Título: Maternal Mortality in Afghanistan: a study for the Provinces of Bamiyan, Daykundi, Ghor, Kabul, Kapisa and Parwan

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Maternal Mortality in Afghanistan: a study for the capital city of Kabul and five other provinces

1. INTRODUCTION

Maternal mortality is currently one of the challenges of the Sustainable Development Goals framework; despite being a key indicator of social development and above all of the access to reproductive health care, data for measurement are very often unreliable. Maternal deaths are highly concentrated in the poorest regions in the world; WHO (2014) estimates for 2013 that the sub-Saharan Africa region alone accounts for 62% of global maternal deaths followed by Southern Asia at 24%, where Afghanistan is located.

High maternal mortality prevalence affects the sex balance of the population, the family composition and even labour-force participation because a maternal death occurs at the prime women's age. High maternal mortality prevalence is associated to high infant and child mortality and by disrupting the nuclear family, most of the time, also interferes negatively in the child's future survivorship, as widely demonstrated (Rosenfield and Maine, 1985). Most of the international development agencies agreed that children who have lost their mothers are up to ten times more likely to die prematurely than those who haven't (Facts about Safe Motherhood)[1].

The focus on maternal mortality as an important development indicator dates back at least to the 1980s, when demands for highlighting this issue motivated the 1987 Safe Motherhood Conference in Nairobi, which motivated the Safe Motherhood Initiative (SMI), a call to action to reduce maternal mortality and morbidity by one half by the year 2000. However, after almost 30 years, a considerable number of annual maternal deaths (289,000 according most recent WHO estimates) continue to be a stubborn health and development challenge. The persistency of these casualties –a vast majority of them avoidable– is due to lack of or inadequate access to maternal health care and antenatal care.

Most recently, the 2000 UN Millennium Declaration included among the Millennium Development Goals the goal MDG 5, aiming a three-quarters reduction between 1990 and 2015 in the Maternal Mortality Ratio (MMratio), that is, the number of maternal deaths per 100,000 live births. At the same time, as mentioned by Zureick-Brown (2013), the

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[1] http://web.lb.unfpa.org/mothers/facts.htm

existence of a great challenge in tracking progress toward achieving this target was acknowledged.

Maternal mortality in Afghanistan

Afghanistan is ranked among the countries with high maternal mortality; the Maternal Mortality Ratio for the most recent period (2013) is around 400 maternal deaths for every 100,000 live births which is about twofold the average corresponding to developing countries (WHO, 2014). According Coleman and Lemmon (2011), several structural factors, for which there are no "quick fixes," affect maternal mortality in Afghanistan. First, there is limited access to quality health services and, in particular, obstetric care. Access to care is especially limited in rural areas.

Despite improvements in women's rights since the fall of Taliban, significant social and cultural barriers still contribute to poor maternal health in Afghanistan.. Coleman and Lemmon mention a number of studies estimating that between 60 percent and 80 percent of all marriages are forced. Women still have minimal economic and educational opportunities. Despite the provisions for gender equality in Afghanistan's constitution, the gap between rhetoric and practice is large, according the mentioned authors. At the micro level, community and religious leaders often resist women's employment and education. Decision-making authority within households is typically held by the eldest male, and control over decisions regarding maternal and child health is shared by older men and mothers-in-law, who can be resistant to modern contraceptive techniques and skilled birthing procedures due to a lack of education (Coleman & Lemmon, 2011; page 6). The challenges of improving maternal health are also exacerbated by a strong cultural preference for women to be seen and treated only by other women, despite a severe shortage of trained female health workers in Afghanistan.

This high maternal mortality level, nevertheless, has followed an impressive declining trend: the ratio was estimated to be well over 1,000 at the beginning of the current century. This decline has been associated to substantial health improvements, particularly to maternal and obstetric care (APHI/MoPH, 2011).

The Universe of this study

Data are from the Socio-Demographic and Economic Survey (SDES), a 50% sample size household survey applied in Kabul the capital city and other five Afghan provinces (Bamiyan, Dakundi, Ghor, Parwan and Kapisa) between approximately, 2011-2014. The

SDES was conducted by the Afghan government via the Central Statistics Office (CSO) supported by UNFPA/Afghanistan and sponsored by the Japanese and British governments. Apart for knowing that Afghanistan is one of the poorest countries in the world, it is also known that it is currently experiencing a relative peace, political stability and implementing social policies aiming to improve children and youth social conditions. Specifically to the population surveyed, it is important, also, to consider that their surrounded social and environment context can be defined in general terms as a very vulnerable. More than two thirds of the women at reproductive age have no schooling, the main economic activity is agricultural subsistence and household conditions are rather precarious[2].

Objective

Based on Socio-Demographic and Economic Survey (SDES) data, this study aims to broaden the understanding of the maternal mortality situation the six surveyed provinces, providing an evidence-based perspective of this critical health issue in different contexts. The results should strengthen the knowledge base to guide health and social policies for reducing maternal mortality, contributing to improve the health and social status of women, enhancing access to reproductive health care and advancing social development in the country. The specific objective of this paper is to measure maternal mortality levels through the information on Pregnancy Related Deaths (PRD); that is, a woman's death while pregnant, during delivery or within 42 days of termination of pregnancy, irrespective of cause.

2. METHODOLOGY AND DATA

The indicators of Maternal Mortality utilized are:

a) Proportion of maternal deaths among total female deaths at reproductive age (PMFD) or proportion of maternal deaths

b) Maternal mortality ratio (MMratio), which it is the most frequently indicator used, it is also the simplest and very easy to understand. It refers to the number of maternal deaths per live birth, multiplied by a conventional factor of 100,000[3]

c) The maternal mortality rate (MMrate) is an indicator of the risk of maternal death among women of reproductive age. Although this indicator does not consider the probability of getting pregnant, the rate is necessary for estimating the lifetime risk of a maternal death.

