

Maternal Morbidity: Inventory Feasibility and Acceptability of Measurement Tools at the Level of Marrakech-morocco

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MATERNAL MORBIDITY: Inventory Feasibility and Acceptability of measurement tools at the level of Marrakech-Morocco

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Abstract: The measurement of less severe maternal morbidity represents many challenges for women during pregnancy and postpartum, and for the organization of health services. In order to explore the different aspects of the feasibility and acceptability of implementing morbidity measurement tools at the primary health care network level, a qualitative and quantitative mixed descriptive study was conducted at the level of the primary health care network in the prefecture of Marrakech. The objectives are: (1) to test the tools for measuring maternal morbidity less severe proposed by the WHO and describe the state of play of this morbidity, (2) to study the feasibility and acceptability of integrating these tools into the Pregnancy and Childbirth Surveillance Program in Marrakech, and (3) to validate and propose a new tool adapted to our Moroccan context. The data were collected by questionnaires administered face-to-face for 257 women in antenatal care and 253 women in postpartum care recruited at the level of ten health centers. Most of the women who participated in the study (55.95% antenatal and 52.17% postpartum care) were not in good health. Of these women, 35.79% had direct complications and 33.85% indirect (medical) complications. In terms of feasibility, the results suggest that the implementation of the tools presents challenges in terms of time, resources and coordination. Regarding the acceptability of the WMOs, the women surveyed perceive it as a useful information tool that promotes communication with health professionals and makes it possible to assess their state of health and ensure their holistic care.

Key words: Maternal morbidity less severe; measurement tools; antenatal care; postpartum care; maternal and child health.

BACKGROUND

Maternal health is essential for sustainable development and is a serious problem in the world. The magnitude of this problem places maternal well-being and survival at the center of the concerns of all countries [2]. Each year, around 210 million women become pregnant and around 140 million newborns are born meaning that maternal health is not a marginal issue [3]. In 2015, the WHO estimated that 303,000 women died from complications related to pregnancy or childbirth, most of these deaths were preventable.

In view of this alarming situation, there is greater awareness globally of the plight of women who have complications related to pregnancy or pregnancy.

childbirth and who may continue to have long-term problems [4]. Fortunately, women's health and their ability to perform economic and social functions is a central concept of the Sustainable Development Goals (SDGs). Thus, the "Survive, Thrive and Transform" program of the Global Strategy for Women's, Children's and Adolescents' Health (2016-2030) is moving away from the goal of reducing maternal and infant mortality, emphasizing the need to ensure good health so that women, adolescents and children can fully play their role in future development. According to Lale Say et al [1], maternal mortality is only part of the overall burden of poor maternal health, as it excludes maternal morbidity. The burden of maternal morbidity is not yet known [5].

WHO estimates that for every recorded maternal death, 20 to 30 women suffer from morbidity. Of these cases, a quarter could suffer serious and permanent sequelae. Maternal morbidity, represented by the health problems borne by women during pregnancy, childbirth and postpartum, contribute to this burden [6]. According to these same authors, these sequelae can affect women on a physical, mental and sexual health level, on their ability to function (cognition, mobility, participation in society), their body image and their socio-economic status in low- and middle-income countries, especially among the poorest women. Currently, there is an estimated 27 million episodes of direct complications that occur each year [1].

Despite this large number of complications, there is little comprehensive research on maternal morbidity. The spectrum of conditions is so wide that studies often focus on the most serious and fatal causes of obstetric morbidity and / or on a single disease [2].

In 1999, Fortney and Smith [7] noted that the literature is full of hospital studies, case studies describing acute and chronic morbidities associated with pregnancy and childbirth. What remains relatively unknown is the prevalence of specific or general morbidity in the population as a whole. These remarks remain largely valid today, few data on morbidity have changed, despite the increase in data on maternal health [8,9].

In Morocco, the attention paid to maternal health in recent years has resulted in notable progress in improving maternal and newborn health. Considerable progress has been made in reducing maternal and neonatal mortality. Indeed, according to the latest national survey carried out by the Ministry of Health in 2017 and 2018, the maternal mortality rate is estimated at 72.6 maternal deaths per 100,000 live births with a decline of nearly 78% compared to the ENSPF from 1992. The neonatal mortality rate fell by 38% between 2011 and 2018, from 21.7 to 13.56 per 1000 NV. The improvement of these health care indicators, as evidenced by the results of the survey, shows that Morocco is on track to achieve the SDGs. While current attention is paid to survival during pregnancy and childbirth, and to ensuring the full development of women throughout their lives, much remains to be done to make pregnancy a positive experience. In order to be in line with the objective 3 of sustainable development and the global strategy, Morocco is called upon to put in place integrated health services capable of maximizing the health, well-being and potential of women throughout of their life. In building the new national maternal and newborn health strategy to end preventable deaths, improving the measurement of maternal health will be the key to success [10].

