

**Evaluation of the Desired Motherhood project, a novel
educational approach to Natural Family Planning in Benin,
Africa**

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ABSTRACT

Introduction

Unintended pregnancies have far-reaching health implications and disproportionately affect developing countries. Contraception has the potential to limit unintended pregnancies and increase birth spacing. In developing countries, 214 million women have an unmet need for Family Planning because of fear of side effects associated with hormonal contraception, lack of accessibility and various socioeconomic, cultural or religious reasons. A new natural Family Planning program, Desired Motherhood, has been implemented in Benin since 2014, among Muslim Peuhl communities living in rural areas and with a low literacy level. The aim is to teach self-observation of cervical mucus secretion to enable women to identify their fertile days, thus empowering them to avoid unintended pregnancies and to space birth. A simple educational approach involving the use of local visualisation materials such as red stones, sticks and leaves is used. The objectives of this evaluation are to assess knowledge acquisition among female trainees, measure the occurrence and assess the causes of unintended pregnancies and short birth spacing, appraise negotiation skills during fertile days and finally get an overview of the difficulties encountered and perceived benefits.

Methodology

A convenience sampling was used to recruit married women who were trained between 2014 and 2015. In January and February 2018, quantitative and qualitative data were collected on 113 women through individual interviews and trainee's files. An interpreter was solicited for the translation between French and Fulfulde. Data was written down manually and then transferred to excel. Quantitative results included mainly descriptive statistics. For qualitative analysis, an inductive approach was employed whereby themes were created and coded after the interview. The statistical software STATA 15 was used for analysis.

Results

63.7% of the women correctly described the fertile days and the corresponding cervical mucus secretion observed during this period and 93.8% mentioned three years as the minimum recommended birth spacing. A total of 76 pregnancies were registered, among which 27.6% (n=21) were unintended. Two main causes of unintended pregnancies were attributed to wrong interpretation of the fertile days (33.3%) and lack of husband cooperation (23.8%). The same major reasons were attributed to birth intervals of less than three years in the subgroup analysis (n=51). For the sub analysis (n=100) on negotiation during fertile days, 39% of the women had their husbands' support while the rest lied, did not get along or did not say anything to their partner. Obstacles include forgetfulness about the training content, difficulty to distinguish between fertile and infertile days and irregular cycles. Most of the participants were satisfied

with the program as they have acquired knowledge and have found a solution to limit and space births with no side effects, cost and stigma.

Conclusion

With its simple, innovative and culturally acceptable Natural Family Planning approach, Desired Motherhood has brought multiple benefits to the Peuhl community. The women are now more knowledgeable on natural fertility regulation and thereafter, they can enjoy the benefits associated with appropriate birth spacing. Nonetheless, wrong or poor interpretation of fertility signs and uncooperative husbands still constitute major challenges. In this perspective, it is important to intensify the follow-up of the trainees and to ensure implication of all husbands. Access to other methods of contraception should be facilitated for those who cannot or do not wish to apply Desired Motherhood. Further studies are needed to quantify success and failures rates of this Fertility Awareness Based Method.

Key words: Desired Motherhood, unintended pregnancies, Natural Family Planning, Fertility Awareness Based Method, cervical mucus secretion, Peuhl, Benin

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LIST OF ABBREVIATIONS

ASRF: Association Suisse Raoul Follereau

BBT: Basal Body Temperature

BOM: Billings Ovulation Method

DM: Desired Motherhood

DHS: Demographic and Health Survey

FABM: Fertility Awareness Based Methods

FP: Family Planning

FP2020: Family Planning 2020

HIV: Human Immunodeficiency Virus

IUD: Intra Uterine Device

LAM: Lactational Amenorrhea Method

MMM: Modified Mucus Method

NFP: Natural Family Planning

NGO: Non-Governmental Organisation

OCP: Oral Contraceptive Pills

PA: Periodic Abstinence

SDC: Swiss Agency for Development and Cooperation/ Swiss Development Cooperation

SDGs: Sustainable Development Goals

USAID: United States Agency for International Development

VTE: Venous Thromboembolism

WHO: World Health Organisation

1. INTRODUCTION

In the era of the Sustainable Development Goals (SDGs), universal access to Family Planning¹ (FP) is a transformational tool which can accelerate progress towards the goals set in this global agenda [1]. Sexual and reproductive health is embedded in two SDGs targets, namely target 3.7 which aims “to ensure universal access to sexual and reproductive health-care services, including family planning” by 2030 and target 5.6 striving to “ensure universal access to sexual and reproductive health and reproductive rights” [2]. Besides being a fundamental human right, access to FP is key to achieving a myriad of societal and health gains. These range from alleviating poverty, improving nutritional outcomes, saving lives, fostering education, empowering women, boosting economic growth to mitigating the effects of population growth [1]. A study analysing investment in women’s and children’s health, underscored the importance of expanding access to FP as it is considered a particularly cost-effective measure [3]. According to estimates, 47% and 53% of child and maternal deaths respectively, can be averted through contraception use [3]. As put forward by Melinda Gates during the London Summit on FP in 2012, “access to contraception can often be the difference between life and death” [4]. Over the years, unprecedented efforts have been made to promote FP through the launching of the SDGs and the Family Planning 2020 (FP2020). FP2020, an initiative born following the London Summit, is a multi-sectorial collaboration advocating the right and access to contraception information and services [5]. Despite renewed global commitment in this field, reaching women in low resource settings and preventing unintended pregnancies remains challenging [6].

2. BACKGROUND

2.1 Unintended pregnancies

Worldwide, it is estimated that 44% of pregnancies are unintended [7]. Unintended pregnancies encompass two concepts, namely *unwanted pregnancy* whereby there is no wish to have a child, and *mistimed pregnancy* which occurs sooner than desired [8]. Despite witnessing a decline over the years, unintended pregnancies still constitute a major issue disproportionately affecting developing countries [7]. To illustrate, from 2010 to 2014, the rate of unintended pregnancy in developed countries was 45 per 1000 women aged 15-44 years and two-fold in

¹ Family Planning is the use of contraception (= methods of preventing a women from becoming pregnant) to control how many children you have and when to have them (Cambridge English Dictionary)

Africa with 89 unintended pregnancies per 1000 women [7]. In 2017, 89 out of 206 million pregnancies registered in developing countries, were unintended [9].

Besides causing financial hardship [10], unexpected childbearing can result in social, psychological and numerous deleterious health consequences for both the mother and the child [10,11]. These include delayed or inadequate prenatal care [10,12,13,14] , higher risk of prematurity [10,15], low birth weight [10,16], infant mortality [10,14] and stunting [13,17], decreased incidence of breastfeeding [18,19], weak mother-child bonding [20] and poor physical, developmental and mental health for the child [10,11]. Moreover, women are more prone to psychological disorders [20] both intra and postpartum [21, 22] and frequently have recourse to induced abortion to terminate the pregnancy [10,11].

2.1.1 Induced abortions

From 2010 to 2014, 56% of all unexpected pregnancies resulted in voluntary abortions [7]. Unfortunately, such abortions are often practised in precarious conditions in developing countries, which have far-reaching health implications. For the same time period, more than 25 million of unsafe abortions were performed yearly and 97% occurred in developing countries [23]. Between 2003 to 2009, 192 000 maternal deaths were attributed to abortion in developing countries, representing 7.9% of all maternal deaths [24]. This figure is thought to be underestimated due to misclassification and underreporting [24]. In 2012, seven million women from developing countries had to be treated for complications ranging from haemorrhage, sepsis to uterine perforation following unsafe abortion [25]. A further three million were deprived of any post abortion care in 2014 [26]. Besides jeopardising women's health, the aftermath of unsafe abortion includes an additional burden on the health system, with an estimated annual cost of 232 million US dollars for post abortion care [26].

2.1.2 Short birth Interval

Unintended pregnancies also often lead to short intervals between two successive births with subsequent maternal and perinatal health implications. Women with short birth spacing are at increased risk of death and placental disorders such as placental abruption and placenta previa [27]. Additionally, there is compelling evidence that a birth to conception interval of less than 18 months increase the risk of prematurity, low birth weight, small for gestational age babies and potentially infant mortality [28]. Several mechanisms such as maternal nutritional depletion, folate deficiency and cervical insufficiency have been hypothesised to drive these adverse health outcomes [29]. The WHO recommends waiting at least 24 months between a live birth and the next conception. In other words, the birth to birth interval should be a minimum of 33 months [30].

2.2 Family planning and contraception

2.2.1 Types of contraception

Access to effective means of contraception are pre-requisites for women in developing countries, to curb the threat associated with unintended pregnancies [9]. Contraception are often classified as modern or traditional [31]. However, there is a lack of consistency and consensus for the classification and definition of modern versus traditional methods across studies. Following a joint technical consultation by the WHO and the United States Agency for International development (USAID), it has been decided that a contraception can be considered as modern if these three criteria are met: (i) it relies on a solid foundation of reproductive medicine, (ii) has guidelines for correct use and (iii) studies with vigorous methodologies have proven its efficacy in different situations [31]. Based on this definition, WHO classifies the following contraception as modern: Oral Contraceptive Pills (OCP), progesterone implants, injectables, intrauterine devices (IUD), condoms, sterilisation, lactational amenorrhea method (LAM), emergency pills, standard days method (SDM), basal body temperature (BBT), TwoDay method(TDM) and sympto-thermal method. Traditional methods include the calendar/rhythm method and withdrawal [32]. Folkloric methods, herbs and vaginal douching which are devoid of any scientific evidence are not considered as contraceptive methods [31]. Further details about the classification, mode of action and effectiveness of the different contraception [32] are presented in Appendix 1.

2.2.2 Natural regulation of fertility

Prior to the advent of modern contraception, postpartum sexual abstinence extending from a few weeks to three years, formed the cornerstone of fertility regulation and birth spacing in many African countries. Such practices were enhanced by myths that breastmilk will be contaminated by semen if there is sexual intercourse [33,34]. Often, after child delivery, women would go and live with their parents and these polygynous societies facilitated abstinence [34]. With urbanisation, decrease in polygyny, fear of husband unfaithfulness and arrival of modern FP, such traditional practices although still existent, are on the decline [33].

Also, before hormonal contraception reached the market, contraception was achieved through withdrawal, calendar method or fertility awareness based methods (FABM) [35]. The calendar method, an old and natural method of regulating fertility, relies on calculations to determine the fertile days [36]. However, a study conducted among women who have once used the calendar method involving periodic abstinence in developing countries, revealed a knowledge of the fertile window ranging from 22 to 73% [37]. Several studies have demonstrated that the concept of fertile period is not universally acquired [37, 38, 39, 40] and knowledge differs depending on

numerous factors such as education, country of residence and being a user of periodic abstinence or not [37]. Che et al claim the existence of multiple misconceptions such as the occurrence of ovulation during or right after the menses and estimate that around 50% of people in developing countries wrongly applies the calendar method [41].