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[2] Details of the Afghanistan Social context at provincial level is well documented in: World bank (2011)

[3] The MMratio is intended to express obstetric risk and can also be estimated by age. Note that the denominator is not exactly the population exposed to the risk of having a maternal death (all pregnant women); due to difficulties in obtain this population, the number of live births is used as a proxy for the most appropriate denominator (which would be those exposed to the risk).

The MMrate is usually multiplied by a factor of 1,000:

d) The lifetime risk of maternal death (LTR) that reflects the chances of a woman dying from maternal causes over the course of her 35-year reproductive life span. This indicator takes into account the probability of a death due to maternal causes each time a woman becomes pregnant.

The basic information needed to calculate the above listed indicators is: *a)* Population distribution by age and sex; *b)* Number of maternal deaths and live births for a specific time period and a well defined population. Given the common data problems for measuring maternal mortality, the evaluation of the data quality is especially important as most experts, among them Hill and others (2001) strongly emphasize. In case of deficiencies, the collected data may need to be adjusted to arrive at a reliable estimate of the maternal mortality indicators

SDES has collected information on household deaths including the identification of all household members who have died within the 24 month previous to the surveys' date as well as the sex and age, in completed years, of each deceased person. In order to distinguish maternal from other deaths, the information specify the timing of a female maternal death (during pregnancy, at childbirth and in the postpartum period). Hence, this paper uses pregnancy-related deaths: a woman's death while pregnant or within 42 days of termination of pregnancy, irrespective of cause. It includes deaths from accidental or incidental causes. For this reason, when this text refers to a maternal death it should be understood that the event is actually a pregnancy related death (PRD).

Pregnancy related death is used as a proxy of a maternal death, because the SDES has no information on the causes of death, neither there is any national register of maternal deaths. PRD were collected when a death in the household was identified as being of an ever married woman, in which case the following question was asked: *"Did ___ die during pregnancy, giving birth, or within 6 weeks of delivery?* [4]*"*

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[5]Data were collected as follow: Timing of the death of ever married woman 10 to 49 years old:
This question applies only to the ever married women 10 to 49 years of age. If the deceased was a male, or a never married or a female 50 years old and above, leave the boxes blank. You must ascertain the precise moment when she died, i.e.:

     a.   whether she died during pregnancy, in which case enter Code "1",
     b.   whether she died during delivery (while giving birth), in which case enter Code "2",
     c.   whether she died within six weeks after she gave birth, in which case enter Code "3", or

Two procedures were implemented to assess the data reliability. Firstly, the total number of reported deaths was evaluated using well established indirect techniques like the Brass' method called *the growth balance* (Brass, 1975)[5]. Extreme adjustment factors were 1.7 and 1.2 for Ghor and Daykundi respectively, with other provinces holding an adjustment factor around 1.5[6].

Secondly, the information on maternal deaths is classified as follows: a) Pregnancy-related deaths; b) Not Pregnancy-related deaths; and c) Not known whether pregnancy-related deaths. The (c) category may have captured maternal deaths –and only maternal deaths– with unknown timing of death (during pregnancy, giving birth or after six weeks of delivery), because the question is included in the column of the questionnaire which is dedicated to maternal deaths; on the other hand, it could have included any female death with unknown pregnant/not pregnant status. To solve this ambiguity it was decided to distribute the "Not known whether pregnancy-related deaths" among the other two categories: *(a) "pregnancy-related deaths"* and *(b) "not pregnancy-related deaths"* by age group. We applied a *pro rata* distribution. Hence, the estimated number of maternal deaths is obtained by adding $(a) + (c^*)$, where c^* is the proportion of "not known" which was assumed to be a pregnancy related death. We believe that this procedure provides a reasonable estimate of the actual number of pregnancy related deaths; therefore, this is what we consider *the most plausible scenario*. In addition to the *most plausible scenario*, we can consider two additional scenarios:

- *A minimum scenario*: it includes only well declared maternal deaths within the three event-timing categories; thus, only the adjustment factor for omission for all adult deaths is applied. Pregnancy related deaths are only those classified in (a).

- *A maximum scenario*: where all "*Not known whether pregnancy-related deaths*" are assumed to be pregnancy related deaths

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d. whether she did NOT die during pregnancy, while giving birth, nor within six weeks after giving birth, in which case enter Code "4". (foot note continues in next page)

As this question must necessarily be asked from a third party, the person in question being dead, the respondent may not know the condition of the deceased at the time of her death. You may ask from other knowledgeable member of the household. If in the remote case that no one in the household knew the condition of the deceased, enter Code "5" (Do not Know).

[5] A very didactic explanation of these procedures can be seen in Hill, K., Stanton, C., and Gupta, N. (2001).

[6] Details about the specific procedures to estimate the adjusting factor are available in the Adult Mortality Report using the same SDES data set. On request.

As deaths refer to the 24 month previous to the interview, to estimate annual risks we halved the figures on the assumption that deaths are uniformly distributed during the 24 month period. The adjusted numbers of maternal deaths, according to the three designed scenarios, are shown in Table 1.