Building on WHO's success in defining and measuring severe maternal morbidity (Near miss), the current focus is now on standardizing and measuring less severe maternal morbidity. Indeed, in 2012, the WHO [11] launched a work program on the development of a common definition and identification criteria for very severe cases of maternal morbidity (Near-miss) allowing its routine measurement and monitoring, in particular as a tool for assessing the quality of care for women with severe morbidity. However, the definition and criteria did not exist for less severe cases along the continuum of maternal health. This working group agreed on the following definition of maternal morbidity "any health condition which contributes to and / or complicates

pregnancy and childbirth and which has a negative impact on the well-being and / or functioning of the mother. wife".

This work led to a conceptual framework, titled Maternal Morbidity Measurement Framework (MMM) [12].

In order to respond to the need to measure and cope with the magnitude of this burden, a tool for measuring this maternal morbidity (OMM) has been developed. The particularity of this tool lies in the fact that it is sensitive to regional specificities and adaptable to any category of communities. It measures less severe maternal morbidity in prenatal and postnatal clinical populations. This tool has already been tested in three resource-limited countries namely Jamaica, Kenya, and Malawi [13]. No test has been conducted so far in Arab countries or North Africa. Therefore, the adoption of tools for measuring maternal morbidity in our Moroccan context requires a study to determine the feasibility and acceptability of setting up a simple and appropriate tool.

In this sense, the present study is proposed to describe the burden of less serious maternal morbidity at the level of the city of Marrakech, and to test the data collection tool proposed by the WHO in order to arrive at a standard tool, adapted to our context. The data collected through this study will provide better information on the extent of maternal morbidity. In order to fill the current gaps in the management of maternal and newborn health, this study will enable researchers, decision-makers and health professionals to be equipped to plan interventions and resources, helping meet women's reproductive health needs. This study will test the feasibility and acceptability of using a tool to measure the consequences of pregnancy and childbirth on a woman's state of health. Once validated in our context, this OMM will provide evidence and will constitute a routine tool for the measurement of maternal morbidity.

FRAMEWORK

This conceptual framework, developed by the WHO Maternal Morbidity Working Group, highlights the general ramifications of maternal morbidity and outlines the types of actions needed to capture as it relates to women, service providers and decision-makers (Figure N° 1). This new conceptual framework presents a new definition of Maternal Morbidity and its measurement. It takes into account and applies the principles of the WHO International Classification of Functioning, Disability and Health (ICF) [14]. The reproductive health cycle is placed at the center of the framework, connecting the various stages of pregnancy, postpartum labor and delivery, and from the pre-reproductive phase to the post-reproductive phase of the life cycle of a woman. Maternal morbidity can occur in any woman during pregnancy, childbirth, or postpartum. The present study concerns the measurement of less severe maternal morbidity during both the prenatal and postnatal periods.

The immediate results of maternal complications are a constant sign of full recovery, less severe maternal morbidity in the short or long term, life-threatening complications (near miss), or maternal death. With the exception of maternal death, each of these complications can have a negative impact on the functioning and well-being of women. The present study is concerned with direct

and indirect maternal complications leading to less severe maternal morbidity in the short or long term. At the top of the framework, external factors are represented and include laws and policies, health systems and quality of care, women's pre-existing socio-economic status as well as their state of health. The morbidity measurement tools that are tested in this study.

THE OBJECTIVES OF THIS STUDY ARE:

- Determine the feasibility, acceptability of implementing a simplified and modified tool to measure maternal morbidity.
- Identify the recommendations regarding the integration of morbidity measurement tools in our Moroccan context.

METHOD

The present study took place at the level of the prefecture of Marrakech. It is part of the Marrakech-Safi Region. This is a qualitative and quantitative study which was carried out following the test of tools for measuring maternal morbidity on 540 women in the pre and postnatal period. Thirty interviews were carried out with health professionals: 27% for general practitioners, 66% of midwives, and 7% of nurses. The majority, or 76%, were female. The average age was 43 years and 60% of the participants have a seniority between 10 and 20 years. This study concerned:

- Health professionals involved in the care of women during pregnancy, childbirth and postpartum at the primary health care network level.
- Midwife surveyors who participated in the administration of the maternal morbidity measurement tools (OMMM).
- Those responsible at the central (Population Directorate), regional (Regional Health Director, public health service manager, mother and child health program manager), provincial level with responsible at the level of the SRES (Head of the SRES, and animator of the pregnant woman care program), and at the local level (Midwives and nurses responsible for the Pregnant woman care program).

