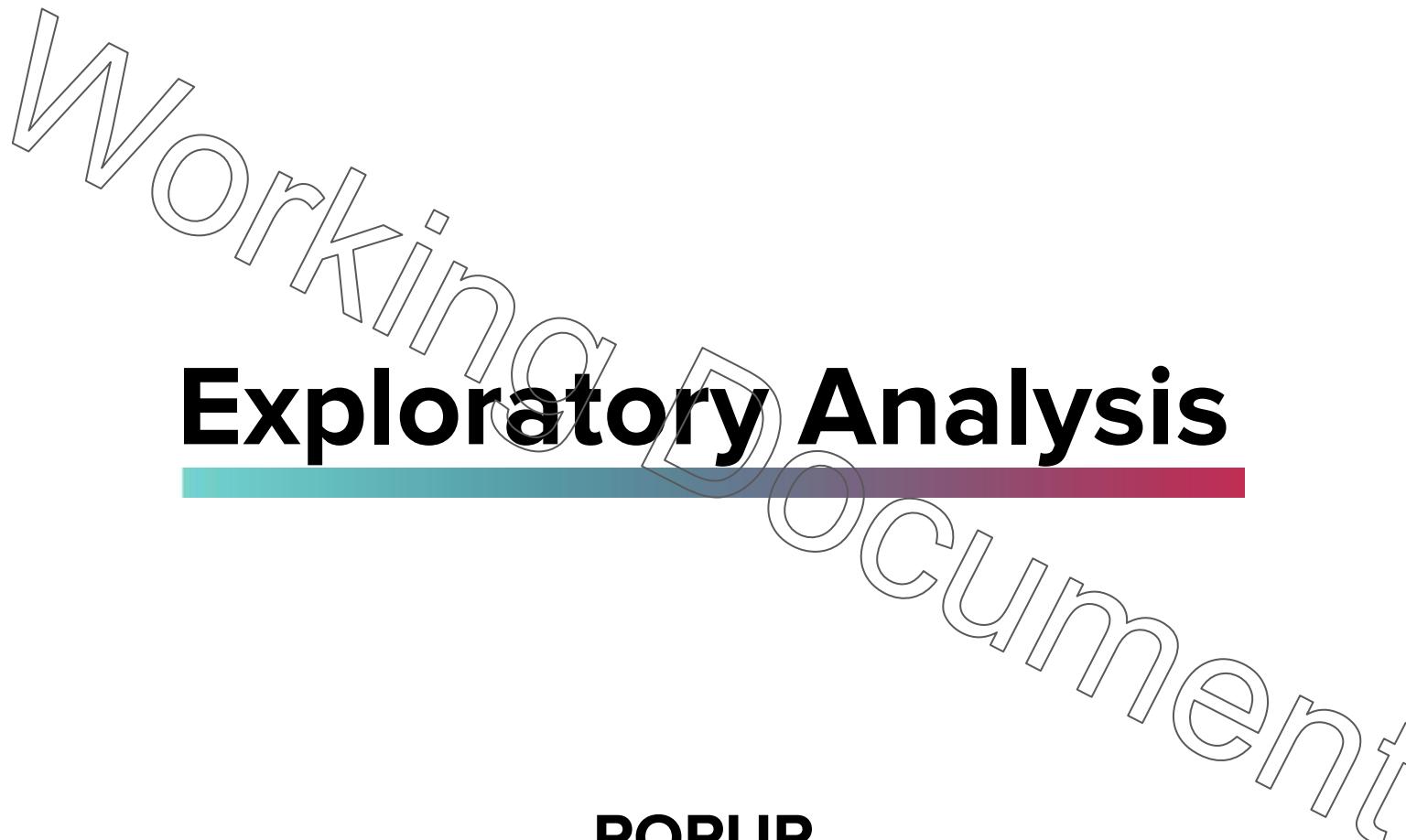


# **Exploratory Analysis**



**POPUP**

POPUP Study

Zakaria

## Outline

- The **Data**
- The **Static Insights**
- The **Dynamic Insights**
- The **Spatial Insights**

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# The Data

Working Document

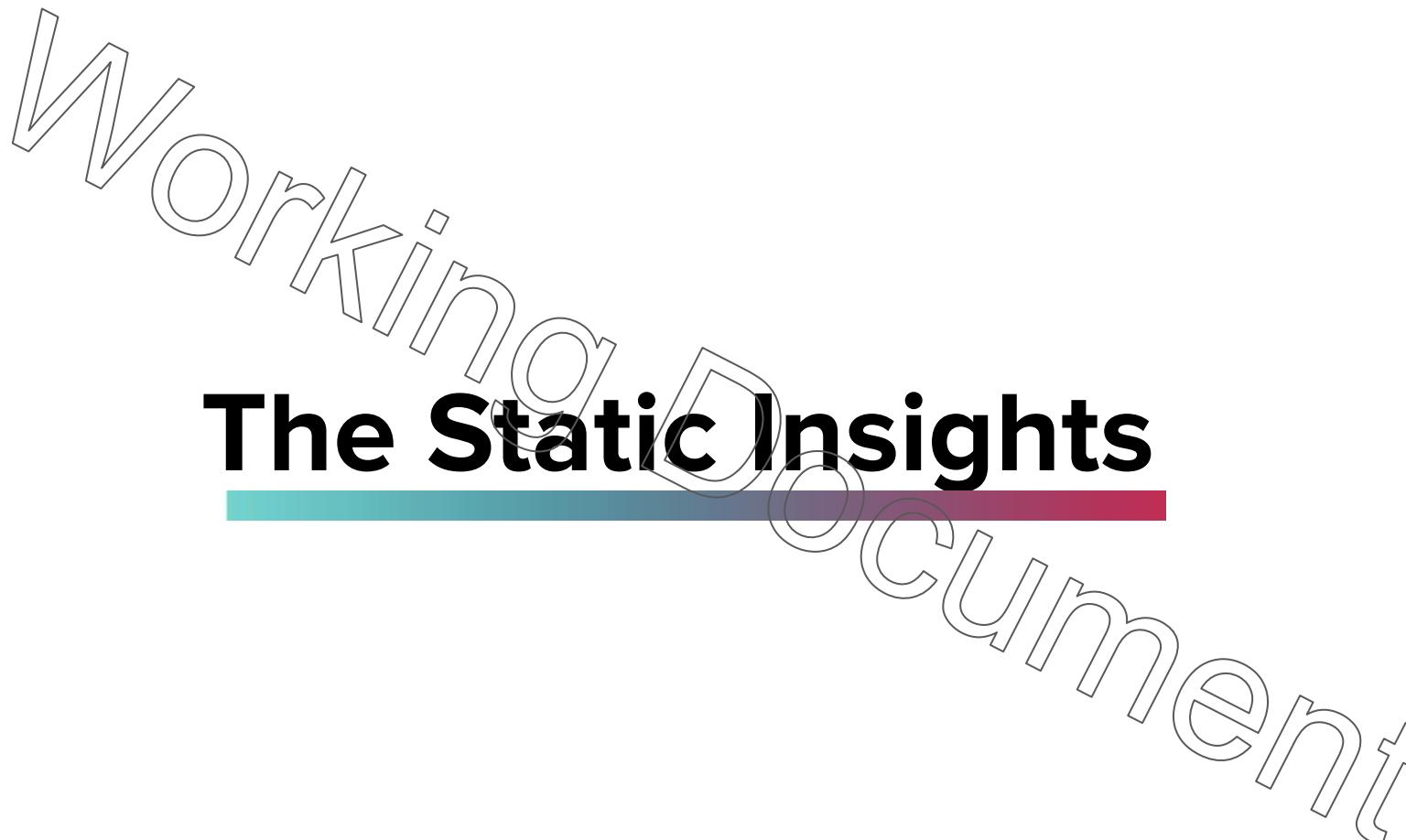
# The Data

- PMSI Sample, with the following structure
  - PUMA Patients (1% Random Sample) - (Protection Universelle Maladie)
  - AME Patients - (Aide Medicale d'Etat)
  - SUV Patients - (Soins Urgents et Vitaux)
- 3M hospital stay observations from 2011 to 2021 ( 2011 missing for PUMA)
- 1.8M unique patients over this period
- ~ 27 native variables + ~ 20 analysis variables
- This EA analysis aims to characterize **key top level differences** between the 3 systems
- Intuitively, the insights we can extract can be derived from :
  - a static stand point considering univariate/bivariate info over the 10 year period as a whole
  - a dynamic stand point considering yearly evolutions
  - a spatial standpoint allowing us to visualize geographical trends

# The Data : Disclaimer

- Artefacts regarding 2011 data for SUV and AME
  - Stays related to important and rather stable GHMs are missing
  - Provenance is missing
- For reassuring statistical significance, statistical tests are in the making for each data visualization

# The Static Insights



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# The **Static** Insights

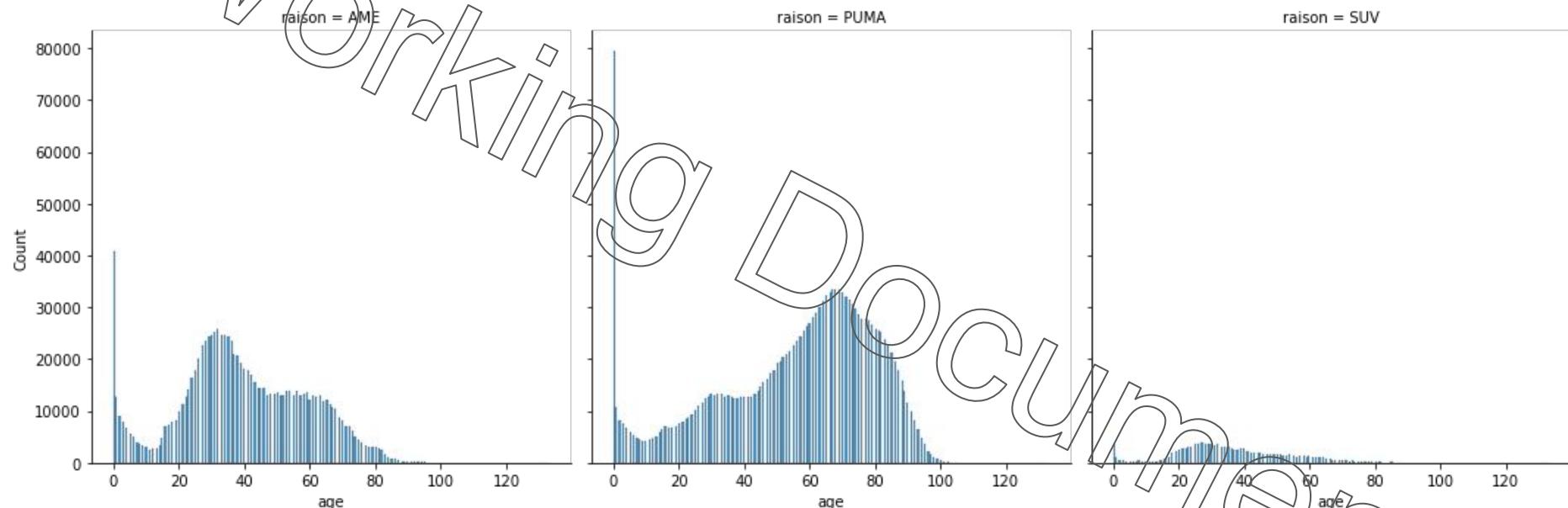
In our effort to characterize static top level differences between AME, SUV and PUMA, we'll explore:

- Demographics
- Stays and Patients distribution
- Curated GHM Group Structure
- Cost
- Pathology Severity
- Stay Supplement
- Patient Stay Provenance

Let's dive deeper

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# The Static Insights



Average age : PUMA 55 y-o | AME 39 y-o | SUV 36 y-o

Insight : significantly younger population in the social initiatives

# The Static Insights

raison	sexe	
	Homme	Femme
AME	38,03%	62,00%
PUMA	46,45%	53,55%
SUV	47,52%	52,49%

*insight : near parity in all systems, except AME which is skewed towards women*

# The Static Insights

	AME	raison	PUMA	SUV
# patients	326 338	1 421 781	54 781	

	AME	raison	PUMA	SUV
# stays	1 023 400	1 664 066	124 902	

	AME	raison	PUMA	SUV
avg stay (in days)	3,136	1,170	2,280	

*insight : the proportionally important catchup of AME in terms of stays relative to patients is explained by a GHM structure skewed towards condition requiring recurring care*

# The Static Insights

Ventilation du CMD Séances sur le  
nombres de patients et séjours, pour  
chaque dispositif

Libellé GHM (groupe)	SUV	AME	PUMA
Aphérèses sanguines	12 (P)	311 (P)	2 478 (P)
	29 (S)	1 379 (S)	3 234 (S)
	2,42 (SM)	4,43 (SM)	1,31 (SM)
Chimiothérapie	1 628 (P)	13 095 (P)	196 772 (P)
	5 281 (S)	95 896 (S)	234 310 (S)
	3,24 (SM)	7,32 (SM)	1,19 (SM)
Hémodialyse	763 (P)	1 893 (P)	39 840 (P)
	18 562 (S)	164 696 (S)	140 515 (S)
	24,33 (SM)	87,00 (SM)	3,53 (SM)
Oxygénothérapie hyperbare	7 (P)	58 (P)	3 194 (P)
	47 (S)	1 322 (S)	4 027 (S)
	6,71 (SM)	22,79 (SM)	1,26 (SM)
Radiothérapie (toutes techniques confondues)	121 (P)	2 679 (P)	153 730 (P)
	1 646 (S)	55 620 (S)	176 967 (S)
	13,60 (SM)	20,76 (SM)	1,15 (SM)
Transfusions	201 (P)	1 632 (P)	16 019 (P)
	501 (S)	6 257 (S)	18 380 (S)
	2,49 (SM)	3,83 (SM)	1,15 (SM)

(P): nombre de patients

(S): nombre de séances

(SM): séances moyennes par patient

*insight : the previous AME stays distribution skewness is explained by the fact that AME hemodialysis patients have about 4 times more sessions than SUV patients and about 20 times more than PUMA patients.*

# The Static Insights

Repartition des groupes ( toutes années confondues) en terme de patients, tout dispositif)



*insight :  
fragmentation of  
the leading groups  
in term of  
pathology, followed  
by an obstetric  
themed middle  
pack.*

# The Static Insights

Répartition des groupes ( toutes années confondues, en terme de patients) - PUMA

Chimiothérapies, en séances  
204 583 patients  
37,10% du dispositifs (patients)  
CM des séjours 1 442 euros

Mouveaux-nés ( problèmes bénins, significatifs, majeurs)  
58 030 patients  
10,52% du dispositifs (patients)  
CM des séjours 2 174 euros

Accouchements sans complications  
38 614 patients  
7,00% du dispositifs (patients)  
CM des séjours 2 487 euros

Endoscopies digestives  
36 433 patients  
6,61% du dispositifs (patients)  
CM des séjours 1 029 euros

CMD 23  
24 198 patients  
4,39% du dispositifs (patients)  
CM des séjours 1 329 euros

Ethylosme  
16 169 patients  
2,93% du dispositifs (patients)  
CM des séjours 1 420 euros

Douleurs abdominales  
11 853 patients  
2,15% du dispositifs (patients)  
CM des séjours 903 euros

Explorations et surveillances pour affections endocrinianes et métaboliques  
9 326 patients  
1,69% du dispositifs (patients)  
CM des séjours 826 euros

Radiothérapies  
75 835 patients  
13,75% du dispositifs (patients)  
CM des séjours 3 318 euros

Interventions sur le cristallin  
20 679 patients  
3,75% du dispositifs (patients)  
CM des séjours 1 590 euros

Chimiothérapies, autres  
8 371 patients  
1,52% du dispositifs (patients)  
CM des séjours 4 210 euros

Affections de l'ante partum  
8 176 patients  
1,48% du dispositifs (patients)  
CM des séjours 819 euros

Interventions sur la peau  
4 570 patients  
0,83% du dispositifs (patients)

IVG et Avortements  
18 192 patients  
3,30% du dispositifs (patients)  
CM des séjours 681 euros

Césariennes sans complications  
8 303 patients  
1,51% du dispositifs (patients)  
CM des séjours 4 001 euros

Diabète  
5 149 patients  
0,93% du dispositifs  
Accouchements avec complications  
4 984 patients

Faux travail et

*insight : greater fragmentation, obstetric themed middle pack is much less present.*

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# The Static Insights

Répartition des groupes ( toutes années confondues, en terme de patients) - AME



*insight : globally obstetric themed for the top groups, even repartition for the following conditions*

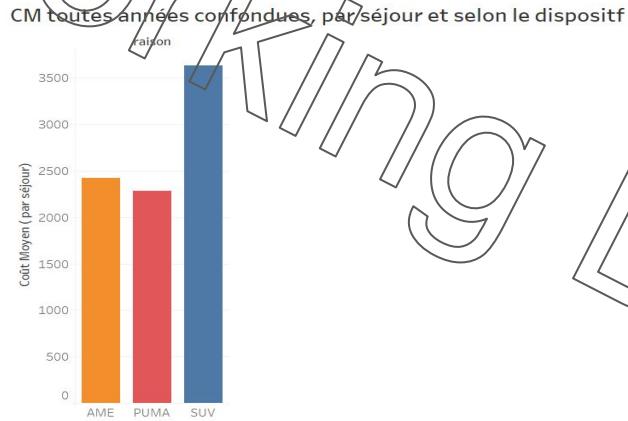
# The Static Insights

répartition des groupes (toutes années confondues, en terme de patients) - SUV

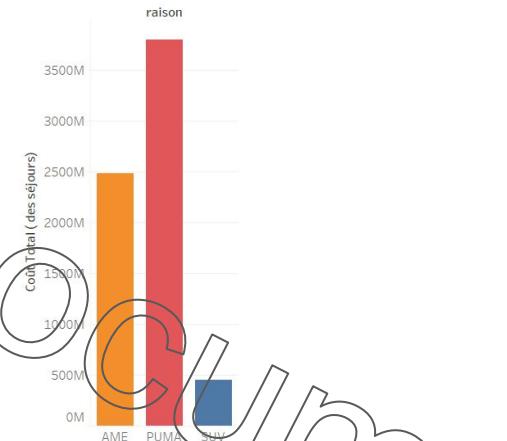


*insight : even stronger obstetric domination, more complications and severity, significant skin intervention relative to its general population occurrence.*

# The Static Insights



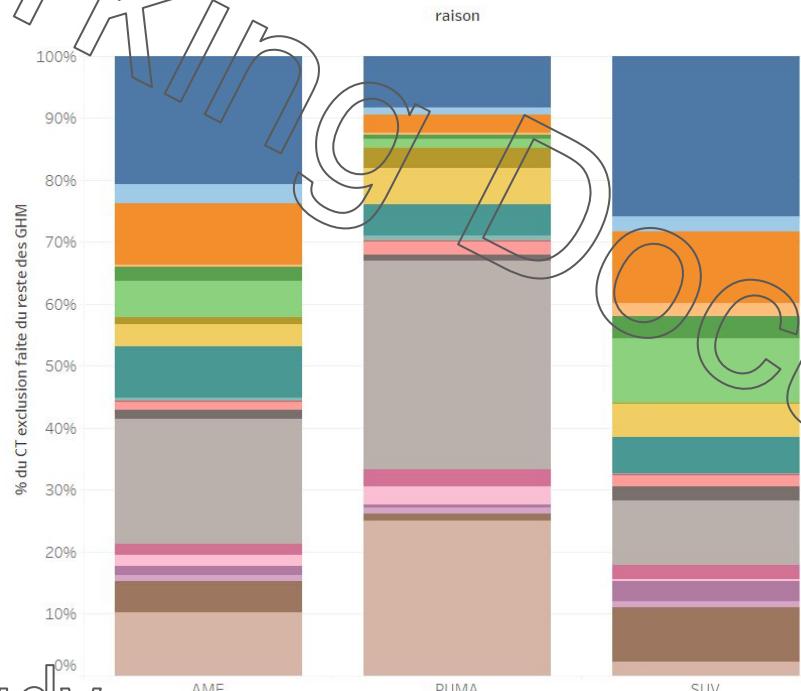
CT toutes années confondues, par séjour et selon le dispositif



*insight : average stay cost follows the level of precarity, however the gap between AME and PUMA seems narrow.*

# The Static Insights

CT des groupes, toutes années confondues, par séjour et selon le dispositif



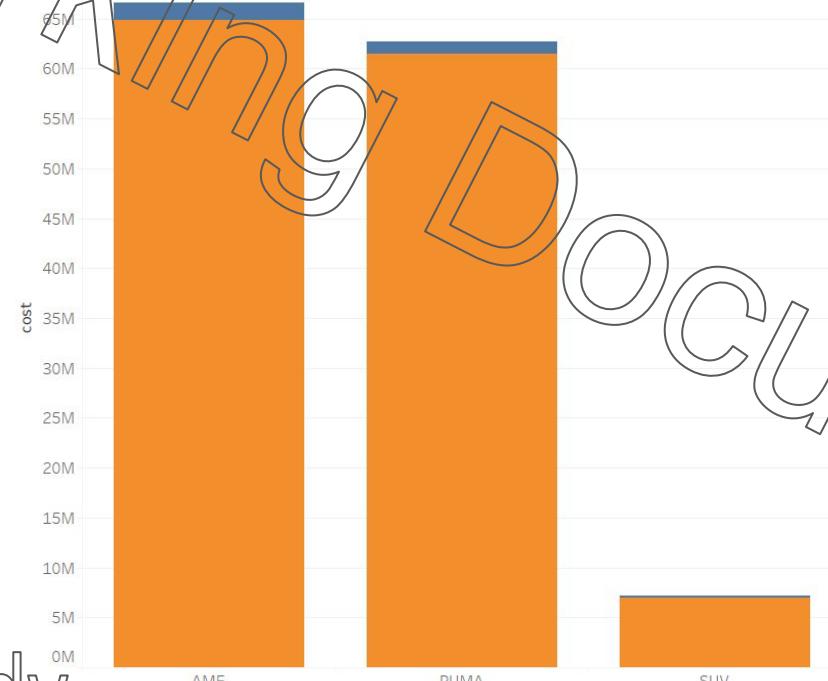
- grp\_cln
- Accouchements ..
- IVG et Avorteme..
- Césariennes san..
- Interventions su..
- Affections de l'a..
- Accouchements ..
- Endoscopies dig..
- Nouveau-nés sa..
- Nouveau-nés av..
- Explorations et ..
- Douleurs thorac..
- Ethylisme
- Diabète
- Chimiothérapie
- CMD 23
- Interventions su..
- Faux travail et ..
- Douleurs abdom..
- Césariennes ave..
- Radiothérapies

