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Choosing where to deliver: decision criteria among women with low-risk pregnancies in France

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Abstract

As in the rest of Europe, the supply of maternity hospitals has progressively decreased over the past few decades in France. An understanding of user choice criteria is important to help health planners reorganize obstetrical services and to predict changes in utilization patterns in response to supply changes. The objectives were to understand the criteria that women use to select their maternity hospital in France and to analyse the relation to individual and community characteristics. A survey of 536 recently delivered women with low-risk pregnancies explored the factors motivating user choice in three territories with distinct geographical and health service supply characteristics: four districts in Burgundy, two districts in Pays de la Loire, and the district of Seine-Saint-Denis in Ile-de-France. Women were asked to select a principal choice criterion. Their responses were grouped into categories: Accessibility/proximity, reputation of the establishment among users, advice of treating physician, technical quality and cost. Accessibility and proximity were the most selected criteria (33%), followed by the reputation of the maternity (29%), technical quality (15%) and advice of treating physician (13%). Age, parity and education influenced choice criteria. After controlling for individual determinants, region of residence was highly related to choice criteria; women living in Burgundy were more likely to select an establishment based on proximity, in Seine-Saint-Denis women were more likely to follow the advice of their physician, and in Pays de la Loire, more likely to base their decisions on the reputation of the establishment. The association between choice criteria and community characteristics could explain the failure of previous models to predict behaviour in different contexts. It is important to carry out local surveys of user perceptions before restructuring in order to take into consideration women's opinions on their future places of delivery and to refine geographic models. © 2003 Elsevier Ltd. All rights reserved.

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Introduction

As in the rest of Europe, the supply of maternity hospitals in France has progressively decreased over the past decades. Part of this decline is due to policies to reorganize the hospital sector in order to control rising

health care costs (Kerleau, 2001). The implementation of a national perinatal regionalization programme in 1998 to improve care provided in cases of high-risk birth also contributed to the reorganization of supply. The 1998 decree requires all hospitals to be classified according to their level of care and specifies the equipment and personnel for each level (Décret no. 98-899). These requirements have placed pressure on private clinics and increased closures for financial reasons. This decree also stipulates that maternity units with fewer than 300

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deliveries annually should be closed, continuing a policy to close small maternity clinics that began in the 1970s. As part of the regionalization programme, responsibility for regulating the organization of care has been delegated to regional governing agencies. These changes have generated a debate in France about optimal models for organizing maternity care and on how regional characteristics affect these choices.

User preferences should be part of this debate. An understanding of user choice criteria helps planners to respond to the needs of the population and to predict changes in utilization patterns following supply changes. Despite their importance, few studies of user preferences have been undertaken to assist planners with the reorganization of the maternity sector. Current policies are broadly based on a belief that women prefer to deliver in maternity units with high-technology capacities, (Vaguet, 2001) but this notion has not been tested empirically.

User preferences may differ by region of residence. Age, parity and educational level have all been found to affect individual provider choices (Bashshur, Shannon, & Metzner, 1971) and variation in population characteristics could create differences between regions. User preferences may also be related directly to community-level characteristics, such as geographical constraints and the organization of perinatal health care; this latter question has not been studied.

This study aims to understand the criteria that women with low-risk pregnancies use to select their maternity hospital in France and to explore how these criteria relate to both individual and community characteristics.

Methods

To describe women's preferences and their choice criteria, we carried out a study of women with low-risk pregnancies delivering in three regions in France in 2001. The areas selected for the study have approximately the same number of births per year and the same population, but very distinct geographical features. They are: four districts in Burgundy, the districts of Vendée and Loire-Atlantique in the Pays de la Loire region and the district of Seine-Saint-Denis in the region of Ile-de-France. In all three areas, maternity services are organized around one level III perinatal centre (maternity unit associated with a neonatal intensive care unit), where high-risk cases are referred and all regions have a policy of in utero transfer for pregnant women with high-risk pregnancies.

Mothers were interviewed at the maternity unit after delivery. We excluded all women with preterm deliveries, post- and prenatal transfers, women who had been hospitalized during pregnancy, and women whose newborns were transferred to a special care nursery. Two

private clinics (in Loire-Atlantique and Seine-Saint-Denis) and one public maternity hospital (Saône et Loire) refused to participate. All other units in the study areas, a total of 49 hospitals or clinics, participated.