RESULTS

1- Feasibility of implementing tools to measure Maternal Morbidity

After having tested the morbidity measurement tools with 510 women (257 in prenatal and 253 in postnatal consultation), and to describe maternal morbidity at the level of the prefecture of Marrakech as part of another study, the present study consists of collect qualitative data in order to study the feasibility and acceptability of integrating these measurement tools into prenatal and postnatal consultation.

In this sense, individual interviews and focus groups guided by the concepts and variables of the study were carried out with the interviewers. These results were consolidated by the data of the interviews with health professionals involved in the care for of prenatal and postnatal women at the level of the primary health care network, as well as resource persons at the central, regional and provincial level.

The period of appropriation of the MM measurement tools required a total of three meetings with each of the interviewers. Questions were reformulated and training sessions were scheduled to facilitate completion and simplify the use of the tools. Elements of information were discussed with other health professionals around the objective of better meeting the needs of parturients. In addition, the integration into the prenatal and postnatal consultation and the coordination of other activities as well as the referral of women if necessary, have been clarified.

Following the appropriation period, the procedure for administering the measurement tools was put in place. The administration time varied between 20 and 45 minutes per participant. The duration of this new task was not commented on by the interviewers reluctantly: "... We have no objection to the duration of the administration of the tool which can sometimes last up to 45min per participant, especially if the latter presents a complication, we are used to proceeding in the manner" (Interviewer 6). Nevertheless, the number of women to be taken care of and the number of questions provided for by these tools constituted an additional, less appreciated task: "... The problem arises especially when we receive several women to whom we must administer the same tool, it is even worse when the woman comes to PoNC with her child, it becomes difficult to devote enough time to each woman, in addition to the questions provided for by the tool, which are very numerous..." (Interviewer 4). The interviewers were also embarrassed by the multitude of information: "... we are obliged to repeat the information several times in the different tools" (Interviewer 4). As they do not have care for at-risk pregnancies, the referral of women who present problems sometimes required considerable coordination efforts on the part of the interviewers: "... The problem does not arise in the administration of the tool. As much as it arises in quality care for women with complications, Also, before the introduction of these tools, no reference was provided for the cases of problems linked to sexuality, conjugal violence and mental disorders: "... There are many difficulties in taking charge of women presenting complications related to sexuality domestic violence and mental disorders, we were not trained to provide information on these aspects either, nor to take care of them..." (Investigator, 2). Another difficulty, considered temporary by the investigators, concerns the unforeseen changes in the duration of the consultation which sometimes disturbs the women: As there are changes in the duration of PNC and PoNC, women are sometimes embarrassed especially when they are accompanied by their husband, they are not used to staying long especially for the PoNC. In short, filling in the morbidity measurement tools requires additional time to complete, alongside the other information materials already established by the pregnancy and childbirth monitoring program (PWCP), and especially to coordinate and animate a meeting that requires more time. This additional time and effort, in part related to an organization not prepared for the integration of new aspects would be assessed as an obstacle to the integration of these tools into current practice.

However, the interviewers declared that they usually take time

with certain women, especially with those who suffer from certain problems related to health or sometimes even to married life, but without notifying this information, nor having a tool to be able to assess state of health and decide whether or not it should be referred to the doctor at the center or to another level of care: "..... Even outside of this study, the PNC sometimes takes a long time, especially in case of complications, we discuss everything with the woman and she can tell us about her relationship with her husband and her personal problems, but this does not concern all women and we do not have any support to notify certain information not appearing on the pregnancy and post-partum surveillance card "(Interviewer 2).