Table 1. Bamiyan, Daykundi, Ghor, Kabul, Kapisa and Parwan (2011-2014): Adjustment factors for reported PRD and live births, annual number of events (live births and PRD) and proportion of PRD among total female deaths in reproductive ages (PMFD)

Events		Provinces					
		Kabul	Bamiyan	Daykundi	Ghor	Kapisa	Parwan
		Adjustment factors					
Live Births (a)		1,88	2,20	1,94	1,91	1,54	1,56
Pregnancy-related deaths (b)		1,53	1,49	1,23	1,72	1,61	1,51
		Number of annual events					
Live births(c)		173.110	18.258	30.326	41.771	14.994	30.947
Pregnancy Related deaths Scenarios (c)	Plausible	508	171	382	786	35	144
	Minimum	292	91	303	601	25	102
	Maximum	1032	202	406	841	76	223
		Variation relative to the plausible scenario (%)					
	Minimum	42,6	46,8	20,7	23,6	28,6	29,3
	Maximum	103,1	18,1	6,3	7,0	117,1	54,9
		PMFD (per cent) according three scenarios					
PMFD Scenarios	Plausible	16,1	45,3	49,7	52,3	12,7	22,9
	Minimum	9,6	24,3	39,5	40,4	9,0	16,2
	Maximum	32,1	53,7	53,4	56,5	27,5	35,3

Source: SDES 2011-2014, UNFPA-Afghanistan and CSO of Afghanistan (Micro data)
(a) Adjustment factor estimated in the Thematic Report on Fertility and Nuptiality
(b) Adjustment factor estimated in the Thematic Report on Mortality
(c) Already adjusted according factors in (a) and (b)

The number of live births, which stands to represent women at risk of a maternal death, was estimated from adjusted age specific fertility rates[7]. The adjusted numbers of live births by province are included also in Table 1.

Table 1 reveals a variation that differs among the six provinces. In Kabul the number of PRD in the *minimum* and *maximum* scenarios are respectively half or twofold the number of PRD estimated for the *most plausible scenario*. In Kapisa, partially due to the small number of cases, the variation is very high, ranging from 29 percent to 115 percent of the number under the *more plausible scenario*.

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[7] These rates were obtaining by applying *Brass´ P/F technique* using the above mentioned information. The application of *Brass´ method* produced adjustments factors to correct fertility rates and to estimate adjusted life births by age of mother. Details about the specific procedures to estimate the adjusting factor are available in the Fertility Report using the same SDES data set. On request

The smallest variations from the PRD of the plausible scenario are observed in Daykundi Ghor, and Bamiyan that, as shown in the next sections, hold the highest maternal mortality levels. Part of differences observed between the three scenarios may be related to different operational conditions faced in fieldwork; under certain circumstances it is more difficult to collect accurate information on events that may be sensitive, as those related to deaths of persons in the household. Additional research about quality of data and adjustment procedures would be desirable, as final conclusions about the maternal mortality levels would necessarily rely on such adjustments.

Additional evidence of the need for adequate data assessment is given by the proportions of maternal deaths among total female deaths in reproductive ages (PMFD) – also simply called proportion of maternal deaths. The age patterns of PMFD according to the three scenarios differ between provinces and scenarios. A peculiar pattern is seen in the provinces with the highest maternal mortality levels: Bamiyan, Daykundi and Ghor; in these provinces the *most plausible* and the *maximum* scenarios registered similar age patterns (See Figure A, in Annex). This indicates that "*Not known whether pregnancy-related deaths*" might have been misclassified, most probably these deaths were in fact PRD.

In the case of Kabul, where one would expect relative higher data reliability, the *most plausible* scenario highly differs from the *maximum* scenario. The same applies to Parwan and Kapisa, which have PMFD age patterns different from each other, but they register some similarity between the *most plausible* and *minimum* scenario. In the case of Kapisa, the difficulties to evaluate data quality are exacerbated by a very small number of cases, which as seen in the previous table registers well below 100 deaths under any scenario.

There is no evidence on which would be the most reliable figure among these scenarios. In any case, the "*most plausible*" scenario has been selected in this report to determine the maternal mortality levels. Although the estimates obtained through this decision may still be affected by a bias, it has the advantage of providing estimates that on average would certainly be closer to the true value. Therefore all the analyses that follow are based on the numbers of PRD as estimated under the assumptions for the "*most plausible*" scenario.

The PMFD for the whole reproductive age period can also give an approximation of the maternal mortality levels[8]. It is widely accepted that the most developed a society, the lowest the mortality rates. Current PMFD for developed and/or high income countries can be even lower than 1 percent of all female deaths aged 15-49 and for most vulnerable countries PMFD is as high as 20 or 30 percent. WHO (2014) reports a PMFD of about 18 percent for Afghanistan in 2013. Considering the PMFD values for the six provinces –using the "*most plausible*" scenario– Kabul and to a lesser extent Kapisa and Parwan register values closer to the national figure (see last panel in Table 1). The provinces with the highest maternal mortality indicators (Bamiyan, Daykundi and Ghor) present PMFD values well over the highest value indicated by WHO (2014) which is around 50%.

Another approximation to the quality of data on maternal mortality is the similarity that the age distribution of the maternal deaths may have with the age pattern of fertility, because the actual risk of dying from a maternal cause follows the risk of having a live birth. Figure 1 illustrates the comparison of both age patterns.

The pattern of maternal deaths slightly departs from the ASFR pattern, about the central part of reproductive period where relative lower obstetric risks are always expected. The maternal mortality pattern shows an increase relative to the fertility pattern by the end of the reproductive period. At those ages, the obstetric risk is generally high and maternal health, particularly in Afghanistan, has a lower coverage than at younger ages[9]. The profile provided by Figure 1 indicates a consistent behaviour that grants a significant level of reliability to the general measures of maternal mortality obtained from the SDES data.

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[8] In conjunction with additional information, the PMFD allows to obtain modeled MMratios that may validate those ratios calculated directly from survey data. (The detail procedures can be seen in: Gelman A, and Hill J. *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press, Cambridge, 2006. – Cited by WHO, 2010.

[9] SDES does not include a module on maternal health care to support this relationship; however, the national survey on maternal mortality (APHI/MoPH, 2011) that included a detailed analysis on this issue shows a more vulnerable situation for women aged 35 or more.

