Federaal Kenniscentrum voor de Gezondheidszorg
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SYNTHESIS

ALTERNATIVE SCENARIOS FOR THE FORECASTING OF THE MIDWIFERY WORKFORCE: HORIZON SCANNING AND QUANTIFICATION MODEL

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NADIA BENAHMED, MÉLANIE LEFÈVRE, IRM VINCK, SABINE STORDEUR

■ABSTRACT

Context

In 2018, the Planning Unit for the Healthcare Professions published a report entitled "Basis scenarios for the evolution of the workforce – Midwives - 2014-2039". This first step consisted of developing basis scenarios with a view to study the balance between the number of midwives and the consumption of care by the population for the period 2014-2039. The basis scenarios focus on a projection of historic trends, within constant policies. The KCE has been charged with conducting a horizon scanning in order to develop alternative scenarios that will adequately try to define a consistent vision of the future incorporating the challenges faced by the profession during the projection period of the workforce.

Method

A multimodal approach (quantitative and qualitative) has been used to develop and quantify the alternative scenarios. The development of the alternative scenarios combines prospective analysis (horizon scanning) and specific techniques for the construction of future scenarios. The future scenarios are first described in narrative form. These narrations detail possible and plausible futures, following a similar framework based on 8 to 10 key points (activities in practising midwifery, characteristics of management of the parturient and the maternity stay) (production of narrative scenarios). The parameters of each scenario are then quantified, using the data on consumption of these activities registered in the administrative databases (RHM-MZG/ INAMI-RIZIV). In the absence of available data, some parameters have been quantified using proposals of experts in the field (process of elicitation).

Results

Three alternative scenarios are proposed. The first scenario (close to the current situation) envisages pregnancy and maternity care centered on gynaecologists practising either in a hospital setting or in outpatient care. The second scenario describes an organisation of midwife-led care at hospital. In the third scenario, care is primarily organised through primary care practitioners (midwives and general practitioners) in outpatient care. Implementation of these scenarios would increase the demand for midwifery care by 11.4%, 12.0% and 17.4% respectively, between 2016 and 2026. The employment status of the midwives (employed at the hospital, independent or mixed with outpatient care) would also be influenced by the dominant care model in the future.

Conclusion

The development of alternative scenarios can be highly useful in supporting decision-making with regard to training of healthcare professionals to respond to the evolution of the care demand. The approach proposed in this report ensures the plausibility of the fundamental assumptions underlying these scenarios and their impact on supply and demand of midwives. However, this qualitative approach requires regular monitoring of the assumptions made and the quantifications proposed by the experts involved in the process in order to make adjustments in the event of forecast deviation compared to current observations.

■SYNTHESIS

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LIST OF ABBREVIATIONS

ABBREVIATION	DEFINITION
AIM – IMA	Intermutualistic Agency (Agence Intermutualiste – InterMutualistisch Agentschap)
APR-DRG	All Patient Refined Diagnosis Related Groups
O-M	Scenario centered on midwifery-led outpatient care
CEpiP	Centre d'épidémiologie périnatale – Perinatal epidemiology center
FTE	Fulltime Equivalent
H-M	Hospital-centered scenario with midwifery-led care
HO-G	Scenario of gynaecologist-led care at the hospital or in outpatient care
NIHDI	National Institute for Health and Disability Insurance
IWEPS	Institut wallon de l'évaluation, de la prospective et de la statistique – Walloon Institute for Assessment, Forecasting and Statistics
MHD	Minimal Hospital Data
OECD	Organisation for Economic Cooperation and Development
PP	Physical persons (individuals)
SOI	Severity of illness
SPE	Studiecentrum Perinatale Epidemiologie – Study Centre for Perinatal Epidemiology
FPS Economy	Federal Public Service Economy, SMEs, Middle Classes, and Energy
FPS Public Health	Federal Public Service Public Health, Food Chain Safety and Environment
Statbel	Belgian Statistical Office

GLOSSARY

Horizon scanning[1] or prospective analysis explores the potential challenges, opportunities and probable developments in the future that can influence workforce planning. These include the influence of technology, economy, environment, policy, and social and ethical developments on the future of the workforce under study. The OECD defines horizon scanning as a technique for detecting early signs of potentially important developments through systematic examination of potential threats and opportunities. Horizon scanning calls for determining what is constant, what changes and what is constantly changing. The technique explores novel, unexpected issues as well as persistent problems and trends, including the margins of current thinking that challenge past assumptions. According to the OECD, horizon scanning exercises are often based on desk research and consultation of experts at the forefront in the area of concern.[2]

Generation of alternative scenarios[1] consists of formulating the ideas resulting from horizon scanning, summarising them and using them to enrich plausible scenarios for the future. Once generated, the results of these scenarios are quantified and used to supplement the workforce planning model.

Stakeholders are representatives of a group or of individuals who are affected by the project, have an interest in it and/or can potentially influence it. During a stakeholder consultation, the persons invited have a representative role and express the positions of the professional organisation or the policy maker that they represent, even if this opinion does not coincide with their personal interest. The list of stakeholders is included in the colophon.

The workshop allows the participants in a meeting to actively exchange their points of view on a predefined topic. There are several forms of workshop organisation: discussion groups, where each participant shares his knowledge and experience of the topic, or exercises in solving practical cases. In this study, each workshop was held in the form of a discussion group. The results obtained by each group were pooled and discussed by all the participants.

'Midwifery-led care' is defined as care provided by a midwife who is, in partnership with the pregnant women, the main healthcare professional responsible for evaluating their needs, planning care, referral to other professionals (if needed) and provision of services related to maternity, from the first appointment to the postnatal period.[3] For more information on the prenatal care models see Annex 6 of the scientific report.

A **'Midwifery-led unit'** is a hospital unit allowing future mothers to give birth according to the principles of **'Midwifery-led care'**.[4]

'One-to-one care' is the principle according to which one midwife is allocated to one parturient. The parturient follow-up is provided by the same midwife throughout pregnancy and delivery and at the beginning of the postnatal period. The underlying philosophy is to ensure continuity and personalisation of care. A 'primary' midwife is dedicated to each parturient; she is available to supervise labour when it begins and delivery for the women in her unit (defined geographic area). One or two other midwives supplement her during the pregnancy in order to follow the parturient prenatally; they will replace the primary midwife if she is unavailable at the time of delivery (if the primary midwife has two deliveries at the same time, if the labour of a parturient is long, or if the primary midwife is absent due to illness or for a leave period).[5] For more information on the prenatal care models, see Annex 6 of the scientific report.

In the **'Centering Pregnancy'** approach, 8 to 12 pregnant women with a similar gestational age are assigned to a group to receive information related to health promotion and education (e.g., advice on nutrition, toxins to be avoided during pregnancy, domestic violence and contraception). The group meets from the second trimester of pregnancy at the same time as the standard obstetrical follow-up appointments.[6] For more information on the prenatal care models, see Annex 6 of the scientific report.

Contextual factors are particular characteristics of an environment on which a person or organisation cannot directly influence. The dynamics of a given environment is the resultant of the interaction of all the contextual factors.

Critical uncertainties are groups of factors with a high impact but an uncertain evolution in the future.

In the context of this report, **elicitation** means 'assignment of a numerical value to a parameter for which no data exist'. Elicitation calls on the judgements of experts in the field described by the parameter.[7]

1. INTRODUCTION

Planning for healthcare professionals in Belgium

In Belgium, evaluation of needs with regard to the supply of human resources for health is a federal competence provided by the Planning Commission – medical supply supported by Planning Unit for the Supply of the Healthcare Professions, depending on the FPS Public Health, Food Chain Safety and Environment (hereinafter called the Planning Commission and the Planning Unit). This Unit is charged with modelling the workforce in the healthcare professions; that is, quantifying the staffing and the workforce of healthcare professionals, as well as their future developments. The evolution of the care demand is estimated on the basis of the number of individuals and the structure of the population according to age and gender, as well as the respective care consumption (data from health and disability Insurance – IMA).

For each professional group under study, the Planning Unit collaborates with a specific working group composed of experts (field professionals, representatives of professional associations and of NIHDI). In the framework of this study, a 'Midwives' Working Group was set up to support the Planning Unit in its reasoning and its work.

The projection model for the midwife workforce

In 2018, the Planning Unit published a report entitled "Basis scenarios for the evolution of the workforce – Midwives - 2014-2039".[8] This first step, essential for the workforce forecasting, consisted in developing the basis scenarios aiming to study the balance between the number of midwives and the care consumption of the population for the period 2014-2039. Two basis scenarios were developed: the <u>first basis scenario</u> focuses on all the <u>midwives active in the healthcare field</u> (practicing as midwives or as nursing practitioners), while the <u>second basis scenario</u> concentrates on <u>midwives who only perform midwife activities</u>. The observed historic trends, described

in the PlanCad[a] report "Midwives in the labour market 2004-2014" are taken as a starting point for these projections.

The projection model for the midwife workforce (basis scenarios) is based entirely on analysis of the historic trends. For each parameter included in the forecasting model, the Midwives working group formulated a basis assumption that is consistent with a continuation of the observed historic trends. The combination of the parameter values included into a mathematical model leads to results obtained by projection (in terms of individuals, fulltime equivalents or densities) that reflect the evolution of the workforce under unchanged circumstances and under constant policy for the period 2014-2039. While the densities indicate the number of professionals per 10 000 inhabitants, the weighted densities represent the ratio between the number of professionals and the number of individuals in the population adjusted by the care consumption by age and by gender. The evolution of a weighted density indicates not only the way in which the number of service providers evolves in terms of individuals, but also the evolution of the care consumption of this same population.