# The Static Insights

CT Hémodialyses, toutes années confondues, par raison

raison

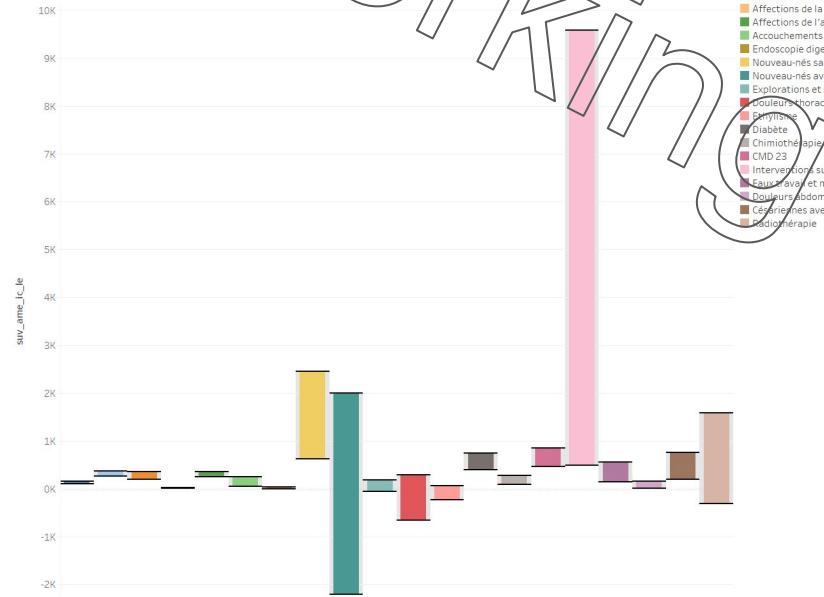
Libellé GHM  
Entraînements ..  
Hémodialyse, en..



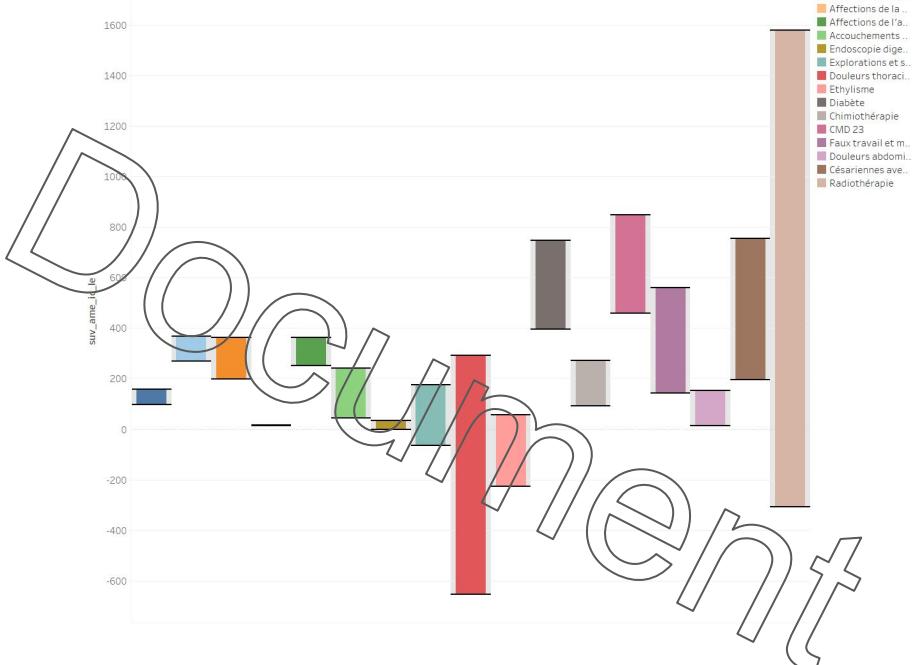
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# The Static Insights

Surcoût de la précarité - SUV vs AME  
(intervalles de confiance à 95%)



Surcoût de la précarité - SUV vs AME - Nouveaux-nés et Interventions sur le christallins exclus  
(intervalles de confiance à 95%)

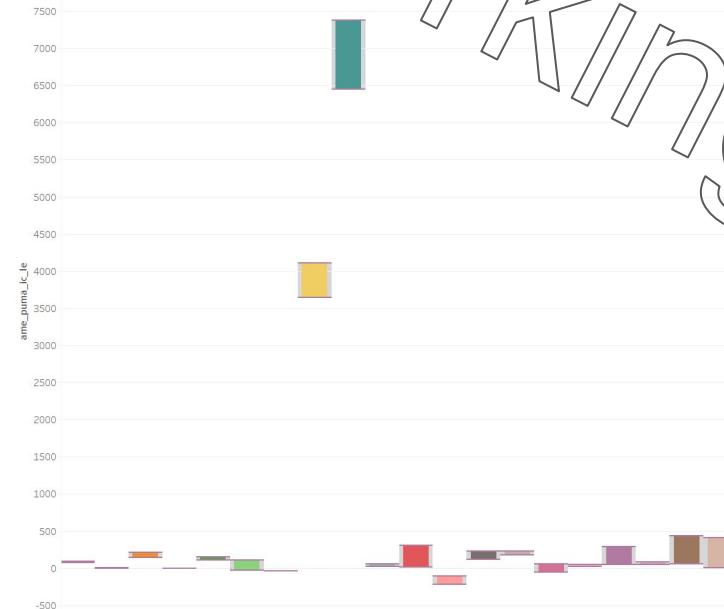


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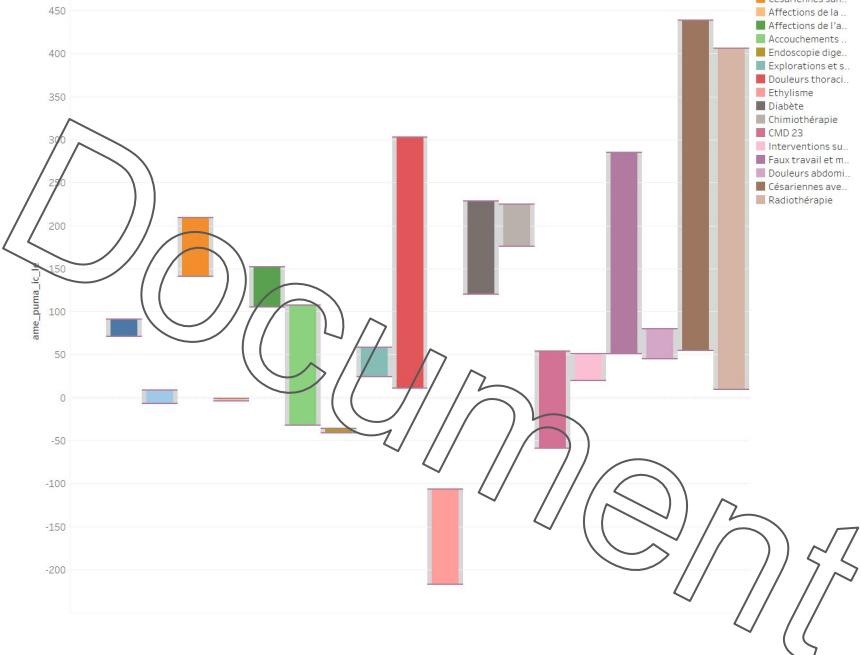
SUV vs AME

# The Static Insights

Surcoût de la précarité - AME vs PUMA  
(intervalles de confiance à 95%)



Surcoût de la précarité - AME vs PUMA - Nouveaux-nés exclus  
(intervalles de confiance à 95%)

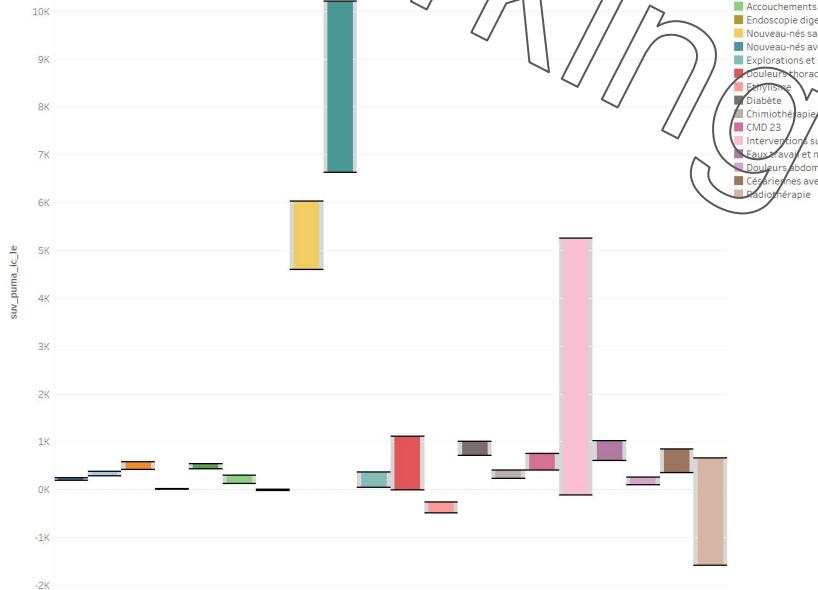


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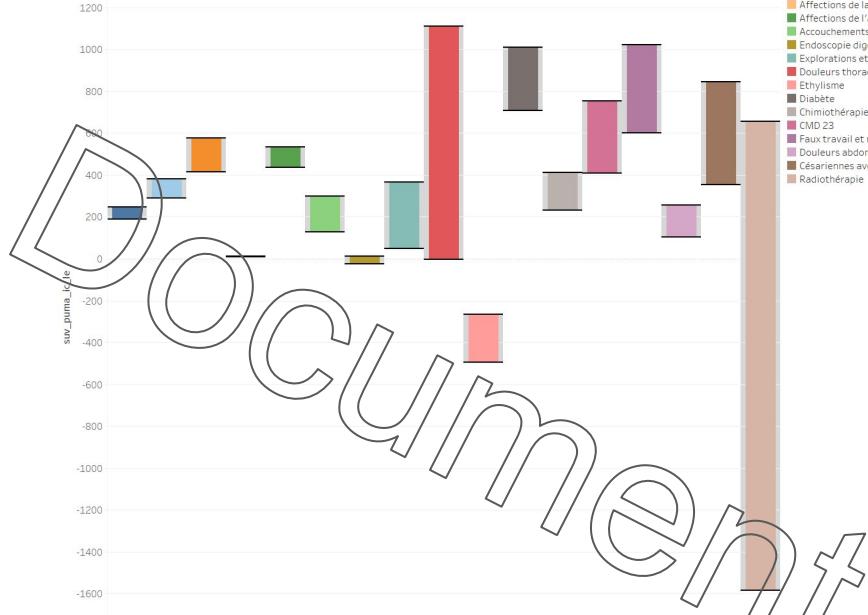
AME vs PUMA

