Maternal and newborn's health consequences of maternity units' closure:

Evidence from a French administrative database

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INED

Key points

In short

Over the course of 40 years, the number of maternity units in France has been divided by 2.8.

- A series of decrees were issued:
    - The 1972 *décret Dienesch* specifies the safety norms for private and public maternity units.
    - The 1998 *décrets Périnatalité* set three types of maternity units, according to their ability to handle risky pregnancies.
- It translated to a dramatic decrease of the number of maternity units: from 1 369 in 1975, to 814 in 1996, to 490 in 2018.

- In the same time, as the number of beds available declined and the birth rate in France remained dynamic, the rate of beds use increased: 22 deliveries by bed on average in 1975 to 47 deliveries by bed on average in 2014. (Drees, 2016)

Health authorities argue that the closures are for safety reasons, but each new closure is decried in local newspapers, often create protests and is seen as an issue of access to health care.

It raises two questions:

1. **Do maternity unit closures have an impact on the health and well-being of mothers and infants?**

2. **If so, is it due to the increased time and distance needed for women to reach maternity units ?**

What would be the rationale behind?

⇒ Closure of maternity units could make access to care for expecting mothers more difficult because it increases **the time and distance needed** to reach them. Especially in more rural areas.

⇒ This could reduce the incentives for women to follow prenatal care checkups.

⇒ This would also mean that reaching maternity units for delivery may be harder. This could either increase the number of out-of-hospital deliveries in unsafe conditions or create a **crowding effect** in the remaining maternities, that would affect quality of care.

Brief literature review

(PILKINGTON et al.,2008): closure of 20 % of maternity units between 1998 and 2003 in France but it implied only a small (≤ 1 km) significant increase in the distance between mothers' residence and the nearest maternity unit and did not change the declared mean travel time.

(COMBIER and al., 2013): Burgundy during 2000-2009. Authors find a significant association between distance and pregnancy outcomes as well as distance and unplanned out-of-hospital deliveries.

(BLONDEL and al, 2011): distance to the nearest hospital is associated positively with out-of-hospital delivery, in 2005-2006 in France. No association with the closure of a near (15 km radius) maternity unit in the preceding year.
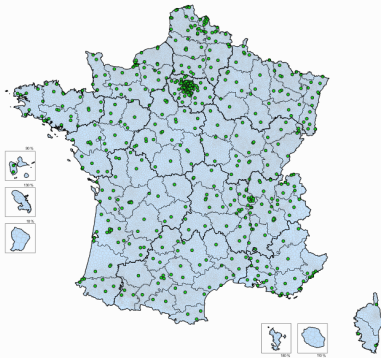
Data

I use two main sources of administrative data:

1. *Statistique Annuelle des Etablissements (SAE)*: Compulsive administrative survey led by the DRESS for all health facilities in France since 1994. SAE surveys give detailed information on structure, equipment, medical staff, type of activities for each year. Available between 2000 and 2018.

2. Perinatal health indicators extracted from the PMSI-MCO database: exhaustive hospital records on birthweight and prevalence of prematurity. Available between 2013 and 2018.

In addition to the birth certificates, which gives me the following information: mother's place of residence, commune of birth, multiple/unique delivery, status of newborn (stillborn/alive).

Figure 1: Municipality with at least a maternity unit

- 387 maternity units closed between 2000 and 2018
- 122 maternity unit opened during the period
  ⇒ This includes maternity unit that closed temporarily and opened again
- A maternity unit closing is most likely a type I maternity:lower number of beds, perform less deliveries ,have no intensive care unit

Question:
Did the closure of maternity units in France between 2000 and 2018 actually increase the distance to the nearest maternity unit?
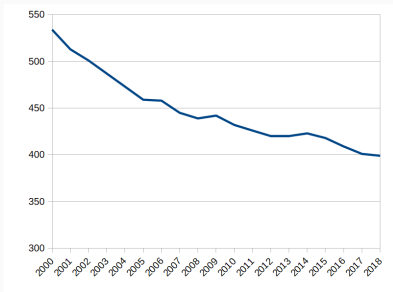
Method: I compute the distance in km and the time needed in minutes for each municipality in France, to the nearest maternity unit, each year.