The sample size was calculated to correspond to approximately 1% of all births in each region. The number of women interviewed in each maternity unit was based on the number of deliveries during the year 2000. Interviewers visited the maternity units in random order within each region. Investigators began interviewing on the day randomly selected for the visit and continued until the sample size for the unit was attained. Inclusions were made chronologically by time of delivery, starting with the woman with the earliest delivery date. All women who were selected into the sample agreed to participate in the study. Several questions on complications of pregnancy and delivery were used to validate the inclusion criteria.

The survey period extended from 1 February to 30 April 2001. During the last month, a national midwives' strike led to the closure of two maternity units before the questionnaires had been completed: one in Burgundy and one in Pays-de-Loire. For these units, the desired sample size was not attained.

For the study, 574 women were interviewed: 156 in Burgundy, 217 in Seine-Saint-Denis and 201 in Vendée and Loire-Atlantique. Thirty-eight women were excluded because of the presence of medical complications during pregnancy and delivery. The final sample of low-risk pregnancies included 536 women: 145 in Burgundy, 196 in Seine-Saint-Denis and 195 in Vendée and Loire-Atlantique.

The questionnaire included items on the socio-economic characteristics of the women, travel times between home and maternity unit, means of transport, antenatal care patterns, and questions on the criteria used to choose the maternity unit.

Women were asked why they chose to deliver at their maternity unit. Response options were: 1: ease of access; 2: proximity; 3: medical advice or recommendation by treating physician; 4: satisfaction in previous deliveries; 5: recommendations from family/friends; 6: comfort/physical conditions; 7: the quality of contact with personnel; 8: technical quality; 9: Cost. Women could select several responses. We then asked them to rank the criteria they mentioned by order of importance. The dependent variable used for the analysis was the criterion mentioned as the most important, grouped by common theme: accessibility/proximity (1–2), medical advice (3), reputation of the establishment among users (4–5), conditions of care (6–7), technical quality (8) and cost (9). About 9% of the sample did not select a primary criterion and were excluded from the analyses; these exclusions are addressed in the discussion.

Distances and travel times to the nearest maternity units were also calculated for the three regions. The

average distance between the mothers' residence and the closest maternity was calculated using geographical software (CHRONOMAP[®] on MAPINFO[®]). This was done using data on township of residence and the township in which the maternity units were located. Distance was calculated for all births in the regions from civil registration data (in Pays de Loire) and from regional health certificates for newborns (in the two other regions) in order to provide a description of geographical constraints in the regions. In addition, within the low-risk sample of births, distance isochrones were used to compute whether the pregnant woman had at least two maternity units within 30 km of her home.

Analyses were carried out using SAS; the multivariate model was run using the CATMOD procedure. We identified factors that influenced choice criteria in univariate analyses. Variables considered were region, age, parity, level of schooling, mother living alone, employment during pregnancy, and mother's country of birth. A separate model was also run including whether the pregnant woman had at least two maternities within 30 km of her home. For multivariate analyses, we included variables that were significant at a $P=0.10$ level. The multivariate analyses use a multinomial (polytomous) logistic regression to analyse the factors influencing women's choice criteria; this variable has more than two outcomes and no natural ordering. The comparison group selected for analysis are women who selected their maternity unit based on the criterion 'proximity/accessibility'. This group was chosen because it was the most numerous and because this criterion is considered in the literature to be the most common.

Description of the three study areas

Bourgogne

The administrative region of Burgundy is made up of four essentially rural districts (la Côte-d'Or, la Nièvre, la Saône-et-Loire et l'Yonne), covering 31 582 km² with a population of 1 610 067, as shown in Table 1 which provides descriptive data on the three regions. In 1999, there were 17,977 infants born in Burgundy. Only 14.3% of the population live in cities with more than 100 000 inhabitants. The most widely used throughway in France (the A6) crosses this territory in the east. In the west, Burgundy is linked to Paris by a national highway. Between these two routes, in the centre of Burgundy is the Morvan Massif (20 km wide and 60 km long) that rises to 901 m and creates a physical barrier between the west of the region (Nevers) and the east (Dijon). This barrier is more formidable in the winter when the climatic conditions are not favourable. The topographical characteristics of the region explain the geographical dispersion of the population: There is an important

contrast between the centre of the region (only 250 000 inhabitants) and the periphery where the rest of the population and the principal economic centres are located.

