

ANALYSIS OF INDIRECT MATERNAL MORTALITY IN ROMANIA IN 2011 AND 2014 – ASSOCIATIONS BETWEEN CAUSES OF DEATH, ANTHROPOLOGICAL AND SOCIOLOGICAL FACTORS

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The present study aims to analyse and underline certain associations between the causes of maternal indirect deaths and certain socio-demographic, cultural and behavioural factors such as the mother's age, place of origin, socio-cultural and health condition and the use of medical services including the prenatal ones. The analysis is performed on the existing casuistry in 2011 and 2014. The authors analyse, in the limit of the existing information also whether the death was avoidable, and try to suggest some recommendations in this respect.

Key words: maternal mortality, anthropological factors, sociological factors, causes of death.

INTRODUCTION

The rate and causes of maternal mortality are considered to be two of the most important indicators of maternal health¹.

Maternal mortality is an important indicator of the performance of the health system even in developed countries, where maternal deaths are very rare. In these countries maternal deaths are perceived as signal events of the efficacy and quality of pre, intra and postnatal medical assistance².

The progress made by Romania in lowering maternal deaths is remarkable. Nevertheless, placing the issue in a European context indicates that the level of maternal mortality in Romania is 3 times higher than the European average of EU countries⁴.

Why do mothers die²:

- Because they did not know they had diseases pre-existing pregnancy which were aggravated during pregnancy;
- Because they did not know that they needed medical care, or did not know to identify the alarm signals regarding the problems which appeared during pregnancy;

- Because the care they receive is inadequate or even harmful;
- Because the medical services to which they could have had recourse were inaccessible for financial reasons, or because of the distance or socio-cultural barriers.

The systematic analysis of maternal deaths is necessary in order to highlight the fundamental factors that lead to these deaths and subsequently to determine the actions to avoid them.

According to the X-th Revision of the WHO concerning the international classification of diseases, **maternal death** is defined as the death of a woman during pregnancy or within a period of 42 days from the termination of pregnancy, irrespective of the duration and location of the pregnancy by any causes determined or aggravated by pregnancy or its management but not from accidental or incidental causes.

According to the causes of death, maternal deaths are divided into three categories: maternal deaths from direct, indirect and collateral causes².

- Deaths from **direct obstetrical risk** are those deaths resulting from obstetrical complications (pregnancy, childbirth, postpartum), interventions, omissions, incorrect treatments, or a series of

events resulting from any of the above-mentioned factors.

- Deaths from **indirect** obstetrical risk are a consequence of an underlying disease or illness which coincided with the pregnancy, not having obstetrical causes, but which could be aggravated by the physiological changes of pregnancy.
- Collateral deaths called also “fortuitous deaths” are those deaths occurring during pregnancy or post-partum but which are not correlated with pregnancy.

Indirect maternal deaths occur from disorders that develop during pregnancy and which do not arise from direct obstetrical causes, but were aggravated by the physiological effects of pregnancy. For this reason there have been periods in which the indirect causes of maternal deaths were not analysed as regards maternal mortality. Since 1996, indirect maternal deaths have been recorded in the data basis collected through “*Sheet of maternal death from indirect causes*” and enter the analysis of official statistics on maternal deaths.

The examples of indirect deaths include epilepsy, diabetes, heart diseases and hormone-dependent tumours. The commission of confidential inquiries into maternal deaths in Great Britain classifies most deaths by suicide as indirect deaths because they were usually the result of puerperal mental disorders, although this is not recognised in the ICD codification of these deaths.

In the United States deaths by suicide in the first year after pregnancy are codified as being caused by pregnancy only if the relationship between pregnancy and death is explicitly mentioned on the death certificate, such as death due to depression after childbirth².

In some countries, HIV infection may be one of the main causes of death in pregnant women or in those who have recently given birth. The relationship between HIV and pregnancy is a complex one, but in general these deaths, especially in developing countries, should be regarded as *indirect*. Although the inclusion of deaths from HIV may increase the casuistry, it is important that they be included, whenever possible, as they will pose problems which should be solved by the managers and providers of health programmes².