FABM, which are newer and modern methods, rely on physical signs and symptoms such as cervical secretions and basal body temperature, varying with hormonal levels, to determine the fertile and infertile period of the menstrual cycle [42,43] and they can be used accordingly to plan or avoid a pregnancy [42, 44]. With FABM, the risk of pregnancy is avoided through either abstinence or the use of barrier methods (e.g. condoms) on the fertile days [42]. When FABM involves periodic abstinence (PA), it is known as Natural Family Planning (NFP) [36]. Some examples of FABM include Standard Days Method, cervical mucus methods (e.g. Billings ovulation method (BOM), Creighton model and TwoDay method) and sympto-thermal method [42]. FABM have numerous advantages such as low cost, no medical side effects, improved spousal communication and respect, immediate return of fertility after discontinuation [42], no need for medical intervention, increased knowledge on the physiology of fertility and its accessibility outside hospital settings [45]. In spite of the numerous advantages, FABM are less commonly used than other modern contraception [46] and are often neglected by FP programs [45]. This can be attributed to the previous incorrect classification of FABM as traditional and inferior methods of contraception which consequently negatively impact on investment for dissemination of these methods [45]. There is also a lack of knowledge of these methods among doctors and other health professionals [42] as these methods are absent from their training [45].

While the calendar method is not considered as very effective, FABM are deemed more effective [31]. For example, in case of typical use, including incorrect use, the effectiveness of calendar method to prevent pregnancy is 75% [32] compared to around 98% with the sympto-thermal method [32, 47]. However, owing to studies with flawed and inconsistent methodologies, the evidence for the effectiveness of FABM are quite sparse with considerable disparities across studies [43]. Nevertheless, the use of FABM, calendar and withdrawal methods are far more effective than not using any contraception. While these methods increased the odds of unintended pregnancies by three, the odds is increased by 14,3 in case of no contraception use, when compared to contraception such as OCP, implants, IUD, condom and LAM [48].

2.2.3 Unmet need for family planning in developing countries

Annually, around 308 million pregnancies [9] and more than 270,000 maternal deaths are prevented in developing countries through modern contraception [49]. Despite the increase in the prevalence of contraception use, progress remains uneven between regions and the

absolute number of women with an unmet need for FP is projected to rise [50]. Unmet need for FP represents the proportion of women who are willing to cease or defer childbearing but who do not have recourse to any method of contraception [46]. In 2017, it was estimated that 214 million women in developing countries had an unmet need for modern contraception. Among these women, 155 million were not using any form of contraception while 59 million were still relying on traditional methods [9]. More than 80% of the unintended pregnancies are attributed to an unmet need for modern family planning [9]. By satisfying the unmet need, around 103,000 deaths can be averted annually [49] and induced abortions reduced by 75% [9]. Contraception coverage is found to be particularly low among women who are young, poor, illiterate and who live in rural areas [51], and also affect those belonging to specific religions such as Islam [51, 52] and ethnic groups like Fulani [52].

2.2.4 Reasons for unmet need for family planning in developing countries

The low coverage of FP in developing countries is a complex issue transcending economic barriers, limited knowledge, lack of access [48,53,54,55] and restricted choice of contraception [32, 53]. Fears about side effects and health risks constitute one of the major hindrances to the use of hormonal modern contraception [48,53,55]. Some of these concerns include menstrual disruption [53], physical discomfort, sexual relations interference, disturbances in daily activities [56], fear of malignancies [54,55], and infertility [53,54]. Some women deem the risks associated with such modern contraception, far outweigh the risk associated with having a pregnancy [57]. It has long been recognised that alteration of the menstrual pattern can arise to different extent from hormonal contraceptives such as OCP, IUD [58,59] and implants [59,60]. These menstrual disturbances which range from unscheduled bleeding, spotting to amenorrhea, often lead to discontinuation among women [59]. However, the disrupted menstrual pattern normally improves with time and can be re-established with medications [59]. Regarding injectable and subdermal contraceptive implants, a wide range of side effects have also been associated with them. Some examples include: headache, weight gain, hair loss, abnormal hair growth, acne, loss of libido, mood swings, dizziness and ovarian cysts [61]. Also, one main concern is the delay in fertility return when hormonal contraception is stopped [62]. More serious health complications can result from hormonal contraception. For example, according to systematic reviews, OCP increase the risk of venous thromboembolism (VTE) [63, 64, 65] by threefold [64], ischaemic stroke by twofold [64] and breast cancer by an odds ratio of 1.08 [66]. Despite the recognised risk, these figures need to be interpreted with caution. For instance the absolute risk of VTE is extremely low with OCP (7 per 10,000 women-years) [67] whereas pregnancy accounts for a higher VTE risk (20 per 10,000 women years) [68].

Additionally, several other factors pertaining to beliefs, religion, culture and traditions hinder the uptake of modern contraception. For instance, some unfounded beliefs about IUD include the fear that the device “*will float in the stomach*” [55], “*children will be born with the device in the hands*” or “*the IUD becoming stuck or cause death*” [57]. Regarding condom use, they fear it might lead to female genital cancers [57] or cause HIV infection since there are rumours that condoms are infected with HIV [69]. Moreover, condom use during sexual intercourse are negatively perceived as they are associated with promiscuity, mistrust between partners and are considered unnatural and going against cultural practices [69].

In some religions such as Islam and Roman Catholicism, contraception is prohibited since children are considered as a gift of God [70]. Some religions do not allow women to receive healthcare services from the opposite sex and prohibit participation in religious rituals during vaginal bleeding [70]. Also, there is the desire to have many children, especially sons [70], owing to societal pressure, to provide help on farms [70,71] and to ensure lineage [70]. Many communities suspect FP organisations of wanting to eliminate their tribe [70]. Several barriers deterring users from visiting FP providers have been identified: lack of trust in their clinical competency and ability to maintain confidentiality, rude treatment, unavailability of information in local languages and poor services [54]. A non-exhaustive list of other contributing factors includes opposition of the husband or surroundings [48,53,54], fear of stigmatisation or criticism [54,57] and low perceived risk of pregnancy in case of infrequent sex, breastfeeding and postpartum amenorrhea [53].

2.3 Implementation of a NFP program in Benin

The numerous detrimental health consequences following unintended pregnancies, induced abortion and short birth spacing arising from an unmet need for FP is a major issue in developing regions and particularly Sub Saharan Africa which top the list with 21% of women with an unmet need for modern contraception [9]. This situation is further complicated when (i) traditional practices such as post-partum sexual abstinence in Africa are declining without being replaced by other methods [33,34] , (ii) knowledge on the fertile period and FABM are either not widespread [37, 42] or erroneous [41] and (iii) there is reluctance to use non-natural modern contraception because of the miscellaneous socio-economic, health, cultural, traditional and religious concerns [70]. According to Konje et al, “*many family planning programs are ineffective because providers have failed to understand and therefore overcome the cultural barriers of the traditional communities*” [70]. In view of the situation exposed above, a NFP program with a new educational approach known as ‘Desired Motherhood’ (Maternité Désirée in French) has been pioneered in Gambia in 2011 and then established in Benin, in the Atacora department as from 2014.

2.3.1 Country Setting

Situated in the west of Africa, Benin is a small developing country which is divided into 12 departments and 77 communes. Benin is largely dominated by Catholicism and Islamism and more than 50 ethnic groups are present in the country. According to the last country survey, around 60% of the women of reproductive age have never attended school [72]. Benin, with an average of 5 births per women, has one of the highest fertility rates which is double the global rate [73]. The fertility rate is even higher in rural in contrast with urban regions (5.4 versus 4.3). In 51% of cases, the interval between two births is less than three years. It was estimated that 43% of the women of childbearing age has the correct knowledge on the timing of the fertile period (i.e. the middle of the cycle). Sexual intercourse in the post-partum period was not yet resumed at 6 months in 50% of cases. The median and mean for postpartum abstinence are 7,3 and 12,2 months respectively [72].

Only 13% of married or in union women in Benin use any form of contraception: 8% for modern contraception (comprising hormonal, barrier, LAM and permanent methods) and 5% for more traditional ones such as withdrawal and periodic abstinence. The prevalence of contraception use is higher in urban than in rural areas (15% versus 12%) and is only 11.4 % in the Atacora department. The knowledge of contraception was higher for non-natural modern methods as opposed to more traditional ones. The most commonly known methods among married women were condoms followed by contraceptive pills, injectables and implants. In urban areas, the most frequently used methods were injectables (2.4%), contraceptive pills (2.0%) and male condoms (1.8%). In rural regions, male condoms (1.8%) and injectables (1,7%) prevailed. The main reason for discontinuing a contraceptive method was the desire to get pregnant, followed by the side effects or health problems associated with contraception. The unmet need for FP among married women has raised from 30% in 2006 [74] to 33 % in 2012 [72]. The reasons for unmet need for FP in Benin are as follows: fear of side effects and health risk (22%), self-opposition and opposition from husband, surroundings and religion (22%), infrequent sexual intercourse (16%), postpartum amenorrhea and breastfeeding (17%), cost (10%) and lack of access (7%) [75].

A study conducted by Jobin on medical contraception use and practices in Benin, revealed that women often seek FP services secretly and when such practices are discovered by the husband, there is violent repercussion. The fear of sterility with medical contraception was identified as a major concern and one of the most spread rumours. Often, rumours about side effects were relayed by the health personnel. Service provision was also found to be discriminatory towards the poor and illiterate women [76].

2.3.2 Description of the project

The project Desired Motherhood (DM), initiated by the Swiss doctor Felix Küchler, is financed by the Association Suisse Raoul Follereau (ASRF) and Swiss Development Cooperation (SDC). The implementation has been facilitated by the local Peuhl NGO 'Potal Men' ('Our Union' in English).

DM involves a simplified FABM. The main aim of the training is to enable women to identify the fertile period through self-observation of the cervical mucus so as to limit unintended pregnancies and to ensure a minimum of three years between two births. In this way, women are empowered and are free to decide about the timing of a pregnancy. The method is devoid of any direct medical side effects and bears no cost for the users. In Benin, the target group was the Peuhl community [77].