Figure 1. Bamiyan, Daykundi, Ghor, Kabul, Kapisa and Parwan 2011-2014: Pregnancy related deaths and age specific fertility rates (ASFR) by age-group (percent).
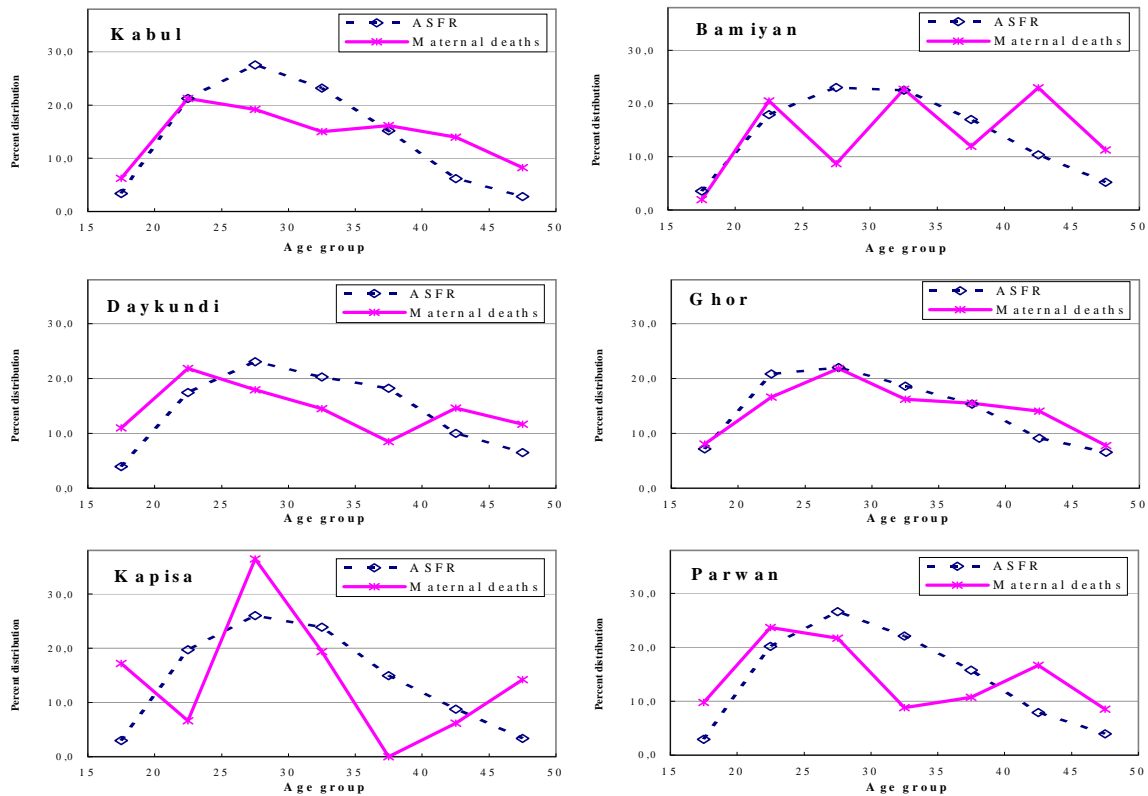
Source: SDES- 2011-2014, UNFPA-Afghanistan and CSO of Afghanistan (Micro data)
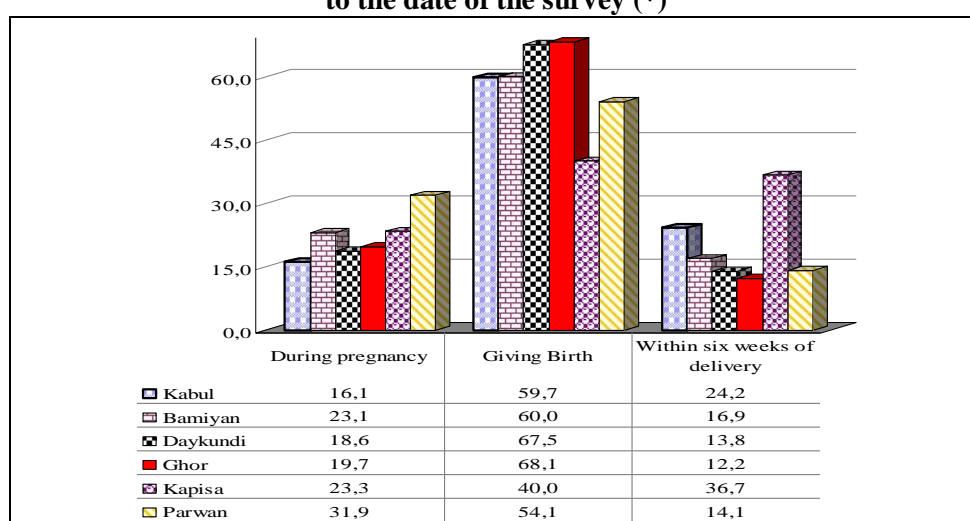
3. Results

3.1. Distribution of pregnancy related deaths according to timing of death

Before defining the level of the maternal mortality in the six provinces is important to assess the distribution by moment of dying from a PRD, which is done considering the deaths "during pregnancy", "delivering" (or giving birth) and "during post-partum" (or within six weeks of delivery). This distribution constitutes the very first approximation of the maternal mortality level, because the timing of the maternal death is associated to the availability of health care services and accordingly to the possibility of being from a cause of death considered avoidable. Data on Figure 2 shows the distribution of PRDs registered for the 24 months prior to the Surveys by timing of death.

Out of almost 2000 PRDs identified in the six surveys more than half of these deaths occurred during delivery, with the only exception of Kapisa, which has the lowest number of cases. Ghor and Daykundi are the provinces where more than two thirds of PRDs occurred while the woman is giving birth. It is known that most of the causes of maternal

deaths are related to severe bleeding, infections, obstructed labour and blood clots/embolism, conditions that are present at the very time of delivering and easily account for more than half of the maternal deaths around the world (see Appendix - Box 1). Evidence given by Bartlett et al. (2005) in their study in Afghan territory reinforce this finding: in the four cases (Kabul, Alisheng, Ragh and Maywand), two causes of death typically occurring at the time of delivery –haemorrhage and obstructed labour– account for half or more of the total maternal deaths researched (60% in the case of Maywand).