Vendée and Loire Atlantique

The Vendée and the Loire-Atlantique are two districts situated on the Atlantic coast of the Pays de la Loire region, with a flat terrain and temperate climate. The department has a surface area of 13 535 km² and a population of 1 674 299 inhabitants. In 1999, there were 20 304 births in Vendée and Loire Atlantique. The Loire-Atlantique is an urban industrial district with a density of 166 inhabitants/km². It has two large industrial centres: Nantes and Saint-Nazaire. The district of the Vendée has a lower population density (80 inhabitants per km²) and the cities are smaller. Two principal axes structure this territory—the Loire river that crosses from east to west and the highway from Nantes to La Roche-sur-Yon which goes south from the Loire. The road network is dense and there are no problems with transportation within the territory.

Seine-Saint-Denis

Seine-Saint-Denis is one of the eight districts in the Ile-de-France region. Situated north-east of Paris, it has a surface area of 236 km², making it one of the smallest districts in France. However, it ranks seventh for population: 1 382 861, making its population density high: 5859 km². In 1999, there were 23 918 births in Seine-Saint-Denis. Seine-Saint-Denis has a higher fertility rate than the other two regions, due in part to the proportion of immigrant populations (18.8% of the total). The immigrant population in France comes principally from the Mediterranean, Northern Africa and Sub-Saharan Africa. This district is highly urban and the physical layout disorganized. The territory is crisscrossed by highways, roads and railroads that either converge in Paris or are part of the outer ring roads surrounding the capital. Many of the most industrial or commercial areas were constructed to maximize access to Paris (such as the two airports: 'Le Bourget' and 'Charles de Gaulle'). These airports as well as large industrial zones and a canal cut across the territory and constitute physical barriers within the district. The network of public transportation is dense and well linked to the city of Paris. However, going from place to place within the district can be difficult. Traffic is a problem on most of the roads.

Comparison of the supply of maternities in each region

In 2000, there were 20 maternity units in Burgundy, 16 in Vendée and Loire Atlantique and 16 in Seine-

Table 1
Characteristics of regions

	Burgundy	Loire/Atlantique and Vendée	Seine-Saint-Denis
Population	1 610 067	1 673 847	1 382 861
Surface area (km ²)	31 582	13 535	236
Density (hab/km ²)	51	124	5859
Population of women between 15 and 49 years	374 293	408 993	371 177
Fertility rate (‰)	48.0	54.4 and 49.6	64.4
Births in 1999	17 977	20 304	23 918
Number of maternity units	20	16	16
Average number of births by maternity unit	899	1298	1495
Size of maternity units			
< 600 deliveries	9	1	2
600–1500 deliveries	6	9	8
> 1500 deliveries	5	6	6
Number of obstetric beds	721	644	542
Number of urban zones with maternity units ^a	16	9	16
Birth in 1999			
In level III units ^b (%)	11	16	11
In public maternity units (%)	77	54	48
In private maternity units (%)	23	46	52
Births in 1999: average distance between			
Home and level III unit (km)	96	42	10
Home and the closest maternity unit (km)	16	11	2

^aCities in Seine-Saint-Denis.

^bMaternity units associated with a neonatal intensive care unit.

Saint-Denis. In Burgundy, nine units have fewer than 600 deliveries per year, including three with fewer than 300 annual deliveries. Maternity services are more concentrated in Vendée and Loire Atlantique: the largest maternity unit (3500+ deliveries per year) is located here and many of the units are located around the city of Nantes. About 16% of all births took place in the level III maternity unit in Vendée and Loire Atlantique versus 11% in Burgundy and Seine-Saint-Denis. In Loire-Atlantique, a greater proportion of births took place in private maternity units.

The average distance to the closest maternity unit was 2 km in Seine-Saint-Denis, 11.2 in Loire Atlantique and 15.8 km in Burgundy. The mean distance to a level III perinatal centre was 10 km in Seine-Saint-Denis, 42 km in Vendée and Loire-Atlantique and 98.2 km in Burgundy.

Results

Population of the study: description by zone

The age and parity distributions of the women in the three regions do not differ greatly, as shown in Table 2.