In addition, the investigators as well as the SF interviewed support the fact that these tools will not require a lot of time since they do not concern all the women who present for the PNC or the PoNC, but just those whose pregnancy is > 28 WA and deliveries > 6 weeks after delivery. They add that this problem of time does not limit the use of morbidity measurement tools, it can be linked to the organizational problem, especially for women who will require specialized care: "..... Me, I do not think that the question of time can cause problems afterwards, I think it is just a question of organization "(MW, 2)," The number of women with more than 28 WA and > 6 weeks postpartum is not always high, in addition in our center,

2- Acceptability of MM measurement tools

For the interviewers:

Despite the feasibility problems posed, the investigators support the added value of these tools to ensure an integrated and quality of care for women during pregnancy and after childbirth. During the interviews, the interviewers mentioned that the participants felt reassured to be able to ask their questions and share their concerns: "The women were very comfortable, they react to the questions even if sometimes it is more intimate, I just came from. learn that women have multiple needs "(interviewer 6). The investigators underline that the discussion of the content of the tools makes it possible to clarify several elements of surveillance and monitoring (general condition, symptoms, mental health, sexuality, health resources and behaviors, etc.). For the interviewers, the use of these tools is acceptable in itself, even desirable. However, the current organizational conditions must be adapted " I really appreciated this tool, I learned a lot of things by using it, aspects that we did not know before " (Interviewers 2).

To counter the feasibility barrier of integrating these tools into their practice, the investigators suggest possible solutions. The time allocated to the appropriation of the tools is evaluated as necessary: "... I took a lot of time to master the tools, it is so long that it takes a lot of time" (Interviewer 3). Training should therefore be provided during the initiation period. In addition, the interviewers suggest that each professional involved in the trajectory or the continuum of care should be informed about the use of the tools: "... Training is essential before the integration of these tools, and this training must concern all stakeholders,

we need to speak the same language ..."(Interviewer 5). The acceptability of this procedure with the actors involved would however need to be documented by the interdisciplinary team. The investigators also suggest that medical data could be added in the same tool. According to them, morbidity measurement tools would be both useful for the patient in understanding her medical situation, and for the health system to have complete and relevant data allowing adequate decisions to be made: " These are tools that will improve care for women, of course, but will also be used by the health system ... "(Investigator 4). Finally, these tools should be integrated into the current information system. Also, the referral of patients requiring specialized care, should also be systematically integrated into the trajectory of patients to facilitate coordination: "... It is preferable that these tools be integrated into the current information system, the best would be to complete the pink sheet concerning the monitoring of the patient. Pregnancy and postpartum, elements already exist, just add those that do not exist such as conjugal violence, sexuality and mental health" (Investigator 1). In short, as with feasibility, organizational constraints compromise the acceptability of these tools according to the interviewers. the best would be to complete the pink card concerning the monitoring of pregnancy and postpartum, elements already exist, it suffices to add those which do not exist such as domestic violence, sexuality and mental health"(Investigator 1). In short, as with feasibility, organizational constraints compromise the acceptability of these tools according to the interviewers. the best would be to complete the pink card concerning the monitoring of pregnancy and postpartum, elements already exist, it suffices to add those which do not exist such as domestic violence, sexuality and mental health ... "(Investigator 1). In short, as with feasibility, organizational constraints compromise the acceptability of these tools according to the interviewers.

For the women interviewed:

Consistently with the investigators, the patients interviewed appreciated being able to discuss widely their state of health and for the first time certain intimate aspects. They report that the new prenatal or postnatal consultation was useful for receiving relevant information about pregnancy or the postnatal period, their state of health, symptoms to watch out for and pathologies related to pregnancy and postnatal care. partum, as well as favorable health behaviors. They also report the relevance of this new method to better understand their situation: "..... I had time to ask all my questions ..." (Participant 4 PoNC), " I have had all the information I needed ... "(Participant 54 PNC). Some participants mentioned that some of the questions asked by the SF had helped to better understand the extent of certain pregnancy-related illnesses that they did not attach great importance to: "... For me, being nervous all the time, being anxious and moving away from everyone, even my children and the people I love, is normal for a pregnant woman "(Participant 37 PNC). For the women who have given birth interviewed, they stated that they never had a postpartum examination, and they did not have the opportunity to discuss the progress of the birth and their state

of health. in a fairly detailed and precise manner. They appreciated the use of this new tool: "... Even if the nurse explained to me that I am going to participate in a study, I was not expecting this type of intimate question, I am not disturbed on the contrary I really enjoyed it, because it is for the first time that I am discussing this question of sexuality with someone "

(Participant 113 PNC). However, another participant mentioned that the consultation took her longer, especially since she is accompanied by her husband: "... I still wanted to stay and I needed more information but I was disturbed by calls from my husband who was waiting, usually the consultation does not take enough time...". The women interviewed find the new consultation very acceptable and rich in information. .."(Participant 113 PNC). However, another participant mentioned that the consultation took her longer, especially since she is accompanied by her husband: "... I still wanted to stay and I needed more information but I was disturbed by calls from my husband who was waiting, usually the consultation does not take enough time...". The women interviewed find the new consultation very acceptable and rich in information..." (Participant 113 PNC). However, another participant mentioned that the consultation took her longer, especially since she is accompanied by her husband: "... I still wanted to stay and I needed more information but I was disturbed by calls from my husband who was waiting, usually the consultation does not take enough time ...".