Figure 2. Afghanistan (SDES) Bamiyan, Daykundi, Ghor, Kabul, Kapisa and Parwan (2011-2014): Timing of death of the pregnancy related death as reported for the 24 months previous to the date of the survey (*)

	During pregnancy	Giving Birth	Within six weeks of delivery
Kabul	16,1	59,7	24,2
Bamiyan	23,1	60,0	16,9
Daykundi	18,6	67,5	13,8
Ghor	19,7	68,1	12,2
Kapisa	23,3	40,0	36,7
Parwan	31,9	54,1	14,1

(*) Referred only to pregnancy related deaths with valid answer on the timing of death.
Source: Source: SDES- (2011-2014) UNFPA-Afghanistan and CSO of Afghanistan (Micro data)

The distribution reported in the SDES points to how fragile the health system can be regarding the specific issue of obstetric care. It is not a surprise that the province registering higher vulnerabilities, Ghor, presents the highest proportion of maternal deaths occurring at the time of delivery. National data from a previous survey on maternal mortality carried out in 2010 present a different pattern: maternal deaths occurring during delivery represent 40% of the total (APHI/MoPH; 2011). Although this is a lower percentage than the one observed in the SDES, still it represents an important share of PRDs occurring during delivery. These observations reinforce the need to undertake further research on causes of maternal death.

3.2.   The Maternal Mortality Risks

This section presents the relative risk of dying from a maternal cause. Table 2 presents the maternal mortality ratio and its age pattern, the maternal mortality rate and the Life Time Risk.

In an effort to avoid random fluctuations by age, the MMratio is estimated for broad age groups 15-24 and 40 or more. Firstly, the lowest MMratio corresponds to Kabul and Kapisa whose social context, characterized for being neighbours and having a relatively high proportion of urban population, have, certainly an important explanatory role. Again, it is not a surprise that Ghor has the highest MMRatio of the six provinces, given the highly vulnerable social context of this province.

Table 2. Afghanistan: Kabul, Daykundi, Bamiyan, Ghor, Kapisa and Parwan (2011-2014): Maternal mortality ratio (total and by age)

Age Groups	Province						Afghanistan
	Kabul	Bamiyan	Daykundi	Ghor	Kapisa	Parwan	(2010)
MMratio(a)	293	937	1.260	1.882	234,7	464	374
15-19	299	263	1,614	1,245	668	821	531
20-24	206	767	1,174	1,134	51	374	257
25-29	189	318	858	1,659	306	342	211
30-34	262	1,114	1,158	1,983	268	251	289
35-39	390	807	662	2,462	--[b]	405	725
40-44	1,155	3,186	3,028	4,797	275	1,600	908
45-49	1,699	4,162	3,984	5,319	2,012	1,874	2405
Comparative risks for MMratio							
15-24	222	650	1,290	1,168	146	444	394[c]
40 or more	1,313	3,424	3,411	4,956	673	1,674	1,656[c]
Ratio of risk of older to young women	5.9	5.3	2.6	4.2	4.6	3.8	4.2
The MMrate and the LTR							
MMrate [d]	0.52	2.13	2.99	4.09	0.47	0.92	0.58
LTR [e]	18.35	55.83	105.56	127.87	16.55	32.91	-

(a) Per 100,000 live births
(b)No maternal death were reported
(c) Estimated as the average from the two five year age group rates involved because micro data were not available
(d)Per 1,000 women aged 15-49.
(e) Estimated as $LTR = 1-(1-MMratio/100,000)^{TFR}$
<u>*Source:*</u> *- Provinces: SDES- (2011-2014) UNFPA-Afghanistan and CSO of Afghanistan (Micro data)*
*   - Afghanistan: APHI/MoPH – (2011)*

Secondly, these values are around the overall MMratio estimated for the whole country, around 400 maternal deaths per 100,000 live births (WHO, 2014; APHI/MoPH, 2011). Although it was estimated that the confidence interval is from 220 to750 for the national

figure, the provinces show a wider range of variation than that confidence interval: 235 in Kapisa to 1,882 in Ghor.

Thirdly, because *no woman should die giving life*, it is important to note that despite the ranking, all the provinces have very high maternal mortality risks. WHO (2014) considers national MMRatios below 20 maternal deaths per 100,000 live births in the Low (or minimum) category, which is often found in developed settings. where some countries have MMratios even lower than 5. Most recent estimates suggest a MMratio of 190.0 in Southern Asia, where Afghanistan is included (WHO, 2014)[10] and implies that the country is among those with the highest MMratio in the region (See Figure A-2 in ANNEX). In short, the estimates of the MMratio for the six provinces are simply unacceptably high. Decision-makers have no option but to urgently formulate policies and implement strategies to improve the situation.

The age pattern of the MMRatio is expected to be J-shaped, i.e., the MMRatio at the very early and later ages are expected to be higher than other ages of the reproductive period and peaking at ages 45-49. Kabul, and Ghor exhibited this J-shaped age-pattern with the lowest MMRatio at ages 25-29 for Kabul, ages 20-24 in Ghor. It is apparent that the older the woman, the higher the risk of a maternal death in all provinces. At the extreme age of the reproductive period (45-49), there are no provinces where the MMRatio is below 1,500. Comparison of ratios for all ages clearly indicates that risks at young ages are lower than at older ages; however, even among young women risks are very high,

Despite the few number of events for some provinces, MMratios for the six provinces are suggestive of, perhaps, three profiles:

a) Ghor with a persistently trend of an always increasing high maternal mortality risk by age and exhibiting the highest MMratio at older ages with t averages a ratio above 5,000 maternal deaths per 100,000 live births among women aged 40 or more.

b) Bamiyan and Daykundi have an intermediary profile with slightly high MMratios at ages 20-24, with a deep increase afterwards; this profile is clearer in Daykundi with the J shape mentioned and with relatively high MMratios at ages 40 or higher.