Aside from these key features, several modifications specific to the profession have also been made by the Midwives working group of the Planning Commission, such as the progressive reduction of the fulltime equivalent (FTE) for employees over 45 years of age working in a hospital (on the basis of the system of exemption from service), the progressive increase in the legal retirement age, and consideration of the fact that midwives graduating as of 1 October 2018 will no longer be able to practise nursing activities outside the areas specific to midwives. These changes have been made at the request of the members of the Midwives Working Group and do not take into account the possible evolution of the hospital infrastructure (reduction in the number of available beds) or the transfer of the hospital activity to outpatient settings in the context of reduction in the length of stay after childbirth.

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[a]   PlanCAD is the name given to the linking of data from the federal databank of healthcare professionals (cadastre) to the data from the Data Warehouse Labour Market and Social Protection (Crossroads Bank for Social Security) and data from health and disability insurance (NIHDI).

It should however be observed that the average length of stay after childbirth decreased between 2003 and 2014 from 5.0 to 4.1 days for vaginal deliveries and from 7.8 to 6.1 days for caesareans.[9] This trend will continue in the future and will very probably be reinforced by the policy advocated by the Minister of Public Health seeking to further shorten the stay in the maternity ward after a delivery without complications. This historic trend will be considered during the horizon scanning exercise and the development of alternative scenarios (see Section 3.2. 'Baseline+'). Until now, the trend of shortening length of hospital stay was partially captured by the midwife services charged to the NIHDI between 2014 and 2016.

Use of the mathematical model for projection of the basis scenarios gives an idea of the trends for the future, for the entire country but also by Community.[b] In 2014, 6 972 midwives were active in the healthcare sector (4 634 in the Flemish Community and 2 338 in the French Community).[8] As the number of midwives graduating increased from 305 to 373 per year in the Flemish Community and decreased from 310 to 265 per year in the French Community between 2009 and 2017, it is expected that for the period 2018-2039 there will be more midwives trained in the Flemish Community (368/year) than in the French Community (278/year). The projected densities of midwives per 10 000 inhabitants (absolute and weighted) also show an increase, more marked when the midwife densities of both Communities are weighted by the care consumption. In both Communities, the level of consumption of care provided by midwives is highest for women between 25 and 34 years old.

In the two Communities of the country, a significant increase in the number of active midwives (physical persons, PP) and the total number of fulltime equivalents (FTE) is expected over a period of 25 years (2014-2039), both for all midwives working in the healthcare sector (an increase of over 65% [PP] and 50% [FTE]), independently of their professional status (basis scenario 1), and for all midwives working in the healthcare sector and practicing a midwifery activity (an increase of over 89% [PP] and 95% [FTE]) (basis scenario 2).

The interested reader may find a critical analysis of the mathematical forecasting model in KCE report 278[10] and an analysis of the medical density by discipline for the period 2012-2037 on the website of the Planning Commission – medical supply.[11]

Objective of the study

While the basis scenarios focus on a continuation of the historic trends, taking into account planned events (such as the extension of the legal retirement age and the restriction of nursing activities to midwifery), the alternative scenarios developed in this report will allow to evaluate the impact of new strategic orientations such as, for example, reduction in the length of hospital stay and the development of outpatient activity of midwives.

The present study is devoted to a horizon scanning exercise for the profession of midwife, the generation of alternative scenarios to the basis scenarios, and output quantification of the developed scenarios.

The study results will be sent to the Planning Unit to allow it to assess variations on the basis scenarios in terms of densities of active midwives.

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[b]   The reader interested in the exact data and their interpretation is invited to read the full report, available at (www.health.belgium.be/hwf; "Publications" tab).[8]

2. METHODOLOGY

The horizon scanning approach combines quantitative and qualitative methods. Data collection via questionnaires, processing of information using workshops, database analysis, analysis of official reports of the competent administrations and of scientific publications are all sources of data supporting the followed horizon scanning methodology (Figure 1). Because there is no scientific technique for predicting the future with certainty, the scenarios were constructed with the aid of key stakeholders in the field, a method that is used internationally. Knowledge from the Netherlands, the United Kingdom, Australia and Belgium (for general practitioners) served as a source of inspiration for the authors in conducting this project. The interested reader will find a summary description of the various methodologies followed in these countries in Chapter 3 of the scientific report, and a detailed description in Annex 3.

The methodology followed in this report relies on two key steps:

1. **Generation of scenarios for the future**: First, the scenarios for the future are described narratively. These narratives recount in detail possible and plausible futures, following a similar framework based on 8 to 10 key points (activities in practising midwifery, characteristics of the management of parturient and of the stay in the maternity ward) (box on the left side in Figure 1);

2. **Quantification of the impact of each scenario on the parameters of the mathematical model** (development of alternative scenarios to the basis scenarios): Each narrative scenario describes a particular organisational model likely to affect the consumption of care and the supply of midwives more or less strongly. This impact will be quantified according to the development assumptions based on objective data or data generated by elicitation (box on the right side in Figure 1).

The results of this quantification exercise can be used by the Midwives working group of the Planning Commission to assess variations in the densities of active midwives estimated in the basis scenarios.

The scientific report is a technical document, considered as intermediate step, and dedicated to the members of the Midwives working group of Planning Commission, allowing it to continue its works on planning of midwives. The resulting synthesis is not dedicated to decision makers and does not include political recommendations.

Figure 1 – Overview of the horizon scanning methodology for midwives
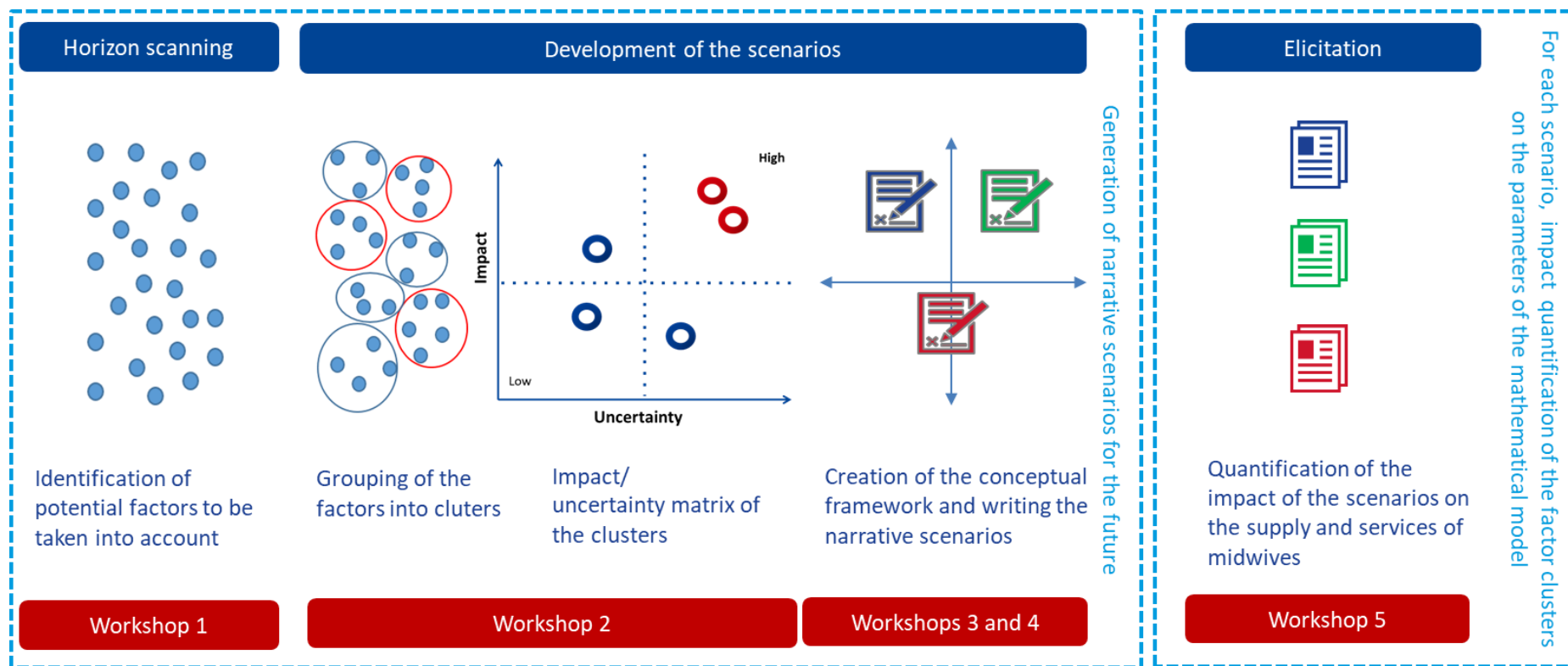
Note. The list of participants at the workshops is provided in appendix 2 of the report. The questionnaires and the material used during the workshops are available on request.

2.1. Scenarios for the future of the profession of midwife

The generation of scenarios for the future of the profession of midwife and its organisation, with a time horizon of 25 years, relies on a five-phase process. The methodology and the participation of the experts and stakeholders in the various phases of this approach are detailed in the scientific report.

2.1.1. Selection of the potential factors to take into account in scenarios for the future

A questionnaire, addressed online to a group of stakeholders and experts in the field, allowed to identify a set of 101 factors with a potential impact on the future workforce of midwives. These factors were discussed and reviewed in a first workshop. On this basis, 77 relevant factors, not redundant with the factors already included in the basis scenarios, were classified by the participants in three groups according to the potential impact of the factor on the workforce (high, moderate or low relevance).

2.1.2. Grouping of the factors into clusters

During a second workshop, the selected factors were grouped into 12 homogeneous groups or clusters according to the topic they represented (Figure 2). Firstly, the participants discussed in 4 small groups composed of about ten people. Secondly, the results of each group were shared and discussed with all the participants.