The population in Seine-Saint-Denis is characterized by the large proportion of women who were born outside of France: about 50% were born outside of continental France. This has an effect on the socio-economic characteristics in the department. About 8% of women in Seine-Saint-Denis have only a primary school education and over 40% report that they have no occupation. However, there are significant differences between the two other regions as well: women in Vendée and Loire Atlantique are more likely to have had a tertiary education (almost 50% versus 31%) and least likely to report that they have no occupation (13% versus 32%). Father's unemployment was highest in Seine-Saint-Denis (10.3%), followed by Burgundy (4.3%) and lowest in Vendée and Loire Atlantique (2.5%).

In all regions, there was no difference in the proportion of women receiving adequate prenatal care: over 90% of women received a monthly visit and had at least three ultrasounds during pregnancy (data not shown). The organization of prenatal care did differ; however, in Burgundy and Seine-Saint-Denis, about half of all women received their prenatal care at the maternity unit where they delivered versus one-quarter of women in Vendée and Loire Atlantique. General practitioners played a greater role in Vendée and Loire

Table 2
Characteristics of sample of low-risk births, by region

	Total N = 536	Burgundy N = 145	Seine-Saint-Denis N = 196	Vendée/Loire Atlantique N = 195	P
Mother's country of birth					
Continental France	77.7	92.4	49.0	95.9	<0.0001
Overseas France	2.3	0.7	5.6	0.0	
Other	20.0	6.9	45.4	4.1	
Primipara	47.2	49.0	43.4	49.7	NS
Education					
Primary	3.6	0.7	7.7	1.6	<0.0001
Secondary	58.7	68.7	60.5	49.5	
Tertiary	37.7	30.6	31.8	48.9	
Age					
<20 years	3.4	5.5	4.1	1.0	0.0768
20–37 years	91.2	89.0	88.7	95.4	
≥38 years	5.4	5.5	7.2	3.6	
Single mother	5.8	5.6	7.7	4.1	NS
No occupation	29.1	31.9	42.9	12.9	<0.0001
Father's unemployment	5.9	4.3	10.3	2.5	0.0023
Prenatal care					
Maternity unit only	41.2	52.4	49.5	24.6	<0.0001
Generalist	25.6	15.9	8.2	50.3	<0.0001
PMI ^a	6.9	0.7	16.8	1.5	<0.0001
Means of transport for delivery					
Private vehicle	90.8	95.1	84.2	94.3	0.0033
Medicalised ambulance	2.8	2.8	3.0	2.1	
Ambulance/taxi	4.5	2.1	8.7	2.6	
Public transport	1.9	0.00	4.1	1.0	
Travel time for delivery					
≤30 min	92.9	94.5	94.4	90.3	NS
>30 min	7.1	5.5	5.6	9.7	

^aDistrict maternal and child protection services

Atlantique, 50%, versus 15% in Burgundy and 8% in Seine-Saint-Denis. The district maternal child protection services oversaw the prenatal care of 17% of women in Seine-Saint-Denis versus less than 2% in the other two zones.

Over 90% of women in all three regions arrived at the maternity unit in 30 min or less. Most women travel by car to the hospital, although in Seine-Saint-Denis, 4% used public transportation and 8% a taxi or non-medicalized ambulance. In all three regions about 2.5% of women arrived by medicalized ambulance (Table 2).

Choice criteria for a maternity unit

Only one out of the 536 women interviewed considered cost to be a primary criteria. Few selected

physical comfort or quality of contact with the personnel (<3%). For these analyses, choices based on physical comfort or quality of contact were grouped with the category 'reputation of the maternity unit among users'. Choices based on cost were excluded, as only one person selected this criterion.

Three hundred and sixty-seven women cited more than one choice criterion. Among those women who had selected the reputation of the establishment as a first criterion, 40% selected a second criterion from the same group. About half of the women who named proximity/accessibility as a first criterion, selected a second criterion in the group 'reputation of maternity unit' and 75% of women whose first criterion was medical advice, selected technical quality as a second choice, and vice versa.