The Peuhl, also known as Fulani, are largely present in West Africa. They are in majority Muslim and polygamous marriage is permitted. Disparities in their status exist across regions. While some live in urban areas with a modern lifestyle, traditional Peuhl are mostly nomadic, illiterate and rely mainly on livestock farming for their living [78]. For the Peuhl women, menstruation is regarded as dirty and they feel shameful to talk about it. Talking about sexuality with the parents is not allowed. Younger people need to seek permission from the house leader to talk to other family members and people of different age groups cannot freely engage into conversation. The DM project in Benin is specifically targeted at the Peuhl with a low literacy level and living in camps in rural areas (Appendix 2, figures (a) and (b)) [77].

DM has been devised using scientific evidence from previous NFP methods. It is implemented using an innovative educational approach and with sensitivity to the cultural context of the Peuhl community.

The underlying scientific rationale of the DM method is derived from the two following cervical mucus methods: Billings Ovulation Method (BOM) and TwoDay method (TDM). In general, with cervical mucous methods, the beginning and end of the fertile window is assessed through changes in the characteristics of cervical mucus secretions such as colour, texture, amount and stretch throughout the cycle [36,42]. BOM requires daily assessment of the cervical mucus secretion and abstinence is required from the day of onset of "wet, slippery, transparent and stretchy" cervical mucus up to 3 days after the secretion is most abundant (peak day) [35]. The probability of unintended pregnancy is 3.2% within the first year if the method is correctly applied [79]. TDM is a simple method whereby the woman asks herself whether she has observed any cervical secretion today and the day before. If observation of any cervical secretion is made on either day, intercourse should be avoided if there is no desire for pregnancy. If no cervical secretion is noticed, then pregnancy is unlikely [42]. In case of correct use of the method, there

were 3.5 pregnancies per 100 women in the first year [79,80] . DM has also been inspired from the modified mucus method (MMM) devised by Dorairaj in India. In MMM, women were visited at their house by a teacher and were taught to observe cervical mucus secretions over three menstrual cycles. With MMM, sexual intercourse had to be avoided when there was “feeling of wetness” up to the third day after the “feeling of wetness stops”. MMM was devised in a simple and acceptable way to be used by women with no or low level of literacy. A Pearl Index of 2.04 was achieved with the method [81].

DM training has a 2-step approach. The first part consists of 4 half days teaching, in group, where basic knowledge on the following items are imparted: the menstrual cycle and identification of the onset and end of the fertile period through cervical mucus secretion observation, recommended birth spacing of three years and the importance of spacing births for the welfare of both the mother and the child. Childhood development milestones are often used by the Peuhl in the camps to get an approximate idea of the child’s age. When a child is able to walk (around one year old), the couple considers the birth spacing is enough. Therefore, DM tries to shift this perception from a child is able to walk to the ability to execute an order (around three years old). In the first part, women are also encouraged and acquainted to talk about sexuality with their husbands, through role-play. The second part is the individual follow-up over four menstrual cycles, during which self-observation skills of the cervical mucus secretions are acquired and refined. In DM, the fertile period begins with the observation of the first thick, yellowish and sticky cervical secretion and end three days after the secretion of abundant transparent, stretchy and slippery mucus (peak day). During this period sexual intercourse should be avoided if there is no desire for pregnancy. Condom use is neither encouraged nor discouraged [77].

There are several specificities in the educational approach of DM. Firstly, it is the trainers of DM who go to the trainees in the Peuhl camp. The sessions take place in an environment where the women feel at ease: under the shade of a tree for the 4-half day group training (Appendix 2, figure (c)) and in the woman’s room during the follow-up. The teaching of the method is done through simple visualisation of the menstrual cycle using readily available local materials as shown in Figure 1. These materials consist of:

- Red stones: menstruation days
- Dry sticks: Infertile or dry days
- Green leaves: fertile days
- Green sticks: days of security
- Shea butter: first thick, yellowish sticky mucus secretion indicating beginning of the fertile period

- Okra (lady fingers) juice: transparent, stretchy and slippery mucus secretion indicating the very fertile days.



Figure 1: Local materials used for visualisation of the menstrual cycle and teaching of self- observation

On the day the transparent and slippery mucus becomes abundant, indicates the occurrence of ovulation. Only very basic knowledge of the anatomy, physiology and human body is transmitted and no other materials (e.g. leaflets, memory aids) or devices are used [77].

A community and cultural approach is also adopted in the implementation of DM. The approval of the Peuhl camp leader needs to be obtained before training. The training involves all married or in-union women of the camp. As far as possible, husbands also receive a half day training

session addressing maternal and child health along with an introduction on the NPF program being proposed to their wives. When the training was first initiated, the training for men were not very well elaborated. Training sessions are carried out separately for men and women. The older and younger age groups are trained separately because daughters in law would not feel at ease in the presence of the mother in law for example. Peuhl women are trained by female instructors, of the same ethnic group, who have received a thorough training on the method and who have themselves applied the DM method for at least 6 months. The trainers need to have a good understanding of French and should be of a respectable age (ideally older than the women being trained) [77].

3. OBJECTIVES OF THE STUDY

The aims of this study are to carry out an external evaluation of the achievements of the DM project, as a novel educational approach to NFP among the Peuhl community in Benin and issue recommendations. The following research questions pertaining to the trainees, have been assessed:

- 1) What is the proportion of trainees who is able to identify the fertile period through description and interpretation of cervical mucus secretion?
- 2) What is the proportion of trainees with the correct knowledge on the recommended birth spacing and what are benefits that they know?
- 3) What is the proportion and causes of unintended pregnancies following the training?
- 4) What is the proportion and causes of birth intervals of less than three years following the training?
- 5) How do women undertake negotiations during fertile days to avoid unintended pregnancies and to space birth?
- 6) What are the difficulties encountered with the training and application of the method?
- 7) What are the overall perception and benefits acquired with DM?

4. MATERIALS AND METHODS

4.1 Selection of study participants and sampling

Since the implementation of the project in Benin, around 2500 women have been trained to date [82]. For the purpose of this study, data was collected from married Peuhl women trained in 2014 and 2015 only. This time frame was chosen to be able to appreciate if the recommended

birth interval of three years was maintained. Additionally, for practical and feasibility issues, only women residing in Peuhl camps of the following four communes of the Atacora department were considered: Natitingou, Toucountouna, Tanguieta and Materi. In 2014 and 2015, a total of 357 women from these four communes and coming from 40 Peuhl camps were trained and followed up [83, 84]. A convenience sampling has been used to recruit the participants despite being prone to bias with no guarantee of ensuring representativeness and generalisability [85]. However, convenience sampling is suitable when the target population needs to be accessible, available, willing to participate and geographical proximity is required [85]. Since the Peuhl community is a semi nomadic population practising transhumance², it was the most appropriate sampling method in this context. The sample size (n) was calculated based on the assumption that the prevalence (p) of women who would be able to identify the fertile period from cervical mucus secretion would be 50%. The confidence interval level (Z) was set at 95% (CI95) and a precision (d) of 0.1 was used. The calculated sample size based on the following formula and parameters mentioned [86] required a sample of at least 97 women.

Formula:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Explanation :

n = sample size required

Z = level of confidence: 97.5th percentile with a 95% confidence interval (z= 1.96 for a confidence level of 95%)

P= estimated prevalence of women knowing signs of fertility based on cervical mucus secretion

d= precision of 10% (0,1)

$$n \geq \frac{1.96^2 \cdot 0.5(1-0.5)}{0.01^2}$$

$$n \geq 96.04$$

² The action or practice of moving livestock from one grazing ground to another in a seasonal cycle, (...) (English Oxford living dictionaries)

A total of 113 participants from 20 different Peuhl camps were interviewed and three women did not wish to take part in the study.

4.2 Data collection

Data collection took place from January to February 2018. This cross-sectional study used a mixed method approach collecting both quantitative and qualitative data. Quantitative data was essential to the breadth of the study [85] especially in terms of knowledge acquired and qualitative data helped to ensure better understanding [87] of behaviour. Data was obtained from the participants' follow-up files and individual interviews. The follow-up files which were filled in prior to and during the training, consisted of two parts. The first part contained demographic information such as the age of the women and the age at marriage, birth histories, use of contraception and additional information such as pregnancy, lactating and menstruation status. The second part comprised of the monthly follow-up records whereby the menstruation pattern and the occurrence of events such as pregnancies were registered.

For the individual interviews, the female trainers acted as gatekeepers to access the field. Whenever possible, the Peuhl camp leader or women were informed of our visit before the scheduled day. The female trainers either informed them directly by going at the camp or they were contacted by phone. This was important to ensure that the women were present in the villages or were not on transhumance and thus avoid unnecessary long distance travelling in vain. Once in the camp, permission was granted from the camp leader to conduct the study. The purpose of the study was explained in their local language i.e. Fulfulde by the female trainers. Participation was voluntary and oral consent was obtained.

The interview was conducted in a private setting; either in the house or under the shadow of a tree in the presence of a female interpreter and myself (Annexe 2, figure (d)). The questions were addressed in French and then translated by the interpreter in Fulfulde. To ensure a smooth running of the interviews and a good comprehension of the questions and responses, the questionnaire had been pilot tested with the translation process on five female trainers. The interpreter was from the Peuhl community. It was important to ensure that she belongs to the same ethnic group to facilitate access and to ensure a good comprehension of Fulfulde. She had a good understanding of DM but was external to the project and NGO financing it, to avoid bias. The interviews lasted one hour on average and included both close and open-ended questions. The interview covered the following elements: participant background, birth histories, contraception history, knowledge on fertile days and birth spacing, any occurrence of pregnancy since the training, birth spacing, negotiation during the fertile period, difficulties encountered

with the training and method and the overall benefits acquired. Whenever available, the participants' follow-up files were used during the interview to double check some information and avoid as far as possible recall bias. The birth certificates of the offspring were used if available or in the possession of the women, to get the appropriate information on the ages and birth spacing. When we felt that the participants looked uncomfortable or were not keen to answer a question, we did not insist and skipped to the next one. At the end of the interview, whenever participants had difficulties or questions with respect to the concepts learned with the NFP method, these questions were attended by myself and the female trainer accompanying us. There was no audio recording of interviews. Instead all the answers were written down manually on the questionnaire and then transcribed in excel. Additional data on the difficulties encountered and the reasons why women did not respect the recommended three years of birth spacing were gathered through four female trainers who were considered as key informants. Confidentiality of all findings were ensured throughout. The advice of the Geneva cantonal commission of research ethics (CCER) was sought prior to the beginning of the study. The objectives of the study were modified accordingly such that the objectives were feasible within the specified time frame and did not require the approval of a research ethics committee.