2.1.3. Impact and uncertainty analysis of the clusters

The 12 homogeneous groups of factors (clusters) were put on an impact and uncertainty matrix (see Figure 2). Ten clusters were recognised as likely to have a very high impact on the future practice of the midwife profession and positioned above the median line of impact, while two were judged to have little effect and placed below the median line of impact. Among the ten remaining clusters, five that are considered certain to be realised were placed to the left of the median line of uncertainty and are called 'Driving Forces'. Five clusters that are considered less certain to be realised are placed in the upper right quadrant of the matrix and are called 'Critical Uncertainties'.

The evolution of each cluster was discussed during the second workshop until a consensus was reached on the direction in which they will evolve (downward, status quo or upward). The two clusters for which the impact on the future practice of the midwife profession is judged as low are no longer incorporated into the rest of the project.

Figure 2 – Positioning of the 12 clusters on the impact/uncertainty matrix
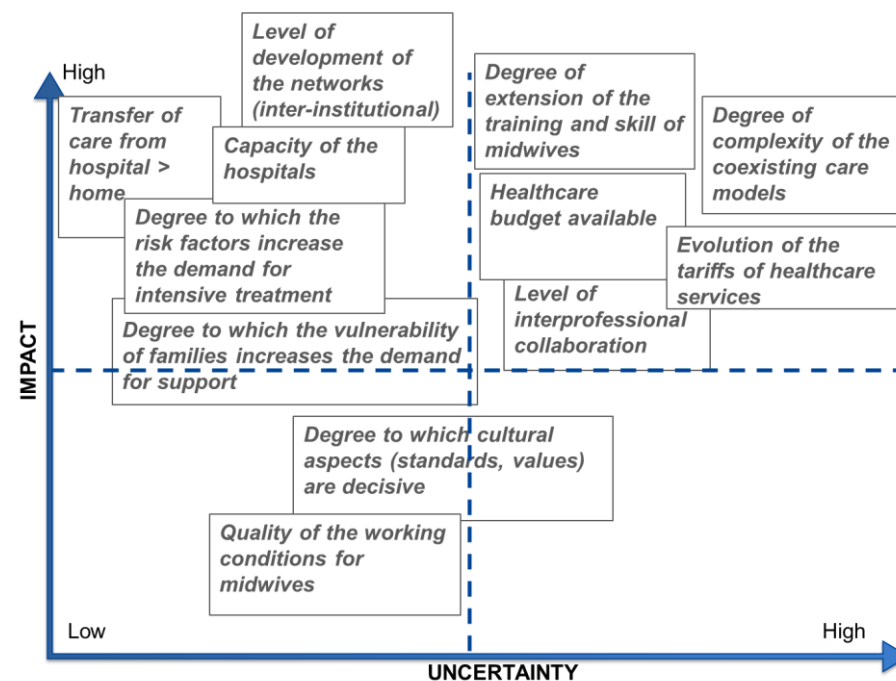
2.1.4. Formulation of a theoretical framework for the narrative scenarios

The impact/uncertainty matrix is the starting point for construction of the framework for scenarios. This step considers how to best use the critical uncertainties to create a space in which scenarios can be developed. The critical uncertainties are of special interest in generating scenarios for the future. In fact, depending on the assumptions made as to their evolution, they can give rise to very different potential contexts. The search for the underlying concepts shared by the critical uncertainties allows to simplify their presentation in the form of two meta-uncertainties (the rationale of the care supply and the nature of the networking), illustrated schematically on a continuum bounded by two extreme values:

- **The rationale of care provision** is expressed on a continuum on which one of the extremes is represented by care mainly provided by midwives (primary care or 'midwifery-led care') and the other extreme by care provided mainly by specialist physicians (secondary care or 'specialist-led care').

- **The nature of the networking**: networks will develop in the future to provide perinatal care to pregnant women and to future parents, but the central core of these networks can be different; it could involve, on the one hand, networks organised around and starting from a central point, which is the hospital (hospital-centered networks), and on the other hand, networks organised around outpatient care by independent care providers or small groups of care providers who work in collaboration with care centres or hospitals (outpatient networks).

The combination of the two dimensions allows to create a matrix with four quadrants within which each possible scenario can be positioned. Nevertheless, while the theoretical framework allows to develop 4 scenarios, participants selected only three plausible scenarios, among which one is close to the current situation, combining gynaecologist-led care in in- and outpatient settings (Figure 3).

Three clusters were not incorporated into the two meta-uncertainties; they involve the evolution of the budget available for healthcare, the pressure exerted on the care demand by the risk factors (health status and medical history of the pregnant woman) and the socioeconomic vulnerability of families.

These groups of factors are independent of the organisation of care and will exert a more or less strong influence on the supply and demand of midwives depending on the scenarios. They have therefore been identified as **contextual factors**.

2.1.5. Generation of the narrative scenarios for projection of the midwife workforce

Each scenario was developed in small groups (during the third and fourth workshops) according to a similar framework based on 8 to 10 key points (activities in practising midwifery, characteristics of the management of the parturient and the maternity stay).

Figure 3 – Positioning of the scenarios to be developed within the theoretical framework
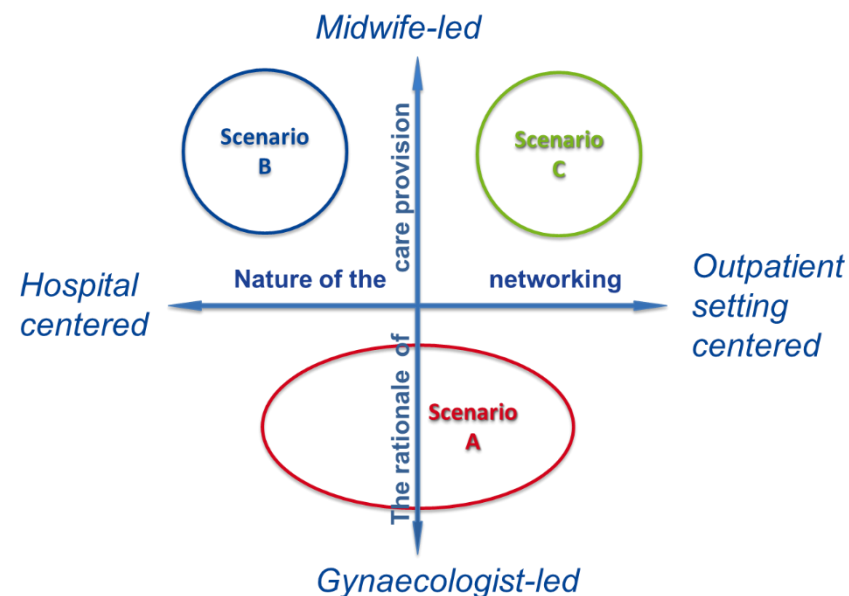
The full description of the narrative scenarios is available in Section 4.3.5 of the scientific report, and we invite the reader to refer to it. In this overview we offer only a summary of the scenarios.

2.1.5.1. Scenario A: Scenario in which the gynaecologist plays a central role in the hospital and in outpatient care (HO – G)

Scenario A is the closest to the current organisation of maternity care; this is a scenario in which the gynaecologist occupies a central role in the hospital and in outpatient care. In this scenario, two complementary care pathways would be foreseen: a low-risk care pathway and a high-risk care pathway. A very high proportion of low-risk pregnancies would be supervised by primary care providers (midwives, general practitioners), while for the highest-risk pregnancies, care would be delivered by a well-coordinated network of hospitals in which specialists are the main care practitioners (gynaecologists-obstetricians, paediatricians, anaesthetists, etc.). Scenario A is thus a complex scenario requiring close collaboration among the hospitals and primary-level providers and care centres, including general practitioners, gynaecologists-obstetricians with outpatient activity (private or not), midwives, psychologists and social workers. In this scenario, the labour market for midwives offers career opportunities as employees, self-employed or a combination of both statuses.

2.1.5.2. Scenario B: Hospital-centered scenario in which midwives plays a central role (H – M)

In this scenario, the pre-, peri- and postnatal care networks would be organised mainly by hospital institutions. Midwives would assume the responsibility for determining the entire care pathway, as well as supervision and, if necessary, coordination with the other services. Hospitals would be the central point for care delivery, and consequently most midwives would be contractually bound to them. They would occupy a more important place in preparing for and conducting normal delivery as well as in the postpartum period, which would free specialist physicians for problematic, severe or urgent situations. Entry into the care pathway would mainly be via a midwife, either in a hospital setting or in a satellite centre of the hospital (polyclinic or birthing centre). In the case of high-risk pregnancies, responsibility for patient follow-up would be delegated to the specialist physician; coordination

of care by the midwife would however remain desirable. In this scenario, the profession of midwife would thus mainly develop in a hospital context, mainly in the form of salaried employment. Midwives with an independent status could also work in a hospital via cooperation agreements clearly specifying everyone's responsibilities.

2.1.5.3. Scenario C: Scenario centered on outpatient care in which midwives play a central role (O – M)

In this scenario, the prenatal, perinatal and postnatal care network would mainly consist of outpatient services. Hospitals and/or independent services (e.g. birthing centres) would only play a role in this network for the delivery *per se*; the stay would be as short as possible. In this scenario, pregnancy and childbirth would be considered more as natural and physiological processes; recourse to medical treatment would be envisaged for a minority of cases due to present or potential risks. Midwives would assume responsibility for coordination and for proper implementation of the care pathway from entry into the care pathway (possibly in the pre-conception period). Their tasks would include, among others, risk analysis, counselling/support before, during and after pregnancy, and delivery at the hospital. In such a configuration, a large proportion of midwives would practise in outpatient care, with self-employed status or as partners in a group practice. However, a significant proportion of midwives would continue to work in hospitals and medical centres, probably with employee status.