Table 3
 Mother's choice criteria by socio-demographic characteristics

	<i>N</i> = 486	Reputation of maternity unit 153	Physician's advice 72	Proximity/ accessibility 176	Technical quality 85	<i>P</i>
Region						
Burgundy	143	25.2	9.7	54.6	10.5	<0.0001
Seine Saint Denis	151	24.5	24.5	33.8	17.2	
Pays Loire	192	41.7	10.9	24.5	22.9	
Age						
<20 years	15	6.7	0.0	80.0	13.3	0.0178
20–37 years	446	32.5	14.8	34.8	17.9	
≥38 years	23	26.1	26.1	34.8	13.0	
Primipara	234	23.1	19.7	37.6	19.6	0.0003
Multipara	252	39.3	10.3	34.9	15.5	
Mother's education						
Primary	18	38.9	27.8	27.7	5.6	0.0008
Secondary	281	31.0	12.7	43.1	13.2	
Tertiary	186	31.2	16.7	26.8	25.3	
Single mother	26	34.6	15.4	30.8	19.2	NS
Mother's occupation						
None	132	35.6	13.6	40.2	10.6	NS
Professional/manager	58	29.3	24.2	22.4	24.1	
Employee/Worker	246	31.7	12.2	37.8	18.3	
Other	30	20.0	23.3	30.0	26.7	
Mother's country of birth						
Continental France	387	32.0	12.7	35.4	19.9	0.0051
Other	99	29.3	23.2	39.4	8.1	

About 9% of women did not prioritize their preferences. Out of the 49 women who did not select a primary criterion, 45 were from Seine-Saint-Denis, three from Vendée and Loire Atlantique and one from Burgundy. In Seine-Saint-Denis there was no significant difference between women who responded and those who did not by socio-economic characteristics (analysis not shown).

For one-third of the women in the sample, accessibility or proximity was the most important factor motivating their choice; 29% based their decision on the reputation of the maternity among users, 15% ranked technical quality first and 13% followed the advice of their physician.

These choice criteria were related to actual travel time: women who selected proximity and accessibility had the lowest proportion of trips over 30 min: 2.3% versus 9% for those whose criteria was the reputation of the maternity unit and 7% who selected a maternity for technical quality. Women who followed the advice of their doctors travelled the farthest: 14% reported a travel time over 30 min.

Individual and regional correlates with the first choice

For the 486 women who provided a first choice, we looked at the individual and regional correlates of these decisions. Univariate analyses of the first choice criteria are presented in Table 3 by region and characteristics of the women. Table 4 displays the results of a multinomial analysis of the factors influencing choice criteria that were significant in univariate analyses. The reference category is choice based on accessibility. Age, parity and education were related to choice criteria in univariate analyses; women under 20 were more likely to base their choices on accessibility, older women were more likely to follow the advice of their physicians, primipara were more likely to select an establishment based on its technical attributes or follow the advice of their physician. Women with a tertiary education were more likely to select their maternity unit in relation to technical quality. Occupational status and living alone were not related to choice criteria. Women born outside of continental France were more likely

Table 4
Factors influencing choice criteria: results of a multinomial analysis

Socio-demographic characteristics (reference category)	Comparison No. 1 Reputation of maternity unit versus proximity		Comparison No. 2 Physician's advice versus proximity		Comparison No. 3 Technical quality versus proximity	
	Coefficients	<i>P</i>	Coefficients	<i>P</i>	Coefficients	<i>P</i>
Intercept	0.7057	0.0029	−1.5298	0.0000	−0.4578	0.1211
Region (Vendée/Loire Atlantique)	—	—	—	—	—	—
Burgundy	−1.2708	0.0000	−0.8121	0.0417	−1.4282	0.0000
Seine-Saint-Denis	−0.8389	0.0147	0.6364	0.1113	0.0162	0.9649
Primipara (multipara)	−0.7194	0.0027	0.6021	0.0483	−0.0945	0.7396
Tertiary education	0.3866	0.1242	0.6198	0.0460	0.9375	0.0013
38 years and over	−0.1154	0.8403	0.8639	0.1437	0.1415	0.8446
Born out of continental France	−0.0337	0.9230	0.0468	0.9058	−1.2236	0.0105
Intercept	0.1918	0.5175	−2.2280	0.0000	−1.1471	0.0034
Region(Vendée/Loire Atlantique)	—	—	—	—	—	—
Burgundy	−0.9719	0.0010	−0.5648	0.1888	−1.1001	0.0035
Seine-Saint-Denis	−1.0661	0.0033	0.3734	0.3707	−0.2984	0.4384
Primipara (multipara)	−0.7564	0.0019	0.6190	0.0464	−0.1159	0.6876
Tertiary education	0.2773	0.2799	0.4959	0.1201	0.8030	0.0069
38 years and over	−0.1483	0.7987	0.8881	0.1386	0.0931	0.8986
Born out of continental France	−0.0875	0.8054	−0.1148	0.7746	−1.3073	0.0064
2+ maternity units within 30 km of home	0.8133	0.0061	1.0734	0.0175	1.1040	0.0037

to follow the advice of their physician and less likely to choose a maternity unit based on technical quality.

