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Pregnancy care in Germany, France and Japan: an international comparison of quality and efficiency using structural equation modelling and data envelopment analysis

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ABSTRACT

Objectives: Healthcare systems in developed countries may differ in financing and organisation. Maternity services and delivery are particularly influenced by culture and habits. In this study, we compared the pregnancy care quality and efficiency of the German, French and Japanese healthcare systems.

Study design: Comparative healthcare data analysis.

Methods: In an international comparison based mainly on Organisation for Economic Co-operation and Development (OECD) indicators, we analysed the health resources significantly affecting pregnancy care and quantified its quality using structural equation modelling. Pregnancy care efficiency was studied using data envelopment analysis. Pregnancy output was quantified overall or separately using indicators based on perinatal, neonatal or maternal mortality.

Results: The density of obstetricians, midwives, paediatricians and the average annual doctor's consultations were positively and the caesarean delivery rate negatively associated with pregnancy outcome. In the international comparison at an aggregate level, Japan ranked first for pregnancy care quality, whereas Germany and France were positioned in the second part of the ranking. Similarly, at an aggregate level, the Japanese system showed pure technical efficiency, whereas Germany and France revealed mediocre efficiency results. Perinatal, neonatal and maternal care quality and efficiency taken separately were quite similar and mediocre in Germany and France. In Japan, there was a marked difference between a highly effective and efficient care of the unborn and newborn baby, and a rather mediocre quality and efficiency of maternal care.

Conclusion: Germany, France, and Japan have to struggle with quality and efficiency issues that are nevertheless different: in Germany and France, disappointing pregnancy care quality does not correspond to the high health care expenditures and lead to low technical efficiency. The Japanese system shows a high variability in outcomes and technical efficiency. Maternal care quality during delivery seems to be a particular issue that could

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possibly be addressed by legally implementing quality assurance systems with stricter rules for reimbursement in obstetrics.

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Introduction

Germany, France and Japan have all established high-level health systems based on the Bismarck model with financing mostly through social insurances,^{1,2} although the contribution from tax funds substantially differ.^{3–5} The three countries share common challenges as continuously growing health expenses related to factors such as the ageing of the population, technological improvements or increasing demands from the patients. However, there are also marked differences between the healthcare systems of the three countries.

In Germany, a private health insurance may be a substitute to social insurance and covers about 10% of the population, whereas in France and Japan, all residents are insured in compulsory public health funds.^{1,6,7} Different compensation schemes for outpatients exist in Germany that are applied depending on the insurance status. Although remuneration amounts differ depending on the scheme, maximum billing is regulated even for patients owning a private insurance. In Japan, there is a single comprehensive fee schedule for diagnostic and curative services with an interdiction to deviate from the fixed remunerations.^{8–10} The French system is less stringent and in private practice allows billing higher than social health insurance reimbursement within socially acceptable limits.¹¹ Germany and France have both introduced case-based lump sums to reimburse for hospital care.^{12,13} In Japan, depending on the diagnosis and procedure, a day rate is applied. This daily fee does however not include expensive medical procedures (e.g. surgery or anaesthesia) that are billed in addition according to the general fee for services schedule. Moreover, the day rate system is not mandatory, and hospitals are free to opt for a billing of the individual medical services provided.^{10,14–16} In Germany, patients may not attend hospitals without a referral, except for emergencies. Apart from patients owning a private insurance, patients have to consult at first a registered practitioner, acting as a gatekeeper. In Japan, the flow of patients is very poorly regulated, and all patients are free to consult a practitioner at his private practice or clinic or to directly attend the outpatient ward of a hospital.¹⁰ All these differences have developed over time for economic and political reasons but should also be considered as reflecting different cultures and deep-rooted societal values.¹⁷

In this regard, a comparison of pregnancy care seems particularly interesting as pregnancy and childbirth habits are deeply rooted in traditions and, even in the case of similarly developed countries, may be expected to differ between cultures to a higher extent than other medical procedures. Regarding Germany, France and Japan for example, this is obvious if considering the ‘allowed weight gain’ in pregnant women, which might be viewed as quite strict in Japan

according to the guidelines (7–12 kg for normal weight woman),¹⁸ or the use of obstetric analgesia, uncommon in Japan, but with a very high demand in France.^{19–22} Moreover, from a more formal point view, the financing of pregnancy care is regulated differently. In Germany and France, the expenses of pregnancy care and obstetrics are born by the health insurances. As normal pregnancy is not a pathological condition, in Japan antenatal care is the responsibility of the local governments (cities). Whereas delivery costs are directly assumed by the health funds in Germany and France, for a normal delivery a Japanese woman gets a lump sum of 420,000 ¥ (at nominal exchange rates, mean 2016: about 3950 US-\$, 3415 €)²³ and is free to select the clinic or hospital where she wants to deliver (costs ranging from about 250,000 to 1,000,000 ¥, 2137 to 8547 US-\$, 2033 to 8130 €).^{19,24} Only pathological conditions requiring for example a caesarean section are directly covered like other diseases by public health insurances.

Thus, it seems interesting to compare the effectiveness/quality and efficiency of pregnancy and obstetric care in the three countries. For that purpose, we used two methodologies: structural equation modelling²⁵ and data envelopment analysis.²⁶ Although our focus is on three countries (Germany, France and Japan), as particularly structural equation modelling may not be expected to give valid results with very small samples,²⁵ we included a total of 24 countries in our analysis for comparison.

Methods

Data sources

The Organisation for Economic Co-operation and Development (OECD) health database 2016 was used to extract most of the indicators.²⁷ Data largely refer to 2014. Otherwise, the latest reported figures were used. In some cases with no data available from the OECD database, other sources were used (examples: for the caesarean delivery rate in Japan,²⁸ for the midwife density in the US,²⁹ for the remuneration of hospital physicians in Japan,³⁰ for the remuneration of specialist physicians in Korea³¹). Nevertheless, because of the unavailability of several indicators, only 24 OECD countries were entered in the analysis. There were no extrapolations of data.

As indicators for pregnancy care quality, we used the perinatal, the neonatal and maternal mortality rates (the term ‘pregnancy care’ as used throughout the article encompasses the prenatal and perinatal care of the mother as well as of the unborn and newborn child). These data were also used as the basis to compute output variables for the assessment of efficiency. For methodological reasons related to the efficiency analysis (a higher ‘better’ output is reflected by a higher

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