4.3 Data processing

For the quantitative part, that is the proportion with the correct knowledge retained, unintended pregnancies and birth spacing maintained, statistical analysis was performed with the software STATA version 15.0. Statistical analysis included mainly descriptive statistics. Qualitative methods involving mainly an inductive approach was used to investigate the causes of unintended pregnancies and short birth intervals and to determine how women negotiate with their husbands during the fertile period to avoid pregnancy. The responses were organised into themes, then coded in excel and analysis was generated using the same statistical software as for quantitative data. Finally, an overview of the difficulties encountered, and the perceived benefits of the project were also assessed.

For investigating the knowledge on fertile days and birth spacing, all the participants (n=113) including menopausal women (n=3) and those using other contraception were considered (n=8). For menopausal women it was to ensure that they have the correct knowledge if they want to transmit the information to younger family members. As for those using other contraceptive method, we could not exclude the possibility that one day they would like to opt for DM. For child bearing events, only conceptions occurring after the initial teaching and follow-up phase of 4 months, were considered as being a pregnancy after the training.

Two subgroup analyses were carried out for the section of the study dealing with birth spacing and negotiation during the fertile period. Any child born or conceived before or within the first four months of the training were considered as the last child conceived before the training. Any child conceived after that period were considered as a child conceived after the training. Miscarriages and stillbirths were not taken into account. The approximate birth spacing between the last child conceived before the training and the child conceived after the training was determined by calculating the difference in terms of months between the two. In cases of women who were pregnant at the time of the interview, the expected month of delivery was used to calculate the birth spacing between the last child and the unborn child, assuming the pregnancy will result in a live birth.

For birth spacing, only women with the following criteria were included in the analysis (n=51):

- (i) Those who have never used any other form of contraception (e.g. OCP, implants) before, during or after the training which could have potentially contributed to increasing the birth interval between the child born before the training and child born after the training.
- (ii) Those who had at least one birth before the training and one after the training
- (iii) Available information on the children's age allowing the birth space to be calculated.

For the negotiation during the fertile period, the following women were included (n=100):

- (i) Those who were not using any other form of contraception at the time of interview
- (ii) Those who have not yet attained menopause
- (iii) Those who were still living with their husband.

5. RESULTS

5.1 Profile of study population

The study population consisted of 113 women enrolled in the DM project. They were from 20 different Peuhl camps spread over four communes of the Atacora department in Benin. The profile of the participants is listed in Table 1. The known age range of the women was between 18 and 43 years and 51% (n= 58) of the women did not know their age. The majority (85%, n=96) never attended school. Around 70% (n=53) were in a polygamous marriage. More than 50% (n=59) of the women had at least 5 living children.

Table 1: Profile of the study population

Variable	Number (n)	Percent (%)
Age of respondent in years		
15-19	2	1.8
20-24	8	7.1
25-29	16	14.2
30-34	18	15.9
35-39	9	8.0
40-44	2	1.8
45-49	0	0
Does not know	58	51.3
Education		
None	96	85.0
Primary incomplete	13	11.5
Primary complete	1	0.9
Secondary incomplete	3	2.7
Secondary complete	0	0
Literate in Fulfulde		
Yes	43	38.1
No	70	61.9
Age at first marriage in years		
≤ 15	16	14.2
>15 et ≤ 18	44	38.9
>18 et ≤ 20	6	5.3
>20	2	1.8
Does not know	45	39.8
Type of marriage		
Monogamous	31	27.4
Polygamous (1 co-spouse)	57	50.4
Polygamous (2 or more co-spouses)	23	20.3
No data	2	1.8
Commune of residence		
Natitingou	25	22.1
Toucountouna	30	26.5
Tanguieta	23	20.4
Materi	35	31.0
Parity³		
0	2	1.8
1-2	16	14.2
3-4	24	21.2
5-6	32	28.3
7-10	33	29.2
10+	6	5.3
Mean parity	5.6	
Median parity	5.0	
Range of parity	0-11	
Number of living children		
0	2	1.8
1-2	18	15.9

³ Total number of deliveries

3-4	34	30.1
5-6	34	30.1
7-10	25	22.1
10+	0	0
Mean number of living children	4.7	
Median number of living children	5.0	
Range of living children	0-10	
Note: Due to rounding, percentages do not always equal to 100		

5.2 DM files, participants' status during training and use of contraception

Only 58.4% (n=66) of the follow-up files of the interviewees could be retrieved from the archives and were completely filled in. Ten additional files (8.8%) were incomplete. The year of the training, the women's status during the training and the use of contraception are described in Table 2. Almost three quarters of the participants were trained in 2015. Surprisingly, only 16% (n=18) of the women were adequately followed up during at least 4 menstrual cycles. For the remaining, the women had no menstrual cycle and signs of fertility because of pregnancy or breastfeeding and for others, data was missing due to lost or incomplete files. Around one quarter of the women had ever used non-natural modern contraception before the arrival of DM. At the time of the training and interview, around 10% (n= 11) and 7% (n=8) of the women respectively were using other forms of contraception, mainly subdermal progesterone-implants.

Table 2: Year of training, status of women during training and interview and use of contraception

Variable	Number (n)	Percent (%)
Year of training		
2014	30	26.5
2015	83	73.5
Observation of menstrual cycles at the beginning of training⁴		
Yes	22	19.5
No	42	37.2
No data	49	43.4
Number of menstrual cycles followed up⁵		
0	35	31.0
1	2	1.8
2	5	4.4
3	4	3.5
4	12	10.6
>4	6	5.3
No data	49	43.4
Pregnancy at time of training⁶		

⁴ If the woman is observing her menstrual cycles during the first month of the follow up, it is recorded as yes. This data has been obtained from the follow up files

⁵ Obtained from follow up files

⁶ Data obtained from follow up file and in case of the file is not available, it is self-reported during the interview

Yes	23	20.3
No	87	77.0
No data	3	2.7
Breastfeeding at time of training⁷		
Yes	60	53.1
No	48	42.5
No data	5	4.4
Observation of menstrual cycle at time of interview		
Yes	61	54.0
No	52	46.0
Pregnancy at time of interview		
Yes	11	9.7
No	101	89.4
No data	1	0.9
Breastfeeding at time of interview		
Yes	59	52.2
No	54	47.8
Ever used non-natural contraception before DM		
Yes	27	23.9
No	86	76.1
Still using non-natural modern contraception at time of training		
Yes	11	9.7
No	102	90.3
Use of other form of contraception other than DM at time of interview		
Yes	8	7.1
No	105	92.9

5.3 Knowledge on identification of fertile period through description of cervical mucus secretion

Interviewees were asked to represent their current or last observed menstrual cycle and identify the fecund time with the educational materials (red stones, sticks and leaves) as taught during the training. Almost half of them (49.6 %, n= 56) could correctly represent it and identify the fertile period at a CI95 of 40.3 to 58.8%. Some women were unable to represent their cycle with the materials but could properly describe and interpret it orally. Altogether, with or without the materials, 63.7% (n=72) of the women managed to describe the sequence of their menstrual cycle and correctly identified the fertile period, with a CI95% of 54.3 to 72.2%. Identification of the fertile days included the description and interpretation of the cyclic change of the cervical mucus. Among those who could not correctly do the identification (36.3 %, n=41), the most commonly evoked reason was forgetfulness (56.1%, n=23) followed by lack of understanding and confusion in 22% (n=9) of cases. The other reasons included incomplete training (17.1%,

⁷ Data obtained from follow up file and in case of the file is not available, it is self-reported during the interview

n=7) and lack of interest (4.9%, n= 2). The respondents were numerous to claim recall sessions to prevent them from forgetting as a long time has elapsed since the training.

Additional analysis using chi square test were carried out to see how the knowledge of the fertile period and ability to correctly interpret fertile cervical mucus secretion were associated with factors such as literacy in the local language, education and year of training. The results are presented in Table 3.

Table 3: Association between knowledge of the fertile period and literacy, education and year of training

VARIABLE	Correct knowledge of the fertile period and cervical mucus secretion				Chi square test (p value)
	YES		NO		
	Number (n)	Percent (%)	Number (%)	Percent (%)	
Literacy in local language (Fulfulde)					
Yes	32	74.4	11	25.6	0.064
No	40	57.1	30	42.9	
Ever attended school					
Yes	12	70.6	5	29.4	0.595 ⁸
No	60	62.5	36	37.5	
Year of training					
2014	13	43.3	17	56.7	0.007
2015	59	71.1	24	28.9	

With a p value of 0.007 ($p < 0.05$) a significant relationship can be suggested between the knowledge of the fertile period and the year of training at a significance level of 5%. The participants who were trained in 2015 were more likely to have a correct knowledge as compared to those trained in 2014. There was no sufficient evidence to suggest a significant association between knowledge and the literacy level in Fulfulde or school education.

⁸ A Fishers exact test was performed instead of the Chi square test for this variable as one condition for the Chi test is violated, i.e. one of the cells is not greater than 5.

5.4 Knowledge on birth spacing

The proportion of women who correctly stated at least three years as the optimal interval between two births was 93.8% (n=106) with a CI95 of 87.4 to 97.1%. Most of them agreed that birth spacing is beneficial. The most frequently mentioned benefits of birth spacing were improved maternal and child health, proper child growth and decreased maternal suffering. Improved nutrition, higher intelligence, reduced expenditure, increased affection provided to the child and the ability to work were other cited advantages. Some interview extracts illustrating the known benefits are listed below.

“I think birth spacing is good because both the mother and the child will be in good health and there is less expenditure. I am happy because since the training, the observation that I have made was that my children are always in good health.” P7, Toucountouna⁹

“Having a baby who does not walk and being pregnant at the same time is a suffering and it does not allow me to do my activities.” P80, Materi

“The child is properly breastfed and can grow well. If the child is too small, he’s ugly and not in good health.” P27 Tanguieta

5.5 Unintended pregnancies after DM training

Between the training of the participants in 2014/2015 and the interviews in January and February 2018, a total of 76 pregnancies were registered, of which 27.6% (n=21) were unintended and 68.4% (n=52) were desired. No information was available for the remaining 4% (n=3). The underlying causes of the unintended pregnancies (n=21) are enumerated in Table 4.