The region in which the women lived was associated with their choice criteria. In Burgundy, women were most likely to list proximity or accessibility as their primary criterion. In Vendée and Loire Atlantique, women were most likely to select a maternity unit based on its reputation, whereas in Seine-Saint-Denis, one quarter were guided by the recommendations of their doctor and 34% by the accessibility and proximity of the establishment. The proportion of women who selected their maternity hospital because of its technical quality varied between the regions and was highest in Vendée and Loire Atlantique.

Of the 78 women who selected proximity/accessibility in Burgundy, 57 (73%) did not have another maternity unit at less than 30 km from their residence (data not shown). In Vendée and Loire Atlantique, 22 (47%) of 47 women selecting accessibility and proximity did not have a second choice at <30 km. In Seine-Saint-Denis, all women had at least two maternity units 30 km from their home. Not all women with these geographical constraints selected proximity as their principal criterion: Out of 93 women in Burgundy who had no other structure within a 30 km radius from their home, 36 (or 39%) selected another criteria than accessibility, as did 31 out of 52 women (58%) in Vendée and Loire Atlantique.

With the exception of age, all variables that were significant in univariate analyses remained so in the multinomial model. Primipara were more likely to follow their physician's advice than to choose their maternity unit based on proximity, women with a tertiary education put more weight on the technical quality of the unit; women born outside of continental France were less likely to select a maternity unit based on its technical qualities.

In order to evaluate the probability that proximity/accessibility was chosen as a principal criterion because no other structure was close to the pregnant woman's home, another model was run which includes the variable measuring whether the pregnant woman had at least two maternity units within a radius of 30 km. As can be seen from the second model, if there are several maternities to choose from, proximity is less often cited as a principal criterion.

After controlling for demographic and socio-economic determinants and the existence of several maternity units within 30 km, however, region of residence was still related to choice criteria; women living in Burgundy were more likely to select an establishment based on proximity, in Seine-Saint-Denis women were more likely to follow the advice of their physician and less likely to base their decisions on the reputation of the establishment.

Discussion

This study explored the choice of maternity unit among women with low-risk pregnancies in France. We limited our focus to women with low-risk pregnancies in order to explore preferences in the absence of medical indications for specialized care. The three regions included in this study have distinct populations, geographic characteristics and supplies of maternity services. Despite these differences, 90% of women in all regions delivered in a maternity unit close to their place of residence (a travel time of 30 min or less). This proportion is the same as that observed in a national sample (Blondel, Norton, du Mazaubrun, & Breart, 2001; Blondel, Norton, du Mazaubrun, & Bréart, 1999).

Accessibility or proximity was the most selected choice criterion: one-third of our sample of women with low-risk pregnancies said that they chose their maternity unit because it was close or easily accessible. Most studies have found that distance appears to be the principal determinant of hospital choice (Bashshur et al., 1971; Kane, 1969; Parker & Srinivasan, 1976; Studnicki, 1975). However, a greater number of women used other criteria in deciding where to deliver: reputation of the maternity: 29%; technical quality: 15%; advice of their physician: 13%.

In contrast to other studies on user choice, mainly from the United States, where cost is an important determinant of choice (Bashshur et al., 1971; Parker et al., 1976; Wind & Spitz, 1976), only one person in our sample mentioned the cost of care as their principal choice criterion. In France, coverage by national insurance and supplementary insurance means most women do not have any out of pocket expenses for childbirth. In these cases, the only costs are those associated with travel. These costs may be perceived as an accessibility and not a financial issue. In private clinics there can be an additional charge that may be dissuasive for low-income women without supplementary insurance coverage. In these cases, cost may influence women's decisions to exclude certain clinics from their choice set. The question on criteria, as it was asked in this survey, would not necessarily have captured this effect.