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[10] The Southern Asia, according WHO (2014), comprises Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan and Sri Lanka.

c) The third specific profile corresponds to Kabul, Kapisa and Parwan where there is a relatively low maternal risk –notwithstanding high in absolute values– that increases with age.

The high risks of dying due to pregnancy related causes among young women should be noted; yet the risks for older women must be emphasized. The last row in Table 2 indicates that regardless of the maternal mortality level, the risk in older groups of women is definitely more than twice the risk compared with younger ages. In Kabul and Bamiyan, the ratio of maternal risk of older and younger women is about fivefold.

Finally, the maternal mortality rate (MMrate) and the Life Time Risk (LTR) or the probability of dying from a pregnancy related cause over the reproductive period –shown in the last rows of Table 2– are complementary measures of maternal mortality. Values of the MMrate follows the trend defined by the MMratio and incorporates the number of women exposed to the risk of becoming pregnant. The LTR indicator, which considers the number of times a woman gives birth, presents a pattern that is coherent with the previous measurements of maternal mortality risks. The estimation of LTR can use more adequate information on mortality by age; in a second stage of analysis life tables for the provinces will be utilized, conducting further in depth research on this issue.

3.3. Alternative Scenarios of Maternal Mortality Risks

The maternal mortality risks in the previous sections are based on the assumption that the number of PRDs included a proportion of those reported as " Not known whether pregnancy-related deaths" and constitute what we call it the *most plausible scenario*. In this section, maternal mortality ratios are presented along with the minimum and maximum scenarios for the overall MMratio by province.

Table 3 shows that MMRatios under the minimum scenario are approximately 20 to 50 percent lower than those in the provable scenario – still, the MMratios are rather high. This suggests that even if PRDs were perfectly captured in the survey, all provinces would have MMratios of over 100 maternal deaths per 100,000 live births. On the other hand, the maximum scenario has a wider variation relative to the most provable level of the maternal mortality. In provinces like Kabul and Kapisa, the MMratio in the maximun scenario is twice the MMratio in the provable scenario. In contrast, the MMratios in the maximum

scenario remain very close to the level for the most provable scenario in Daykundi and Ghor.

Table 3. Afghanistan: Kabul, Daykundi, Bamiyan, Ghor, Kapisa and Parwan (2011-2014): Maternal mortality ratio for three scenarios and relative variation from the provable scenario

Province	Scenarios			Relative variation from the provable scenario (%)	
	Provable	Minimum	Maximum	Minimum	Maximum
Kabul	293	168	596	-42.6	103.2
Bamiyan	937	499	1,108	-46.8	18.2
Daykundi	1,260	999	1,340	-20.7	6.3
Ghor	1,882	1,438	2,014	-23.6	7.0
Kapisa	235	167	506	-29.0	115.4
Parwan	464	328	722	-29.3	55.7

Source: SDES- (2011-2014) UNFPA-Afghanistan and CSO of Afghanistan (Micro data)

3.4. Maternal mortality differentials: Educational levels and Maternal Mortality in Kabul

In order to consider social determinants of maternal mortality, this section presents MMratio estimates according educational levels. Formal education is a well-known socioeconomic determinant of social and demographic behaviour. The analysis is done only for Kabul due to data processing limitations and because it is the province which has enough numbers to breakdown maternal mortality estimates by education categories.

The MMratio for Kabul is analysed using two measures for the formal education level: i) the household head's years of education, and ii) the highest education level attained in the household. The first one because it is considered that the household head has the power of making important decisions pertaining to the household. Such decisions would involve also the woman's pregnancy care. The second variable -highest education level in the household- is used under the assumption that the household's head may not hold the highest educational level.

In Afghanistan, education has improved in recent years benefiting mostly the younger cohorts. Higher educational status is associated with better access to information and more capacity within the household to make health decisions and accessing services. In such case, it would be expected that one household dweller with high education can positively impact the woman's pregnancy care. Probably the education of the individual woman would have been a better indicator for assessing the influence of education on the

level of maternal mortality. However this information is not available, because only the age and timing of death related to the status of pregnancy were collected on the women who had died.

Formal education is classified using three categories for the years of schooling: *No schooling*; *1-6 years of schooling* and *7+ years of schooling*. It should be emphasised that the *no schooling* category would define an extremely vulnerable situation. The methodology used for estimating maternal deaths was slightly different from the previous case. Two categories were considered: *a) "pregnancy-related deaths"* and *b) "Not known whether pregnancy-related deaths"*. As in the maximum *scenario* discussed earlier, these were taken together as pregnancy-related deaths, excluding the category *"Not Pregnancy-related deaths"* from the total maternal deaths. This procedure was adopted to deal with the issue of connecting the deaths with the socioeconomic attributes. This required the creation of identification codes; in the process, cases of a second or more deaths in a household had to be excluded.[11]

Table 4. Kabul, 2013: Maternal Mortality Ratio (per 100 000 live births) according to woman's age at death by highest schooling of the household head and a household member with the highest schooling

Age Groups	Household Head Schooling			Highest household schooling		
	0 Schooling	1 to six	Seven or more	0 Schooling	1 to six	Seven or more
MMratio[a]	**662**	**517**	**572**	**552**	**503**	**646**
15-19	589	-- [c]	252	250	616	373
20-24	271	209	219	177	264	252
25-29	335	194	210	293	249	253
30-34	429	533	526	378	264	613
35-39	834	559	966	983	708	886
40-44	3,598	2,544	3,018	5,916	3,189	2,903
45-49	7,570	11,272	10,508	20,059	4,899	9,128
Number of PRD [b]	634	154	551	190	218	930