Box 1 – Plausibility of the scenarios

These scenarios were considered plausible by the workshop participants, who represented various professional affiliations and levels of decision-making. These scenarios rely on observation of past trends, on developments in professional practice in other countries (e.g. the Netherlands, the United Kingdom, Sweden, and Canada) and on the assumption that similar developments are highly probable in Belgium. Nevertheless, the assumptions underlying the development of the scenarios are formulated in a future context that is uncertain, complex and influenced by external factors not envisaged here (e.g. international mobility of healthcare professionals, population migration). In addition, it cannot be established with certainty at what pace and according to what pattern the evolution of supply and demand will take place over the next 25 years.

The scenarios are not necessarily organisational options that rely on evidence-based principles and are not necessarily recommended by the KCE. However, a literature review was conducted in parallel in order to evaluate the health outcomes of the different care models cited in the scenarios (midwife-led care vs. physician-led care, midwife-led wards vs. obstetrician-led wards, individual care (one-to-one) vs. group care). This literature review confirms that the proposed options –Midwifery-led care, group care –Centering pregnancy– are as safe as the classical care, do not induce any additional adverse event and lead to similar satisfaction levels. This literature review is available in Annex 6 of the scientific report.

Each narrative scenario was constructed by specifying 8 to 10 key points (activities in practising the midwife profession, characteristics of management of the parturient and during the maternity stay) according to an identical framework. The three models of care organisation (scenarios) described above differ by the healthcare professionals who interact and the way in which they are organised. Each model should thus have an impact on care consumption and the supply of midwives.

3. IMPACT OF THE SCENARIOS ON THE DEMAND PARAMETERS OF THE FORECASTING MODEL FOR THE WORKFORCE OF MIDWIVES

3.1. Care consumption in the basis scenarios

The forecasting model for the midwife workforce used by the Planning Commission provides an estimate of the density of midwives adjusted for the relative consumption of the population. The forecasts are made "for constant policy and conditions".

The future evolution of the demand depends on three types of factors: 1) the demographic evolution of the population; 2) the contextual factors (not related to the model of care organisation) and the observed trend toward shortening the length of stay in the maternity ward after childbirth and 3) the model of care organisation that will be predominant in the future. Three possible models of care organisation have been envisaged for the future, as illustrated by the three scenarios described in the previous section, i.e. scenarios A, B and C.

The development of the alternative scenarios to the basis scenarios used by the Planning Commission will take into account all of these factors. In the mathematical model used for forecasting the midwife workforce, these factors affect the rate of care consumption. The alternative scenarios proposed below thus suggest an adjustment of this rate of care consumption starting from the rate calculated for the reference year, i.e. 2016. The Planning Commission will then be able, as a second step, to provide an estimate of the density of midwives adjusted for the relative consumption of the population in these alternative scenarios.

Box 2 – Rate of consumption

"The demographic forecasts used here were made by the Federal Planning Bureau. These 'raw' forecasts of the population were multiplied by a consumption rate based on the consumption of 'midwife fees' observed over three years (2014, 2015 and 2016) by NIHDI in the context of health insurance reimbursements. This is translated into 're-weighted population figures' that reflect the 'weight' of each segment of the population in current and future healthcare.

The used consumption rate varies with the linguistic community, age and gender. This rate must be interpreted in a relative way and allows a comparison with the consumption of the reference year 2014. More specifically, the weighted average consumption in 2014 equalled to 1. The consumption rate of each segment of the population is then calculated by comparison to this reference consumption. A segment of the population with a consumption rate of 2 thus indicates that the individuals in this segment weigh 2 times more on average on healthcare than the average consumption in 2014."

Source: Planning Unit for the Healthcare Professions (2018)[8]

3.2. Enriched basis scenarios: 'Baseline+'

During the creation of the conceptual framework for the scenarios, three groups of factors (i.e. the contextual factors) were recognised as independent of the organisation of care and likely to exert a more or less strong influence on the supply and demand of midwives in function of the scenarios; these were the evolution of the budget available for healthcare, and the pressure exerted by risk factors (health status and medical history of the pregnant woman) and the socioeconomic vulnerability of families.

Likewise, the observed trend of shortening the length of the stay in the maternity ward after a delivery influences the future consumption of care provided by midwives. As the reduction in the length of stay and the contextual factors act upstream of the alternative scenarios (regardless of the number and variability), we suggest to include them in adapted or enriched versions of the basis scenarios, which we distinguish with the name 'Baseline+' (see Figure 4).

It should be noted that the evolution of the budget cannot be modelled and so will not be quantified. The underlying assumption is that the budget allowance will not increase. The budget allowance (unchanged or decreasing) will be used depending on the particular characteristics of the scenarios (distribution of the activities among healthcare professionals – in particular between gynaecologists and midwives for pregnancy follow-up according to the level of risk, and between levels of care – in particular between the hospital setting and the outpatient setting).