In the countries with low levels of maternal mortality, indirect causes are responsible for the majority of deaths. The most important indirect causes include diseases of the circulatory, respiratory systems, psychiatric diseases, infectious

diseases (HIV), endocrine and metabolic diseases, cancer, haemoglobinopathies and also domestic violence¹.

The indirect maternal deaths are the most likely to under-reporting, because upon the registration of an indirect maternal death, the physician who records the death may not be an obstetrician and therefore not to mention that the woman was recently pregnant³.

METHOD

There are several levels the analysis of maternal mortality depending on their magnitude, the available data and their credibility. Each country may decide for the analyses that can contribute the most to avoid deaths².

Our study exhibits aspects of indirect maternal deaths based on socio-demographic characteristics of the deceased women and the causes of deaths in the period 2011–2014, based on the records of maternal death.

In the analysed period there have been 44 deaths from indirect obstetrical risk, 21 in 2011, 9 in 2012 and 7 maternal deaths in 2013 and 2014⁴.

Table 1

Maternal deaths from indirect obstetrical risk
2011–2014

Years	2011	2012	2013	2014
No. of deaths	21	9	7	7

Source: Statistical Bulletin CNSISPB, 2011–2014

The most significant information concerning the structure of these deaths by different criteria concerns the urban/rural distribution of these deaths. In rural areas the share of indirect deaths from obstetrical risk is two times higher than in urban areas, in 2011 registering seven maternal deaths in urban areas against 14 in rural areas.

We mention that in 2012, 4 deaths were recorded in urban areas and 5 in rural areas. The same distribution is maintained for 2013, 5 deaths in rural areas against 2 in urban areas, compared to 2014 when the distribution is reversed, with only 2 deaths recorded in rural areas against 5 deaths in urban areas.

Table 2

Rural and Urban deaths and maternal mortality from indirect obstetrical risk 2011–2014

Year	Maternal deaths from indirect obstetrical risk			Maternal death from indirect obstetrical risk at 100,000 alive new born babies		
	Total	Urban	Rural	Total	Urban	Rural
2011	21	7	14	10.7	6.6	15.6
2012	9	4	5	4.5	3.7	5.4
2013	7	2	5	3.5	1.8	5.6
2014	7	5	2	3.8	2.7	1.1

Source: CNSISP-INSP, INS, HFA (September 2015), Maternal mortality in Romania in 2013 and 2014

Although, in 2014 compared to 2013, maternal mortality from indirect obstetrical risk in the whole country slightly increased, from 3.5 per 100,000 live births from 3.8 per 100,000 live births, but in general it decreased compared to 2011 from 10.7 per 100,000 live births. On the average, we can observe that the higher distribution in rural areas compared to urban areas is maintained between 2011 and 2013, but this is reversed in 2014, when in rural areas it decreased by 4.5 per 100,000 live births, while in urban areas it increased by 0.9 per 100,000 live births. All in all, between 2011 and 2014 we notice a decrease in rural areas of 14.5 per 100,000 live births compared to 3.9 in urban areas.

Table 3

Structure of deaths from indirect obstetrical risk by age group of the mother between 2011 and 2014 – deaths and indexes per 100,000 live births

Age Year	10–19 years		20–29 years		30–39 years		40–49 years	
2011	3	1.5	10	5.1	8	4.1		
2012	1	0.5	3	1.5	4	2.0	1	0.5
2013			5	2.5	2	1.0		
2014			2	1.1	5	2.7		

Source: CNSISP-INSP, INS, HFA, Maternal mortality in Romania in 2013 and 2014

The training level of the deceased mothers, for the entire period analysed, keeps the decreasing trend also observed in the number of deaths, the highest frequency being among graduates of primary school, followed by graduates of secondary school and high school, noting that in many cases of deaths the training level was not mentioned, the

deaths being thus recorded as *other situations*, which is why in 2014 the mortality index for this category is higher.

Another important information concerns the use of prenatal services. In 2011, 16 of the 21 women who died were not recorded by health services during pregnancy. Only five women were monitored during pregnancy by a family doctor or specialist.