# The Static Insights

Surcoût de la précarité - SUV vs PUMA  
(intervalles de confiance à 95%)



Surcoût de la précarité - SUV vs PUMA - Nouveaux-nés et Interventions sur le cristallins exclus  
(intervalles de confiance à 95%)

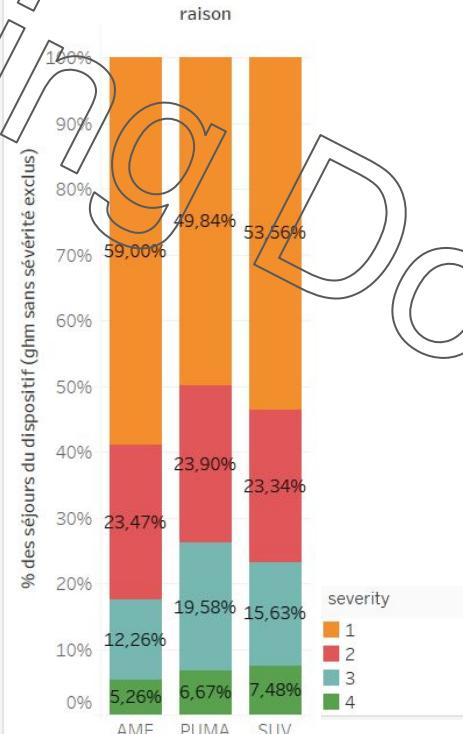


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SUV vs PUMA

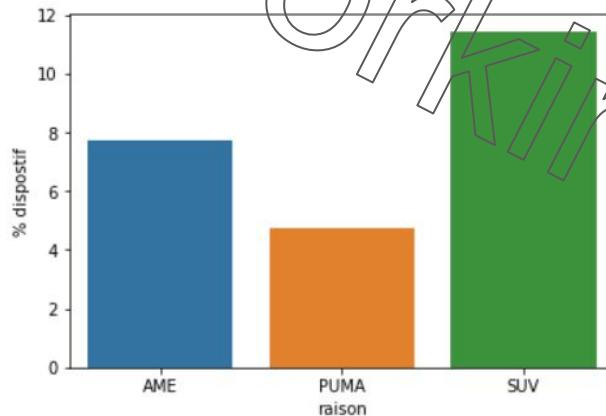
# The Static Insights

Répartition de la sévérité selon le dispositif

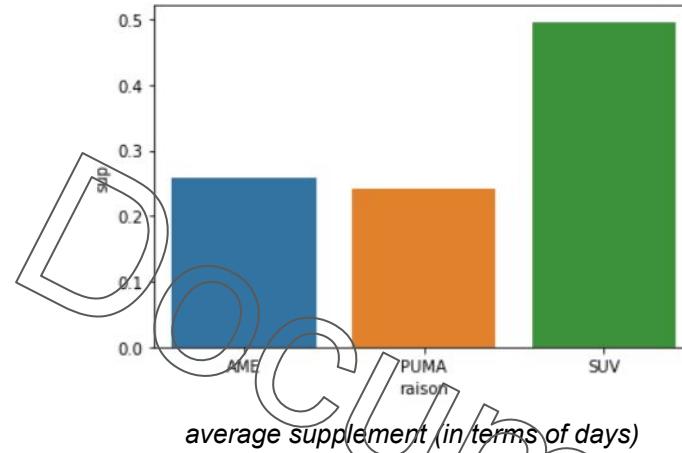


*insight : no greatly significant distortion in terms of severity across systems.*

# The Static Insights



# patients with at least a supplement



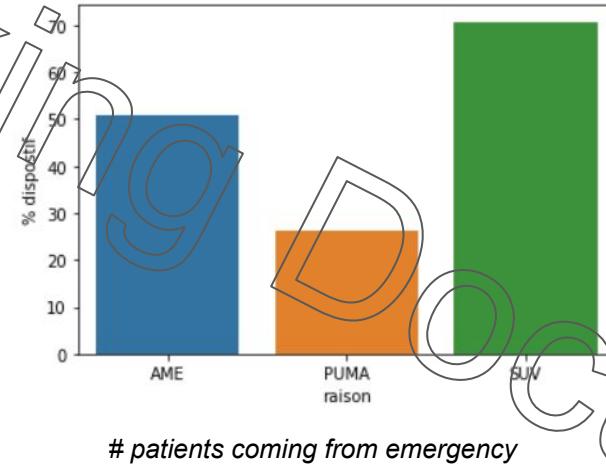
*insight : skewed towards the systems with the more precarious patients.  
SUV highlights itself on both views. AME difference with PUMA is more subtle in terms of average supplement.*

# The Static Insights

Supplément moyen par groupe, toutes années confondues

grp_cln	raison		
	AME	PUMA	SUV
Accouchements san..	0,0009	0,0007	0,0001
IVG et Avortements	0,0024	0,0023	0,0154
Césariennes sans co..	0,0041	0,0030	0,0024
Interventions sur la ..	0,0019	0,0002	0,0000
Affections de l'ante ..	0,0010	0,0010	0,0018
Accouchements ave..	0,0255	0,0142	0,0386
Endoscopies digesti..	0,0002	0,0004	0,0146
Nouveau-nés sans c..	0,0014	0,0002	0,0000
Nouveau-nés avec c..	0,0366	0,0232	0,0090
Explorations et surv..	0,0044	0,0016	0,0000
Douleurs thoraciques	0,4218	0,2996	0,2697
Ethylisme	0,0789	0,0482	0,2167
Diabète	0,0121	0,0072	0,0111
Chimiothérapie	0,0796	0,0289	0,1133
CMD 23	0,0236	0,0182	0,0176
Interventions sur le ..	0,0002	0,0004	0,0000
Faux travail et mena..	0,0012	0,0024	0,0077
Douleurs abdominal..	0,0078	0,0054	0,0297
Césariennes avec co..	0,2776	0,2711	0,2402
Radiothérapies	0,0000	0,0000	0,0000

# The Static Insights



POPUP Study insight: significantly skewed towards the systems with the more precarious patients.

# The Dynamic Insights



POPUP Study

# The **Dynamic** Insights

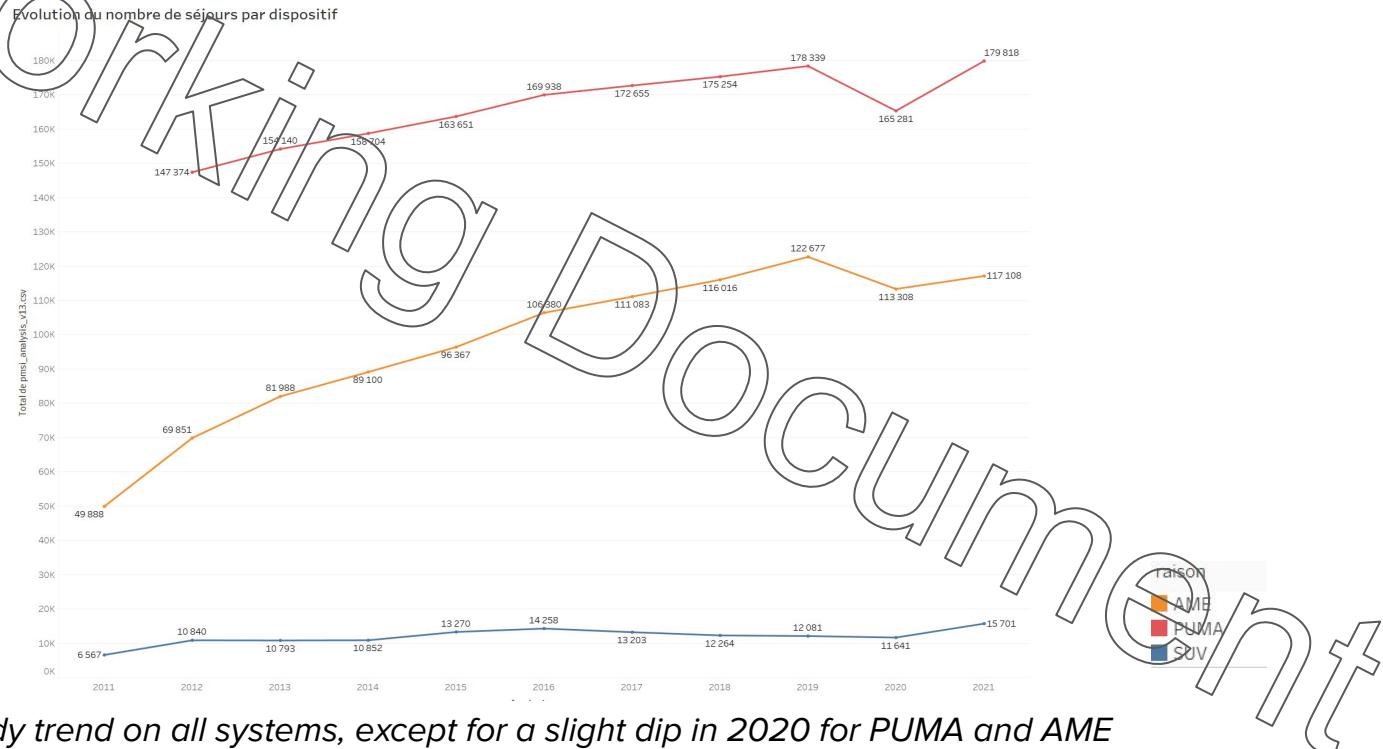
In our effort to characterize static top level differences between AME, SUV and PUMA and the effect of public policies, we'll explore :

- Stays and Patients distribution
- Curated GHM Group Structure
- Cost
- Pathology Severity
- Stay Supplement
- Patient Stay Provenance

**Through time, on a yearly basis**

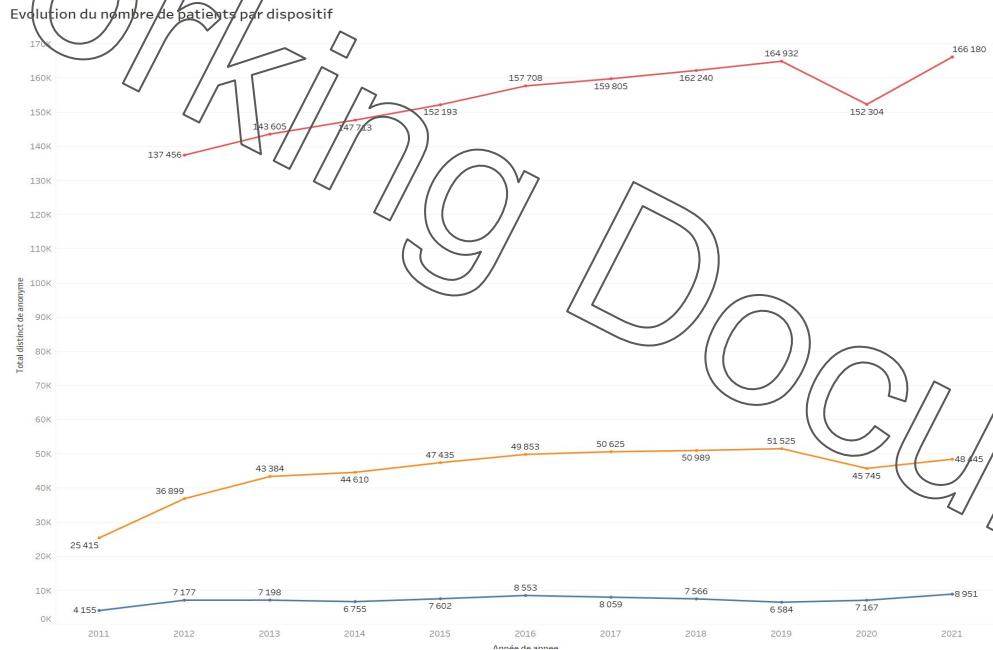
**POPUP Study**

# The Dynamic Insights



*insight : steady trend on all systems, except for a slight dip in 2020 for PUMA and AME*