Figure 4 – Framework of the impact of the contextual factors and intrinsic characteristics of the scenarios on demand

```
┌─────────────────────────────────┐
│        Basis scenarios          │
└─────────────────────────────────┘
                  │
Length of stay↓   │  Vulnerability↑
                  │  Medical risks ↑
                  │  Budget ↑ not
                  ▼
┌─────────────────────────────────┐
│          'Baseline+'            │
└─────────────────────────────────┘
                  │
                  │  Participation of the midwives
                  │  in the clinical follow-up of
                  │  low-risk pregnancies ↑
                  ▼
┌─────────────────────────────────┐
│      Scenario A « HO – G »      │
└─────────────────────────────────┘
                  │
                  │  Transition to midwifery-led
                  │  care
                  ▼
┌─────────────────────────────────┐
│      Scenario B « H – M »       │
└─────────────────────────────────┘
                  │
                  │  Transition to outpatient-
                  │  centered organisation
                  ▼
┌─────────────────────────────────┐
│      Scenario C « O – M »       │
└─────────────────────────────────┘
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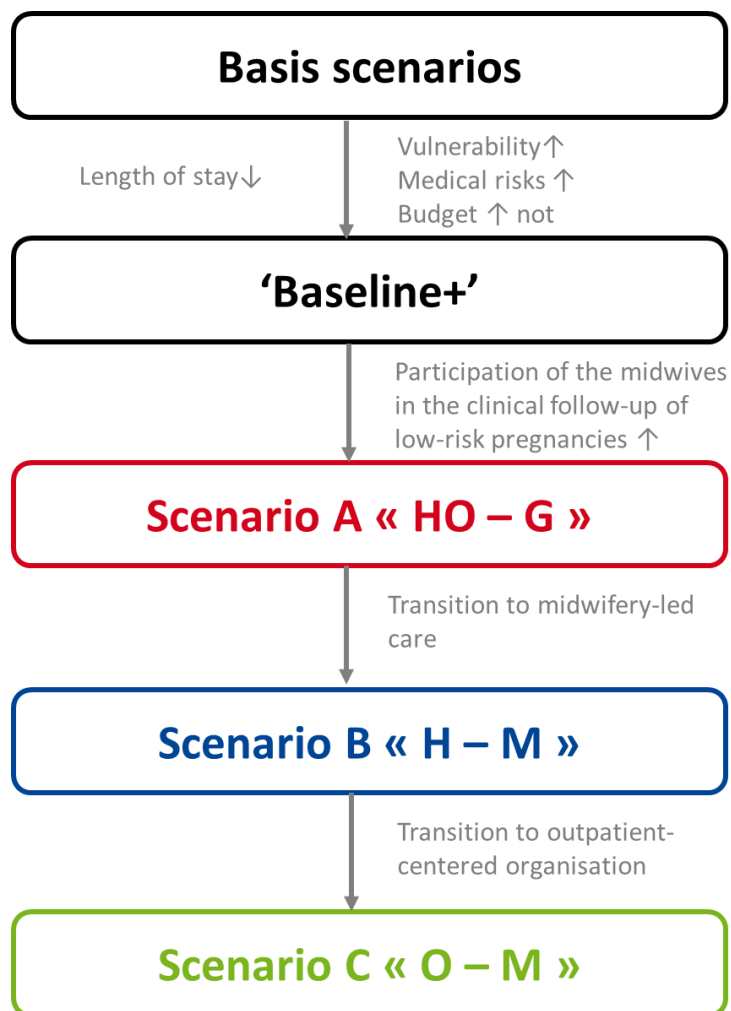
3.3. Alternative scenarios

3.3.1. Characteristics of the alternative scenarios

The alternative scenarios allow to adjust the evolution of the estimated consumption rate in the basis scenarios to take into account the characteristics of the organisation models described in the three previously constructed narrative scenarios A, B and C. These three possible futures are distinguished according to the key activities of midwifery practice, the characteristics of the parturient management, and the stay in the maternity ward:

• Point of entry into the care system

• Medical history and evaluation of the medical and psychosocial risks

• Coordination of the care provided by several caregivers, management of group practices/ agreements of midwives

• Development of the care pathway

• Individual or group preparation (including Centering Pregnancy) for birth and parenthood education

• Ultrasound scans, clinical follow-up (low risk/high risk)

• Care during the delivery (without complication/at-risk), recourse to the epidural and to the caesarean

• One-to-one care: reduction in the number of caregivers by speciality

• Length of hospital stay for a delivery

• Postnatal consultations (low risk/high risk)

3.3.2. *Modelling the parameters specific to each scenario*

In order to measure the evolution of consumption, these various parameters must then be modelled to be taken into account in the alternative scenarios (Figure 5). The model divides the services into categories according to the period (prenatal, perinatal or postnatal) and the location of the activities (in hospital or outside a hospital). Although relatively complete, this model is not exhaustive and does not take into account all the activity of the midwives (for example the activities in the areas of fertility, neonatology, research, etc.). Nevertheless, as our objective is to measure the evolution of care consumption (pre-, peri- and post-natal) over a horizon of 25 years, the assumption made is that the evolution of the activities not taken into account in this model is assumed stable over time. It should therefore not be influenced by the organisational models described in the three scenarios.

The evolution of the parameters in time is subject to assumptions. Some assumptions are substantiated by objective data, whenever such data exist (e.g. the current proportion of multiparous pregnancies). Some parameters have even already been projected in other research projects, allowing us to be confident in their plausibility and reliability (e.g. projection of the demographic developments (size and composition of the population);[12] forecasting of the number of hospital stays for childbirth in the future[9]).

When such developments have not been estimated in the past or are not documented in the international literature, we have used a process of elicitation (see glossary), allowing to allocate a numerical value to a parameter for which no data exist. This process was conducted by means of an online survey (34 participants) supplemented by a workshop (18 participants).

Figure 5 – Modelling of the parameters taken into account in the alternative scenarios for measuring (the evolution of) care consumption
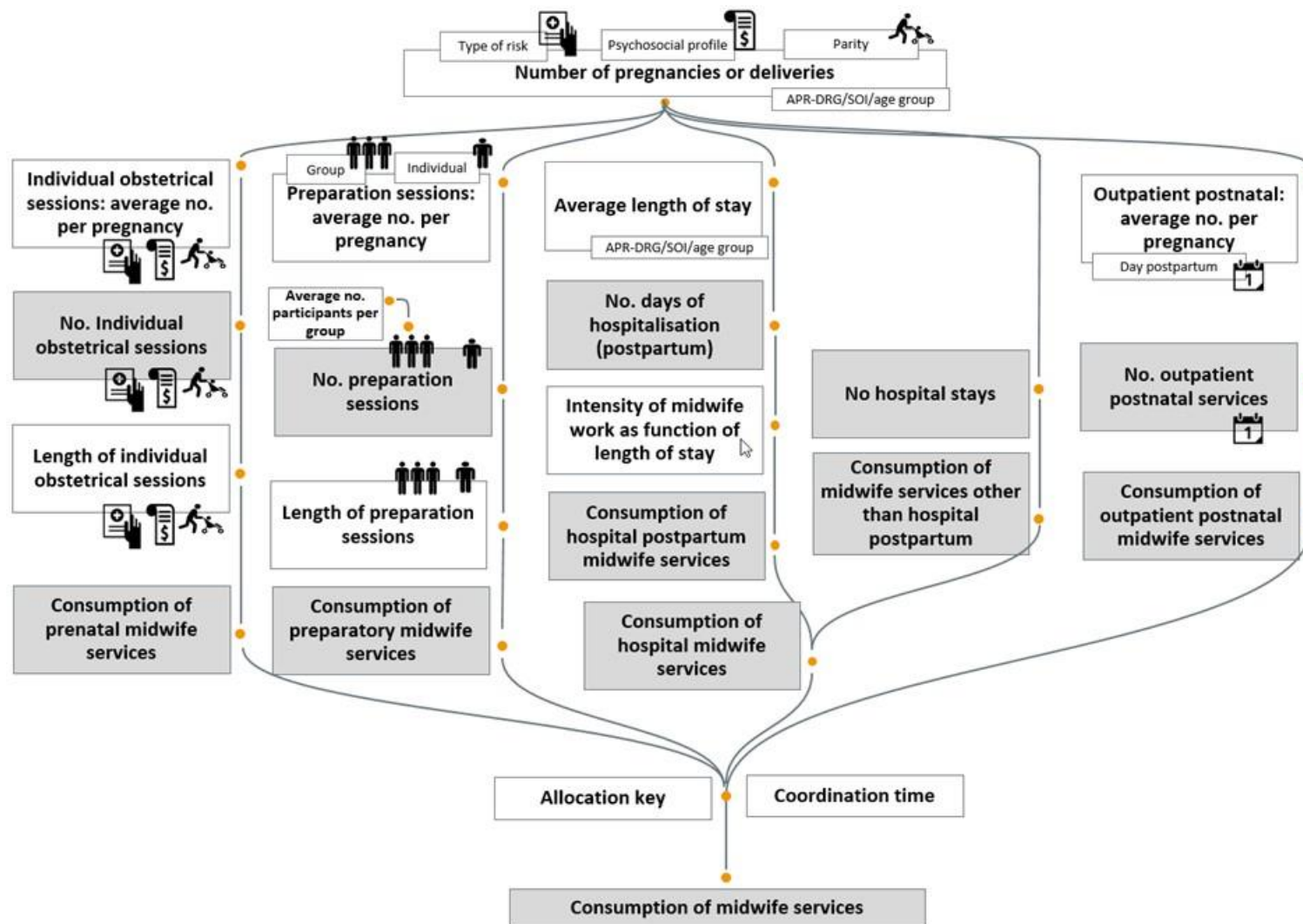
3.3.3. Allocation key

Using the assumptions made, it is possible for us to estimate the evolution of the midwife service consumption in various categories of activity (prenatal obstetrics, preparation for birth and parenthood education, postpartum at hospital, midwife services at the hospital aside from postpartum, outpatient postnatal) in the Baseline+ and in the three narrative scenarios A, B and C. However, some (outpatient) consumptions are measured in number of services (possibly weighted by their duration) while others are measured in days of hospitalisation or are assumed to be proportional to the number of deliveries. While the use of different units of measurement does not pose any problem when estimating the evolution of consumption within a type of activity, it complicates aggregation of the different activities. Yet it is the evolution of the overall consumption that is relevant and must be compared to the supply of midwives. We must therefore establish an initial allocation key for the various activities. This allocation key, combined with the estimated evolution of consumption for each type of service, allows to assess the overall evolution of consumption.

The initial (2016) allocation key for the consumption of midwife services is given in Table 1. This parameter is an important feature of the model that can substantially modify the results obtained. Validation of this assumption, based on available data, field surveys, and/or the expertise of the Midwives Working Group of the Planning Commission will be essential to use the proposed model.

Table 1 – Allocation of the consumption of midwife services: assumptions

	2016
Prenatal	5.5%
Preparation	2.7%
Hospital (postpartum)	48.0%
Hospital (other)	32.0%
Outpatient postnatal	11.8%

Note. These assumptions are based on elicitation and on the relative allocation of the outpatient services recorded by health insurance in 2016 (Econodat)

3.4. Results: expected variations in the consumption of midwife services

Sections 3.4.1, 3.4.2, 3.4.3 and 3.4.4 specify the assumptions used and report the expected variation in consumption per scenario. Section 3.4.5 offers an overview of the common assumptions and the assumptions specific to each scenario, the forecast for the 25 years to come and the source of the data used (Table 6 and Table 7).

3.4.1. Baseline+: basis scenarios incorporating contextual factors and length of stay

In Baseline+, the contextual factors (demographic evolution, epidemiological evolution, evolution of socioeconomic vulnerability) and the reduction in the length of stay in the maternity ward are taken into account.

Assumptions:

- The number of women likely to consume midwife services is estimated by the number of hospital stays linked to a childbirth. Its evolution is predicted using a trend analysis[9];

- The proportion of moderate- or high-risk pregnancies evolves according to a linear trend from 2010 to 2016, and then kept constant from 2026 to 2041;

- The future evolution of the proportion of multiparous women is estimated using 2010-2016 data and a linear projection from 2016 to 2026 and then kept constant from 2026 to 2041;

- Socioeconomic vulnerability is estimated by the percentage of the population living in a household whose equivalent disposable income is less than 60% of the national median income (poverty threshold). Its future evolution is estimated on the basis of 2003-2016 data with a linear projection from 2016 to 2026 and then kept constant from 2026 to 2041;

- The average number of birth preparation and parenthood education sessions is increased by 1 in the event of socioeconomic vulnerability in 2021 and by 2 as of 2026;

- The average length of stay by APR-DRG-SOI-age group is given by a projection model[9] relying on trend analysis using the 2003-2014 data until 2025, then kept constant at its 2025 level for 2026-2041;
- The average number of outpatient postnatal follow-up and care services is 1 service per day and per woman between the day of the maternity discharge and the fifth day postpartum. From the sixth day postpartum, the average number of postnatal follow-up and outpatient care services is 4 services for multiparous women and 2 services for primiparous women as of 2021;
- The average number of individual obstetrical sessions, the average number of birth preparation and parenthood education sessions (in the absence of socioeconomic vulnerability), the average number of postnatal follow-up and outpatient care services due to complications, and the average number of consultations on breastfeeding are kept constant at their 2016 levels.

Given the aforementioned assumptions, the expected variation in consumption is reported in Table 2.

Table 2 – Baseline+: expected variation in consumption of midwife services compared to 2016

	Allocation	2021	2026	2031	2036	2041
Prenatal	5.5%	+6.9%	+13.5%	+12.9%	+14.8%	+16.2%
Preparation	2.7%	+24.7%	+50.5%	+49.6%	+52.1%	+54.0%
Hospital (postpartum)	48.0%	-7.1%	-9.7%	-10.2%	-8.7%	-7.6%
Hospital (other)	32.0%	+2.0%	+3.3%	+2.7%	+4.4%	+5.7%
Outpatient postnatal	11.8%	+65.0%	+72.3%	+71.3%	+74.1%	+76.3%
Total	100.0%	+5.9%	+7.1%	+6.4%	+8.2%	+9.6%

3.4.2. Scenario A (hospital/outpatient – gynaecologists)

In addition to the parameters taken into account in the "Baseline+", scenario A takes account of a greater involvement of midwives in prenatal follow-up of low-risk pregnancies.

Assumptions:

- for low-risk pregnancies, the average number of individual obstetrical sessions will rise in 2041 to 3 for multiparous women and 5 for primiparous women; these objectives will be reached by 2041, following an exponential increase starting from the number currently observed. For moderate- or high-risk pregnancies, the average number of individual obstetrical sessions is kept constant at its 2016 level;