Table 4

Structure of maternal deaths from indirect obstetrical risk by place of death in the period 2011–2014 – deaths and indexes per 100,000 alive new born babies

Place Year	Hospital		Home		Elsewhere	
	2011	17	8.7	4	2.0	
2012	8	4.0	1	0.5		
2013	6	3.0	1	0.5		
2014	7	3.7				

Source: CNSISP-INSP, INS, HFA, Maternal mortality in Romania in 2013 and 2014

These women's deaths occurred in hospitals (17 cases) and at home (4 cases).

In 2011, the deaths from indirect obstetrical risk were caused by diseases of the circulatory system (9 cases), of the respiratory system (8 cases), digestive and infectious diseases (two cases each).

It is interesting to note that in the statistics of other countries drug consumption/banned substances or obesity appear in this category, which in Romania is not the case up to now.

For the 21 women who died from indirect obstetrical risk the illness occurred during pregnancy (10 cases), preceded the pregnancy (7 cases), appeared during postpartum (3 cases), or occurred during childbirth (1 case).

Among the women deceased in 2012 from indirect obstetrical risk only 4 were recorded as pregnant and monitored by the medical network (family doctor and / or specialist) and 5 have were not entered in the medical records.

Of the nine deaths from indirect obstetrical risk, seven deaths occurred in medical units, one at home and one elsewhere.

We note that in 2012, in the case of the 9 deaths from indirect obstetrical risk, in one case there was no illness previous to the pregnancy, in 4 cases the

illness occurred during pregnancy and for the remaining 4 cases, the time of the onset of the illness was not specified. One death was caused by the mother's blood disease, in 7 other cases by diseases of the circulatory system and one death was caused by diseases of the digestive system.

In 2013 seven indirect maternal deaths were recorded of which two mothers came from urban areas and five from rural areas. Of the deceased mothers six died at the hospital and one at home. All the mothers were adults in the age group of 20 to 39 years.

Table 5

The distribution of indirect deaths depending on the codes to which the causes of death were ascribed

	2011	2012	2013	2014
098 Infectious and parasitic diseases of mother, ranked at other places, but complicating pregnancy, childbirth and postpartum	2		1	
099 Other diseases of the mother, ranked at other places, but complicating pregnancy, childbirth and postpartum	19	9	6	7

Source: CNSISP-INSP, INS, HFA, Maternal mortality in Romania in 2013 and 2014

In 4 of the 7 deceased mothers, the disease was pre-existent, in 2 cases the disease occurred during pregnancy and for one case there are no indications. Five of the mothers had a variable number of prenatal visits, and for the other two no information was recorded on this issue.

In 2014 there were also seven indirect maternal deaths. Five of the mothers came from urban areas and two from rural areas. All the seven deaths occurred at the hospital. None of the mothers was a teenager.

In 2 cases the disease pre-existed pregnancy, in 1 case it appeared during pregnancy, in 3 cases the disease occurred during the postpartum period and for 1 case we have no information. Only two mothers had prenatal checkups, for the other cases we do not have any information.

The distribution of the cases by diagnostic codes is shown in the Table 5.

Using the information gathered from the files we have tried to present even deeper the context and causes which led to death.

Case 1. Death by indirect obstetrical risk – cardiac-respiratory failure due to massive pulmonary thromboembolism.

The patient, aged 21, from the urban area, deceased on 16.01.2014 at 7:20 o'clock in the Department of Anaesthesia and Intensive Care of the County Clinical Emergency Hospital.

The patient is admitted on 13.01.2014 at 13:00 o'clock with the diagnostic: 8 weeks pregnant with risk of abortion at the Public County Hospital. She was admitted because of nausea, vomit, inappetence; the symptoms began in the last month and increased in the last week. Symptomatic treatment is started but the evolution is unfavourable. On 15.01.2014, the patient is deteriorating, presenting tachycardia, polypnea, pain in the upper abdominal area. An emergency transfer is decided to the Clinical Emergency Hospital in the region, in the Obstetric-Gynaecology Clinic for: 8–9 weeks pregnancy in evolution, double scarred uterus, septic state probably due to digestive causes. The patient is admitted on 15.01.2014, at 19:29 o'clock.

The diagnostic at admittance is: 8-9 pregnancy in evolution, possible toxic-septic shock.

The transfer is made to a sanitary unit with a level of competence and/or equipment higher than that of the unit requesting the transfer.