(a) per 100 000 live births
(b) As reported over a 24 month period. Not adjusted. It includes the categories "pregnancy-related deaths" and "Not known whether pregnancy-related deaths" and excludes the not- pregnancy-related deaths.
(c) No events registered in this category
Source: SDES- Kabul 2013, UNFPA-Afghanistan and CSO of Afghanistan (Micro data)

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[11] Analyzing maternal deaths according to years of education requires a link between the death´s dataset and households' dataset. An identification code to link the two data sets had to be constructed because it was not available. However, during the construction process duplicated codes were found, which hampered the merging of datasets. To merge the datasets and to avoid elimination of multiple deaths in a household (duplicated identification codes) a "maternal death" variable was created from two categories (*pregnancy-related deaths* and *not know whether pregnancy-related*), assuming that *not know pregnancy-related deaths* were all pregnancy-related deaths. From this unique variable it was possible to construct an identification code that linked the datasets. The problem of constructing identification codes to merge datasets generating duplicated codes was an important issue affecting some of the analyses of thematic reports.

The live births and the maternal deaths were distributed according to the deceased woman's age and educational groups, and were adjusted by the same factors previously estimated to deal with omissions. Hence, the same adjustment factor for live births (1.9) and the same adjustment factor for maternal deaths (1.5) were applied for each educational and age groups. Table 4 shows the results for Kabul. To facilitate understanding of the magnitude in the differences, the results are plotted in Figure 3   Overall, the MMratio does not present relevant differences as we would had expected, which may be related to the size of the populations involved. It is important to consider that in Kabul it is possible that access to maternal health -although scarce- would be similar to most people in terms of distance and cost. On the one side, this would contribute to relative homogeneity in terms of maternal mortality, which in any case is very high (MMRatio above 500). On the other side, the age composition of each educational level should also be considered.

Results reveal that the age pattern shows the expected association between education and maternal mortality, in most cases. The MMratio is higher for older age groups by education level (highest attained in household). For ages older than 35-39, MMratio differences between the lowest education group (0 years) and other groups are striking. The lower the formal education the higher the risk of dying from a pregnancy related cause, particularly after ages 35-39, measuring education by highest level attained in the household.

Figure 3. Kabul (2013): Maternal Mortality Ratio (per 100 000 live births) according to household education variables

a) Household head schooling   **b) Highest household member's schooling**
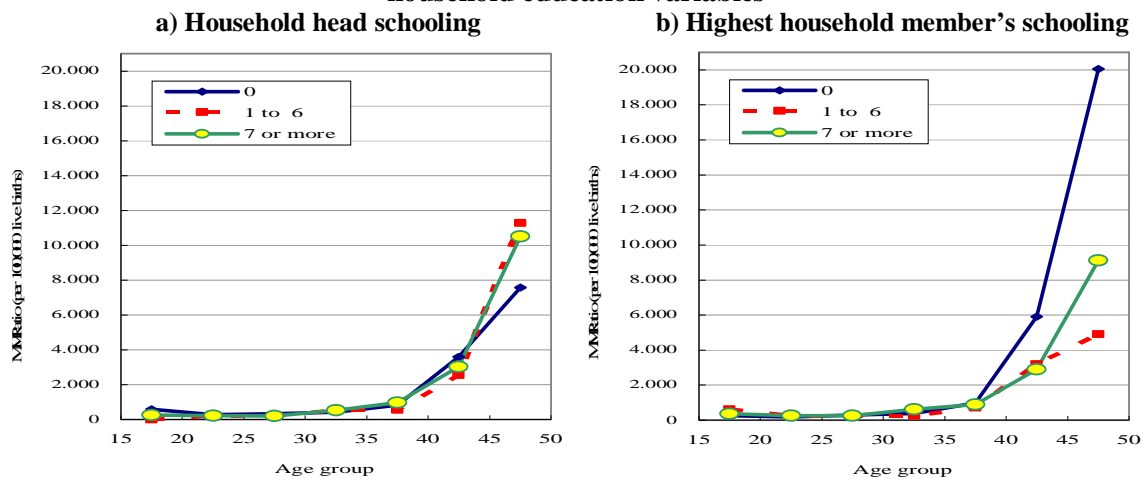
Source: SDES- Kabul 2013, UNFPA-Afghanistan and CSO of Afghanistan (Micro data).

Relevant observations are the differences in the MMratio for the first three age groups, when comparing household head's education with highest household's education. When the household head has no education it impacts more negatively on maternal mortality than when the highest household attainment is "no education". Instead, when the household head has "1 to 6" years of education it impacts more positively on MMratio than when that level of education is measured through highest household's attainment. This may occur because in Afghanistan the householder plays an important role in the household decision-making, including maternal health care and even on women´s life conditions in a household. For young girls, the impact of household head´s education seems to be much more sensible than the highest education level attained in the household. Thus the higher the education of household head the lower the level of maternal mortality. Instead, the highest household's education may have little influence on maternal mortality ratio for young girls, as this relationship is not apparent in the results.

In general, Figure 3 (a) indicates a little impact of the household head education in the maternal mortality levels. Nevertheless, after age 35-39, the MMratios surpass the four-digit mark. At the very end of the reproductive life, MMratios are always above 6,000. In the case of the highest education of a household member, it is clear that for dwellers in households where nobody has attended school maternal mortality skyrockets after the age 35-39. The trends observed show that household head education has little influence on the high levels of maternal mortality affecting Afghan women regardless of education category; however, regarding the highest education of a household member, the lower levels of education are associated with significantly higher maternal mortality risks for age groups older than 35-39.