- the average number of individual sessions for preparation for birth and parenthood education is brought to 3 in 2041, while the average number of group sessions is brought to 0.90 for primiparous women (3 sessions for 30% of the women) and 0.15 for multiparous women (1 session for 15% of the women). These objectives will be reached in 2041 following an exponential increase starting from the average number observed in 2016, except for the average number of group sessions for multiparous women, which is kept constant at 0.15;
- the other assumptions are unchanged compared to the "Baseline+".

Given the assumptions above, the expected variation in consumption is reported in Table 3.

Table 3 – Scenario A ("HO-G"): expected variation in consumption compared to 2016

	Allocation	2021	2026	2031	2036	2041
Prenatal	5.5%	+9.5%	+23.9%	+34.8%	+52.1%	+72.5%
Preparation	2.7%	+90.1%	+186.6%	+220.8%	+274.0%	+342.6%
Hospital (postpartum)	48.0%	-7.1%	-9.7%	-10.2%	-8.7%	-7.6%
Hospital (other)	32.0%	+2.0%	+3.3%	+2.7%	+4.4%	+5.7%
Outpatient postnatal	11.8%	+65.0%	+72.3%	+71.3%	+74.1%	+76.3%
Total	**100.0%**	**+7.9%**	**+11.4%**	**+12.3%**	**+16.3%**	**+20.5%**

3.4.3. Scenario B (hospital-centered – midwives)

The transition from scenario A to scenarios B and C involves a change in organisation toward a 'midwifery-led care' care model. Midwives are more involved in follow-up of low-risk pregnancies; follow-up of moderate- or high-risk pregnancies is provided mainly by gynaecologists. Midwives conduct the first consultation, during which the medical and psychosocial anamnesis is performed, and refer the patient to a gynaecologist if necessary. However, they conduct follow-up consultations during the pregnancy and coordinate care provided by other caregivers.

Assumptions:

- for low-risk pregnancies, the average number of individual obstetrical sessions provided by midwives will be 6 for multiparous women and 8 for primiparous women in 2041. It is assumed that these objectives of 6 and 8 consultations will be reached by 2041, following an exponential increase starting from the average number currently observed;

- for moderate- or high-risk pregnancies, the average number of individual obstetrical sessions (aside from sessions specific to high-risk pregnancies) provided by midwives in 2041 will be 1 (medical and psychosocial anamnesis), this number being reached following a linear increase starting from the average number observed in 2016. The average number of individual obstetrical sessions specific to at-risk pregnancies is kept constant at its 2016 level;

- the outpatient administrative tasks would be 10 hours per week in 2041 in a scenario where midwives coordinate the various caregivers (currently 8 hours of work per week), i.e. a relative increase by 25%. To take this into account, the length of the individual obstetrical consultations and postnatal services is artificially increased by 25%;

- the other assumptions are unchanged compared to Scenario A.

Given the assumptions above, the expected variation in consumption is reported in Table 4.

Table 4 – Scenario B ("H-M"): expected variation in consumption compared to 2016

	Allocation	2021	2026	2031	2036	2041
Prenatal	5.5%	+11.5%	+30.1%	+48.9%	+83.0%	+131.7%
Preparation	2.7%	+90.1%	+186.6%	+220.8%	+274.0%	+342.6%
Hospital (postpartum)	48.0%	-7.1%	-9.7%	-10.2%	-8.7%	-7.6%
Hospital (other)	32.0%	+2.0%	+3.3%	+2.7%	+4.4%	+5.7%
Outpatient postnatal	11.8%	+66.3%	+75.2%	+75.6%	+79.9%	+83.6%
Total	**100.0%**	**+8.1%**	**+12.0%**	**+13.6%**	**+18.7%**	**+24.6%**

3.4.4. Scenario C (outpatient – midwives)

The transition from Scenario B to Scenario C involves a change in organisation from a hospital centered model to an outpatient centered model. This is reflected in a more significantly reduced length of stay in the maternity ward and increased use of outpatient postnatal services.

Assumptions:

- the reduction in the average length of stay per APR-DRG SOI will be, respectively:
  - o APR-DRG 560, SOI 1: by 2 days for all age groups from 2025
  - o APR-DRG 560, SOI 2: by 2.5 days for all age groups from 2025
  - o APR-DRG 540, SOI 1: by 3 days for all age groups from 2025
  - o APR-DRG 540, SOI 2: by 4 days for all age groups from 2025
  - o for the other APR-DRGs and other levels of severity, the average length of stay per APR-DRG-SOI-age group is given by the projection model[9] relying on trend analysis that uses the 2003-2014 data until 2025, then kept constant at its 2025 level for the following years;
- the reduction in the length of stay increases the need for outpatient postnatal follow-up by midwives. In this context, the average number of outpatient follow-up and postnatal care services is 1 service per day and per woman between the day of maternity discharge and the fifth day postpartum. From the sixth day postpartum, the average number of follow-up and postnatal care services is 7 for primiparous women and 4 for multiparous women as of 2021;
- the other assumptions are unchanged compared to Scenario B.

Given the assumptions above, the expected variation in consumption is reported in Table 5.

Table 5 – Scenario C ("O-M"): expected variation in consumption compared to 2016

	Allocation	2021	2026	2031	2036	2041
Prenatal	5.5%	+11.5%	+30.1%	+48.9%	+83.0%	+131.7%
Preparation	2.7%	+90.1%	+186.6%	+220.8%	+274.0%	+342.6%
Hospital (postpartum)	48.0%	-7.1%	-24.9%	-25.3%	-24.1%	-23.2%
Hospital (other)	32.0%	+2.0%	+3.3%	+2.7%	+4.4%	+5.7%
Outpatient postnatal	11.8%	+146.8%	+182.4%	+183.0%	+190.2%	+196.1%
Total	100.0%	+17.6%	+17.4%	+19.0%	+24.3%	+30.4%

3.4.5. Summary table of the assumptions underlying Baseline+ and the three scenarios for the future

Table 6 lists the assumptions common to all of the scenarios, while Table 7 reports the assumptions specific to each scenario. The penultimate column gives the source of the data. The forecasts for the period 2021 to 2041 were made by the KCE in the framework of this report. The interested reader will find the justification for each of the assumptions and the forecasting method in the full version of the report (Section 5.3 of the scientific report).

Table 6 – Assumptions common to all the scenarios

	2011	2016	2021	2026	2031	2036	2041	2011-2016 Source	Projection
Number of hospital stays involving childbirth	125 150	122 458	124 867	126 487	125 726	127 864	129 434	Van de Voorde et al. (2017)[9]	Until 2025: Van de Voorde et al. (2017)[9], then constant length of stay and population forecast (Planning Bureau)[12]
Proportion of moderate- to high-risk pregnancies	17.5%	23.3%	28.7%	34.1%	34.1%	34.1%	34.1%	IMA-AIM	Linear until 2026 then constant
Proportion of the population living in a household with an equivalent disposable income below the poverty threshold	15.3%	15.9%	16.0%	16.4%	16.4%	16.4%	16.4%	IWEPS[13] on basis of EU-SILC[14]	Linear until 2026 then constant
Proportion of multiparous pregnancies	55.2%	56.3%	58.4%	60.0%	60.0%	60.0%	60.0%	CEpiP[15] and SPE[16]	Linear until 2026 then constant
Length of the first individual obstetrical session (all risk levels)				52 minutes				Elicitation	Constant
Length of the following individual obstetrical sessions for low-risk pregnancies				30 minutes				Elicitation	Constant
Length of the following individual obstetrical sessions for moderate- to high-risk pregnancies (including session specific to at-risk pregnancies)				35 minutes				Elicitation	Constant
Additional length of the individual obstetrical sessions in the event of socioeconomic vulnerability				15 minutes				Elicitation	Constant
Average number of additional sessions of preparation for birth and parenthood education in the case of socioeconomic vulnerability			1.0	2.0	2.0	2.0	2.0	Elicitation	Elicitation

	2011	2016	2021	2026	2031	2036	2041	2011-2016 Source	Projection
Length of the individual sessions of birth preparation and parenthood education				60 minutes				Elicitation	Constant
Length of the group sessions of birth preparation and parenthood education				120 minutes				Elicitation	Constant
Average number of participants in the group sessions				7				Elicitation	Elicitation
Weighting coefficient applied to the days of hospitalisation (severity level 1)	Day 1: 155; day 2: 129; day 3: 92; day 4: 84; day 5 and following: 77							ULB, School of Public Health (PACHA)[17]	Constant
Weighting coefficient applied to the days of hospitalisation (severity level 2)	Day 1: 140; day 2: 144; day 3: 97; day 4: 86; day 5 and following: 82							ULB, School of Public Health (PACHA)[17]	Constant
Weighting coefficient applied to the days of hospitalisation (severity level 3 and 4)	Day 1: 172; day 2: 156; day 3: 118; day 4: 108; day 5 and following: 105							ULB, School of Public Health (PACHA)[17]	Constant
Average number of postnatal follow-up and care services until the 5th day postpartum	0.3	0.8			1/day			Econodat and IMA-AIM	Elicitation
Average number of postnatal follow-up and care services due to complication	0.1	0.1			0.1			Econodat and IMA-AIM	Constant
Average number of breastfeeding consultations	0.2	0.4			0.4			Econodat and IMA-AIM	Constant

Table 7 – Assumptions specific to each scenario

	2011	2016	2021	2026	2031	2036	2041	2011-2016 Source	Projection
Average number of individual obstetrical sessions per pregnancy (low-risk)	1.0	1.4						IMA-AIM	
• Baseline+			1.4	1.4	1.4	1.4	1.4		Constant
• Scenario A "HO-G"　– multiparous			1.6	1.8	2.2	2.6	3.0		Elicitation
– primiparous			1.8	2.2	3.0	3.4	5.0		Elicitation
• Scenarios B "H-M" and C "O-M" – multiparous			1.9	2.4	3.4	4.5	6.0		Elicitation
– primiparous			2.0	2.6	4.0	5.7	8.0		Elicitation
Average number of individual obstetrical sessions per pregnancy (moderate- to high-risk)	0.8	3.4						Econodat and IMA-AIM	
• Baseline+ and Scenario A "HO-G"			3.4	3.4	3.4	3.4	3.4		Constant
• Scenarios B "H-M" and C "O-M"			3.0	2.7	2.3	1.9	1.6		Elicitation
Average number of individual sessions on preparation for birth and parenthood education per pregnancy	0.3	0.6						Econodat and IMA-AIM	
• Baseline+			0.6	0.6	0.6	0.6	0.6		Constant
• Scenarios A ("HO-G"), B ("H-M") and C ("O-M")									
– multiparous			0.7	0.7	0.8	0.9	1.0		Elicitation
– primiparous			0.8	1.1	1.6	2.2	3.0		Elicitation
Average number of group sessions of preparation for birth and parenting per pregnancy	0.3	0.4						Econodat and IMA-AIM	
• Baseline+			0.4	0.3	0.4	0.4	0.4		Constant
• Scenarios A ("HO-G"), B ("H-M") and C ("O-M")									
– multiparous			0.2	0.2	0.2	0.2	0.2		Elicitation
– primiparous			0.5	0.6	0.7	0.8	0.9		Elicitation

	2011	2016	2021	2026	2031	2036	2041	2011-2016 Source	Projection
Average length of stay								Van de Voorde et al. (2017)[9]	