When admitted the patient presented: altered general state, pain in the upper abdominal area, tachycardia (AV=150 bpm, polypnea and paraclinical: hyperleukocytosis (23.180/mm³), elevated transaminases (SGPT = 190 U/L; SGOT = 116 U/L), serum hyperamylasemia = 130 U/L. No significant pathologic personal history was revealed, we point out that the patient has had 2 previous births by Caesarean operation.

The admittance to the AIC clinic is decided because of the serious general condition and to perform the haematology and imaging emergency tests and to initiate the intensive care. The following treatments were administered: antibiotic, anti-coagulant, gastric antisecretory, prokinetic, hepatotrophic, diuretic, steroidal anti-inflammatory, sedative, simultaneously with hemodynamic and hydroelectrolytic balancing.

The ultrasound pelvic-abdominal examination reveals the uterus with a gestational sack corresponding to 8–9 weeks of pregnancy with an embryo showing cardiac activity.

A consult in internal medicine and a consult in general surgery are performed, excluding the diagnosis of acute surgical abdomen.

A CAT scan was performed and a cardiology consult was conducted, discovering a **massive pulmonary thromboembolism, congenital malformed cardiomyopathy.**

On 16.01.2014, at 01:10, the state of the patient suddenly worsens with extreme agitation, sensation of suffocation, tachypnea 40 bpm, collapse, decayed pulse oximetry, asystole. Manoeuvres of resuscitation and mechanical ventilation are initiated, external cardiac massage, Atropine, Adrenalin, Na Bicarbonate, Dexamethasone, Heparin 5000 UI. At 02:00 o'clock, after the heart had responded to the resuscitation manoeuvres, suddenly bradycardia occurs followed by collapse and asystole. At 07:00 o'clock, after sustained resuscitation, cardiac arrest under mechanical ventilation is ascertained, non resuscitable and at 07:20 death is declared.

After the necropsy, the following is determined:

1. Pulmonary thromboembolism
2. 8 week pregnancy

Direct cause of death: cardiac-respiratory failure

- Disease: unspecified
- No of days of admittance: 4
- No. of prenatal checkups: 0

– When the disease/worsening happened: during pregnancy, weeks 8–11

Death:

– The disease that caused the death: massive thromboembolism

– Direct cause: cardiac-respiratory failure

The anatomic-pathologic diagnosis and the medical reason for death are: the same

From the medical chart of the family doctor (from 2011) we find as a medical record a Caesarean section and medial hypoacusis, with no other information. The second pregnancy was recorded and followed as per the medical letters.

There is no information on the first pregnancy, its evolution and the indication of the initial Caesarean surgery.

We have no information on other investigations or consults at specialists indicating the diagnosis of a congenital malformation cardiomyopathy.

Case 2. Death by indirect obstetric risk – intracerebral, cortical haemorrhage between the hemispheres.

The patient aged 33, married, from the rural environment, secondary school level training, employed, is admitted with an emergency at the County Emergency Hospital on 01.01.2014, at 13:00 o'clock, with the diagnosis 23 week pregnancy, eclampsia.

The patient is admitted in deep coma, with convulsions, with a history of hypertension. Intensive care of hypopresors and anticonvulsants is instituted. An emergency surgical procedure is performed and by hysterotomy a dead foetus is extracted, weighing 600 grams, of F sex, partially detached with a retroplacental hematoma. Post-surgically, because the convulsions reappeared and because of a brain oedema a CT was performed that showed a deep intraparenchymal parietal haemorrhage, right capsule-lenticular-thalamic, with a marked oedema of the brain stem. The evolution is unfavourable with brain death (from 05.01.2014) and a simultaneous development of the HELP syndrome. After the brain death is declared, permission is obtained for harvesting organs but the evolution of the HELP syndrome with increased transaminases, altered renal function contraindicates organ harvesting. Under treatment with liver protectors, cortisone in average-big doses, the renal and liver function is improving and organ donation is considered. On 07.01.2014 under general anaesthetic the organs for which permission has been obtained are harvested except for the liver and at 08:05 o'clock the aorta is clamped and biological death is declared.

Main diagnosis when discharged: intracerebral, cortical haemorrhage between the hemispheres.