Table 4: Underlying causes of unintended pregnancies after the training (n=21)

Category	Number (n)	Percent (%)
Did not master self-observation of mucus secretion/incorrectly interpret fertile period/was wrong on fertile days	7	33.3
Husband did not cooperate during fertile days	5	23.8
Self-observation was not done	3	14.3
Got pregnant in post-partum amenorrhea	2	9.5
Subdermal progesterone implant was removed to apply DM and fertile days could not be interpreted because of cycle disturbance	2	9.5
Out of curiosity, had intercourse during fertile days, to see whether what has been taught during the training is true	1	4.8
Do not wish to answer	1	4.8

⁹ P7 refers to the number of the participant and Toucountouna the name of the commune from which the participant is

The most commonly cited reasons were due to erroneous interpretation of the fertile window and incorrect self-observation (33.3%), followed by the husbands' lack of cooperation (23.8%). As depicted by the following statement from a participant, some women have to endure a lot of hardship when the husbands are not cooperative, and they are forced to have many children.

"When I inform my husband that I am in the fertile days, he never cooperates with me. It's only recently that my husband has been trained and that he understood but I was already pregnant of twins (...) I initially thought of abortion (...) The twins are very small, and I have another child who does not walk and who is sick. Is my husband here? No! I am suffering alone in my room."
P113, Tanguieta

Many women did not have cycles during the follow-up phase and could not put into practice the self-observation skills as evoked by the following woman:

"During the training and follow up, I was pregnant and could not observe my menses and fertile days. When my menses came back some time after the delivery, there was no follow-up anymore for the self-observation." P72, Natitingou

There have been cases of women with subdermal implant who abandoned the method to opt for DM and became pregnant owing to the difficulty of identifying the fertile period following cycle disturbance as described by the following women:

"When I removed the implant, I did not have a normal cycle, and this is how I became pregnant."
P29, Tanguieta

One interesting finding is about a participant who confessed she purposely had intercourse during the fertile period to verify the reliability of the instructions received.

"I had intercourse during the fertile days to see if what I have been taught was true and I indeed got pregnant. I didn't want a pregnancy. I did it out of curiosity." P3, Toucountouna

5.6 Birth spacing after DM training

A total of 51 women were included in the sub analysis to determine if the beneficiaries were able to abide by the recommended birth spacing of at least three years. Table 5 gives the percentage of women with the corresponding birth interval between the last child born before and after the training.

Table 5: Birth interval respected between two births after the training (n=51)

Birth spacing in months	Number (n)	Percent (%)
< 24	5	9.8
≥ 24 and < 36	24	47.1
≥ 36	22	43.1

The underlying reasons for the women (56.9%, n=29) who were not able to maintain at least three years are listed in Table 6.

Table 6: Underlying causes of a birth interval of less than three years after the training (n=29)

Category	Number (n)	Percent (%)
Did not master self-observation and was mistaken on fertile days	8	27.6
Husband did not cooperate	4	13.8
Pregnancy was desired following the death of a child	3	10.3
The previous child was already walking and considered as big enough	3	10.3
Pregnancy was desired	3	10.3
Self-observation not done	1	3.5
Out of curiosity, had intercourse during fertile days, to verify if the knowledge imparted was true	1	3.5
No information given	6	20.7

Similar to the underlying reasons of unintended pregnancies, the main reasons for women not being able to respect the three years were due to wrong interpretation of the fertile period (27.7%) and uncooperative husbands (13.8%). The sadness and discouragement ensuing the death of a child was also a reason evoked to rapidly get pregnant. As soon as the youngest child of the interviewed lady started to walk, some women considered them big enough and deemed appropriate to get pregnant again. In a few cases, it was difficult to gather information for this question. Either the question yielded no responses, or the answers remained vague or unclear.

5.7 Negotiation during fertile days

For this sub analysis, 100 women were included. A total of 13 women were excluded for the following reasons: use of other forms of contraception during the interview (n=8), menopause (n= 3) and those who were separated from their husband (n=2). Among the interviewed women, 42% (n= 42) reported that their husband had received the training session in the context of the

project while 15% (n=15) were not aware if their husbands were trained. Participants were questioned on the ways they normally negotiate with their husbands if there was no desire for pregnancy. The answers given have been regrouped into various categories and recorded in Table 7 and illustrated with citations in Figure 1.

Table 7: Type of negotiation and tactic during fertile days following the training received by women (n=100)

Category	Number (n)	Percent (%)
Husband cooperates when informed about the fertile days and/or the desire to avoid a pregnancy since the previous child is too small.	37	37
Lie to husband (e.g. pretend menstruation or sickness) since she feels ashamed or is afraid to tell the truth to the husband fearing he will refuse or ask too many questions	23	23
She does not say anything to the husband during the fertile days either because she doesn't know about the fertile days or doesn't know how to tell him	16	16
Lie to husband (e.g. pretend menstruation or sickness) since he has previously refused to cooperate	8	8
Refuse any intercourse despite the opposition of the husband	8	8
Husband refuses to cooperate, and she accepts	5	5
Tactics are used (e.g. giving the back to the husband or placing the children in the middle of the bed) to indirectly inform the husband it is the fertile days	2	2
No answer	1	1

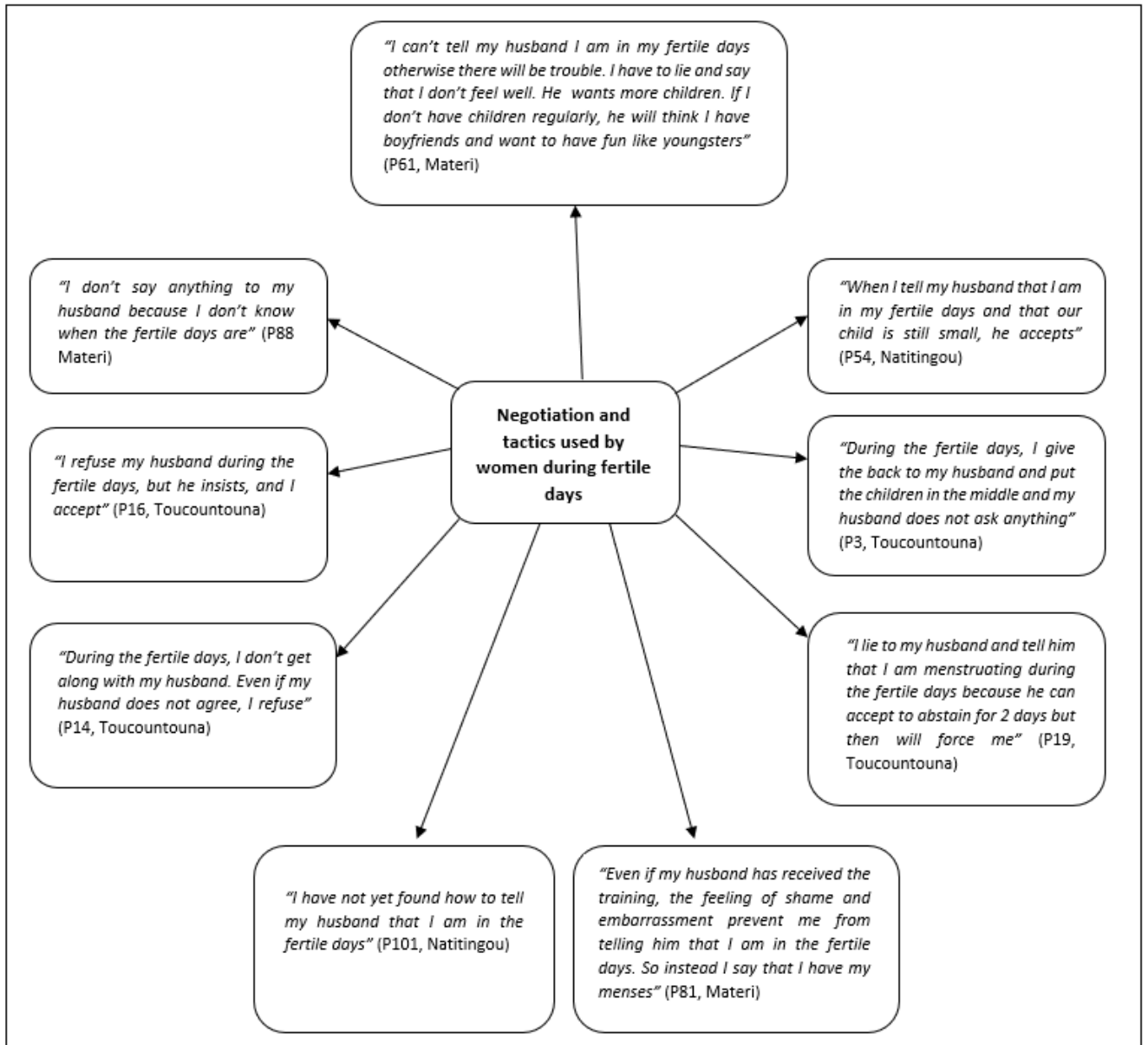


Figure 2: Illustration of the ways women negotiate cooperation or use tactics during the fertile days.

Overall, 39% of the women succeeded in obtaining their husband collaboration either through direct discussions or by using tactics to avoid unintended pregnancies. Two contributing factors which appear to favour husband cooperation include polygamous marriage and husbands who received the half day training session.

"During my fertile days, since I have a co-spouse, my husband goes there. My husband agrees as he want the children to be in good health." P7, Toucountouna

“It is not difficult with my husband. We will talk and agree. At the beginning my husband did not agree, and I had to lie during the fertile days. After my husband has received the training, he accepts, and everything goes on well now.” P21, Tanguieta

On the other hand, 31% of the women were compelled to lie during their fertile days. The most frequent lie to avoid intercourse was pretending to be in the menstruation phase. The women claimed their husband refuse to cooperate as they wanted more children, they did not trust their wives or were ignorant. For some of the participants, lying was judged as a safer alternative when they were unsure of their husbands’ reaction, which in case of refusal, would expose them to the risk of an undesired or mistimed pregnancy.

5.8 Difficulties encountered with DM

Many of the women reported that they did not encounter any difficulty with the training and the application of the method. However, from the interviews it was evident that some of them did not understand or had trouble applying the method. From the information which could be obtained, the difficulties mentioned were forgetfulness, lack of recall sessions, irregular cycles and inability to distinguish between fertile and non-fertile days. A few participants also mentioned that they do not understand the meaning of the cervical mucus as well as the local materials used for the visual aid. Some beneficiaries reported that they did not have any trouble with the method itself but rather with their husband. A few respondents considered familial relationship with the trainer as a major obstacle, as the feeling of shame made it hard to focus on the training or approach the trainer for queries. Also, one women mentioned it was problematic for her to abstain from intercourse during the fertile days because of her libido. In addition, four of the female trainers, were asked about the difficulties faced by the participants with self-observation. Three of them affirmed that the trainees’ major problem lies in differentiating vaginal discharges, including infections, from the fertile cervical mucus secretion. One of the trainers claimed that the women did not face any particular difficulties except for follow-up which need to be more frequent.