• Baseline +, scenario A ("HO-G") and scenario B ("H-M") - examples									
o *APR-DRG 540 (caesarean) – severity 1 – 25-34 y*	5.7	5.0	4.4	4.0	4.0	4.0	4.0		Until 2025: Van de Voorde et al. (2017)[9] then constant
– 35-39 y	5.7	5.1	4.5	4.1	4.1	4.1	4.1		
o *APR-DRG 560 (vaginal) – severity 1 – 25-34 y*	4.1	3.7	3.3	3.0	3.0	3.0	3.0		
– 35-39 y	4.0	3.6	3.3	3.0	3.0	3.0	3.0		
• Scenario C ("O-M")									
o *APR-DRG 560 – SOI 1: for all age groups*			3.0	2.0	2.0	2.0	2.0		Until 2025: Van de Voorde et al. (2017)[9] then reduced
– SOI 2: for all age groups			3.7	2.5	2.5	2.5	2.5		
o *APR-DRG 540 – SOI 1: for all age groups*			4.4	3.0	3.0	3.0	3.0		
– SOI 2: for all age groups			5.4	4.0	4.0	4.0	4.0		
Average number of postnatal monitoring and care services as of the 6th day postpartum	0.9	1.7						Econodat and IMA-AIM	
• Baseline+, Scenario A "HO-G" and Scenarios B "H-M"									
- multiparous			2.0	2.0	2.0	2.0	2.0		Elicitation
- primiparous			4.0	4.0	4.0	4.0	4.0		Elicitation
• Scenarios C ("O-M")									
- multiparous			4.0	4.0	4.0	4.0	4.0		Elicitation
- primiparous			7.0	7.0	7.0	7.0	7.0		Elicitation
Inclusion of coordination tasks via increase in the length of the prenatal and postnatal consultations		20%						Elicitation	
• Baseline + and scenario A ("HO-G")			20%	20%	20%	20%	20%		Elicitation
• Scenarios B ("H-M") and C ("O-M")			21%	22%	23%	24%	25%		Elicitation

3.4.6.   Sensitivity analysis at the regional level

The results presented above make the implicit assumption that the consumption rate of the midwifery services evolves similarly in the three regions of the country. Below, we relax this assumption by introducing a variation at the regional level for the following parameters: the number of deliveries, the average length of stay, the proportion of at-risk pregnancies, the socioeconomic vulnerability and the proportion of multiparous women. Table 8 presents the evolution of the consumption of midwifery services compared to its level in 2016 in the three regions of the country, according to the various scenarios considered.

Table 8 – Analysis at the regional level: expected variation of the consumption compared to 2016

	2021	2026	2031	2036	2041
Flanders					
Baseline+	+5.6%	+3.9%	+3.2%	+5.2%	+7.0%
Scenario A ("HO-G")	+7.8%	+8.7%	+9.6%	+13.9%	+18.7%
Scenario B ("H-M")	+8.1%	+9.4%	+11.0%	+16.4%	+23.0%
Scenario C ("O-M")	+17.5%	+16.2%	+17.8%	+23.5%	+30.3%
Wallonia					
Baseline+	+7.4%	+8.4%	+8.0%	+8.8%	+9.2%
Scenario A ("HO-G")	+9.2%	+12.3%	+13.4%	+16.4%	+19.4%
Scenario B ("H-M")	+9.4%	+13.0%	+14.7%	+18.6%	+23.2%
Scenario C ("O-M")	+18.9%	+18.3%	+20.1%	+24.2%	+28.9%
Brussels					
Baseline+	+8.9%	+14.4%	+17.1%	+21.0%	+24.1%
Scenario A ("HO-G")	+10.1%	+16.9%	+21.3%	+27.4%	+33.4%
Scenario B ("H-M")	+10.3%	+17.4%	+22.3%	+29.4%	+37.1%
Scenario C ("O-M")	+19.9%	+23.0%	+28.1%	+35.5%	+43.5%

In the Baseline+, an increase in the consumption of midwifery services of 4% in Flanders, 8% in Wallonia and 14% in Brussels is expected by 2026 compared to 2016 (10-year horizon). In the scenario furthest from the current model (scenario C), these expected increases are 16% in Flanders, 18% in Wallonia and 23% in Brussels between 2016 and 2026. In all the scenarios, a greater increase in demand for obstetrical care provided by midwives is expected in Brussels than in the other regions of the country, and this difference is increased when the time horizon considered is longer.

3.4.7. Prediction intervals

For some parameters, when historic data are available, we have assumed a future evolution following a linear trajectory. This is the case for example for the proportion of at-risk pregnancies (medical risks), the proportion of women in a situation of socioeconomic vulnerability, and the proportion of multiparous pregnancies. Nevertheless, the further on we move in time, the higher the degree of uncertainty of these forecasts, especially when the estimate of the future value of some parameters relies on short time series. For this reason, the linear forecasting was limited to 2026 and the forecasting is supposed to be constant for the following years. However, prediction intervals have been calculated around these linear proportions and the impact of these parameters on future care consumption has been re-evaluated in light of these intervals according to a conservative assumption (the medical risks and the parity evolve according to the upper bound of the prediction interval in the future, while the socioeconomic vulnerability evolves according to the lower bound in the future) and according to a second less conservative assumption (the medical risks and the parity evolve according to the lower bound in the future while the socioeconomic vulnerability evolves according to the upper bound in the future).

The results can be found in Table 9.

Table 9 – Range of expected variation in consumption compared to 2016

	2021	2026	2031	2036	2041
Most conservative assumption					
Baseline+	+5.8%	+6.8%	+6.3%	+8.2%	+9.7%
Scenario A ("HO-G")	+7.7%	+11.0%	+11.7%	+15.0%	+18.1%
Scenario B ("H-M")	+7.9%	+11.7%	+12.5%	+16.3%	+19.8%
Scenario C ("O-M")	+17.4%	+16.9%	+17.7%	+21.6%	+25.1%
Least conservative assumption					
Baseline+	+6.11%	+7.4%	+7.0%	+9.1%	+10.7%
Scenario A ("HO-G")	+8.06%	+11.7%	+12.8%	+16.8%	+20.9%
Scenario B ("H-M")	+8.35%	+12.4%	+13.9%	+18.6%	+23.5%
Scenario C ("O-M")	+19.07%	+17.9%	+19.4%	+24.3%	+29.4%

3.4.8. Additional alternative assumptions

Some parameters appearing in the narrative descriptions of the scenarios could not be incorporated into the model above (Figure 5) due to the absence of solid data in the administrative databases, the absence of evidence in the literature on the impact of these parameters on consumption, and the absence of sufficient experience with regard to these parameters in Belgian daily obstetrical practice. For these reasons, these parameters could not be incorporated into the model assessing the future evolution of consumption, but are detailed in the scientific report (Section 5.6.). The following parameters are involved:

- The expansion of the scope of midwife competences (e.g. ultrasound scans, perineal re-education, etc.);

- The increase in patient-centered approaches and family-centered approaches;

- The evolution of the characteristics and aspirations of the population;

- The evolution of postpartum care;

- The evolution of mobility.

4. IMPACT OF THE SCENARIOS ON THE SUPPLY PARAMETERS OF THE FORECASTING MODEL FOR THE MIDWIFE WORKFORCE

The predominant care model in the future will have an impact not only on midwifery demand, but also on midwifery supply. In particular, according to whether the future care model is centered on outpatient or hospital care, a difference in the primary employment status of midwives is expected to be observed.

4.1. Basis scenarios

In the basis scenarios used by the Planning Commission, the distribution according to activity sector and professional status ('sector repartition rate') is not assumed to be stable over time. It evolves starting from the distribution observed in 2014 due to two factors:

- Midwives graduated after 1 October 2018 will no longer be able to provide nursing activities outside the areas specific to midwives.

- The progressive increase in the legal retirement age as of 2025 (66 years of age) and 2030 (67 years).

4.2. Alternative scenarios

We make the assumption that the percentage of midwives active outside of healthcare is not directly influenced by the care model. This rate is thus kept identical to that estimated in the basis scenarios, regardless of the care model considered. Among midwives active in obstetrics, an estimate of the plausible values of allocation rates in the future (between the statuses of employee, independent and combined) in the different scenarios is obtained by the elicitation process (Table 10). Scenario A envisages no variation in employment status in the future compared to the current situation, and so is not subject to assumptions. As scenario B is a hospital-centered scenario, it is expected that a greater share of professionals would have employee status, in contrast to scenario C, centered on outpatient care, where it is customary for professionals to practise with independent status.

Table 10 – Distribution according to status (midwives active in healthcare): assumptions

	Scenario B ("H-M") in 25 years	Scenario C ("O-M") in 25 years
Proportion of employees	65%	45%
Proportion of independent midwives	20%	35%
Proportion of midwives with mixed status	15%	20%

Again, additional alternative assumptions have been envisaged dealing with enhancement and expansion of training in order to acquire more skills in independent practice of obstetrics and in organisational and coordinating abilities. These assumptions are detailed in the scientific report (Section 6.4.).

In the mathematical model used by the Planning Commission for midwifery workforce forecasting, an increase in the length of training would temporarily affect the number of graduates (parameter 1 of the mathematical model[8]), as during the period of transition to a system with longer training very few students would be graduated. It is also probable that an upgrading to Master level would change the attractiveness of the midwife profession (number enrolled in training) but potentially also the success rate per year of study. These factors will combine to determine the number of graduates.

5. DISCUSSION

The Planning Commission is in charge of the healthcare professions forecasting, that is, quantifying the staffing (number of professionals) and the workforce (number of fulltime equivalents) of healthcare professionals, as well as their future evolutions. The forecasting model of the midwife workforce (basis scenarios) is entirely based on analysis of the historic trends in a context of "constant policy and conditions". Two basis scenarios have been developed: the first basis scenario focuses on all the midwives active <u>in the area of healthcare</u>, while the second basis scenario concentrates on midwives who perform <u>only midwife activities</u>.

The obstetrical activity of midwives within the alternative scenarios