Secondary diagnoses when discharged (complications/comorbidity): 1. Coma, unspecified; 2. Respiratory arrest; 3. Diseases of the circulatory system complicating pregnancy, childbirth and postpartum period; 4. Pre-existing hypertensive disorder with added proteinuria; 5. Duration of pregnancy 20–25 full weeks; 6. Small Caesarean section; 7. Single birth of a stillborn baby.

The pregnant patient had records at her family doctor, and was considered a high-risk pregnancy because of her HT. There are 5 prenatal consults in the chart of the pregnant patient, and in her consult chart there are records of referrals to specialists in obstetrics-gynaecology, cardiology and endocrinology.

The conclusions of the minute from the county professional committee for analysis of maternal mortality are:

- Death occurred by indirect obstetric causes.
- The pre-existing disease worsened during pregnancy

– Treatment for the pre-existing illness was made incorrectly or insufficiently and led to a major accident.

Case 3. Death by indirect obstetric risk – cardio-circulatory failure caused by a pheochromocytoma.

The patient aged 37, from the urban environment, married, educated at high-school level, employed, is brought by ambulance at the Emergency Receiving Unit of the County Emergency Hospital in cardiorespiratory arrest while being resuscitated on 05.04.2014, at 02:16 o'clock.

The admission diagnosis is primigesta primipara pregnancy in the VIIth month, single foetus, dead, cranial presentation, intact membranes, labour not triggered. The pregnant woman is hypertensive, from the cardiology records, she is resuscitated in the ambulance and the resuscitation continues in the Emergency Receiving Unit. An emergency surgical procedure is performed (at 02:25 o'clock) for extracting the foetus by caesarean section, and a dead foetus is extracted, weighing 1600 gr. After the procedure, the patient shows convulsions with great tensional oscillations, goes into cardiorespiratory arrest that cannot be resuscitated and the mother's death is declared (at 02:30 o'clock). During autopsy a pheochromocytoma is found (tumour of the suprarenal gland).

The death diagnosis ascertained by the coroner is cardio-circulatory failure caused by a pheochromocytoma-suprarenal gland tumour that resulted in cardio-circulatory disorders.

In conclusion, it was considered that this case was admitted in a clinically late stage in irreversible cardio-circulatory arrest.

The conclusions of the minute from the county professional committee for analysis of maternal mortality are that:

- Death occurred by indirect obstetric causes
- The pre-existing disease worsened during pregnancy
- The treatment for the pre-existing illness was made incorrectly or insufficiently and led to a major accident.

CONCLUSIONS

Although the number of maternal deaths decreased significantly in the last 15 years, the indicator of maternal death continues to put Romania on the last places in Europe. Each case has a medical explanation, but the synthetic overall data clearly indicate that the health system starting from the primary care to the highly specialised assistance does not fully meet these complicated cases.

In the analysed period, 2011–2014, we can notice a 50% decrease in the overall maternal deaths (from 50 to 24 cases), while when it comes to the deaths from indirect obstetrical deaths a significant decrease can be noted, namely of more than 50% (from 21 cases in 2011, to 7 cases in 2014).

The downward trend is similar till 2013 for both urban and rural areas, with a prevalent constant more increased in rural areas, this trend being reversed in 2014 when maternal deaths by indirect obstetrical risk from the urban areas exceeded those in the rural areas (5 against 2 cases).

The qualitative analysis of deaths, particularly of those from indirect obstetrical risk, revealed that some of the deaths could have been avoided, especially if the woman / pregnant woman had had recourse to medical services, if she had had a medical record, by improving the quality of the medical care and by a better operationalization of the therapeutic guidelines and protocols for emergencies.

The insufficient proactive community support in the case of people with a low educational level can be a cause of the insufficient and ineffective prenatal supervision with consequences in the complications that appeared in some pregnant women. Additionally but closely related, **the failure to use or the under-use of prenatal services** constitute a nearly general characteristic of the mothers who died regardless of the cause.

The barriers, including the financial ones as regards the access of the pregnant woman at risk to specialised services, can be a cause of the inadequate treatment of the pregnancy pathology which can lead to irreversible complications.

Romania can avoid, even with the existing reserves, part of the maternal deaths by activating the existing institutions at community level and by changing certain practices of the medical conduct at the level of hospitals.

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