# The Dynamic Insights

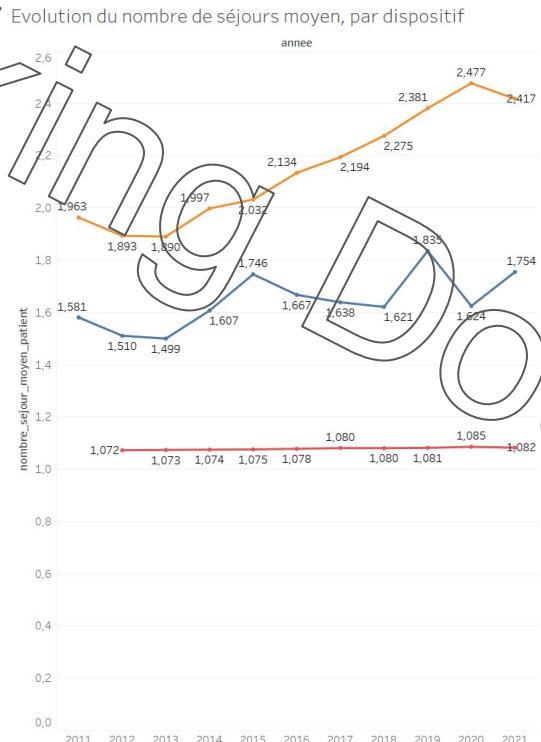


Raison

- AME
- PUMA
- SVI

*insight : steady trend on all systems, except for a slight dip in 2020 for PUMA and AME*

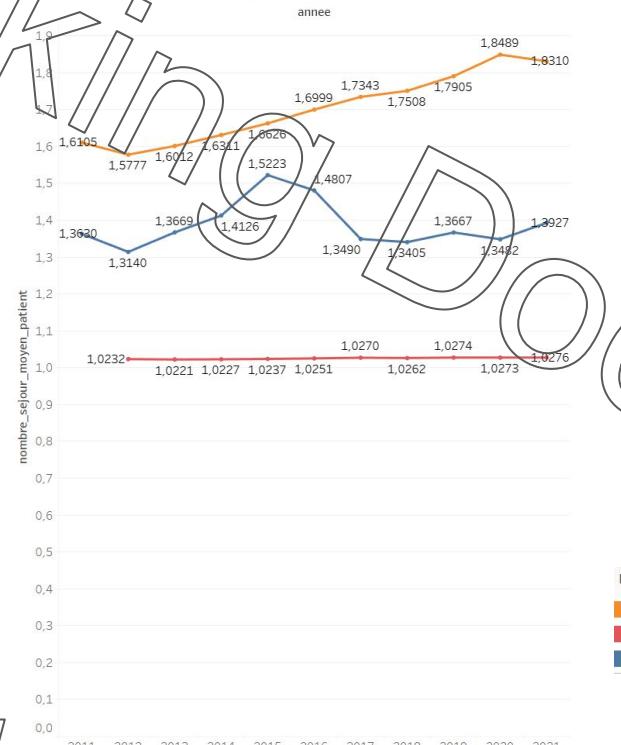
# The Dynamic Insights



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# The Dynamic Insights

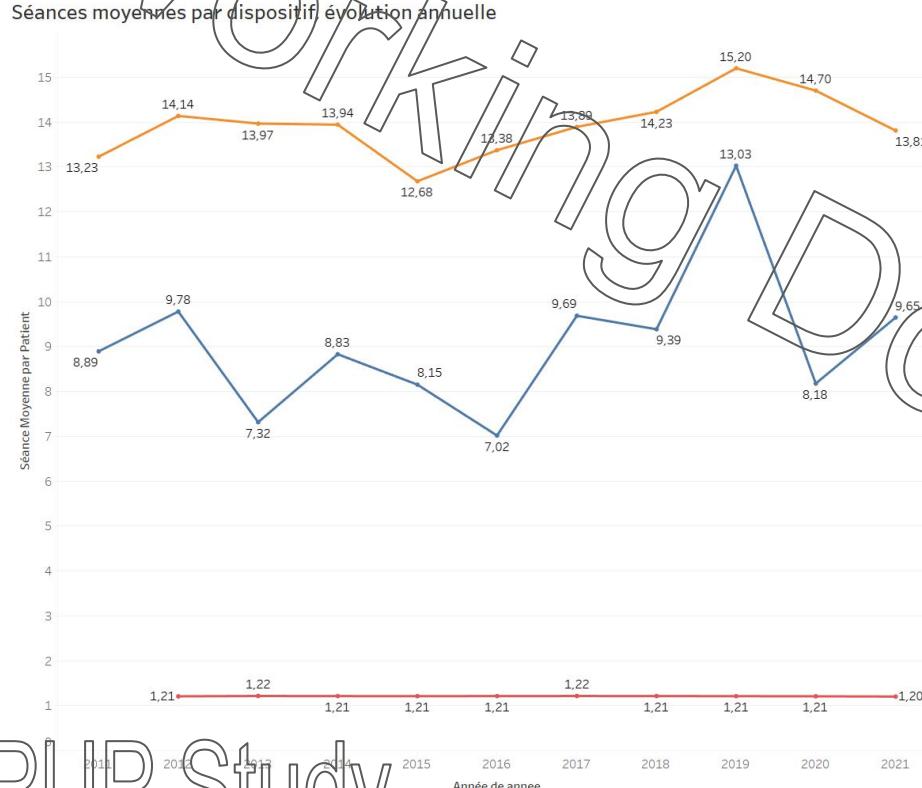
Evolution du nombre de séjours moyen, par dispositif - Hémodialyses et Radiothérapies exclues



raison

- AME
- PUMA
- SUV

# The Dynamic Insights



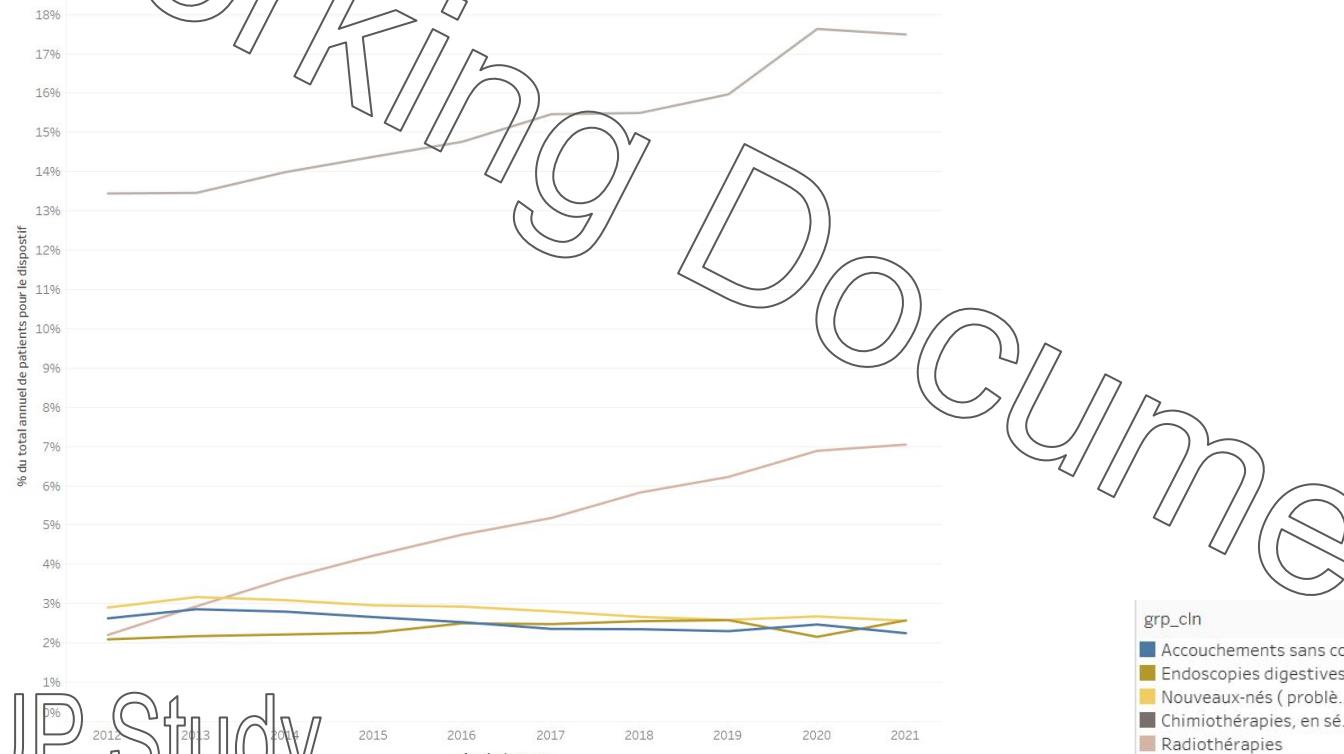
raison

- AME
- PUMA
- SUV

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# The Dynamic Insights

Evolution annuelle de l'effectif de patients par top groupe - PUMA



# The Dynamic Insights

Evolution annuelle de l'effectif de patients par top groupe - AME

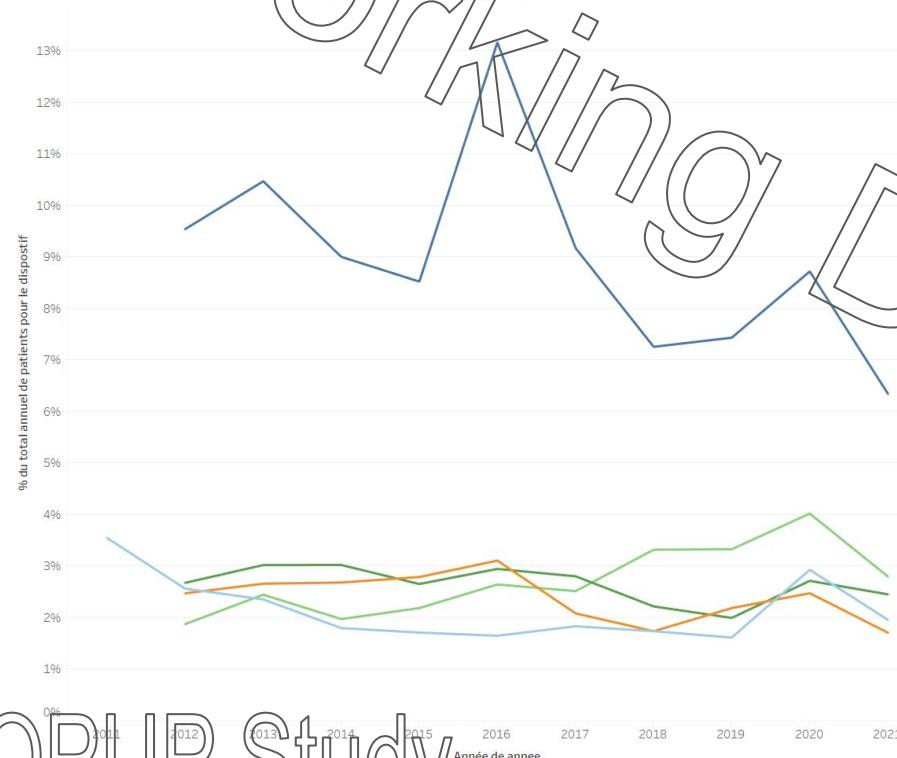


- grp\_cln
- Accouchements sans co.
  - IVG et Avortements
  - Césariennes sans comp..
  - Affections de l'ante par..
  - Accouchements avec co..