- I use the METRIC software developed by INSEE (French *National Institute of Statistics and Economic Studies*), that builds on road network and detailed maps of France
- Distance in km between two municipalities is computed from road maps
- Computation for the time needed to reach the nearest maternity unit is estimated for high/low density road traffic

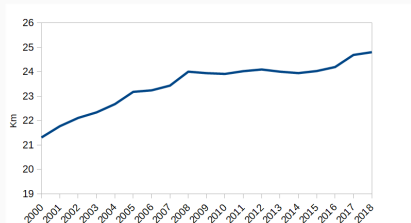NB: Localisation of maternities is coded at the municipality level

Access to care II

Figure 2: Municipalities with a
maternity unit during the study period

Figure 3: Average distance in Km to
the nearest maternity unit

⇒ Nearly 150 municipalities went
from at least one maternity unit to
none

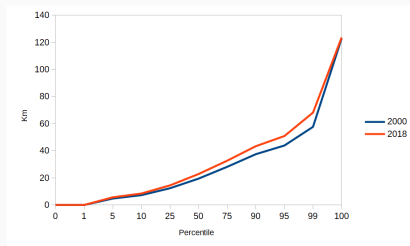⇒ Average distance in km needed
to reach the nearest maternity unit
increased by 16.4 %

Percentile distribution

Figure 4

	Km in 2000	Km in 2018	2018/2000 (%)
p1	0	0	0
p5	4,8	5,7	18,75
p10	7,3	8,5	16,44
p25	12,4	14,5	16,94
p50	19,5	22,9	17,44
p75	28,2	32,7	15,96
p90	37,5	43,4	15,73
p95	43,9	50,9	15,95
p99	57,7	68,2	18,20
max	122,9	123,6	0,57

⇒ Highest increase is percentage is actually for the closest municipalities
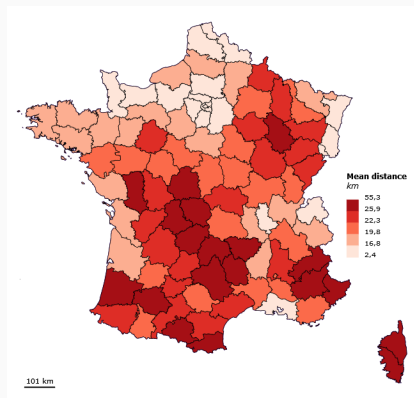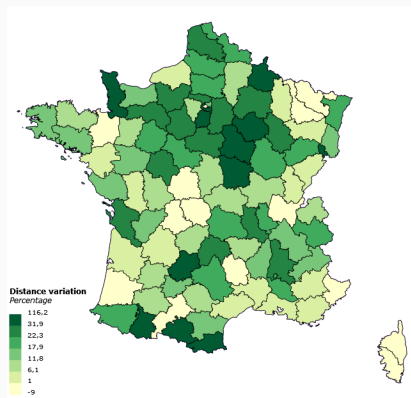
Figure 5

⇒ Average distance to the nearest maternity unit increase slightly for the whole distribution during the time period

Spatial disparity in access to healthcare

Figure 6: Departmental disparities in access to care in 2000

Figure 7: Evolution of mean distance between 2000 and 2018

Results

- More than 300 maternity units closed at least one year between 2000 and 2018
- 209 municipalities went from having at least one maternity unit to none
- The average distance needed to reach the nearest maternity unit increased by 16.4 % between 2000 and 2018, from 21.3 km to 24.8 km
- The average time needed to reach the nearest maternity unit increased by 14.8 % between 2000 and 2018, from 27,5 minutes to 31.6 minutes.
- Effects are heterogeneous across French departments

Next steps

- I have used every municipalities in France, every year, to compute the distance to the nearest maternity unit. I plan on using the birth certificates to re-run my program on the subset of municipalities where mothers actually reside each year.

- I built a dataset of flows between mother's residence and the municipalities where the maternities are. Flows can be fanned out by number of children, or whether the deliveries were unique or multiple.

- Birth certificates include out-of-hospital deliveries, which I can identify both through the birth certificate and through my own list of maternity units. I want to expand on that.