5.9 Overall perception and benefits acquired with DM

The vast majority of the women were satisfied with the training and acknowledge its multiple benefits as illustrated in Figure 2. The benefits can be classified into three broad categories namely: (i) knowledge acquired, (ii) solutions to childbearing related problems and (iii) solutions related to the inconvenience of hormonal contraception. Knowledge on the fertile period was a major benefit as participants were either unfamiliar with the concept or had an erroneous idea relayed by the elderly and some believed that cervical mucus secretion was a disease. In

addition, they were informed on the importance of birth spacing. Some participants were keen to transmit the knowledge to their daughters. In terms of childbearing, women were happy that they could space birth, decide on the timing of pregnancy and rest as they have found a solution to decrease their suffering related to close pregnancies. Limiting birth also enable them to pursue their economic and daily activities. Finally, they were relieved to use a method which is not associated with stigma and have no cost and side effects.

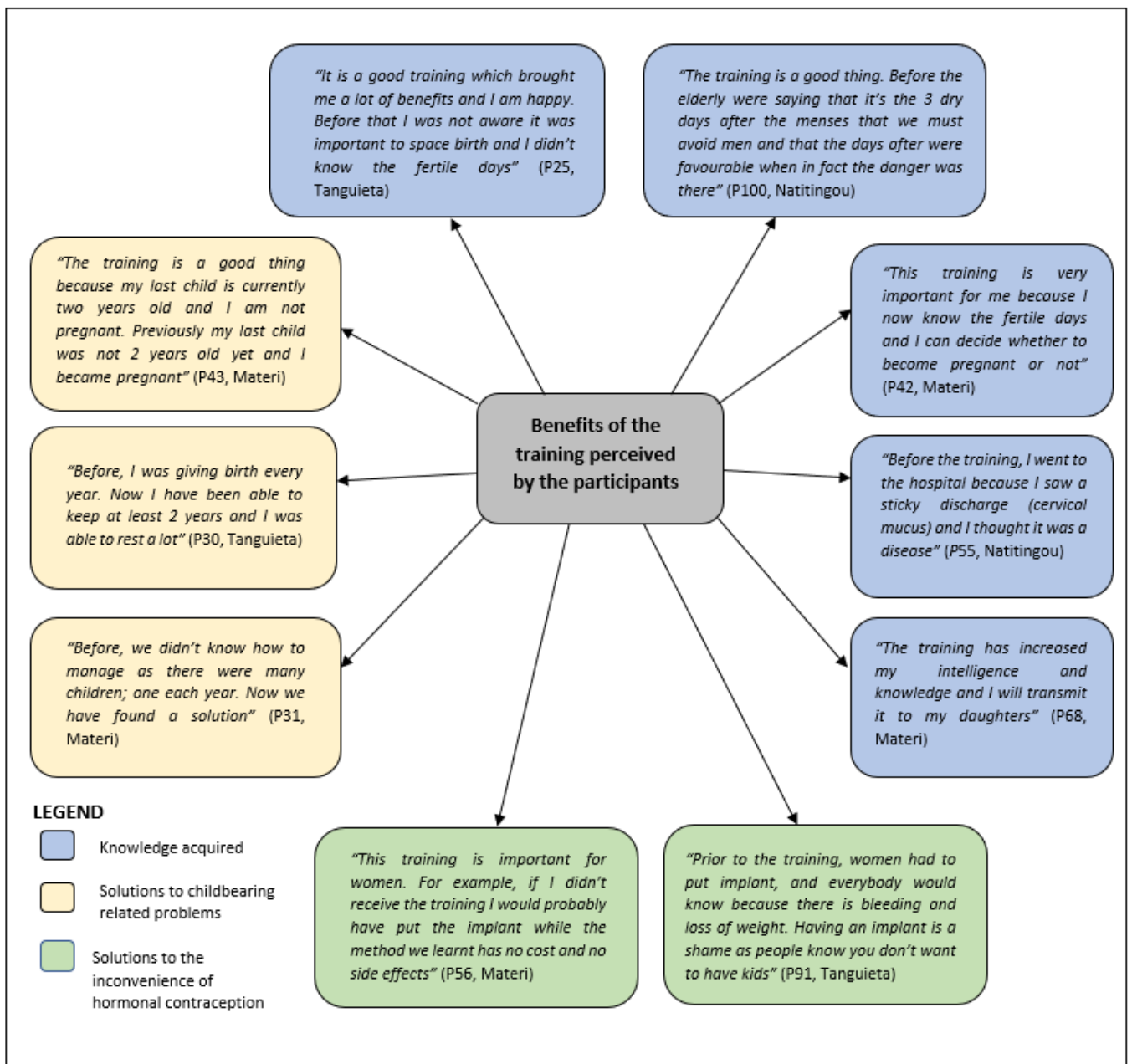


Figure 3: Benefits of the training as perceived by the participants

6. DISCUSSION & RECOMMENDATIONS

The project DM aspires to overcome the unmet need for family planning in a context of limited accessibility, fear associated with side effects of hormonal contraception and a patriarchal society, by providing a natural way to regulate fertility. This external evaluation of the DM project assessed the achievements and outcomes of this NFP program implemented in the Peuhl community of the Atacora department in Benin. Overall, the interviews went on well and the participants were responsive. Different elements were explored through individual interviews. Our study population consisted of 113 women of which 85% never attended school. On average, each woman gave birth to 5.6 children and only 7% were using a hormonal contraception at the time of the interview. In total, 63.7% of the women correctly described and interpreted the cervical mucus secretion observed during the fertile window and 93.8% were aware of the minimum recommended years required for birth spacing. Around a quarter of all registered pregnancies were unintended and resulted mainly from wrong interpretation of fertile days and lack of support from the husband. The same reasons were attributed to birth intervals of less than three years in the subgroup analysis (n=51). For the sub analysis (n=100) on negotiation, only 39% of the women got their husbands' support while the rest lied, did not get along or did not say anything to their partner. Despite encountering several difficulties, most of the women perceived many benefits associated with the training.

6.1 Knowledge on identification of fertile period through description of cervical mucus secretion

Around 64% of the women correctly described how to identify and interpret the cervical mucus secretion corresponding to the fertile phase. This proportion is lower compared to a WHO multicentre trial study assessing a similar method. In the WHO study, 97% of the participants had a good understanding of the method and were able to accurately interpret cervical mucus pattern of the fertile phase after three cycles. The sample comprised more than 800 women who were neither pregnant nor breastfeeding. The women came from a diverse socio-economic and educational background and only 13.3 % were illiterate. Also, their knowledge was assessed immediately after the training [88]. Although this sample of women is not comparable to ours, we can nevertheless suspect that the knowledge is lower in our population since 2.5 to 4 years have elapsed since they received the training. The participants in our survey frequently mentioned having forgotten how to apply the method and stressed on the importance of recall sessions to sustain the knowledge acquired. The high proportion of women who were breastfeeding or pregnant during the teaching and follow-up phase of DM and therefore could not apply the method immediately, can also account for this lower figure.

The result is however quite satisfactory when compared to other studies. For instance, according to the last Demographic and Household survey (DHS) in Benin, only 43% of the women, all socioeconomic status confounded, had a correct knowledge of the fertile period [72]. It is noteworthy that this assessment by the DHS was limited to knowing the approximate timing of the fertile days which is the middle of the cycle [72], irrespective of the ability to interpret cervical mucus secretion. Another assessment among FABM users in developing countries showed that the percentage with an accurate knowledge of the fertile period that is the middle of the cycle, ranged from 8% to 91% with a median of 62% [41].

The use of local materials to visualise the menstrual cycle and cervical mucus secretion pattern is an innovative approach which might have contributed significantly to a rapid assimilation for many participants. However, our findings suggest the use of the visual aid was not utterly fundamental for all users. There were participants could not remember how to represent and explain their cycle and the fecund time using the materials but could give a perfect oral explanation. It is challenging to draw a conclusion of the extent to which the visual aid facilitated the acquisition of knowledge since there was no control group.

The knowledge assessed in this evaluation is only theoretical and does not imply that the participant correctly applies it in practice. However, attaining the maximum number of women with the proper knowledge of the fertile window is highly desirable as a study has demonstrated that a correct understanding of methods involving periodic abstinence is associated with a 12% decrease in failure rate [41]. Hence, it is advisable to have frequent recall sessions for the women, particularly for those who were lactating or pregnant. For future trainings, it is important to ensure that beneficiaries can observe their fertility signs simultaneously to the teaching and follow-up sessions. Planning the monthly home visits so that they coincide with the period during which the women need help with the self-observation would be desirable and probably more effective. Such a strategy was adapted in the modified mucus method (MMM) in India [81]. The number of menstrual cycle follow ups could be extended and a closer monitoring offered to women having difficulties with the self-observation.

No significant relationship was found between the correct knowledge and education, suggesting the training was adapted to different educational levels. However, the number of women who have attended school in the sample was very small. The women trained in 2015 were more likely to have a correct knowledge than those who were trained in 2014. This is not surprising as the training has been improved between 2014 and 2015 and the trainers were also more experienced. Additionally, this difference could also be explained by more forgetfulness resulting from a longer time elapsed between the training and the interview.

6.2 Knowledge on birth spacing

Most of the participants were proficient in the recommended birth spacing interval and its benefits. The training has undeniably contributed to such a high proportion of women with a proper knowledge. A study conducted in Guatemala also showed that women who have followed an educational program on maternal and child health were well informed of the required birth spacing and its advantages [89]. However, the need to space birth was probably an already known concept since traditional communities practice or used to practice post-partum abstinence extending over several weeks to months, not only for traditional and religious religions but also to space births [34]. Nonetheless, there is a knowledge-practice gap (discussed later) whereby some women, knowledgeable on the recommended birth spacing period, do not put it into practice.

6.3 Unintended pregnancies after the training

More than a quarter of pregnancies recorded following the training till the day of the interview were reported as unintended. Most of these pregnancies intentions were reported retrospectively after the conception or child's birth. Since intention can shift from unintended to intended in the presence of the child, the number of unintended pregnancies is potentially underestimated [90]. Moreover, recall bias, the feeling of uneasiness when evoking an unwanted pregnancy [90] and underreporting of first trimester pregnancies could have further led to understating the number of unintended pregnancies. Underreporting of first trimester pregnancies were however minimised by systematically asking the participants about their current menstrual cycle status. Furthermore, many of the women were already pregnant or breastfeeding before and during the training and therefore their chance of conceiving was decreased as a result of postpartum and lactational amenorrhea. As no previous data for unintended pregnancy is available for the studied population and in regards of the issues raised above which might have contributed to an underestimation of the unintended pregnancies, it is difficult to draw a conclusion on the proportion of unintended pregnancies.