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The first concerns relevance for pregnant and postpartum women. The three of The doctors interviewed maintain that the implementation of morbidity measurement tools is relevant: "It is obvious that these tools are relevant, they will allow us to measure an aspect that has long been neglected" (GD, 1). They added that these tools and especially the other aspects that were not included in the information system could promote monitoring and lead to better overall care for women as well as a feeling of reassurance in order to prevent the woman feels "abandoned" for certain aspects which are not currently taken into consideration during prenatal and postnatal consultations. "It would also be relevant to integrate these tools into the current information system" (MG 3).

The second concerns the usefulness of morbidity measurement tools for general practitioners. For all the doctors interviewed, the OMM would be useful to them by allowing a better knowledge of the state of health of the women and the medical follow-up. Training would however be desirable. Also an adaptation to the context, an integration into the current information system and the establishment of care networks are required: "The establishment of these OMMs is dependent on the involvement of all stakeholders during the continuum of care" (GD 2). Clarifications would also be desired for patients

concerning the complexity of the follow-up when several comorbidities are present and the importance of shared follow-up, carried out jointly with the specialized team during pregnancy and post-partum.

The third theme addresses the impact of OMMs on the continuity of care. Respondents mention that OMMs could facilitate continuity of care and relational continuity between patient and health professionals, they believe that these tools could thus better meet the information and emotional needs of women: "We need it so much. of this kind of study and this kind of tools which will act on the continuity of care "(GD 3). In addition, all GMs report that the content is well detailed, clear, precise and complete, except that it is a bit long. They add that OMM can be adopted in our context and require readjustments and suggest deleting the chapter on female genital mutilation. Only one participant pointed out that the integration of these tools could help to increase the workload. In short, all the actors perceive the OMM as acceptable, even desirable.

3- Validation and presentation of final tools The integration of all the recommendations formulated by the various actors during the interviews and the literature allowed the development of a first draft of the tools for measuring maternal morbidity adapted to our context. The draft has gone through a validation process. A participatory and iterative process was carried out in two stages:

- a) Presentation of the measurement tools for validation to the interviewers and other actors (midwives, managers of the Pregnant woman care) according to a consensual approach for each of the items proposed in the tools,
- b) Meetings with midwives and managers of the Pregnant woman care for clarification.

This validation process required two group meetings, and three individual meetings representing a total of 11 hours to allow the development of a final version of the OMM integrated into the pregnancy and childbirth monitoring form. First, a focused discussion group lasting four hours was carried out with participants from the group of health professionals, namely midwives (n = 7), a nurse and a medical specialist. Each OMM item was presented by PowerPoint, in order to validate the content of these tools and the proposed format. Then, three individual 60-minute meetings were scheduled with three SFs for the technical development of the tool.

Thus, the remarks raised are as follows:

- **Notes on presentation, organization of tools and questions**
- Both tools for PNC and PoNC should be summarized. It is recommended, according to the focus group carried out with the interviewers and also by the managers and the PS interviewed, to adapt the content of these tools and to integrate them into the sheet already mentioned. The same recommendation was proposed by officials at the central level.
- The illustrations used in the clinical examination section are important but the same information can be reported in a simpler way.

- The presentation in tabular form was found to be complicated, following the same structure of the pink card is desirable.
- The number of questions was considered too important, it is recommended to add just the questions which do not appear on the information system in particular the pink sheet.
- The organization of the tools by topic was suggested as well as the numbering of the questions in order to facilitate the use of the data.

□ Notes on the content of the questionnaire

In order to ensure its use, participants suggest that the content be shorter. The use of measurement scales is desirable only for measuring mental health. Other supports can be used to supplement the information if necessary, or to assess the state of health of the woman or the type of complications she presents.

- Items to add: The new chapters concerning mental health, conjugal violence, sexuality, assessment of the state of health and risk factors and environment must be summarized and added to the information on the sheet.