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# The Dynamic Insights

Evolution annuelle de l'effectif de patients par top groupe - SUV

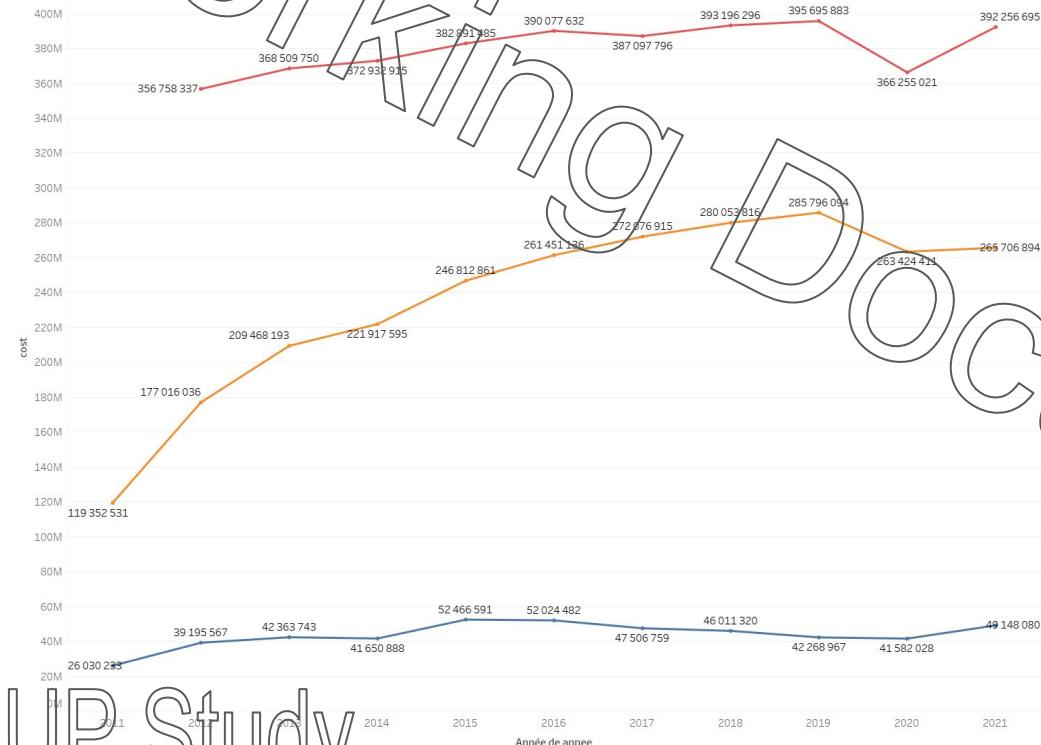


- grp\_cln
- Accouchements sans co..
  - IVG et Avortements
  - Césariennes sans comp..
  - Affections de l'ante par..
  - Accouchements avec co..

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# The Dynamic Insights

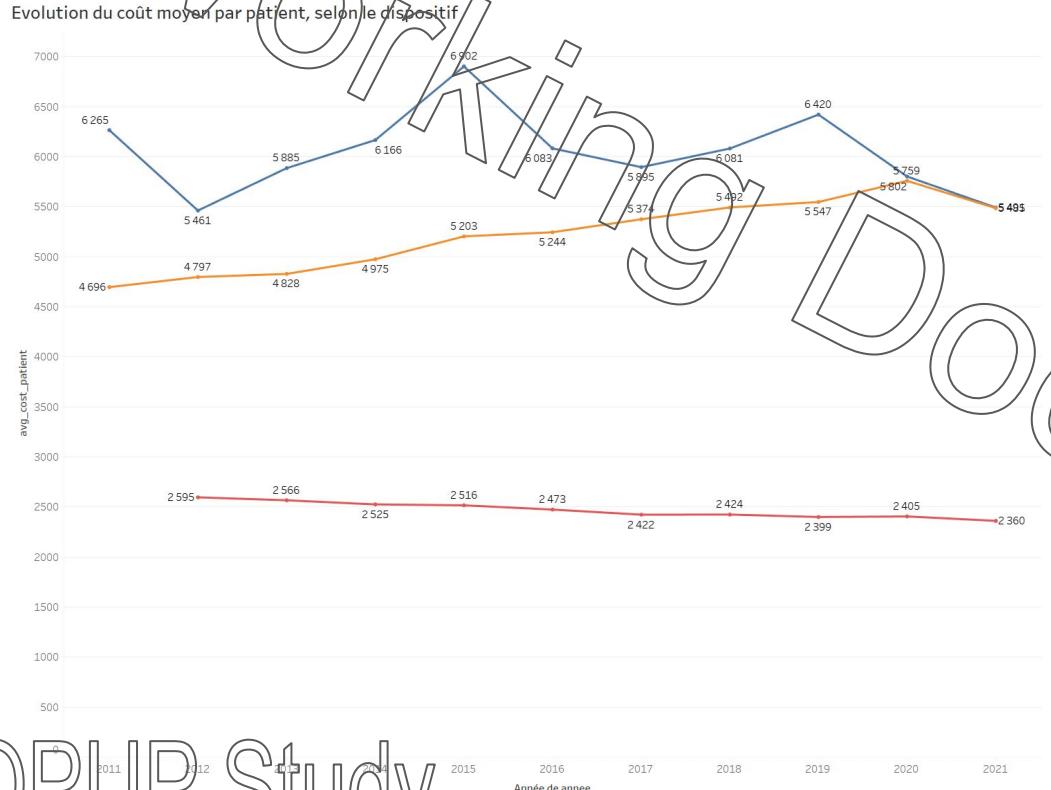
Evolution du coût global selon le dispositif



raison

- AME
- PUMA
- SUV

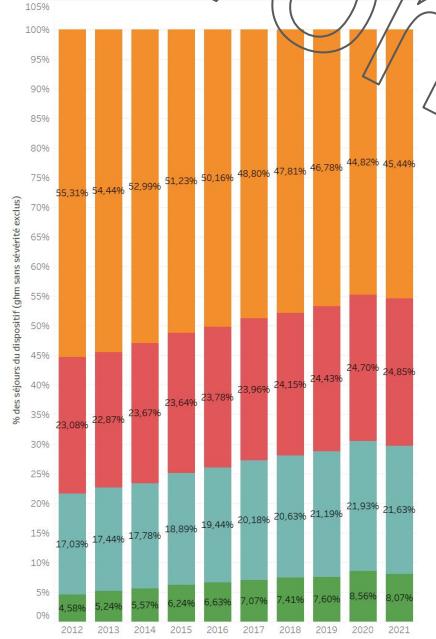
# The Dynamic Insights



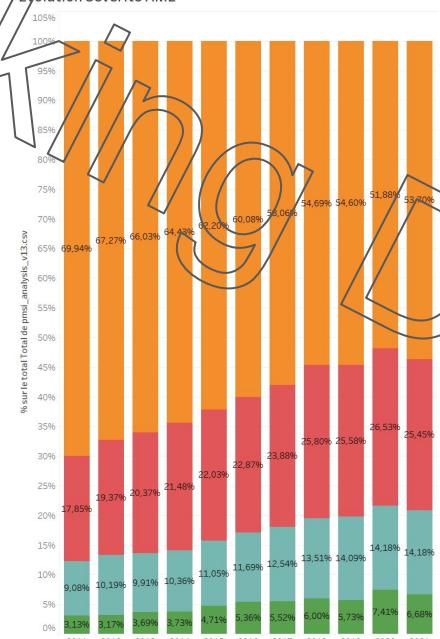
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# The Dynamic Insights

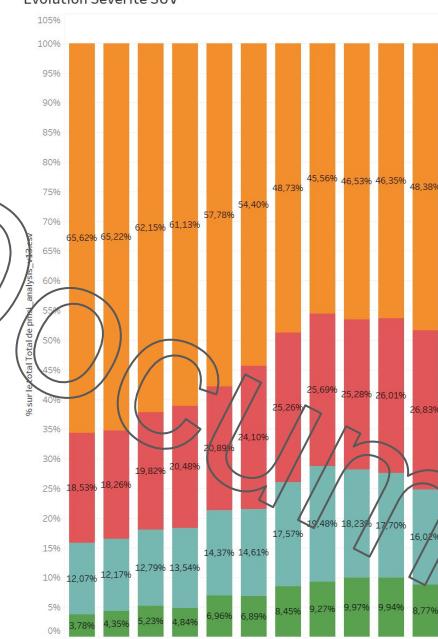
Evolution Sévérité PUMA



Evolution Sévérité AME



Evolution Sévérité SUV

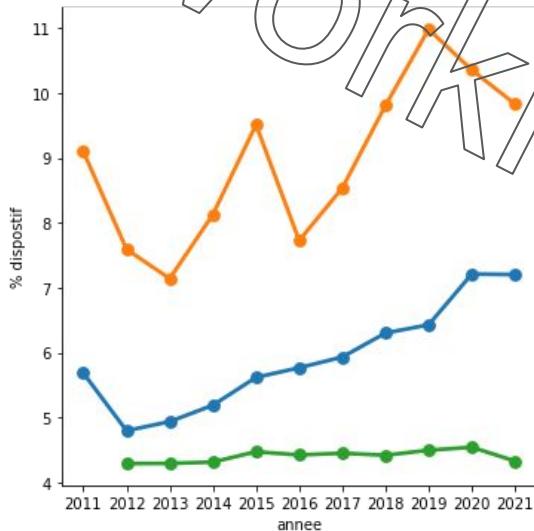


severity

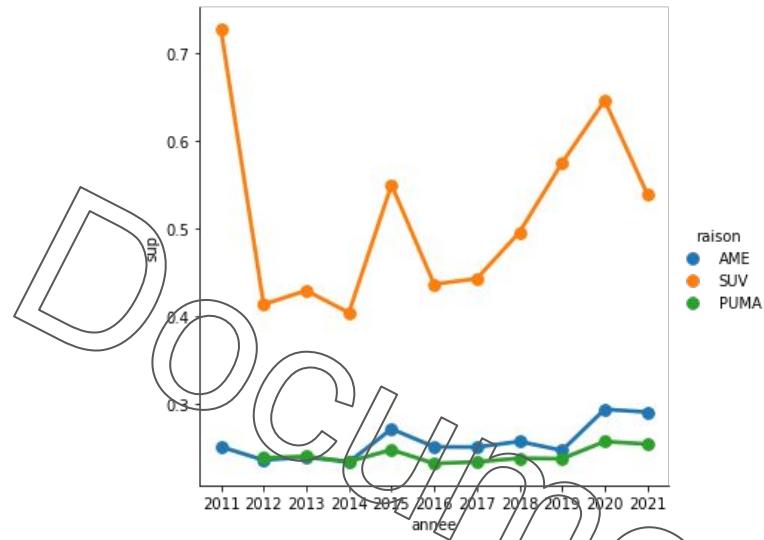
insight : roughly the same structure overtime