However, the main purpose was to dig into the underlying causes of these unintended pregnancies despite the training. The main cause resulted from wrong identification and interpretation of the fertile days, suggesting this method is not precisely mastered by several women and that training should be refined. Lack of collaboration from the husband was the second major cause of unexpected pregnancies. This finding suggests that self-observation skills alone are not sufficient to apply the method and that men play a vital role in family planning methods involving PA. This observation is consistent with other studies. For instance, Che et al

evoked husband compliance as potentially crucial in decreasing failure associated with PA [41]. Another study demonstrated that the absence of husband's support for FABM involving PA contributes to the method failure and discontinuation [42]. The role played by the male partners will be further developed later.

Disturbance of the menstrual cycle after implant removal and ignorance of the possibility of getting pregnant in the post-partum period before the return of the menses are also factors which contributed to unintended pregnancies. Despite not being major components of the proportion of unintended pregnancies in our study, they nevertheless constitute important risk factors which need to be highlighted during the training. Raising awareness of these possibilities can encourage couple to take measures to prevent unwanted pregnancies. Ethical concern arises in the situation where women have discontinued their hormonal contraception, which have a proven efficacy, to apply DM with no known efficacy yet, and subsequently got pregnant. This can happen because cycle disturbances can complicate self-observation. Studies have shown that discontinuation of hormonal contraception such as OCP cause cycle disturbances such as longer cycles [62, 91] variable cycle length and fluctuation of the ovulation time [91]. According to a study by Gnoth et al, re-establishing the normal cycles can take up to nine months or longer [62]. In the postpartum period, it is known that ovulation, which is possibly fertile, precedes the first menses in 20 to 71% of cases [92]. It is the duty of the trainers to make the women aware of those risks. If the beneficiaries judge that DM better suits them and want to discontinue other methods, they could be proposed alternatives such as the use of condoms until their normal cycle is re-established.

6.4 Birth spacing after DM

Despite knowing and understanding the benefits of birth spacing, respecting the recommended three years was not always feasible for some women for several reasons. The two principal reasons evoked were the wrong identification or inability to distinguish the fertile days and the lack of cooperation from the partner. The need to compensate for the loss of a child was also mentioned. Indeed, the desire to replace a child who has passed away is a known phenomenon which leads to a decreased interval between two pregnancies [29]. One striking feature during the interviews was that many of the women did not know the age or date of birth of their children and did not have a birth certificate as the child was born at home. Often, the approximate age was determined according to different seasons (e.g. rainy season, harvesting season) during which the child was born, and some mothers had difficulty to recall the seasons. On one side, the established birth intervals calculated may not be exact even if all efforts were made to get the most accurate interval. On the other side, we may wonder if the inability to respect the three

years could also be due to their ignorance of the months and years elapsing. For some women, as soon as the child starts walking, the spacing was deemed sufficient and she was ready for the next conception. A similar perception was found in a study in Côte d'Ivoire whereby when a child starts walking, he or she was judged to be strong, grown up and healthy and therefore sexual relations would resume [34]. It is therefore essential that DM more clearly emphasises that walking should not be taken as a milestone to judge that birth spacing is sufficient but rather the ability to execute an order. It could be helpful to concretely explain what a child aged between 24 and 36 months can do, by taking the example of children of this age group who are present on the camp.

There are potentially other reasons for not maintaining the recommended birth spacing, which women might have felt uncomfortable to talk about. One of these could have been family or societal pressure. In traditional societies, mothers in laws are known to exert some influence on the number of children a couple must have [93]. Another explanation for close successive birth could be due to competition between co-spouses in terms of the number of children they give to their husband [76, 94]. In Africa, women with more children tend to enjoy a higher status [94]. Also, women who do not have any co-spouse are afraid their husband will find another wife if they are not bearing enough children [76, 94]. In the bid to get further information on this phenomenon whereby women do not respect the recommended interval, a senior female trainer was interviewed, and she also mentioned about competition between co-spouses. Additionally, she explained that women who have more children can enjoy more rest while those with less children have more tasks to accomplish. According to Jobin, even if polygamy on one side contributes in increasing the number of children a woman gets, it can also help to limit the number of pregnancies as the responsibility of ensuring descendants is shared among co-spouses [76].

It was not possible within the scope of this study to assess the contribution of DM in achieving birth spacing among the participants and the main aim was to understand why some women, despite knowing its importance, were not able to attain the recommended birth spacing. Even if DM might have helped some women to space birth, this cannot be solely attributed to DM. Other factors can account for increased birth spacing such as the natural decline in fertility as the age advances or medical conditions. In addition, we cannot exclude the role played by post-partum sexual abstinence for couples who abide by it, and the contribution of lactational amenorrhea in increasing birth spacing.

6.5 Negotiation during fertile days

Undertaking negotiations with the husband during the fertile phase is an integral part in the application of DM. While supportive husbands tend to facilitate adoption of DM, opposing

husbands impedes it. Only around two fifth of the women could inform their partner directly or indirectly that they are in their fertile period. Educational session received by some husband provide no guarantee for their collaboration during the fertile days. However, a few women pointed out that negotiations became easier after men have been trained as they could better understand the importance of FP. Only 42% of the women's partners have received the educational session. It was observed that 36% of the women either did not receive the support of their husbands during the fertile days or had recourse to lies to avoid intercourse. The motives behind these lies were: previous refusal of the husband to cooperate, fear of refusal and feeling of shame to address such an issue. In this study, men were not interviewed to understand the rationale behind their behaviour. But according to some women, their refusal had diverse motivations: wish for more children, fear of wife's infidelity, belief that wife is lying and lack of education. Previous studies looked into similar patriarchal settings whereby men were against any contraceptive use [54, 93]. Wulifan et al mentioned husbands' unwillingness as being due to the fear of losing their role as house leader and exposing themselves to the risk of their wives' infidelity [54]. In addition to the risk of wives' adultery, a study in Nigeria elaborated further reasons for men's negative attitude towards contraception. These include: lack of education, traditional pro-natalistic beliefs, the pride associated with large families, the preference for male children and the need to ensure enough children survive because of the high childhood mortality prevailing [93]. One study in Malawi also found that women met resistance when attempting to discuss FP with their husband as the latter had trust issues with what they were being told [95]. In our study some women found it difficult to initiate any FP discussion with their husband. This finding corroborates with another study carried out in Tanzania whereby women portrayed men as the decision makers regarding family size and use of FP and discussing on topics related to sex is regarded as taboo [71].

It is highly recommended that DM's educational programme is intensified and reaches out to all husbands. Similar recommendations on educational programs for men have been proposed in previous studies [54, 89, 93] to promote acceptability of contraception use [89, 93], favour shared responsibility within couples and enhance spousal communication regarding uptake of contraception [89]. During these sessions, men should be encouraged to be the ones initiating FP discussions with their wives as the latter are often afraid or reluctant to do so. Mother in laws and religious leaders often have a key role in family size and contraception use [54, 71, 93]. Aransiola et al have suggested to involve mother in laws, religious leaders or other elderly people from the community to serve as promoters in FP educational programs [93]. These people are believed to be able to impact positively on men's decision to adopt FP practices [93] and could potentially be involved in DM educational reproductive sessions for both men and women. Traditional leaders of the Peuhl camps are already involved in DM as they are the ones

who granted access for the implementation of the program. However, their role should not be limited to that of gatekeeper but extended to that of promoter and trainers alongside religious leaders and other respected people from the community. Finally, it might prove useful to conduct a qualitative study involving husband to shed light on their concerns and behaviour towards the project, in an attempt to address any of their issues.

6.6 Difficulties encountered with DM

The participants were asked about the overall difficulties encountered with the training and application of the method. This question is deemed essential to get an insight of the sustainability of the project and measures to be implemented to make the training and method easier to adopt. To our dismay, this question yielded only a few adequate and reliable responses which could be attributable to a wrong understanding of the question or apprehension to talk negatively about the project. The main difficulties were to distinguish between fertile and infertile days, dealing with irregular cycles and forgetfulness. It is already known that with FABM, identifying the fertile and not fertile days may not be so obvious [43] and irregular cycles can be problematic, thereby increasing the risk of unwanted pregnancy [35]. Occurrence of pregnancies can result in high discontinuation rates as evidenced by a study based on a similar FABM [88]. Women experiencing such difficulties should be identified during training and follow-up and offered a more intense support. Husbands constitute a major hindrance in the application of the method when they refused abstinence over several consecutive days. Even if mentioned by only one participant, abstinence can also be difficult for women during fertile days because of increased libido. The PA required with NFP is relatively long and can extend to almost half of the menstrual cycle. Consequently, it is known to be too demanding or even unacceptable for many couples to abide by it and use such methods [36, 96]. In her work on contraception, Jobin also mentioned that methods requiring periodic abstinence is not readily accepted by men in Benin [76]. Family ties between the trainer and trainee was regarded as an obstacle for some and hence should be avoided to avert any uncomfortable situations which will negatively impact on the learning process.

6.7 Overall perception and benefits of DM

Even if the effectiveness of DM is yet to be investigated and established, one major positive outcome is the large adherence and global satisfaction gained with the program. The women have benefited from the project to different extents: from knowing that birth spacing is important to learning about the fertile time of the menstrual cycle and being able to decide when to conceive and finally to maintaining the recommended birth spacing. Despite being demanding, FABM are generally appreciated by women for the acquired knowledge of their body's

physiology and self-control achieved [35]. The empowerment of women as they can decide when to get pregnant or not without having recourse to any medical products or interventions, is a known benefit of NFP methods [36]. Above all, the advent of the project was viewed as a blessing by many women, who had no alternatives, and who were suffering from giving birth regularly. The enthusiasm manifested by the participants, re affirm that the unmet need for contraception within the vulnerable population need to be urgently addressed. One additional benefit which can be derived for women practising FABM is the ability to detect unusual changes such as cervical bleeding outside of the menses or infections. Thus, medical help can be sought early [97]. None of the participants address this issue during the interview. We cannot ascertain whether it is because it was a major concern or whether they cannot make out the difference, because the question was not directly asked.