- Inappropriate items or which do not adapt to our context: The part concerning genital mutilation should be deleted according to the investigators. The same proposition was raised during the interview with managers as well as healthcare providers. On the basis of the guide concerning biological analyzes for pregnant women, drawn up in 2013 by the Moroccan Ministry of Health, it was agreed to reduce the number of tests offered by the measurement tool and to keep only those proposed. by this guide.

The final morbidity measurement tool is thus validated by taking into account the various comments and suggestions. It is proposed to be included in the pregnancy and postpartum monitoring sheet. Indeed, most of the information already existed on this sheet, only four chapters relating to sexuality, risk factors, violence and mental health will be added.

DISCUSSION

The study of the feasibility and acceptability of tools for measuring maternal morbidity in a Moroccan context, more particularly at the level of the prefecture of Marrakech, revealed that the tools are complete. content of the tools, I find them complete and well organized ...”(MD 6), with a simple, understandable language, and the information is relevant to describe the state of health of the woman. The investigators when they read and tested the tools, they said they contain more information compared to the current information system. Nevertheless, they raised that the place given to the newborn is very limited “... I wonder why these tools give less importance to the newborn? few questions are given to her ...” (Interviewer 3). The answer to this question can be found among the principles of the conceptual framework on the measurement of maternal morbidity [12] on which we relied in the framework of this study. Indeed, this conceptual framework emphasizes the importance of using a woman-centered

approach. Because indirectly the influence on the newborn is proven. Indeed, the health problems that prevent women from carrying out their normal activities can have a direct or indirect, significant impact on their life and that of the fetus, newborn baby and even other members of their family. use a woman-centered approach. Because indirectly the influence on the newborn is proven. Indeed, the health problems that prevent women from carrying out their normal activities can have a direct or indirect, significant impact on their life and that of the fetus, newborn baby and even other members of their family. use a woman-centered approach. Because indirectly the influence on the newborn is proven. Indeed, the health problems that prevent women from carrying out their normal activities can have a direct or indirect, significant impact on their life and that of the fetus, newborn baby and even other members of their family.

According to those in charge at the central level, the integration of these tools in the pregnant woman care program is feasible at their level “...At our level, there is no disadvantage to integrate these tools, on the contrary, we have already expressed this need and we are just waiting for the right moment.

What remains to be studied is the feasibility at the operational level and the adherence of health professionals, it is they who will put it in place in a concrete way, this feasibility study will greatly facilitate our task...”. The same result was raised by the WHO pilot study [10] which showed that the interviewers agreed that these problems raised by the tools were important and that they had to be taken into account in future clinical interactions with women. During discussions with the interviewers to determine the feasibility and challenges of implementing these tools, it appeared that the women were open to difficult topics (violence, mental health and sexuality).

Nonetheless, the interviewers raised that they did not feel prepared to engage in some discussions, or were concerned that the information they had was insufficient to properly inform women who had problems or complications.

With regard to the appropriate time for the administration of the tools, the investigators find that the time proposed by the WHO during pregnancy is adequate (beyond 28 weeks). Nevertheless, it is recommended to schedule other consultations beyond 6 weeks after childbirth to measure and diagnose other morbidities and complications. This recommendation corroborates that proposed by Assarag (2015) [33] in his study which focused on postpartum maternal morbidity in Morocco.

STRENGTHS OF THE STUDY

Our study is the first in North Africa to study the feasibility and acceptability of integrating the tools for measuring less severe maternal morbidity proposed by the WHO [1] in the management of women during pregnancy and after childbirth. It is the third in Morocco to deal with the subject of maternal morbidity and the first to deal with the measurement of less severe maternal morbidity in Morocco. We have diversified the data collection tools and at the same time we proceeded by triangulation in the analysis of the results to study the feasibility and acceptability of the tools tested to have more visibility and understanding in order

to propose and validate the tools of measure adapted to our context.

CONCLUSION

As the international community works to reduce maternal mortality, there is an urgent need to define and measure maternal morbidity. Beyond 2015, it is an investment that no one can ignore. All countries must now go beyond survival, to establish integrated health services capable of maximizing the health, well-being and potential of women throughout their lives [26]. It reflects the full value of women as members of families, communities, societies and economies. This study supports the added value of tools for measuring maternal morbidity to meet information needs, and for comprehensive and integrated care that is part of the continuum of care. Although the women interviewed report a high level of satisfaction with MM tools, and despite the growing support for these tools from healthcare professionals, managers and international partners, its adoption can take time. The reasons include the limited resources available, the lack of time to complete the tools as offered by WHO and the buy-in of all health professionals. In the light of the results of the present study, we have proposed avenues for improvement to key players, which first consist of adopting a broader approach to maternal health that responds to contemporary challenges and the most frequent complications.