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# The Static Insights

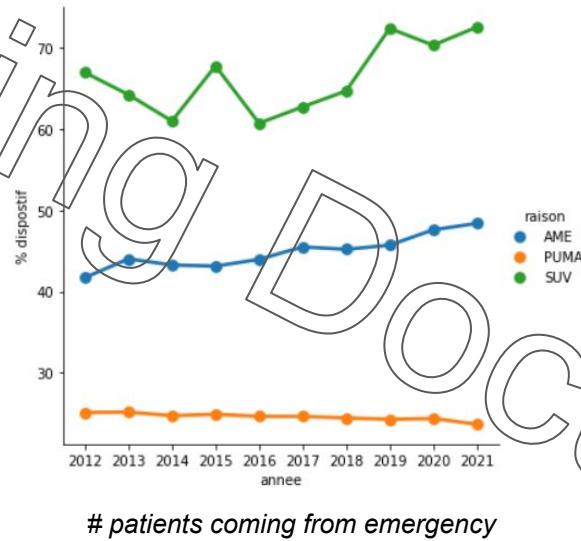


# patients with at least a supplement



average supplement (in terms of days)

# The Static Insights



insight : significantly skewed towards the systems with the more precarious patients.

Upward trend for SUV & AME, SUV bumps in 15' and 19'. Stable/slightly decreasing profile for PUMA.

# The Spatial Insights

POPUP Study

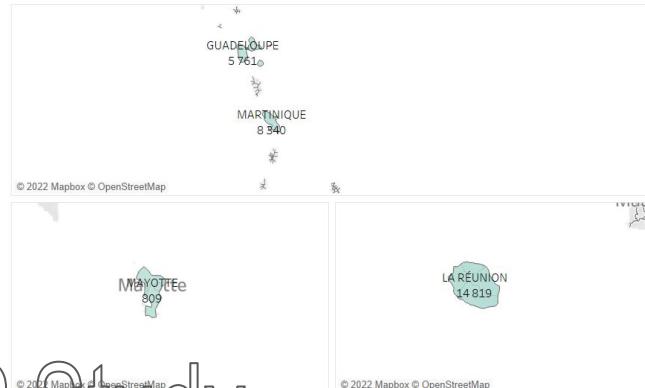
# The Spatial Insights

In our effort to characterize static top level differences between AME, SUV and PUMA and the effect of public policies, we'll explore :

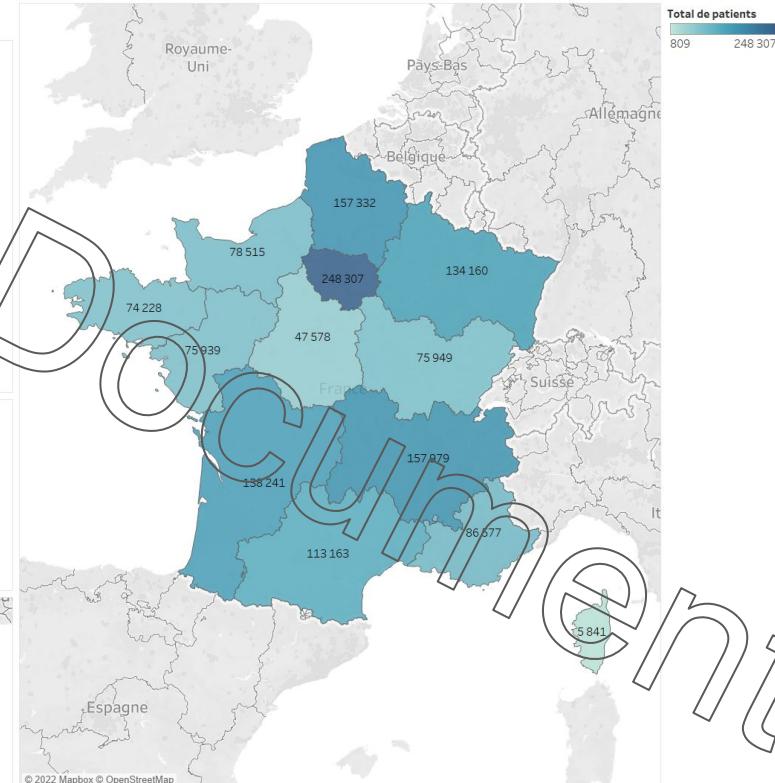
- Geographical distribution across french regions
- Yearly evolution of geo-distribution

# The Spatial Insights

Répartition géographique des patients pris en charge - PUMA



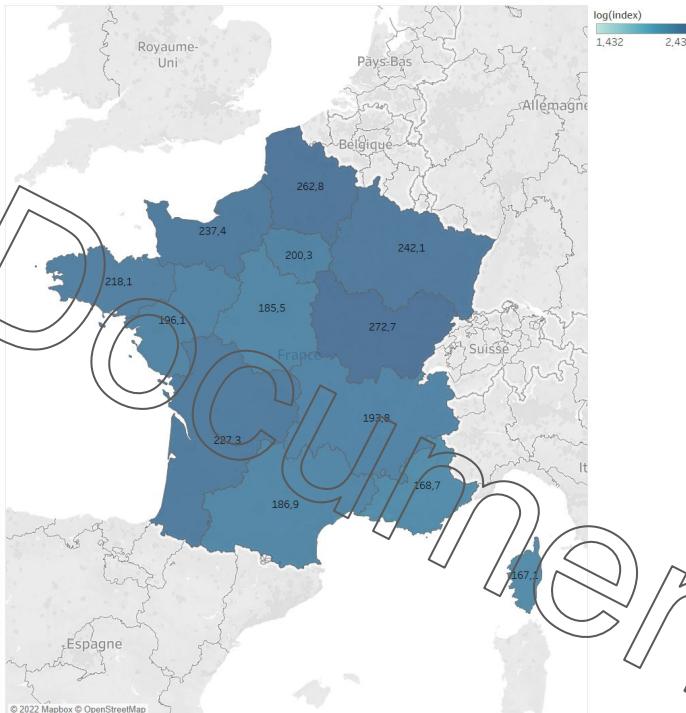
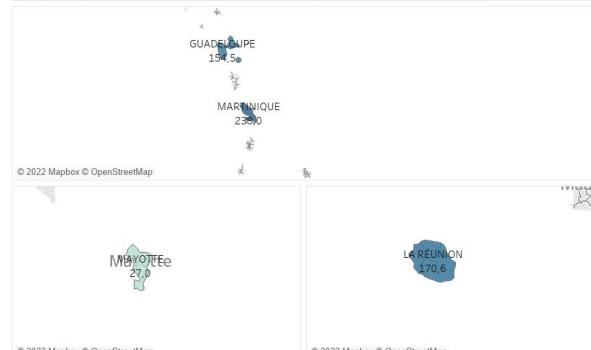
# patients



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# The Spatial Insights

répartition géographique des patients pris en charge - PUMA  
(nombre de patients pour 10 000 habitants)

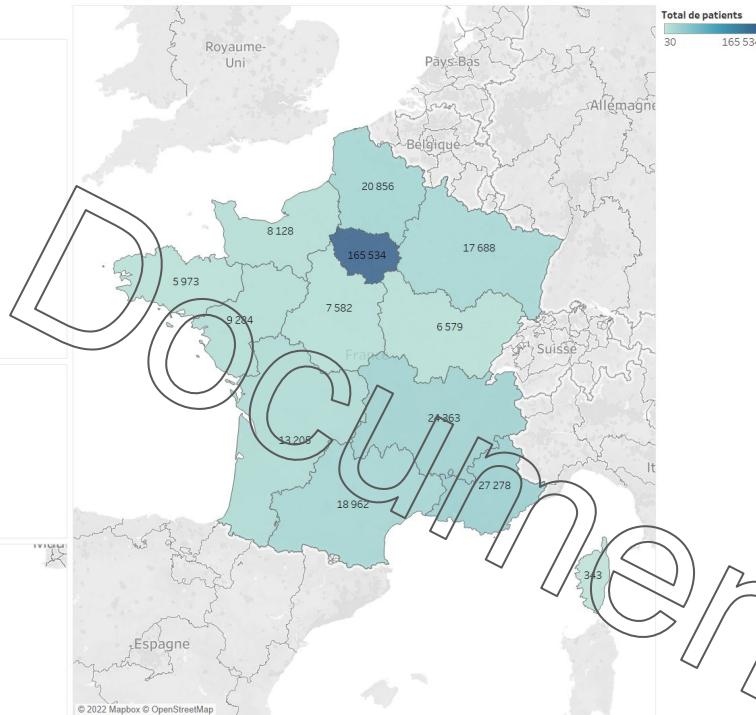


demographic index [log for the gradient]

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# The Spatial Insights

#### Répartition géographique des patients pris en charge - AME

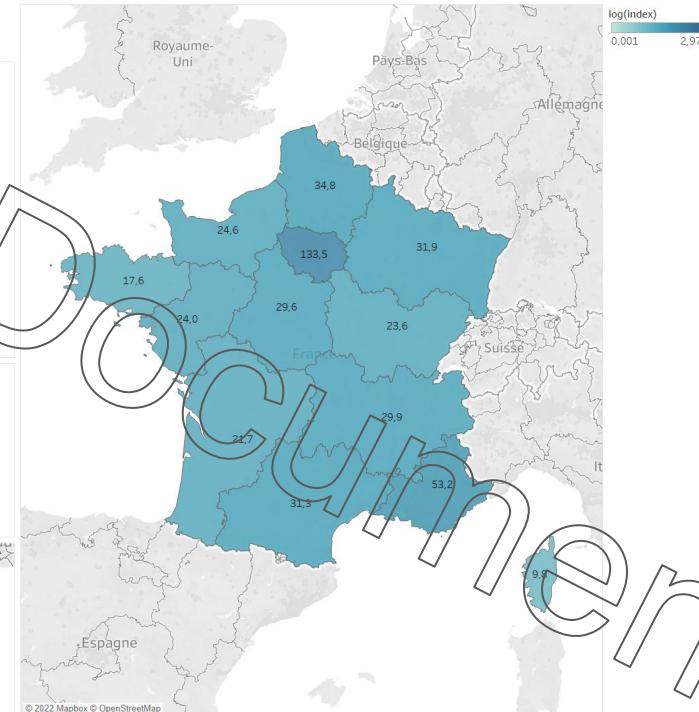
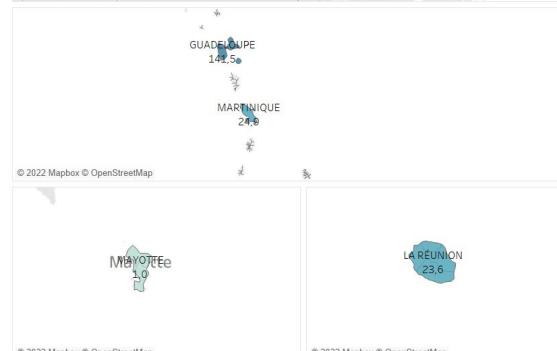