6.8 Further recommendations

In an endeavour to reach the maximum number of women with an unmet need for contraception and in accordance with the principle of 'leaving no one behind' of the SDGs [98], the project DM could further broaden its objectives and aim to find alternatives for women who are not able to apply self-observation. These include women in the following situations: poor understanding of the method, unwillingness to do daily self-observation, husband's refusal to cooperate during fertile days and at-risk pregnancies which require contraception of proven efficacy. During DM training and follow-up, these women could be informed about other available contraceptive methods and redirected towards health facilities. While it is important to mention about the side effects caused by some contraception, misconceptions and unfounded rumours should also be cleared during the training sessions. Studies have found that some women are reluctant and wary about the use of some modern contraception because of misinformation [55], misconception [54] and unfounded rumours on the side effects, rather than own personal experiences [54,99]. According to Malarcher et al, it is essential to clear misconception so as to broaden the choice of contraceptive methods [45]. It will thus be important that the female trainers receive an additional training to get acquainted with the other contraceptive methods to better inform the women.

Ultimately, partnerships could be established with other local NGOs such as the ABPF (Association Béninoise pour la promotion de la famille) [100] providing FP services. For the women to have a true choice of birth control methods [101] and as a matter of human rights principles [31], it is fundamental that they are aware of all contraception options available in their regions [101]. In this way, they could potentially make an enlightened decision to tailor their couple's specific needs. For instance, older women can find methods requiring periodic

abstinence more appropriate for them as there is a decline in coital frequency with advanced age [41]. For women who deliver by caesarean section and require sufficient time interval between two births, it might be more cautious and appropriate for them to use a contraception of high efficacy.

Moreover, the use of barrier methods such as condoms, should be promoted for couples who wish to adopt NFP based on self-observation but who are unsure of their self-observation skills or who find it hard to abstain for an extended period. The combination of NFP to a barrier method is likely to provide more protection against unwanted pregnancies [35]. Also, for women who wish to switch from a hormonal contraception to DM, the use of condoms should be promoted in the transition phase until the menstrual cycle is normalised. Overall, there is a need for women to be well informed of each method and chose the best suitable method after having balanced the risk and benefit.

However, there will be numerous challenges for Peuhl women if they are redirected to access other contraceptive methods in health facilities. These include the financial cost, the language barrier and physical accessibility. Most of the Peuhl camps visited were in remote places, difficult to access and far from health facilities. A lot of investment will be needed to build health facilities which are readily accessible, employ dedicated personnel and provide methods of contraception at an affordable price. Additionally, the inequality of treatment and condescending attitude towards poor illiterate people and 'rumours' on medicalised contraception relayed by FP providers in Benin [76], can potentially deter the Peuhl women from visiting these facilities.

Absence of adequate archiving and lack of rigor in filling the participants files were identified as major shortcomings in the DM program. In order to keep track of the participants' follow-up and any events occurring, it is fundamental to properly archive the files and ensure that they are properly filled in. Properly kept files will constitute important tools for further research work and will help in avoiding recall bias. Additionally, such files contain confidential information on the participants and therefore it is an imperative that they are safeguarded in a secured place.

6.9 Limitations and strengths of this study

Despite yielding substantial information which have major implications for the future of the project, this evaluation has several limitations. The program is restricted to a specific community of Benin and therefore the results and observations generated apply only to this particular population. Since the studied population are semi- nomadic, a convenience rather than a random sampling was used. As such, the generalisability of the findings to the Peuhl community who received the training is compromised [85]. Even if the women to be interviewed were

primarily chosen because of their availability and presence on the camps, a selection bias cannot be excluded as selection and contact with the camp leaders was established by the local NGO implementing the DM program. However, data was collected from 20 different camps out of 40, offering a fairly good representativeness.

Language constituted a barrier during the interviews and an interpreter was solicited for the translation from French to Fulfulde and vice versa. Even if some information can potentially be lost or be subjected to erroneous interpretations, efforts were made to guarantee the reliability of the translated information as far as possible. These include pilot testing of the questionnaire in the local language, learning some key words in the Fulfulde dialect and the objective evaluation of the cycle whereby the participants were asked to visually represent it using stones, sticks and green leaves. The interpreter was also from the same ethnicity as the participants to ensure not only easy access to this community, but also to have a good understanding of the language.

Analysis was further compromised by paucity of data resulting from: absence of appropriate archiving of the participants' file, lack of rigor and monitoring for data entry into the files, inadequate follow-up over at least 4 menstrual cycles for all participants, uneven time elapsed between the training and the interviews and absence of information from the participants regarding ages as a result of illiteracy or recalling difficulties.

Nevertheless, the study has some important strengths. To our knowledge, this work is among the very few which evaluated a new educational approach to learning self-observation of cervical mucus secretion among a highly illiterate population living in rural areas, such as the Peuhl community studied. Since the study has both a quantitative and qualitative component, a considerable amount of information was collected which enabled us to understand the reasons for the knowledge-practice gap, the different barriers and difficulties and helped in issuing some recommendations.

6.10 Further research work

The overall concept of DM which involves dissemination of fundamental knowledge and skills for regulating fertility is very much appreciated by the Peuhl women. However, its effectiveness as a natural method of contraception and consequently as a means to space birth, is yet to be determined. A longitudinal prospective study will have to be conducted. The aim of the study would be to determine the effectiveness of the method in case of perfect and imperfect use and eventually work out its Pearl index. For the purpose of the study, women of reproductive age with the following criteria should be enrolled: proven fertility, not using other contraceptives, devoid of any pregnancy or birth related complications, good self-observation skills, collaboration of the husband, no intention of pregnancies throughout the duration of the study

and the willingness to do the self-observation continuously and be followed throughout the study-time. Additionally, only women who cannot use or do not wish to use other contraceptive methods of already proven efficacy, should be enrolled to avoid any ethical issues.

7. CONCLUSIONS

The implementation of DM, a NFP program using a simple, innovative and culturally accepted approach, has been transformational for many Peuhl women in terms of knowledge and skills acquired. Through the acquisition of knowledge and skills, they have been empowered to better manage their fertility. They can decide on the timing of a pregnancy and decrease the suffering associated with close pregnancies, without the barriers of cost, fear of side effects and stigma associated with other methods such as hormonal contraception. However, several issues need to be addressed to cater for specific problems and improve the outcomes of DM. All trainees have not been able to master the knowledge on the fertile days and skills of cervical mucus self-observation which resulted in unintended pregnancies and short birth intervals. Therefore, recommendations for future trainings are: recall sessions to reduce forgetfulness, closer monitoring and extension of follow-up for participants with difficulties, ensure that women can observe their menstrual cycles and fertility signs during follow-up and coincide monthly home visits when women are most in need of help. Lack of support from the husbands, especially those who did not receive the training session, and feeling of shame to talk about the fertile days made it hard for women to correctly follow the method. Hence it is advised that all husbands are invited to training sessions, where they will also be encouraged to initiate discussion on the topic with their wife. Having respected elderly people from the community advising the husbands could be more effective and a study about men's attitude towards DM could also help to improve the situation. Additionally, female trainers should be instructed on the different types of contraception and ensure that misconceptions regarding other contraceptive methods are clarified. Condoms could be promoted for situations whereby there is uncertainty about fertile days, transition from hormonal contraception to DM and difficulty to abstain from sexual intercourse. Alternatively, women who cannot apply DM should be informed and advised about other methods and be directed towards services offering family planning. It is fundamental that participants' files are properly archived and filled. As far as possible, it would be desirable that there is adherence to the recommendations issued to decrease the knowledge-practice gap, i.e. to ensure that the women are able to put into practice what they are being taught and thus ensure the maximum expected benefits from the project. Finally, a research work to assess the effectiveness of DM is required. Despite its potential, implementing a natural FP program such as DM in religious and culturally conservative communities is still challenging due to the complex socio-cultural context. It should therefore take into account different factors and actors to tackle

the unmet need for FP which will eventually help in achieving the SDGs for the Peuhl community.

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Appendix 1

Classification, description, mechanism of action and effectiveness of different contraception

Type of method	Method	Brief description/ Mechanism of action	Effectiveness to prevent pregnancy	
			Correct use	Typical use
Modern	Oral contraceptive pills (OCP)	Comprised Combined Oral Contraceptives (COC) containing two hormones and Progesterone only pills (POP) Act by preventing ovulation	99%	90-97%
Modern	Progesterone implants	Small rods containing progesterone hormone are inserted under the skin Act by preventing ovulation	>99%	
Modern	Injectables	Either progesterone only or combined injectables which are injected monthly in the muscles Act by preventing ovulation	>99%	97%
Modern	Intrauterine devices (IUD)	Copper IUD: plastic device containing copper is inserted in the uterine cavity. The copper damages the sperm. Ovulation is prevented Levonorgestrel IUD: plastic device placed in uterus releases levonorgestrel daily. It thickens the cervical mucus to prevent sperm and eggs from meeting	>99%	
Modern	Male condom	Acts as a barrier to prevent the sperm from meeting the egg	98%	85%
Modern	Female condom	Acts as a barrier to prevent the sperm from meeting the egg	90%	79%
Modern	Male sterilisation (vasectomy)	A contraception which permanently blocks the tube carrying sperm from the testicles	>99%	

Modern	Female sterilisation	A permanent contraception in which the fallopian tubes are cut or blocked such that eggs cannot reach the sperm	>99%	
Modern	Lactational amenorrhea method	A temporary contraception which prevents release of eggs from the ovaries when there is exclusive breastfeeding day and night in an infant of less than 6 months old	99%	98%
Modern	Standard days method	A natural contraception whereby fertile periods are tracked through cycle beads or other aids and unprotected sex is avoided on those days	95%	88%
Modern	Basal Body Temperature (BBT)	Natural contraception involving daily temperature recording. Persistent elevated temperature for three consecutive days by at least 0.2 ^o C indicates ovulation, Intercourse is avoided during fertile days	99%	75%
Modern	TwoDay method	Natural contraception where the presence of cervical mucus is observed to determine fertile days	96%	86%
Modern	Sympto-thermal method	A natural contraception which involves observation of changes in cervical mucus, body temperature and cervix position and consistency to identify the fertile days and avoid intercourse	98%	98%
Traditional	Calendar/rhythm method	Intercourse is avoided on fertile days which are estimated through calculations following observation of the menstrual cycle over the past 6 months	91%	75%
Traditional	Withdrawal	During intercourse, the male partner ejaculates outside the vagina	96%	73%

Adapted from the WHO (2018)

Appendix 2



Figure (a) Peulh camp



Figure (b): Peulh camp



Figure (c): Group training given by female trainer



Figure (d): Data collection through interview in the presence of the female interpreter