The reader's attention should be drawn to the fact that the alternative scenarios envisaged in this report only concerned the obstetrical activity of midwives. Midwives practise in other sub-sectors of care activity such as neonatology and medically assisted procreation, but also outside the care sector. In addition, some parameters specific to the alternative scenarios could not be incorporated into the model due to the absence of solid data, the absence of evidence in the literature on the impact of these parameters on consumption, and the absence of sufficient experience with regard to these parameters in daily practice. For these reasons, the impact of these parameters has not been quantified. Nevertheless, a detailed description of the potential impact of these parameters has been offered in the report allowing their future incorporation into the mathematical model.

Distribution of the consumption of the obstetrical services of midwives

The obstetrical activity of midwives has been studied on the basis of distinct categories: prenatal follow-up, preparation for childbirth and parenthood education, postpartum outpatient care, hospital activity related to the immediate postpartum period, and hospital activity in other sectors. Given that these activities are measured on different bases and with different units, we had to establish an initial allocation key of the midwifery activity among the categories. We constructed this allocation key using data from the Minimum Hospital Summary and from NIHDI, but also through the elicitation process. The assumptions made will have to be validated and regular monitoring will be necessary to periodically re-evaluate the working hypotheses.

The plausibility of the scenarios

The scenarios developed rely on observation of past trends, developments in professional practice in other countries (e.g. the Netherlands, the United Kingdom, Sweden, and Canada) and on the assumption that similar developments are highly probable in Belgium. These scenarios were considered plausible by the stakeholders involved, representing different professional affiliations and levels of decision-making. Working groups composed of other professional representatives could have led to the development of other care models for the future. The scenarios developed sketch futures that are different, but nevertheless marked by greater participation of midwives in maternity care. The plausibility of each scenario depends on numerous factors, including the political will to reorganise care for pregnant women, the propensity of the system to make a more intensive and faster shift to outpatient care, the access to specialists reserved for at-risk clinical situations, and the time horizon envisaged.

The time horizon of the forecasts

The Planning Commission wants to produce estimates on a horizon of 25 years. It is important to recall that the degree of uncertainty of the forecasts is higher the further away one moves in time. This is especially true since the estimate of the future value of some parameters relies on short time series, sometimes significantly shorter than the total period of forecast. For example, the projection of the reduction in length of stay in the maternity ward is only available for 10 years to come. Beyond this, new assumptions must be envisaged for the evolution of the parameter and its impact on the care demand. Furthermore, evolution of the parameters can be linear or exponential or can plateau. For some parameters, such as the proportion of at-risk pregnancies, the proportion of women living under the poverty threshold and the evolution of multiparity, the choice of a linear evolution has been privileged for the short-term forecasts (2026) while a stabilisation of the projected rate in 2026 has been preferred for the long-term forecasts (from 2026 to 2041). In fact, if the linear forecast was maintained until 2041 (or in 25 years), one pregnant woman out of two would have a pregnancy classified as at-risk and over 64% of women would be multiparous. Such assumptions seem unlikely and show the limitation of using consumption data to make epidemiological forecast over a long-term timeframe. This is why it seems reasonable to us to limit ourselves to projections of 5 and 10 years to meet the planning objectives.

6. CONCLUSION

The issue of the future of healthcare organisation confronts any planner of human resources for health. Forecasts from historic data are assumed to be valid in the context of a stable healthcare system resulting from constant and thus invariable policies. The planner naturally wonders about the possible variations in the future. The development of alternative scenarios has a certain added value in supporting decision-making about healthcare professionals to be trained to meet future demand. The reflexion about the possible future of midwifery raises important strategic issues regarding care model going beyond the issue of human resources for health. These strategic issues are intrinsically societal choices and thus political choices. These choices should be guided by maintaining or even improving the health outcomes of the mother-child dyad.

What method should be preferred in order to obtain reliable results? This question has been discussed in the literature for the past decade.[18] Comparative analysis of foreign experiences[19-24] indicates that combining quantitative and qualitative data can usefully give input to the reflexion on the alternative scenario development.

The horizon scanning exercise led us to propose the Baseline+, which enriches the basis scenarios developed by the Planning Commission by incorporating contextual factors (medical risks, socioeconomic vulnerability, and healthcare budget) and the integration of forecast of reduction in length of hospital stay by APR-DRG. These factors alone contribute to increasing the demand for midwives for obstetrical care in a range of 7.1% during the period 2016-2026.[8] The three developed alternative scenarios allow to consider plausible variations on the current care model, likely to be developed in the more or less near future: from a scenario very close to the current model, in which specialist physicians (gynaecologists) are the main practitioners (including for pregnancies and deliveries without complications) to a very different scenario oriented toward outpatient services provided mainly by primary healthcare providers (midwives and general practitioners), in which women at risk are referred to specialists. At the national level, the overall increase in the demand for obstetrical care provided by midwives between 2016 and 2026 is estimated to lie in a range from +11.4 to +17.4% depending on the scenarios and the underlying assumptions. The employment status of the midwives (salaried,

independent or mixed) will also be influenced by the dominant care model in the future. A model centered on obstetrical care provided at hospital would rely mainly on a salaried workforce, while a model centered on outpatient care would produce an increase in the proportion of independent midwives.

Between 2016 and 2026, Baseline+ shows an increase of 7.1% in demand of midwifery activities. This is mainly due to the increase in activities in postnatal outpatient care (+8.6%). It should be noted that Baseline+ takes into account the reduction in the length of hospital stay leading to the reduction of 4.6% in activities in postnatal inpatient care (see Table 2). The transition from Baseline+ to scenario A results in an increase of 11.4% in the midwife activities between 2016 and 2026. This growth is mainly due to the rise of midwifery sessions dedicated to childbirth preparation and parenthood education (+5.1% in scenario A versus +1.4% in Baseline+) and in a lesser extent the rise of the prenatal activities (+1.3% in scenario A versus +0.7% in Baseline+) (see Table 3). The transition from scenario A to scenario B has a low impact on the increase of midwife activity. As a matter of fact, a very slight increase related to the prenatal and postnatal care is observed (+0.3% between the two scenarios (see Table 4)). Finally, scenario C shows a growth of 17.4% in demand for midwifery activities during the period 2016 and 2026. It is mainly due to a very strong increase in postnatal outpatient activities (+21.6%), partially minimized by a decrease in postnatal inpatient activities (+12.0% see Table 5).

The identification of contextual factors as well as the development of alternative scenarios and their quantification rely on a bottom-up approach ensuring greater plausibility of the basic assumptions of the model for forecasting the demand. However, the qualitative component of the approach proposed has certain limits; this is why it requires regular monitoring of the assumptions made and the evaluations proposed by the experts involved in the process in order to make any adjustments in case of deviation of the observations from the forecasts. The involvement of field experts and representatives of their professional associations has been a major asset and an undeniable advantage throughout the research process. Finally, this methodological approach is easily reproducible to enrich the planning model for other healthcare professions.

The results presented in this synthesis are limited to the evolution analysis of some parameters included in the midwifery demand and supply forecasting model developed by the Planning Commission – medical supply. Only the parameters directly affected by the alternative scenarios were quantified i.e. the consumption of obstetrical care and the repartition of the supply between the different professionals statuses. The results are made available to the members of the midwife working group of Planning Commission to be introduced in its mathematical model for assessing the impact of alternative scenarios on the midwife supply and demand.

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COLOPHON

midwives), Ingrid Morales (Direction Health ONE; organisation of prenatal care in neighbourhood prenatal consultations and articulation with medical and social workers), Joke Muyldermans (VBOV, daily management), Anne Niset (President of AFSFC and BMA), Jacqueline Orban (Head of department mother & child, CHIREC), Nathalie Schumacher (Direction of High School for midwives (HEPH - Condorcet), Pascale Steinberg (Cellule de planification, SPF Santé publique, Commission de planification), Joachim Van Keirsbilck (President of Department Obstetrics VVOG), Marleen Van Puymbroeck (Head of Midwives – AZ Sint Nikolaas), Vanessa Wittvrouw (UpSfB)

Other possible interests that could lead to a potential or actual conflict of interest: Marleen Van Puymbroeck (Safety in the delivery room and emotional health of the health worker)

Layout:	Ine Verhulst, Joyce Grijseels