# POPUP Study

# patients

# The Spatial Insights

Répartition géographique des patients pris en charge - AME  
(nombre de patients pour 10 000 habitants)

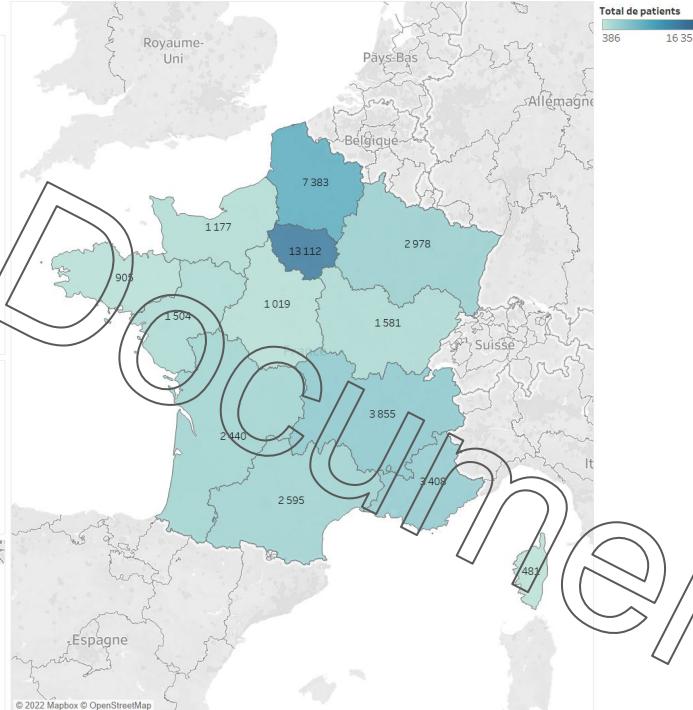
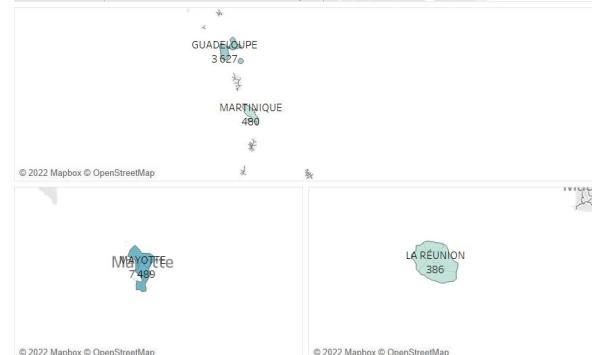


POPUP Study

demographic index [log for the gradient]

# The Spatial Insights

Repartition géographique des patients pris en charge - SUV

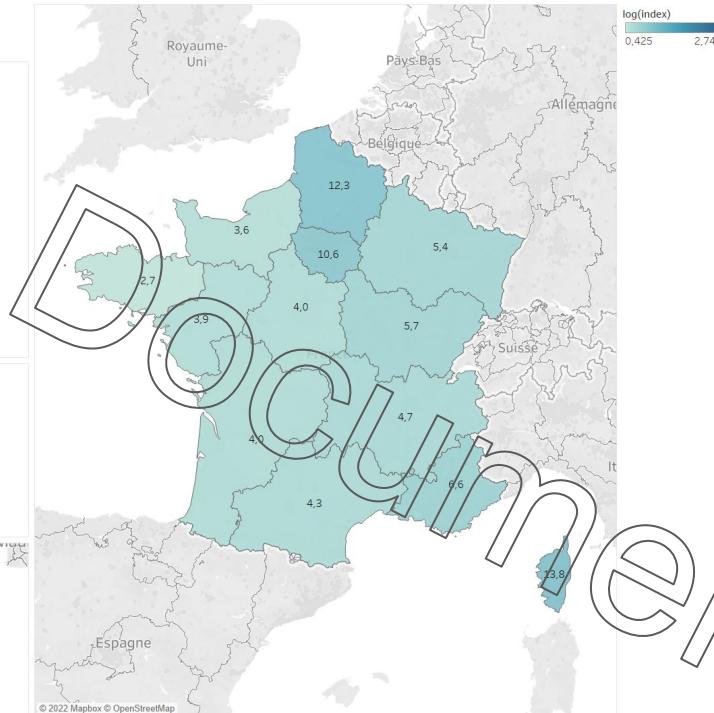
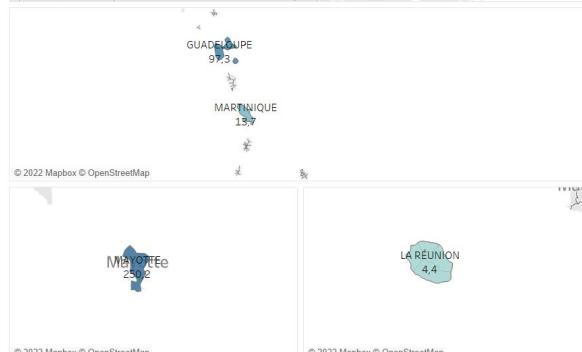


# patients

POPUP Study

# The Spatial Insights

Répartition géographique des patients pris en charge - SUV  
(nombre de patients pour 10 000 habitants)

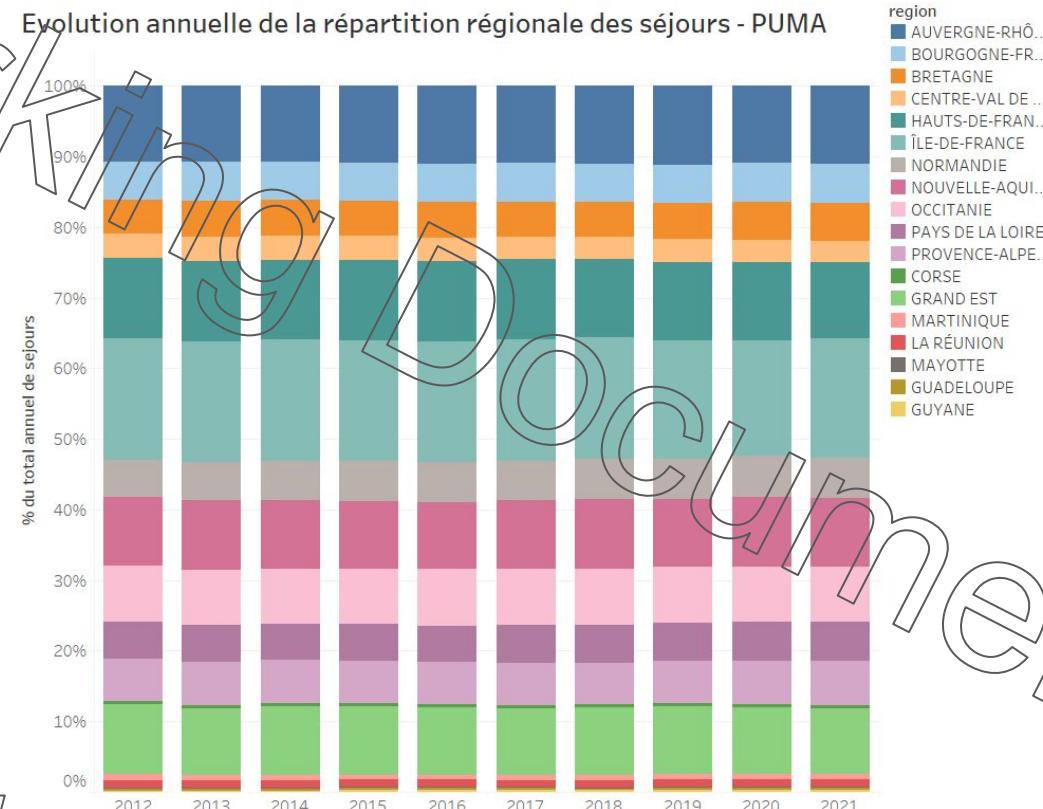


POPUP Study

demographic index [log for the gradient]

# The Spatial Insights

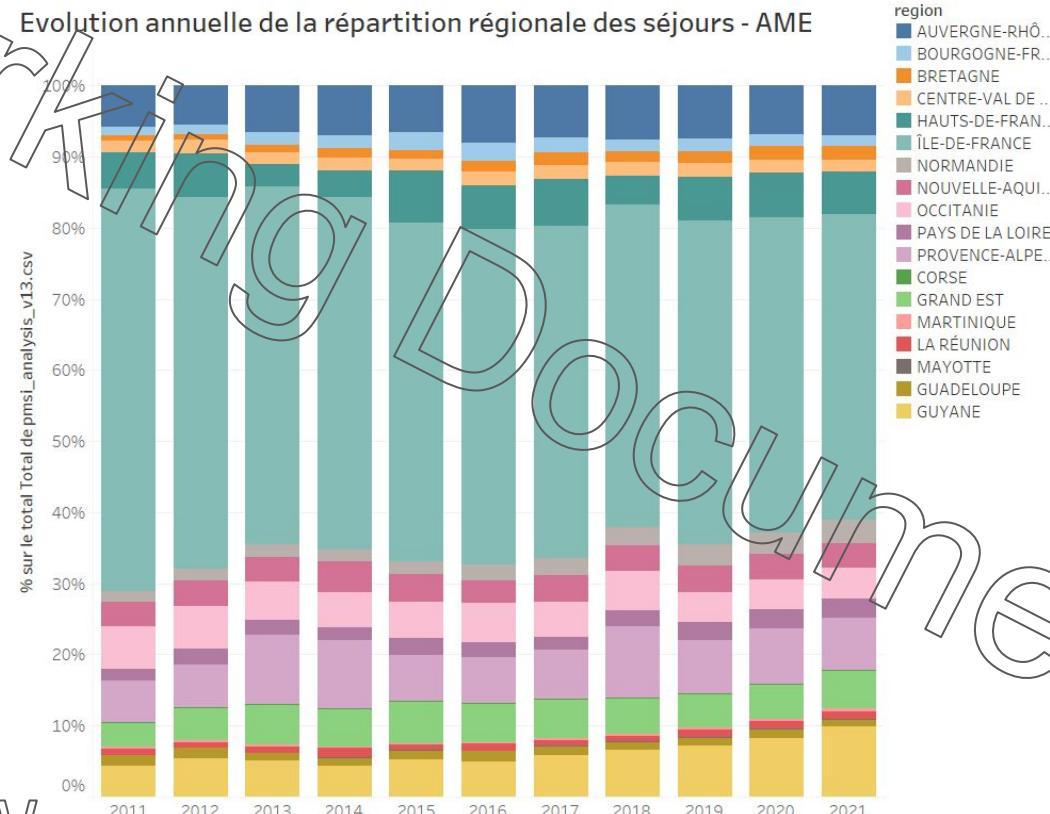
Evolution annuelle de la répartition régionale des séjours - PUMA



POPUP Study

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Evolution annuelle de la répartition régionale des séjours - AME



# The Spatial Insights

Evolution annuelle de la répartition régionale des séjours - SUV