4. Conclusion

The evidence from the SDES confirms the high maternal mortality levels endured by women in Kabul and the other five provinces. Further analyses exploring the relationship with the traditional determinants are needed, such as those established in the literature, like in the Safe Motherhood Initiative: reproductive health care access, women education, gender relationships, attitudinal behaviour. It is relevant to highlight that, particularly in Afghanistan, the high maternal mortality risks are the consequence of a

complex synergy of many social, demographic, medical, economic and cultural factors (Fernandez, Jha and Eelens; 2012).

These factors structure three types of barriers responsible for the high maternal mortality risks found in these provinces: 1) *Gender barriers:* early and child pregnancies, narrowly spaced births and high fertility; low level of education of women; lower status of women; gender based violence and various harmful traditional practices; 2) *Access barriers:* custom of home deliveries, limited availability and access to health services; limited number of female health service providers; limited knowledge of safe practices for maternal health in family and community; 3) *Capacity barriers:* inadequate quality of provided care, lack of antenatal, emergency obstetric care, postpartum care and modern family planning services; insufficient number of skilled birth attendants, especially female; poverty and deprivation.

The SDES did not collect data on health care; yet, other dimensions as gender equity, education, poverty and rural/urban residence should be object of further research using this dataset in order to establish their association with the maternal mortality levels and expand the knowledge base required to guide policy design, programme implementation and best strategies to reduce the extremely high maternal mortality levels prevailing in the country. It is important to remember that according to international sources, Afghanistan has made notable efforts in reducing the maternal mortality; this paper, however is unable to confirm any downwards trend as SDES is a cross-section data.

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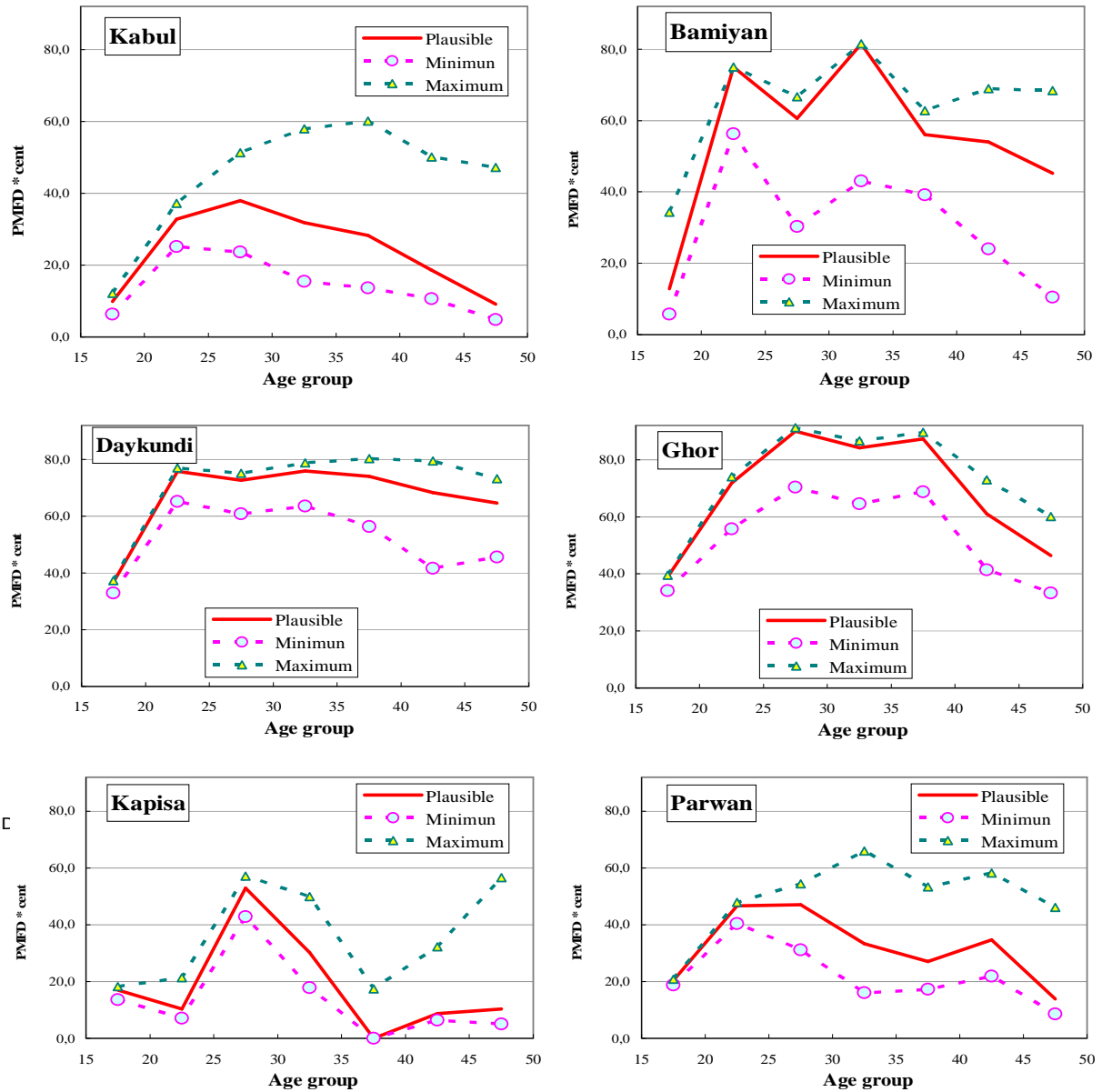
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ANNEX - Figure A. Bamiyan, Daykundi, Ghor, Kabul, Kapisa and Parwan 2011-2014

Proportion of maternal deaths among total female deaths in reproductive ages (PMFD), percent.

Source: SDES- 2011-2014, UNFPA-Afghanistan and CSO of Afghanistan (Micro data)