In line with other research, women's choice criteria were influenced by their individual characteristics, the supply of services available, and other characteristics of the region (Cohen & Lee, 1985; Meade & Aerickson, 2000; Studnicki, 1975; Wind et al., 1976). Women's age, parity and education all influenced the primary criteria used to choose the maternity unit. Women between 20 and 37 years of age were most likely to choose a maternity unit by its reputation, as were multiparas. This group appeared to place more emphasis on factors contributing to the ambiance of the birth experience, which may reflect the fact that they are most likely to

have pregnancies at low risk (Phibbs et al., 1993). Women with a tertiary education were more likely to choose their maternity unit based on technical quality. In contrast, women born outside of France less often mentioned technical quality. The importance of technical quality in perinatal care for people of high socio-economic status has already been observed in France (Vaguet, 2001).

The geographical context influenced decisions. In particular, if women had only one choice (next closest maternity at 30km or more from their homes), accessibility or proximity was more frequently cited. Since there are no constraints on where women can deliver in France—childbirth is covered by the national insurance at 100% of cost regardless of choice of maternity unit—this suggests that there is a certain minimum supply of accessible structures, defined in relation to a maximum travel time, before choices are based on criteria other than proximity (Bashshur et al., 1971; Parker et al., 1976). The desire to deliver in a maternity unit close to home is understandable since an increased distance between home and hospital increases the risk of delivery at home or en route to hospital (Rodie, Thomson, & Norman, 2002; Viisainen, Gissler, Hartikainen, & Hemminki, 1999). This willingness to choose hospitals closest to home more often in obstetrics than in other specialities such as psychiatry or surgery has been observed in other research (Dear, 1977; Kane, 1969).

If a sparse supply of services leads women to use as a principal choice criterion distance or proximity, it appears from the results from the urban zone in this study (Seine-Saint-Denis), that a proliferation of units can make the choice difficult. In this district, women have a choice of many maternity hospitals in under 30min travel time from their homes. The number of missing responses (no first criteria provided) was highest in this department and among those that did provide a principal choice criterion, a large proportion said that they selected their maternity unit based on recommendations from their physician. There are several hypotheses for the patterns observed in this region: first, since many Parisian maternity hospitals are over-booked, it is possible that for some women the choice process is based primarily on the ability to secure a space, an option not included in our list. Furthermore, eight small maternity units, situated in lower-income areas have closed since 1992 which could disorient the choice process for many women and make it difficult to base choices on the reputation of the establishment among previous users; finally, in this department there is a large proportion of immigrant women who may not have many other sources of advice.

In contrast, in Vendée and Loire Atlantique, although there is a concentration of maternity units in a small number of urban centres, women are more likely to

make their choice based on the reputation of the maternity unit among users. The larger average size of the maternity units in this area may lead to a greater concern with material and human factors. There is a much greater use of the private sector for antenatal care in this district, suggesting a larger overall emphasis on quality attributes associated with private care (more personalized care, less institutionalized environment, and better hotel services).

Further analysis of the impact that the supply of antenatal care services has on preferences for delivery care or on the way private versus public services affect choice could give us insight into observed regional differences, but these analyses would require information from a larger number of geographic units and more complete local-level data on supply side characteristics. In this sample, we only had regional-level data on antenatal care. We also had data on the choices made by the women themselves, including the characteristics of the units they chose and the prenatal care they received, but these choices incorporate women's preferences in addition to supply side factors. In addition, the organization of the health system may affect the importance of regional effects. These results apply to a French context, where women have a free choice of maternity unit given supply factors. However, they may not apply to other contexts where there is less choice, whether because of constraints imposed by managed care plans or because maternity care is organized by place of residence.

Implications for health planning

These results have implications for modelling user behaviour. Various models are used to describe user choice. Those based on cartographic models (Cohen et al., 1985; Place, 1997; Walsh, Page, & Gesler, 1997). find that proximity, defined as distance or travel time (Phibbs & Luft, 1995), is a principal determinant of hospital choice. In other words, the attraction of an establishment diminishes with increasing travel time. This attraction is also directly linked to the size of the hospital. This inverse relationship between distance and the size of an establishment was formalized in the Gravity model elaborated from Reilly's Law, which is based on Newton's law of gravity (Reilly, 1929). More complete models that incorporate other sources of heterogeneity in addition to distance and size of establishment have replaced the gravity model (Congdon, 2000).