This is about going beyond traditional models of maternity care where women are in contact with health systems only during pregnancy up to 6 weeks after childbirth. Maternal health service delivery can have a greater reach over a woman's life cycle, including pre-marital care, longer-term health care, and better integration with existing health programs and services. Maternal health and communicable and non-communicable disease control programs should be synergistic. The recommendations proposed as well as the simplified form to be included in the pregnancy and postpartum surveillance form already in place at the level of ESSP, will help to have factual and comprehensive data on maternal morbidity and therefore facilitate decision making. Investing in maternal morbidity will not only prevent maternal and newborn deaths, but also contribute to the well-being of the mother and her newborn and thus achieve SDG 3 by 2030.

ABBREVIATIONS

PoNC (Postnatal consultation); PNC (Prenatal consultation); GD (General Doctor); PHCN (Primary health care Network); PWCP (Pregnant woman care program); MD (Midwife); OMM (Measuring maternal morbidity, WHO (World Health Organization)).

DECLARATIONS

Ethics approval and consent to participate

The research protocol was approved by the Ethics Committee for Biomedical Research under the Faculty of Medicine and Pharmacy of Rabat. All study participants signed a consent form before the start of the study.

Consent for publication

You will find in attachments the consents for the publication of

the two authors

Availability of data and material

All the database and material used in this study are available. We confirm that all methods were performed in accordance with the relevant guidelines and regulations.

If someone wants to request the data from this study, he can contact: hababahanane@gmail.com

Competing interests

All authors declare no competing interest.

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Authors' contributions

Hanane Hababa searched the literature, extracted data, synthesized data and developed the first draft of the manuscript; Bouchra Assarag carefully checked the manuscript; To provided essential methodological advice. The authors have read and approved the final manuscript.

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REFERENCES

- [1] Say L, Barreix M, Chou D, et al. Maternal morbidity measurement tool pilot: Study protocol. *Reprod Health*. 2016; 13: 69.
- [2] Graham W, Woodd S, Byass P, et al. Diversity and divergence: the dynamic burden of poor maternal health. (2016). *Lancet*; 388: 2164–75
- [3] Singh S, Darroch JE, Ashford LS. *Adding It Up: The Costs and Benefits of Investing in Sexual and Reproductive Health 2014*. New York: Gumacher Institute; 2017.
- [4] Knaul F, Langer A, Atun R, Rodin D, Frenk J, Bonita R. Rethinking maternal health. *Lancet Glob Health*. 2016; 4: e227 – e228.
- [5] Chou D, Tunçalp Ö, Firoz T, et al. Constructing maternal morbidity - towards a standard tool to measure and monitor maternal health beyond mortality. (2016). *BMC Pregnancy Childbirth*; 4:45 PM
- [6] Kazuyo; Metal. *Consequences of maternal morbidity on health-related functioning: a systematic scoping review*. (2017).
- [7] Fortney J, Smith J. Measuring maternal morbidity. In: Berer M, Ravindran TKS, eds. *Safe Motherhood Initiatives: Critical Issues*. London: Reproductive Health Matters; 1999: 43–50.
- [8] Hardee K, Gay J, Blanc A. Maternal morbidity: Neglected dimension of safe motherhood in the developing world. *Glob Public Health*. 2012; 7: 603–617.
- [9] Haddad SM, Ceca JG, Parpinelli MA, et al. From planning to practice: Building the national network for the surveillance of severe maternal morbidity. *BMC Public Health*. 2011; 11: 283.
- [10] Barreix M, Barbour K, McCaw-Binns A, et al. Standardizing the measurement of maternal morbidity: Pilot study results. *Int J Gynecol Obstet*. 2018; 141 (Suppl.1): 10–19.
- [11] Vanderkruik RC, Tunçalp O, Chou D, Say L. Framing maternal morbidity: WHO scoping exercise. *BMC Pregnancy*

Childbirth. 2013; 13: 213.

[12] Filippi V, Chou D, Barreix M, Say L. A new conceptual framework for maternal morbidity. *Int J Gynecol Obstet.* 2018; 141 (Suppl. 1): 4–9.

[13] Barbour, KD et al. Developing maternal morbidity identification algorithms: results from the pilot study of the WHO Maternal Morbidity Measurement Tool. (2017).

[14] World Health Organization. WHO Disability Assessment Schedule 2.0 (WHODAS 2.0). Geneva: WHO; 2017.