In geographical models, the maximum point at which distance becomes a barrier to care differs in relation to the sex, age and medical condition of the patient and the health services under study (Cohen et al., 1985; Place, 1997). Models of user choice incorporate distance as one of a number of determinants of choice. Non-spatial

determinants that have been found to affect decision-making include cultural values, socio-economic characteristics, and the attitudes and beliefs of health professionals (Cohen et al., 1985; Luft et al., 1990). Finally, the development of geographical information systems and network analysis software makes it possible to combine geographic analyses with an analysis of user profiles. These systems simulate alternative solutions and compare them (Walsh et al., 1997).

Our results suggest that these models may not be sufficient to explain decisions or predict changes in use patterns (Cohen et al., 1985; Studnicki, 1975), although models of spatial interaction could be expanded to include regional-level specificity (Congdon, 2000). While it may be possible to describe individual and cultural determinants of choice within a specified context, these factors may be expressed differently depending on the available health services or the geographical context. We find that ‘region’ of residence has an impact on choice criteria, even after controlling for population differences between the three regions.

When the supply of maternity units is not restricted, as in the Vendée or in Seine-Saint-Denis, the majority of women base their choices on other criteria than proximity. However, when the supply of services is limited, as in Burgundy, proximity becomes a principal choice criterion for most women. Other factors can also operate on a regional level, such as the reputation of a maternity unit, based on previous experiences of women in the community. The importance of these factors is mediated by individual-level variables, such as educational level.

This implies, as Thouez, Bodson, and Joseph (1988) has observed that it is difficult both conceptually and statistically to isolate the determinants of user choice without considering the context. The roots of this problem lie in the complexity of the behavioural process that serves to translate a perceived need for medical care into use of a particular service facility. Since we can only measure the utilization of services, which is determined by accessibility, population characteristics and medical practices (Place, 1997), we can only describe the behaviour of a given population, within a given environment with a specific configuration of available services. No matter what model is used, the same problem of individualization of sub-groups that have different behaviour remains (Studnicki, 1975).

The choice process itself involves both social and spatial components that modify the distance that women accept to travel. For instance, a choice strategy based on physician recommendations—involving first the choice of a treating physician, and then the choice of a maternity unit based on his/her advice—could result in the selection of a maternity unit which is not closest to home or convenient in terms of accessibility. In this study, we observed longer travel times for women

following their physician’s recommendations, in line with results from other studies (Morrill, Earickson, & Rees, 1970). The delimitation of the service areas of hospitals in geographic terms will thus be difficult because boundaries are not impermeable; the delineation of these spaces will remain probabilistic and not discrete (Bashshur et al., 1971).

Indeed, gravity-based models and other models based on a minimization of travel time and distance, have been found to have limits for the prediction of behaviour after hospital closure (Place, 1997). As McLafferty (1988) observes in her study of closure of Sydenham hospital in New York: ‘Although such models may accurately describe the use of hospitals at a given time, they may be quite inaccurate in predicting utilization patterns after a hospital closes’. This illustrates the difficulties of constructing models to explain the interactions existing between all patients and all hospitals (Studnicki, 1975).

Furthermore, in the context of the elaboration of health policy, the factors correlated with choice criteria are not neutral. Women who are responsible for elaborating health policy or who are in a position to influence health policy tend to have a tertiary education. Women who follow the advice of their treating physicians, as in Seine-Saint-Denis, also follow the advice of individuals who do not necessarily share their priorities—or their opinions. On the other hand, the women in Burgundy, who place a large importance on proximity or in Vendée and Loire Atlantique where the quality of the environment and the human factor is important, are further from the centres of decision making and not a significant lobbying power. The difference in preference structures could clarify why women are opposed to closure decisions, even though these are often justified on grounds of improving safety.

In conclusion, for prediction of user behaviour and planning of the distribution of supply, it is important to carry out local surveys of user perceptions before restructuring, making it possible to take into consideration women’s opinions on their future places of delivery. These surveys would help planners refine geographic models. This approach could also incorporate a focus on other non-spatial outcomes, such as consumer satisfaction (Sitzia & Wood, 1997).

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