[15] Browne JL, Vissers KM, Antwi E, et al. Perinatal outcomes after hypertensive disorders in pregnancy in a low resource setting. *Trop Med Int Health.* 2015; 20: 1778–1786.

[16] Singh JK, Evans-Lacko S, Acharya D, Kadel R, Gautam S. Intimate partner violence during pregnancy and use of antenatal care among rural women in southern Terai of Nepal. *Women Birth.* 2017; pii: S1871–5192 (16) 30143–3. [Epub ahead of print].

[17] Bailey BA. Partner violence during pregnancy: Prevalence, effects, screening, and management. *Int J Womens Health.* 2010; 2: 183–197.

[18] El-Hosary EA, Amany A, Emaghawry Eldeeb M. Effect of Domestic Violence on Pregnancy Outcomes among Rural and Urban Women. 2017; *IOSR Journal of Nursing and Health Science* Volume 6, Issue 3 Ver. II (May. - June. 2017), PP 35-42

[19] Palladino CL, Singh V, Campbell J, Flynn H, Gold K. Homicide and suicide during the perinatal period: Findings from the National Violent Death Reporting System. *Obstet Gynecol.* 2011; 118: 1056–1063.

[20] Villas Boas Teixeira S, Aparecida Vasconcelos Moura M, Rangel da Silva L, Beatrix Azevedo Queiroz A, Ventura de Souza K, Albuquerque Netto L. Intimate partner violence against pregnant women: the environment according to Levine's nursing theory. 2015 *Journal of School of Nursing, USP.*

[21] Tachibana Y, Koizumi T, Takehara K, et al. Antenatal risk factors of postpartum depression at 20 weeks gestation in a Japanese sample: Psychosocial perspectives from a cohort study in Tokyo. *PLoS ONE.* 2015; 10: e0142410.

[22] Gausia K, Fisher C, Ali M, Oosthuizen J. Antenatal depression and suicidal idea among rural Bangladeshi women: A community-based study. *Arch Womens Ment Health.* 2009; 12: 351–358.

[23] Surkan PJ, Patel SA, Rahman A. Preventing infant and child morbidity and mortality due to maternal depression. *Best Pract Res Clin Obstet Gynecol.* 2016; 36: 156–168.

[24] Hyde et al, (1996). Sexuality during Pregnancy and the Year postpartum

[25] O'Malley D, Agnes Higgins A, Begley C, Daly D, Smith V. Prevalence of and risk factors associated with sexual health issues in primiparous women at 6 and 12 months postpartum; a longitudinal prospective cohort study (the MAMMI study). 2018. *MC Pregnancy and Childbirth* (2018) 18: 196

[26] Firoz T, McCaw-Binns A, Filippi V, et al. A framework for healthcare interventions to address maternal morbidity. *Int J Gynecol Obstet.* 2018; 141 (Suppl.1): 61–68.

[27] Feig DS, Zinman B, Wang X, Hux JE. Risk of development of diabetes mellitus after diagnosis of gestational diabetes. *CMAJ.* 2008; 179: 229–234.

[28] Herath H, Herath R, Wickremasinghe R. Gestational diabetes mellitus and risk of type 2 diabetes 10 years after the index pregnancy in Sri Lankan women - a community based retrospective cohort study. *PLoS ONE.* 2017; 12: e0179647.

[29] World Health Organization. The Global Burden of Disease: 2004 Update. Geneva: WHO; 2008.

[30] Bhutta ZA, Lassi ZS, Bergeron G, et al. Delivering an action agenda for nutrition interventions addressing adolescent girls and young women: Priorities for implementation and research. *Ann NY Acad Sci.* 2017; 1393: 61–71.

[31] Dean SV, Imam AM, Lassi ZS, Bhu a ZA. Systematic Review of Preconception Risks and Interventions http://mother-childlink.tghn.org/site_media/media/articles/Preconception_Report.pdf. Accessed December 18, 2017.

[32] Johnson K, Posner SF, Biermann J, et al. Recommendations to improve preconception health and health care - United States. A report of the CDC / ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR Recomm Rep.* 2006; 6: 1–23.

[33] Assarag, B (2015). Severe Acute Maternal Morbidity in Morocco - Explanatory Factors and Consequences: A Necessary Evidence Base for an Appropriate Response

[34] Dennis CL, Dowswell T. Psychosocial and psychological interventions for preventing postpartum depression. *Cochrane Database Syst Rev.* 2013; (2): CD001134.